

Baseline Monitoring Document and As-Built Baseline Report

Final

UT to Bear Creek (#92347)

Chatham County

Data Collection Period: May 2009 through April 2010

Submission Date: August 13, 2010



North Carolina Department of
Environment and Natural Resources
Ecosystem Enhancement Program
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1.0 Executive Summary

The goals of the UT to Bear Creek Restoration Project are to improve water quality, reduce excess sedimentation input from channel banks, attenuate floodwater flows, and restore aquatic and riparian habitat. To achieve these goals, the project has the following objectives:

- Reduce nutrient loading from the on-site cattle operation by fencing out cattle and re-vegetating the riparian buffer;
- Restore stable channel dimension, pattern, and profile so that on-site streams will transport watershed flows and sediment loads without aggradation or erosion;
- Improve aquatic habitat by enhancing stream bed variability, providing shaded areas within the channel, and introducing woody debris in the form of rootwads, log vanes, and log sills;
- Enhance wildlife habitat by re-vegetating the riparian buffers with native plants, helping to create a wildlife corridor through existing agricultural lands.

The project is located on pasture land owned until recently by Mr. James R. Weaver. Prior to the restoration, cattle had access to the project site and the vegetation was absent from the banks, resulting in degraded water quality and unstable stream channel characteristics (incision, erosion, and bank collapse). The design includes the restoration of two tributaries to Bear Creek (Northern UT and Southern UT), the restoration of the riparian buffer along both of these tributaries, the enhancement and preservation of the existing riparian buffer along the main stream of Bear Creek and the enhancement of 0.39 acres of riparian wetland along the Northern UT.

Initial site assessment classified both the Northern and Southern UTs as unstable E4-type channels that were transitioning towards G4-type channels. G-type channels typically have a low entrenchment and width-to-depth ratios and low sinuosity, resulting in higher shear stresses on the bed and channel and an over abundance of stream power, leading to channel degradation. Both tributaries were designed as C4-type channels with moderately low width-to-depth ratios and both include sections of Priority I and Priority II restorations. Priority I restorations reconnect the bankfull discharge to the historic floodplain; Priority II restorations cut a floodplain bench at the bankfull elevation. The upstream portion of each reach begins as a Priority II restoration and becomes a Priority I restoration as the channel falls through the valley.

The final restoration plan was submitted to the North Carolina Ecosystem Enhancement Program (NCEEP) in July 2007. Site construction was completed in the spring of 2009 and there were no significant deviations from the design plan, however below-average rainfall in the summer of 2009 in the area may have adversely affected planted stem survival after one growing season (NC CRONOS 2010; SERCC 2010). Baseline monitoring was completed in April 2010. First year monitoring will be done in October and November 2010. The site will be monitored for five years.

2.0 Project Goals, Background, and Attributes

2.1. Location and Setting

The UT of Bear Creek Stream Restoration is located in Chatham County, North Carolina on NC Highway 902 between the Town of Bear Creek and Johnsons Crossroads (Figure 1.0). Directions to the site are included on Figure 1.0. The project includes Bear Creek and two unnamed tributaries (UTs) of Bear Creek (Northern and Southern UTs). Land use adjacent to all three reaches is pasture and unmanaged mix pine and hardwood forest.

The project is located in the Cape Fear River Basin, United State Geological Survey (USGS) Hydrologic Unit (HU) 03030003070050, North Carolina Division of Water Quality (NCDWQ) Subbasin 03-06-12. This NCDWQ subbasin includes the Rocky River, Loves Creek, Tick Creek, and Bear Creek. It is not a targeted local watershed. The project lies in the Piedmont of North Carolina, in the Carolina Slate Belt ecoregion. The Carolina Slate Belt is characterized by wider floodplains, less topographic variation, and more exposed bedrock than other portions of the Piedmont (Griffin, et al 2002; NRCS 2006). Streams in the Carolina Slate Belt typically experience low-flows during the summer (Griffin, et al 2002; NC DWQ 2005).

2.2. Project Goals and Objectives

The goals of the UT to Bear Creek Restoration Project are to improve water quality, reduce excess sedimentation input from channel banks, attenuate floodwater flows, and restore aquatic and riparian habitat. To achieve these goals, the project has the following objectives:

- Reduce nutrient loading from the on-site cattle operation by fencing out cattle and re-vegetating the riparian buffer;
- Restore stable channel dimension, pattern, and profile so that on-site streams will transport watershed flows and sediment loads without aggradation or erosion;
- Improve aquatic habitat by enhancing stream bed variability, providing shaded areas within the channel, and introducing woody debris in the form of rootwads, log vanes, and log sills;
- Enhance wildlife habitat by re-vegetating the riparian buffers with native plants, helping to create a wildlife corridor through existing agricultural lands.

2.3. Project Structure, Restoration Type, and Approach

2.3.1. Project Structure

Project restoration components are detailed in Figure 1.2 and in Tables 1.0-1.1 in Appendix A.

2.3.2. Restoration Type and Approach

The Rosgen Level II classification for both streams was an unstable E4-type channel that was transitioning to a G4-type channel. Existing conditions resulted in degraded water quality, loss of aquatic and terrestrial habitat, reduced nutrient and sediment retention, unstable channel characteristics (mass wasting of channel banks, sediment loading, and loss of bedform diversity), and denuded banks and riparian areas. The primary causes of degradation stemmed from cattle access to both channels and the removal of bank and riparian vegetation. Project wetlands were classified as disturbed pasture wetlands dominated by *Juncus effuses* and *Carex* spp (Ko 2007).

Both tributaries were designed as C4-type channels with moderately low width-to-depth ratios and both include sections of Priority I and Priority II restorations. Priority I restorations reconnect the bankfull discharge to the historic floodplain; Priority II restorations cut a floodplain bench at the bankfull elevation. The upstream portion of each reach begins as a Priority II restoration and becomes a Priority I restoration as the channel falls through the valley. Primary activities that took place during channel restoration included: 1) placement of permanent fencing along the easement boundary; 2) channel and floodplain bench excavation; 3) installation of channel plugs; 4) backfilling of some of the abandoned channel; and 5) installation of in-stream structures. The restoration plan called for the restoration of 3,132 linear feet of the Northern UT and 1,745 linear feet of the Southern UT. Additionally, 0.39 acres of riparian wetlands were enhanced by supplemental vegetation plantings, 15 acres along the Northern and Southern UTs and 3.2 acres along Bear Creek were planted with native species, and 12.15 acres along Bear Creek were preserved.

2.4. Project History, Contacts, and Attribute Data

The final restoration plan was submitted to the North Carolina Ecosystem Enhancement Program (NCEEP) in July 2007. Site construction was completed in the spring of 2009. Baseline monitoring was completed in April 2010. First year monitoring will be done in October and November 2010. The site will be monitored for five years. Table 2.0 in Appendix A outlines the project activity and reporting history. Table 3.0 includes the designer and contractor information. Table 4.0 details the project attributes includes watershed size and land uses, dominant soils, NCDWQ classification, and Rosgen classification.

3.0 Success Criteria

3.1. Morphologic Parameters and Channel Stability

3.1.1. Dimension

General maintenance of a stable cross-section and access to the floodplain features (e.g., Bank Height Ratios) over the course of the monitoring period will generally represent success in dimensional stability. However, some change is natural and expected and can even indicate that the design was successful and appropriate for the hydrologic and sediment regime. Moderate decreases in the width-to-depth ratio or cross-sectional area, as well as floodplain or bank deposition, will indicate functional performance.

Significant widening of the channel cross section or increases in the cross-sectional area generally represent trends of concern, although some adjustment in this direction is acceptable if the process is arrested after a period of moderate adjustment. In the case of riffle cross sections, maintenance of depths that represent small changes to target competency would also reflect stability. Likewise, a successful pool cross section would experience only moderate changes in pool depth ratios such that pool habitat is maintained and lateral migration rates are moderate.

3.1.2. Pattern and Profile

While some adjustments will occur, the relative abundance and spatial distribution of bedform features should be appropriate for the C-type stream for both the Northern and Southern reaches and be maintained over the monitoring period. Pools should be lower in grade and deeper, while riffles steeper and shallower in keeping with design ratios. Pattern features should show little adjustment over the standard five-year monitoring period.

3.1.3. Substrate

Riffles and pools should either maintain or achieve their target particle size distributions, which is gravel throughout the restoration unless in a bedrock area. Generally as the monitoring period progresses, riffles and pools should exhibit coarser and finer sediment types, respectively.

3.1.4. Sediment Transport

The net effect of the state of the parameters in sections 3.1.1 – 3.1.3 above, should result in channels that effectively transport sediment and experience neither aggradation nor erosion.

3.2. Vegetation

In accordance with the 1973 North Carolina Sedimentation Pollution Control Act, an erosion control plan was developed and implemented during the construction phase. Erosion control was performed locally throughout the Project and incorporated into construction sequencing. Exposed surficial soils at the Project are unconsolidated, alluvial sediments, which do not re-vegetate rapidly after disturbance. Therefore, seeding

with annual grasses and immediate planting of species on the planting plan was employed following the earth-moving process. Grading was completed on April 10, 2009; planting was completed on April 16, 2009.

Vegetation data will be collected using the guidelines outlined in the EEP/CVS vegetation monitoring protocol (Lee *et al* 2006). Following the 2003 USACE Stream Mitigation Guidelines, vegetation success in the enhanced wetland and the riparian buffer will be based upon an average density of 320 stems per acre at the end of three years of monitoring. A tolerance of 10% mortality rate will be acceptable for year four (288 stems/acre) and year five (260 stems/acre) (USACE 2003). Photos taken at each monitoring plot should indicate maturation of the riparian vegetation.

3.3. Hydrology

3.3.1. Streams

A minimum of two bankfull events must be documented within the standard five-year monitoring period. In order for the monitoring to be considered complete, the two verification events must occur in separate monitoring years.

3.3.2. Wetlands

Wetland hydrologic success requires that saturated soil conditions occur within 12 inches of the ground surface for at least 12.5 percent of the growing season during a typical or normal year (USACE 1987). In Chatham County, the growing season is typically 216 days, assuming a temperature of 28 degrees F or higher and a frequency of 5 of 10 years (NRCS 2006). Hydrologic success for the enhanced wetland requires that the soils be saturated for at least 27 days during the growing season.

4.0 Monitoring Plan Guidelines

Annual data will be collected for the monitoring parameters below for five years after construction, unless otherwise stated or directed as part of the review process.

4.1. Hydrology

4.1.1. Wetlands

Data will be collected monthly from two automated groundwater monitoring gauges installed in the riparian wetland adjacent to the Northern UT on April 20, 2010 in accordance with USACE guidance (USACE 2000). Gauge data will be downloaded monthly and plotted against precipitation data from the Siler City Airport ECONet station (SILR). Wetland gauge plots will be included in the annual monitoring reports.

4.1.2. Streams

The UT to Bear Creek restoration includes a crest gauge at Station 2280 to verify the on-site occurrence of bankfull events. Each site visit by the monitoring performer will include documentation of the highest stage for the monitoring interval and a reset of the gauge. The site will also be assessed for evidence of bankfull indicators and the dates of these potential bankfull events will be inferred using precipitation data from the Siler

City Airport ECONet station (SILR) (NC CRONOS, 2010). The bankfull verification data will be included in each monitoring report.

4.2. Stream Channel Stability and Geomorphology

UT to Bear Creek hydraulic and geomorphic data for pre-existing condition, reference reaches, design conditions, and as-built conditions are presented in Tables 5.0 and 6.0. Dimension, pattern, and profile data will be collected annually and compared to the baseline condition.

4.2.1. Dimension

Six cross sections (four riffles and two pools) were established along the Northern UT; three (two riffles and one pool) were established along the Southern UT. Data will be collected at each break in slope along each cross section in accordance with USACE and US Forest Service guidances on stream assessment and monitoring (USACE, 2003; Harrelson et al., 1994). Photos will be taken at each cross section facing downstream. Thalweg, bankfull, and top of bank points will be identified in the field. Data will be analyzed using RIVERMorph and Microsoft Excel.

4.2.2. Profile

A longitudinal profile survey for the entire length of each reach will be conducted annually following standard protocols for stream assessment and monitoring (USACE, 2003; Harrelson et al., 1994). The location of bedform features, in-stream structures, bankfull, top of bank, water depth, and permanent benchmarks will be collected. Data will be analyzed using RIVERMorph and Microsoft Excel.

4.2.3. Pattern

Pattern data will be collected, analyzed and reported annually according accepted stream assessment and monitoring protocols (USACE, 2003; Harrelson et al., 1994).

4.2.4. Visual assessment

Each year a visual assessment will be conducted throughout the restoration project, to obtain qualitative stability and geomorphology data on all portions of the project.

4.2.5 Bank Stability Assessments

Detailed BEHI and NBS assessments will be performed in year five. The entire stream restoration will be classified into the BEHI erosion hazard categories and accompanied by an NBS assessment for the purpose of describing the proportion of project bank footage in the various hazard categories and to produce project sediment export estimates (tonnage per annum).

4.3. Vegetation

Vegetation data will be collected using the guidelines outlined in the EEP/CVS vegetation monitoring protocol (Lee *et al* 2006). A total of 12 representative vegetation monitoring plots were established in April 2010; seven along the Northern UT (including one in the enhanced riparian wetland) and five along the Southern UT. All plots

measure 100 square meters in area and are either be 10 meters by 10 meters, or five meters by 20 meters. The four corners of each plot (e.g. 0,0; 0,10; 10,0; and 10,10; or 0,0; 0,20; 5,0; and 5,20) are marked with one-half inch diameter galvanized steel conduit. Level 1 (planted woody stems) and Level 2 (volunteer woody stems) data collection was performed in all plots in April 14-15, 2010. Each planted woody stem location (x and y), height (cm), and live stem diameter (ddh for plants less than 137 cm in height, DBH for woody stems 137 cm or taller) was recorded. All planted stems were identified with pink flagging. Vegetation was identified using Weakley (Weakley 2007). Photos were taken of each vegetation plot from the 0,0 corner. Vegetation data in these plots will be collected in October or November 2010 for the first-year monitoring report.

4.4. Photo Stations

Ten permanent photopoints were established along the Northern UT to visually document the state of the channel annually; eight were established along the Southern UT. Photos from the most current monitoring year will be included in the annual report alongside the photos taken during baseline monitoring.

5.0 Maintenance and Contingency Plans

If visual evaluations identify a high priority problem area, or monitoring findings indicate a failure to meet success criteria, then remedial action may be necessary. The appropriate remedial action for any stream or vegetation problem will be resolved on a case-by-case basis. Any remedial action must be approved by EEP.

5.1. Vegetation problems

Vegetation problems may include planted vegetation not meeting success criteria, persistent barren areas with no herbaceous vegetation, and the presence of invasive species. These problem areas will be mapped as discreet polygons and included in the Current Conditions Plan View as part of the annual vegetation assessment. Upon determining the cause of the problems, the appropriate remedial actions will be initiated with the approval of EEP. These actions may include replanting woody stems, re-seeding, soil nutrient amendments, grading, and herbicide application to remove invasive vegetation.

5.2. Stream problems

Stream problems may include bank erosion, structure failure due to scour, and obstruction of flow due to debris or beaverdams. Upon determining the cause of any problems, appropriate remedial actions will be initiated with the approval of EEP. These actions may include re-establishing the eroded bank with an appropriate cross-section design, re-application of seed mix and/or matting, repair or replacement of an in-stream structure, mechanical or hand removal of obstructions, and possible elimination of beaver.

6.0 Documenting the As-Built Condition (Baseline)

Design parameters for UT to Bear Creek were divided into the Northern UT and the Southern UT. As-built calculations were divided in this same way for comparison to those of the design.

6.1. *As-built/Record Drawings*

See Appendix D for the As-built drawings as provided by the designer, Ko & Associates.

6.2. *Baseline Data Collection*

6.2.1. Morphological State of the Channel

6.2.1.1. Profile

Data for the as-built longitudinal profile were collected in May 2009 and included the thalweg, top of bank/bankfull, and grade control structures. The beginning/end of bed features data were not collected, but were estimated based on the profile plot.

Calculations for feature length, slope, and spacing were based on these estimations and appear in Table 5.0 in Appendix B. Given the limitation of the data collected, profile parameters reported for the monitoring baseline probably do not accurately reflect conditions in the field and apparent deviations from the design numbers will need to be assessed after data are collected for the first-year monitoring report in October and November 2010. Water depth was also not collected as part of this as-built survey and therefore does not appear on the profile and water slope could not be calculated. The plotted longitudinal profile and related summary data can be found in Appendix B.

6.2.1.2. Dimension

Nine cross sections were established and collected on April 20, 2010. Summary data and cross-section plots can be found in Appendix B. Baseline dimension numbers closely conform to those design numbers that were available.

6.2.1.3. Pattern

Pattern data were calculated using the as-built profile data collected in May 2009 and are presented in Table 5 in Appendix B. Radius of curvature and channel beltwidth numbers are similar to design objectives for both reaches. The meander wavelengths are longer than provided design numbers, but appear to closely mirror lengths calculated from the construction plan sheets.

6.2.1.4. Sediment Transport in the As-built State

Sediment transport data are reported in Table 5 in Appendix B. As-built shear stress and stream power are similar to design parameters and should reduce the risk of further erosion along the Northern and Southern UTs. Differences between the design and as-built numbers may be due, in part, to the fact that bankfull slope was used as a proxy for

water surface slope in calculating these numbers. Data from a pebble count at cross-section four is appears on Figure 5 in Appendix B.

6.2.2. Vegetation

Twelve vegetation monitoring plots were established and data collected on April 14-15, 2010. Photos were taken at the 0,0 corner of each plot. Vegetation data and photos can be found in Appendix C. Overall planted stem density for all 12 vegetation monitoring plots is 445 stems/acre. Planted stem density is excellent in vegetation plot 5, located in the enhanced wetland. Planted stem density in plots 1, 2, 4, 7, 8, and 9 is below the required the 320 stems/acre success criteria for monitoring year three. A map of areas of low planted stem density was sent to NCEEP on April 19, 2010.

6.2.3. Photo Documentation

Ten permanent photopoints along the Northern UT and eight along the Southern UT were established on March 24-25, 2010. Locations were recorded using a sub-meter Trimble GPS. These photos can be found in Appendix B.

6.2.4. Hydrology

A crest gauge and two automatic groundwater gauges were installed on April 20, 2010. Data from the groundwater gauges and Precipitation data from the Siler City Airport are graphed in Figures 6.0 and 6.1. As of July 1, 2010, groundwater gauge 138BDBD7_1336 indicates that soils were saturated within 12 inches of the surface for 17 days; gauge 9BEA457_1327 indicates that soils were saturated within 12 inches of the surface for 18 days. An assessment of the crest gauge on July 1 indicates that at least one bankfull event had occurred since the crest gauge was installed. Based on NC CRONOS data for the Siler City Airport, a bankfull event may have occurred on May 17 (1.32”), June 1 (1.05”), or June 15 (1.25”), 2010.

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Appendix A. Project Vicinity Map and Background Tables

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Directions to the Site:

From Pittsboro, take 15-501 South. At the intersection with NC 87, take a right on to NC 87 North. Take a left on to NC 902 West. Stay on 902 through the Town of Bear Creek. Cross US Hwy 421 and then Old US Highway 421. Access to the Northern UT is a gravel road on your left, across from Chatham Central High School. Access to the Southern UT is approximately 3/4 mile further west on 902.

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

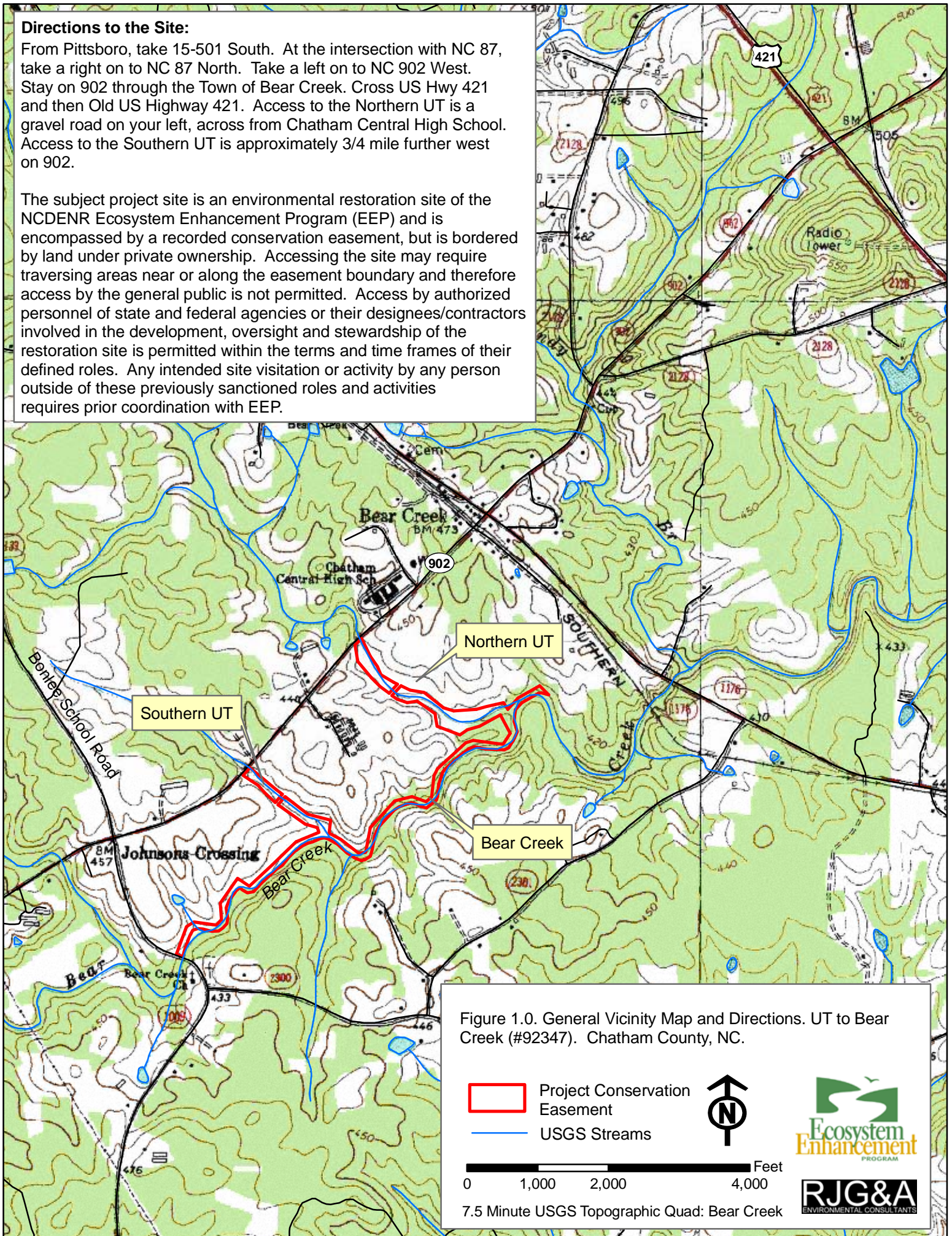


Figure 1.0. General Vicinity Map and Directions. UT to Bear Creek (#92347). Chatham County, NC.

- Project Conservation Easement
- USGS Streams



0 1,000 2,000 4,000 Feet

7.5 Minute USGS Topographic Quad: Bear Creek



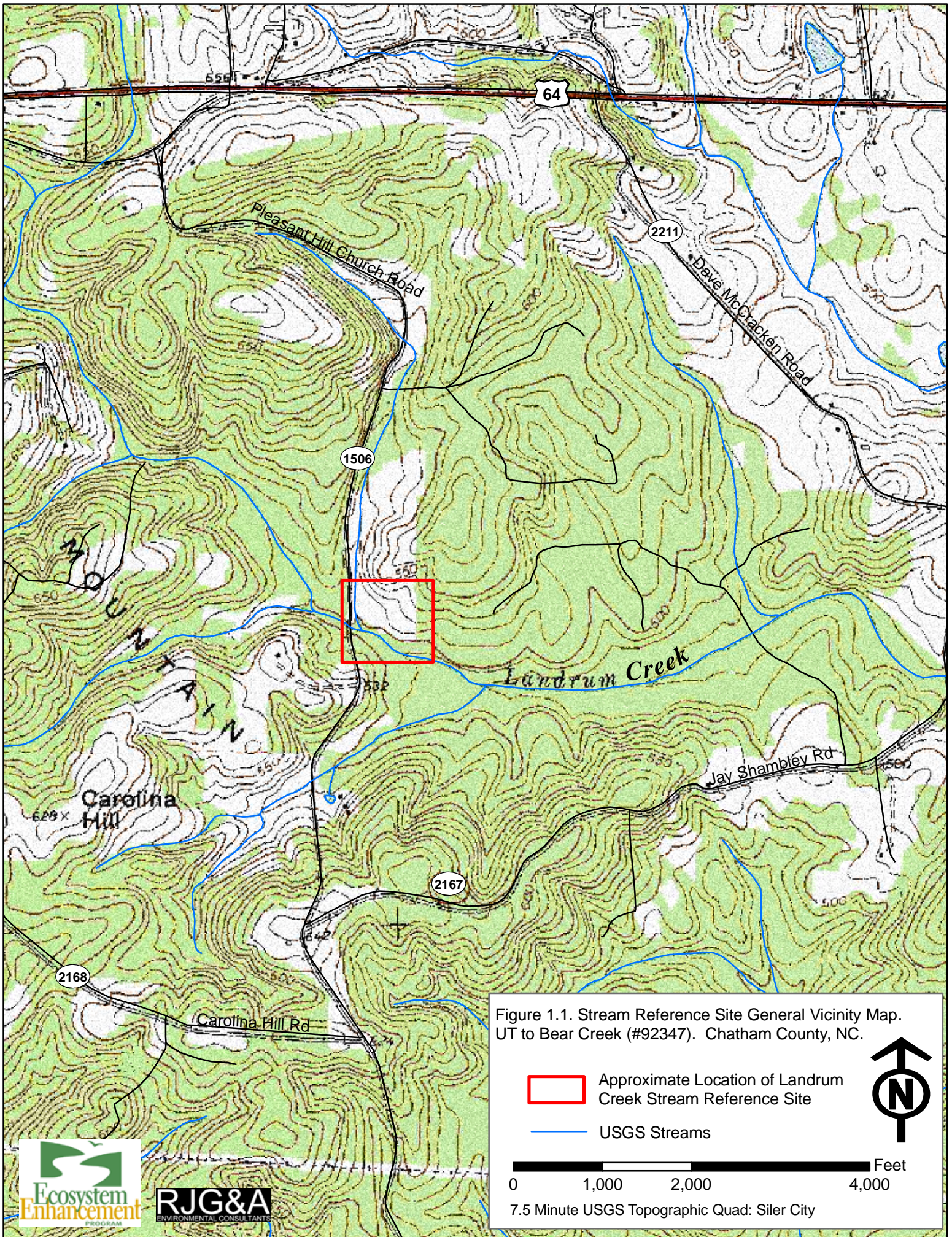


Figure 1.1. Stream Reference Site General Vicinity Map. UT to Bear Creek (#92347). Chatham County, NC.

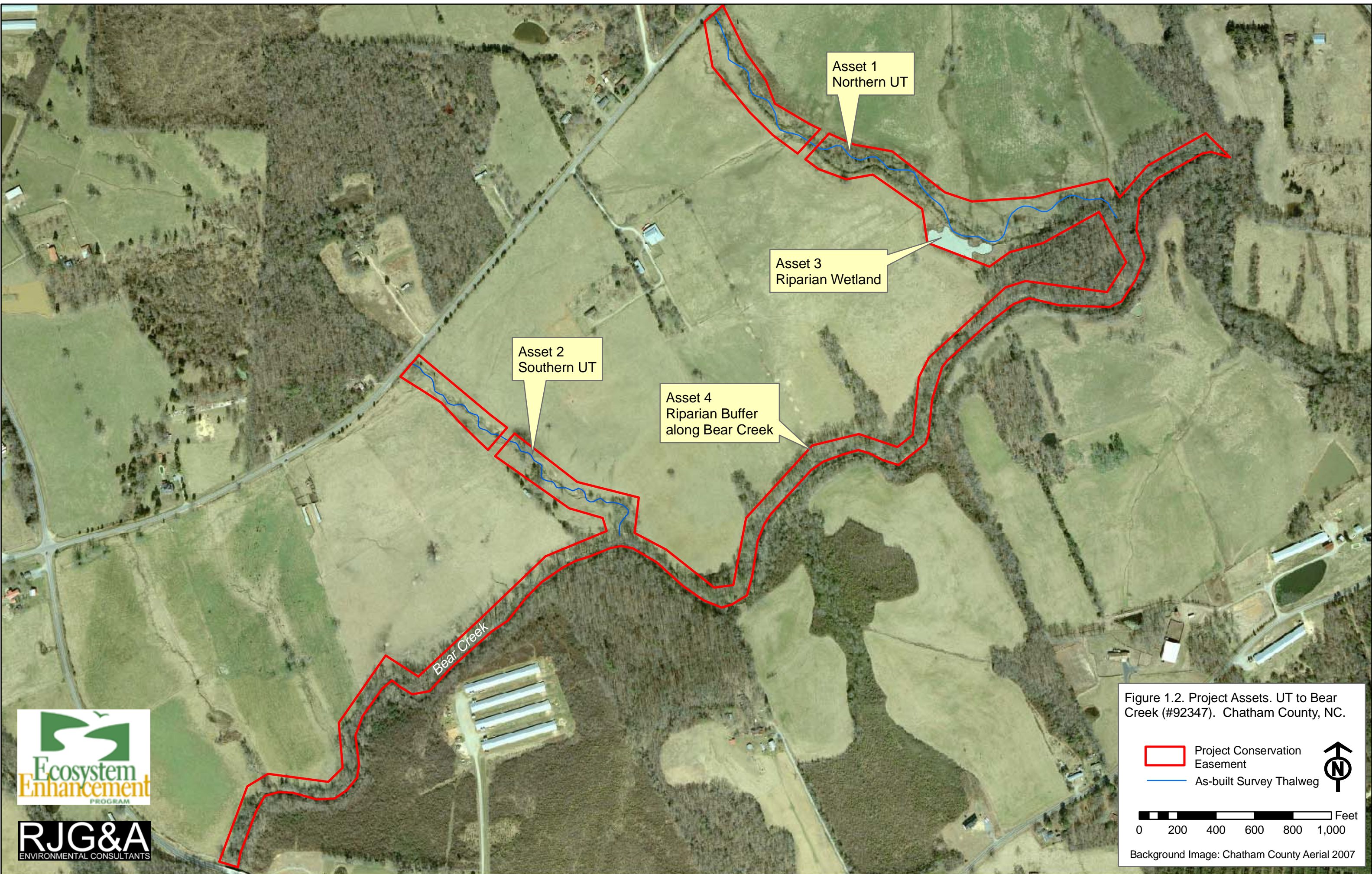
- Approximate Location of Landrum Creek Stream Reference Site
- USGS Streams



0 1,000 2,000 4,000 Feet

7.5 Minute USGS Topographic Quad: Siler City





Asset 1
Northern UT



Asset 3
Riparian Wetland

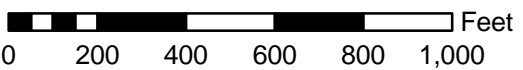
Asset 2
Southern UT

Asset 4
Riparian Buffer
along Bear Creek

Bear Creek

Figure 1.2. Project Assets. UT to Bear Creek (#92347). Chatham County, NC.

-  Project Conservation Easement
-  As-built Survey Thalweg



Background Image: Chatham County Aerial 2007



**Table 1.0. Project Restoration Components
UT of Bear Creek Stream Restoration - Project #92347**

| Project Component or Reach ID | Existing Feet/Acres | Restoration Level | Approach | Footage or Acreage | Stationing | Mitigation Ratio | Ratio Multiplier | Mitigation Units | Comment |
|--------------------------------------|----------------------------|--------------------------|-----------------|---------------------------|----------------------------|-------------------------|-------------------------|-------------------------|--|
| Bear Creek Buffer | 12.15 | P | -- | 12.15 ac. | -- | 5:1 | 0.20 | 2.43 | Preservation of existing vegetation along Bear Creek |
| Bear Creek Buffer | 3.23 | E | -- | 3.23 ac. | -- | 2:1 | 0.50 | 1.61 | Vegetative Plantings to pasture areas within 50 feet of Bear Creek |
| Northern UT to Bear Creek | 2,832 | R | PI | 550 ft. | 10+00-15+50 | 1:1 | 1.00 | 550 | Restore channel on new location |
| | | | PII | 125 ft. | 15+50-16+75 | 1:1 | 1.00 | 125 | |
| | | | PI | 225 ft. | 16+75-19+00 | 1:1 | 1.00 | 225 | |
| | | | PII | 350 ft. | 19+50-23+00 | 1:1 | 1.00 | 350 | |
| | | | PI | 1,675 ft. | 23+00-39+75 | 1:1 | 1.00 | 1,675 | |
| | | | PII | 157 ft. | 39+75-41+32 | 1:1 | 1.00 | 157 | |
| Southern UT to Bear Creek | 1,635 | R | PI | 1,298 ft. | 10+00-16+67 17+19-23+50 | 1:1 | 1.00 | 1,298 | Restore channel on new location |
| | | | PII | 395 ft. | 23+50-27+45 | 1:1 | 1.00 | 395 | |
| Riparian Wetland along Northern UT | 0.49 | E | -- | 0.39 ac. | -- | 2:1 | 0.50 | 0.20 | Supplemental plantings to existing wetlands |

**Table 1.1. Component Summations
UT of Bear Creek Stream Restoration - Project #92347**

| Restoration Level | Stream (lf) | Riparian Wetland (Ac) | | Non-Ripar (Ac) | Upland (Ac) | Buffer (Ac) | BMP |
|----------------------------|--------------|-----------------------|--------------|----------------|-------------|--------------|----------|
| | | Riverine | Non-Riverine | | | | |
| Restoration | 4,775 | | | | | | |
| Enhancement | | 0.39 | | | | | |
| Enhancement I | | | | | | 3.23 | |
| Enhancement II | | | | | | | |
| Creation | | | | | | | |
| Preservation | | | | | | 12.15 | |
| HQ Preservation | | | | | | | |
| Totals (Feet/Acres) | 4,775 | 0.39 | | 0 | 0 | 15.38 | 0 |
| MU Totals | 4,775 | 0.20 | | 0 | 0 | 4.04 | 0 |

 Non-Applicable

**Table 2. Project Activity and Reporting History
UT of Bear Creek Stream Restoration - Project #92347**

| Elapsed Time Since Grading Complete: 1 yrs 1 months | | |
|---|--------------------------|------------------------|
| Elapsed Time Since Planting Complete: 1 yr 1 Months | | |
| Number of Reporting Years ¹ : 0 | | |
| Activity or Deliverable | Data Collection Complete | Completion or Delivery |
| Restoration Plan | U | July 2007 |
| Final Design – Construction Plans | U | January 2008 |
| Construction | NA | April 2009 |
| Containerized, bare root and B&B plantings for entire project | NA | April 2009 |
| Mitigation Plan / As-built (Year 0 Monitoring – baseline) | April 2010 | August 2010 |

Table 3. Project Contacts Table
UT of Bear Creek Stream Restoration - Project #92347

| | |
|--------------------------------|--|
| Designer | Ko & Associates, P.C. 1011 Schaub Drive, Suite 202 Raleigh, North Carolina 27606 R. Kevin Williams, PE, (919) 851-6066 |
| Construction Contractor | Land Mechanics Designs, Inc. 126 Circle G Lane Willow Spring, NC 27592-9671 (919) 639-6132 |
| Survey Contractor | Stewart Proctor 319 Chapanoke Road, Suite 106 Raleigh NC 27603 (919) 779-1855 |
| Planting Contractor | Habitat Assessment and Restoration Program 301 McCullough Drive, 4 th Floor Charlotte, NC 28262 (704) 841-2841 |
| Seeding Contractor | Land Mechanics Designs, Inc. 126 Circle G Lane Willow Spring, NC 27592-9671 (919) 639-6132 |
| Seed Mix Sources | U |
| Nursery Stock Suppliers | Arbrogen aka South Carolina Super Tree Nursery Cure Nursery Foggy Mountain Nursery Virginia Department of Forestry |
| Monitoring Performers | Robert J. Goldstein & Associates 1221 Corporation Parkway, Ste. 100 Raleigh NC 27610 Sean Doig, (919) 872-1174 |

**Table 4. Project Attribute Table
UT to Bear Creek (NCEEP #92347)**

| | | | | |
|--|--|---------------------|---------------------|---------------------|
| Project County | Chatham | | | |
| Physiographic Region | Piedmont | | | |
| Ecoregion | Carolina Slate Belt | | | |
| Project River Basin | Cape Fear | | | |
| USGS HUC for Project (14 digit) | 03030003070050 | | | |
| NCDWQ Sub-basin for Project | 03-06-12 | | | |
| Within extent of EEP Watershed Plan? | Cape Fear River Basin Restoration Priorities (2009) and Upper and Middle Rocky River Watershed Plan (2005) | | | |
| WRC Hab Class (Warm, Cool, Cold) | Warm | | | |
| % of project easement fenced or demarcated | 100% | | | |
| Beaver activity observed during design phase? | No | | | |
| Restoration Component Attribute Table | | | | |
| | Bear Creek | Northern UT to Bear | Southern UT to Bear | Northern UT Wetland |
| Drainage area | 25.0 sq miles | 2.36 sq miles | 0.34 sq miles | NA |
| Stream order | 4th | 2nd | 1st | NA |
| Restored length (feet) | -- | 3132 | 1,745 | 0.4 acres |
| Perennial or Intermittent | Perennial | Perennial | Perennial | NA |
| Watershed type (Rural, Urban, Developing etc.) | Rural | Rural | Rural | NA |
| Watershed LULC Distribution (e.g.) | | | | |
| Residential | 3% | 7% | 6% | NA |
| Commercial | 1% | 1% | 0% | NA |
| Ag-Row Crop | 3% | 1% | 2% | NA |
| Ag-Livestock | 30% | 28% | 51% | NA |
| Forested | 52% | 54% | 35% | NA |
| Shrub/Scrub/Early Successional | 11% | 9% | 6% | NA |
| Watershed impervious cover (%) | 2% | 3% | 2% | NA |
| NCDWQ AU/Index number | 17-43-16 | 17-43-16 | 17-43-16 | NA |
| NCDWQ classification | C | C | C | NA |
| 303d listed? | No | No | No | NA |
| Upstream of a 303d listed segment? | No | No | No | NA |
| Reasons for 303d listing or stressor | NA | NA | NA | NA |
| Total acreage of easement | 15.48 | 11.75 | 4.65 | NA |
| Total vegetated acreage within the easement | 12.15 | 1.58 | 0.55 | NA |
| Total planted acreage as part of the restoration | 3.23 | 11.75 | 4.56 | 0.40 |
| Rosgen classification of pre-existing channel | NA | E4/F4 | E4/F4 | NA |

| | Bear Creek | Northern UT to Bear | Southern UT to Bear | Northern UT Wetland |
|--|-------------|------------------------|------------------------|---------------------------|
| Rosgen classification of As-built | NA | C4/C5 | C4/C5 | NA |
| Valley type | VIII | VIII | VIII | NA |
| Valley slope | 0.1% | 0.4% | 1% | NA |
| Valley side slope range (e.g. 2-3.%) | 3-15% | 3-4% | 3-11% | NA |
| Valley toe slope range (e.g. 2-3.%) | 1-20% | 7-8% | 3-5% | NA |
| Cowardin classification | R3UBH | R3UBH | R3UBH | PSS1B |
| Trout waters designation | NA | NA | NA | NA |
| Species of concern, endangered etc.? (Y/N) | No | No | No | No |
| Dominant soil series and characteristics | | | | |
| Series | Georgeville | Chewacla | Cid-Lignum | Chewacla |
| Depth | 0-80 | 0-80 | 0-80 | 0-80 |
| Clay% | 5-40 | 5-40 | 10-50 | 5-40 |
| K | 0.17-0.37 | 0.24-0.37 | 0.24-.043 | 0.24-0.37 |
| T | 5 | 5 | 2 | 5 |

Use N/A for items that may not apply. Use “-“ for items that are unavailable and “U” for items that are unknown

Appendix B. Morphological Summary Data and Plots

| | |
|----------------|---|
| Table 5.0 | Baseline Stream Data Summary |
| Table 6.0 | Dimensional Morphology Summary |
| Figure 2.0-2.5 | Longitudinal Profiles with Annual Overlays |
| Figure 3.0-3.8 | Cross Sections with Annual Overlays |
| Figure 4.0-4.4 | Stream Photo Station Photos |
| Figure 5.0 | Pebble Count Cross Section Four |
| Figure 6.0-6.1 | Groundwater Gauge and Precipitation Data |
| e-Tables | Raw Cross Section Survey Data Spreadsheets |
| | Raw Longitudinal Profile Survey Data Spreadsheets |

Table 5. Baseline Stream Data Summary
UT to Bear Creek (NCEEP# 92347) - Northern UT (2,975 feet)

| Parameter | Gauge ² | Regional Curve | | | Pre-Existing Condition | | | | | | Reference Reach(es) Data | | | | | | Design | | | Monitoring Baseline | | | | | | |
|--|--------------------|----------------|----|-----|------------------------|------|-----|-------|-----------------|----|--------------------------|-------|-----|-------|-----------------|----|--------|-------|-------|---------------------|-------|-------|-------|-----------------|----|--|
| | | LL | UL | Eq. | Min | Mean | Med | Max | SD ⁵ | n | Min | Mean | Med | Max | SD ⁵ | n | Min | Med* | Max | Min | Mean | Med | Max | SD ⁵ | n | |
| Dimension and Substrate - Riffle Only | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | NA | | | | -- | 15.2 | -- | -- | -- | -- | -- | 20.2 | -- | -- | -- | -- | -- | 19.0 | -- | 18.3 | 19.0 | 18.7 | 20.3 | 0.9 | 4 | |
| Floodprone Width (ft) | | | | | -- | 40.0 | -- | -- | -- | -- | -- | 140.0 | -- | -- | -- | -- | -- | 100.0 | -- | 100.0 | 130.0 | 100.0 | 220.0 | 60.0 | 4 | |
| Bankfull Mean Depth (ft) | NA | | | | -- | 1.4 | -- | -- | -- | -- | -- | 1.4 | -- | -- | -- | -- | -- | 1.4 | -- | 1.2 | 1.4 | 1.4 | 1.5 | 0.1 | 4 | |
| ¹ Bankfull Max Depth (ft) | NA | | | | -- | 1.7 | -- | -- | -- | -- | -- | 1.9 | -- | -- | -- | -- | -- | 1.9 | -- | 1.9 | 2.1 | 2.2 | 2.4 | 0.2 | 4 | |
| Bankfull Cross Sectional Area (ft ²) | NA | | | | -- | 20.8 | -- | -- | -- | -- | -- | 28.2 | -- | -- | -- | -- | -- | 25.8 | -- | 23.0 | 25.7 | 25.2 | 29.5 | 2.9 | 4 | |
| Width/Depth Ratio | NA | | | | -- | 11.0 | -- | -- | -- | -- | -- | 14.5 | -- | -- | -- | -- | -- | 14.0 | -- | 13.0 | 14.1 | 13.9 | 15.6 | 1.1 | 4 | |
| Entrenchment Ratio | NA | | | | -- | 2.6 | -- | -- | -- | -- | -- | 6.9 | -- | -- | -- | -- | -- | 5.3 | -- | 4.9 | 6.9 | 5.4 | 11.6 | 3.2 | 4 | |
| ¹ Bank Height Ratio | NA | | | | -- | 1.4 | -- | -- | -- | -- | -- | 1.0 | -- | -- | -- | -- | -- | 1.0 | -- | 1.0 | 1.0 | 1.0 | 1.0 | 0.0 | 4 | |
| Profile | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 13.9 | 33.8 | 35.7 | 67.0 | 12.0 | 21 | |
| Riffle Slope (ft/ft) | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.002 | 0.008 | 0.006 | 0.024 | 0.006 | 21 | |
| Pool Length (ft) | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 28.7 | 58.2 | 58.7 | 112.8 | 18.9 | 23 | |
| Pool Max depth (ft) | | | | | -- | 2.0 | -- | -- | -- | -- | -- | 2.7 | -- | -- | -- | -- | -- | 2.7 | -- | 1.8 | 2.6 | 2.6 | 3.7 | 0.5 | 23 | |
| Pool Spacing (ft) | | | | | 25.5 | -- | -- | 127.0 | -- | -- | 25.0 | -- | -- | 104.0 | -- | -- | 22.8 | 114.0 | 42.6 | 131.1 | 103.2 | 309.1 | 75.8 | 22 | | |
| Pattern | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | | | | | 41.0 | -- | -- | 116.0 | -- | -- | 20.0 | -- | -- | 77.0 | -- | -- | 38.0 | -- | 114.0 | 28.9 | 62.5 | 61.4 | 112.3 | 19.4 | 20 | |
| Radius of Curvature (ft) | | | | | 21.0 | -- | -- | 75.0 | -- | -- | 10.2 | -- | -- | 13.3 | -- | -- | 38.0 | -- | 76.0 | 31.6 | 57.5 | 53.6 | 98.2 | 17.5 | 22 | |
| Rc:Bankfull width (ft/ft) | | | | | 1.4 | -- | -- | 4.9 | -- | -- | 0.5 | -- | -- | 0.7 | -- | -- | 2.0 | -- | 4.0 | 1.6 | 2.9 | 2.7 | 5.0 | 0.9 | 22 | |
| Meander Wavelength (ft) | | | | | 125.0 | -- | -- | 250.0 | -- | -- | 94.0 | -- | -- | 100.0 | -- | -- | 95.0 | -- | 228.0 | 166.0 | 227.1 | 225.8 | 310.3 | 34.6 | 21 | |
| Meander Width Ratio | | | | | 2.7 | -- | -- | 7.7 | -- | -- | 1.0 | -- | -- | 3.8 | -- | -- | 2.0 | -- | 6.0 | 1.5 | 3.2 | 3.1 | 5.7 | 1.0 | 20 | |
| Transport parameters | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reach Shear Stress (competency) lb/f ² | | | | | 0.53 | | | | | | | | | | | | 0.22 | | | 0.28 | | | | | | |
| Max part size (mm) mobilized at bankfull | | | | | 145 | | | | | | | | | | | | 50 | | | 80 | | | | | | |
| Stream Power (transport capacity) W/m ² | | | | | 3.8 | | | | | | | | | | | | 1.15 | | | 1.23 | | | | | | |
| Additional Reach Parameters | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rosgen Classification | NA | | | | Degraded E4/F4 | | | | | | C4 | | | | | | C4 | | | C4 | | | | | | |
| Mean Bankfull Velocity (fps) | NA | | | | 4.8 | | | | | | 6.2 | | | | | | 3.5 | | | 3.0 | | | | | | |
| Bankfull Discharge (cfs) | NA | | | | 100 | | | | | | 173.7 | | | | | | 100 | | | 77.0 | | | | | | |
| Valley length (ft) | | | | | 2697 | | | | | | -- | | | | | | | | | | | | | | | |
| Channel Thalweg length (ft) | | | | | 2832 | | | | | | -- | | | | | | 3132 | | | 2975 | | | | | | |
| Sinuosity (ft) | | | | | 1.05 | | | | | | 1.12 | | | | | | 1.13 | | | 1.10 | | | | | | |
| Water Surface Slope (Channel) (ft/ft) | NA | | | | 0.0062 | | | | | | 0.0077 | | | | | | 0.0028 | | | -- | | | | | | |
| BF slope (ft/ft) | NA | | | | -- | | | | | | -- | | | | | | -- | | | 0.003 | | | | | | |
| ³ Bankfull Floodplain Area (acres) | | | | | -- | | | | | | -- | | | | | | -- | | | 8.19 | | | | | | |
| ⁴ % of Reach with Eroding Banks | | | | | -- | | | | | | -- | | | | | | -- | | | -- | | | | | | |
| Channel Stability or Habitat Metric | | | | | -- | | | | | | -- | | | | | | -- | | | -- | | | | | | |
| Biological or Other | | | | | -- | | | | | | -- | | | | | | -- | | | -- | | | | | | |

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

* Mean, not median, provided for design numbers.

Table 5. Baseline Stream Data Summary
 UT to Bear Creek (NCEEP# 92347) - Southern UT (1,700 feet)

| Parameter | Gauge ² | Regional Curve | | | Pre-Existing Condition | | | | | | Reference Reach(es) Data | | | | | | Design | | | Monitoring Baseline | | | | | | | |
|--|--------------------|----------------|----|-----|------------------------|------|-----|------|-----------------|----|--------------------------|-------|-----|-------|-----------------|----|--------|------|-------|---------------------|-------|-------|-------|-----------------|------|----------------|--|
| | | LL | UL | Eq. | Min | Mean | Med | Max | SD ⁵ | n | Min | Mean | Med | Max | SD ⁵ | n | Min | Med* | Max | Min | Mean | Med | Max | SD ⁵ | n | | |
| Dimension and Substrate - Riffle Only | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Bankfull Width (ft) | | | | | -- | 5.0 | -- | -- | -- | -- | -- | 20.2 | -- | -- | -- | -- | -- | 8.5 | -- | 7.9 | 10.7 | 10.7 | 13.5 | NA | 2 | | |
| Floodprone Width (ft) | | | | | -- | 14.3 | -- | -- | -- | -- | -- | 140.0 | -- | -- | -- | -- | -- | 50.0 | -- | 50.0 | 75.0 | 75.0 | 100.0 | NA | 2 | | |
| Bankfull Mean Depth (ft) | | | | | -- | 1.1 | -- | -- | -- | -- | -- | 1.4 | -- | -- | -- | -- | -- | 0.7 | -- | 0.6 | 0.6 | 0.6 | 0.7 | NA | 2 | | |
| ¹ Bankfull Max Depth (ft) | | | | | -- | 1.3 | -- | -- | -- | -- | -- | 1.9 | -- | -- | -- | -- | -- | 1.1 | -- | 1.2 | 1.3 | 1.3 | 1.4 | NA | 2 | | |
| Bankfull Cross Sectional Area (ft ²) | | | | | -- | 5.2 | -- | -- | -- | -- | -- | 28.2 | -- | -- | -- | -- | -- | 6.0 | -- | 5.3 | 6.5 | 6.5 | 7.8 | NA | 2 | | |
| Width/Depth Ratio | | | | | -- | 4.7 | -- | -- | -- | -- | -- | 14.5 | -- | -- | -- | -- | -- | 12.0 | -- | 12.0 | 17.7 | 17.7 | 23.3 | NA | 2 | | |
| Entrenchment Ratio | | | | | -- | 2.9 | -- | -- | -- | -- | -- | 6.9 | -- | -- | -- | -- | -- | 5.9 | -- | 3.7 | 8.1 | 8.1 | 12.6 | NA | 2 | | |
| ¹ Bank Height Ratio | | | | | -- | 1.4 | -- | -- | -- | -- | -- | 1.0 | -- | -- | -- | -- | -- | 1.0 | -- | 1.0 | 1.0 | 1.0 | 1.0 | NA | 2 | | |
| Profile | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Riffle Length (ft) | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 9.0 | 20.9 | 17.6 | 40.2 | 8.9 | 13 | | |
| Riffle Slope (ft/ft) | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 0.004 | 0.021 | 0.019 | 0.046 | 0.011 | 13 | | |
| Pool Length (ft) | | | | | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | -- | 7.7 | 30.9 | 29.5 | 53.0 | 12.8 | 30 | | |
| Pool Max depth (ft) | | | | | -- | 1.7 | -- | -- | -- | -- | -- | 2.7 | -- | -- | -- | -- | -- | 1.4 | -- | 0.5 | 1.7 | 1.7 | 3.0 | 0.5 | 30 | | |
| Pool Spacing (ft) | | | | | 6.8 | -- | -- | 21.5 | -- | -- | 25.0 | -- | -- | 104.0 | -- | -- | 10.2 | -- | 51.0 | 15.9 | 49.1 | 41.8 | 169.3 | 34.3 | 29 | | |
| Pattern | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Channel Beltwidth (ft) | | | | | 25.0 | -- | -- | 36.0 | -- | -- | 20.0 | -- | -- | 77.0 | -- | -- | 34.0 | -- | 51.0 | 16.1 | 31.1 | 28.4 | 96.7 | 16.0 | 26 | | |
| Radius of Curvature (ft) | | | | | 5.0 | -- | -- | 30.0 | -- | -- | 10.2 | -- | -- | 13.3 | -- | -- | 17.0 | -- | 34.0 | 15.4 | 24.7 | 23.8 | 35.6 | 5.5 | 28 | | |
| Rc:Bankfull width (ft/ft) | | | | | 1.0 | -- | -- | 6.1 | -- | -- | 0.5 | -- | -- | 0.7 | -- | -- | 2.0 | -- | 4.0 | 1.4 | 2.3 | 2.2 | 3.3 | 0.5 | 28 | | |
| Meander Wavelength (ft) | | | | | 40.0 | -- | -- | 53.0 | -- | -- | 94.0 | -- | -- | 100.0 | -- | -- | 42.5 | -- | 102.0 | 58.2 | 99.5 | 98.9 | 176.5 | 22.2 | 27 | | |
| Meander Width Ratio | | | | | 5.0 | -- | -- | 7.3 | -- | -- | 1.0 | -- | -- | 3.8 | -- | -- | 4.0 | -- | 6.0 | 1.5 | 2.9 | 2.6 | 9.0 | 1.5 | 26 | | |
| Transport parameters | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Reach Shear Stress (competency) lb/ft ² | | | | | | | | | | | | | | | | | | | | 0.161 | | | | | 0.39 | | |
| Max part size (mm) mobilized at bankfull | | | | | | | | | | | | | | | | | | | | 36 | | | | | 100 | | |
| Stream Power (transport capacity) W/m ² | | | | | | | | | | | | | | | | | | | | 0.94 | | | | | 2.07 | | |
| Additional Reach Parameters | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Rosgen Classification | | | | | | | | | | | | | | | | | | | | | | | | | | Degraded E4/F4 | |
| Mean Bankfull Velocity (fps) | | | | | | | | | | | | | | | | | | | | | | | | | | 4.2 | |
| Bankfull Discharge (cfs) | | | | | | | | | | | | | | | | | | | | | | | | | | 22 | |
| Valley length (ft) | | | | | | | | | | | | | | | | | | | | | | | | | | 1542 | |
| Channel Thalweg length (ft) | | | | | | | | | | | | | | | | | | | | | | | | | | 1635 | |
| Sinuosity (ft) | | | | | | | | | | | | | | | | | | | | | | | | | | 1.06 | |
| Water Surface Slope (Channel) (ft/ft) | | | | | | | | | | | | | | | | | | | | | | | | | | 0.0145 | |
| BF slope (ft/ft) | | | | | | | | | | | | | | | | | | | | | | | | | | -- | |
| ³ Bankfull Floodplain Area (acres) | | | | | | | | | | | | | | | | | | | | | | | | | | 3.33 | |
| ⁴ % of Reach with Eroding Banks | | | | | | | | | | | | | | | | | | | | | | | | | | 90 | |
| Channel Stability or Habitat Metric | | | | | | | | | | | | | | | | | | | | | | | | | | -- | |
| Biological or Other | | | | | | | | | | | | | | | | | | | | | | | | | | -- | |

Shaded cells indicate that these will typically not be filled in.

1 = The distributions for these parameters can include information from both the cross-section surveys and the longitudinal profile. 2 = For projects with a proximal USGS gauge in-line with the project reach (added bankfull verification - rare).

3. Utilizing survey data produce an estimate of the bankfull floodplain area in acres, which should be the area from the top of bank to the toe of the terrace riser/slope.

4 = Proportion of reach exhibiting banks that are eroding based on the visual survey for comparison to monitoring data; 5. Of value/needed only if the n exceeds 3

* Mean, not median, provided for design numbers.

**Table 6. Monitoring Data - Dimensional Morphology Summary (Dimensional Parameters – Cross Sections)
UT to Bear Creek (NCEEP# 92347) - Northern UT (2,975 feet) & Southern UT (1,700 feet)**

| | Cross Section 1 (Riffle) | | | | | | | Cross Section 2 (Riffle) | | | | | | | Cross Section 3 (Pool) | | | | | | | Cross Section 4 (Riffle) | | | | | | | Cross Section 5 (Pool) | | | | | | |
|---|--------------------------|-----|-----|-----|-----|-----|-----|--------------------------|-----|-----|-----|-----|-----|-----|--------------------------|-----|-----|-----|-----|-----|-----|--------------------------|-----|-----|-----|-----|-----|-----|------------------------|-----|-----|-----|-----|-----|-----|
| Based on fixed baseline bankfull elevation¹ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Record elevation (datum) used | 100 | | | | | | | 100 | | | | | | | 100 | | | | | | | 100 | | | | | | | 100 | | | | | | |
| Bankfull Width (ft) | 18.5 | | | | | | | 18.3 | | | | | | | 20.0 | | | | | | | 20.3 | | | | | | | 22.9 | | | | | | |
| Floodprone Width (ft) | 100.0 | | | | | | | 100.0 | | | | | | | 100.0 | | | | | | | 100.0 | | | | | | | 220.0 | | | | | | |
| Bankfull Mean Depth (ft) | 1.4 | | | | | | | 1.3 | | | | | | | 2.2 | | | | | | | 1.5 | | | | | | | 1.5 | | | | | | |
| Bankfull Max Depth (ft) | 2.2 | | | | | | | 2.1 | | | | | | | 3.9 | | | | | | | 2.4 | | | | | | | 3.8 | | | | | | |
| Bankfull Cross Sectional Area (ft ²) | 26.3 | | | | | | | 24.0 | | | | | | | 44.2 | | | | | | | 29.5 | | | | | | | 33.3 | | | | | | |
| Bankfull Width/Depth Ratio | 13.0 | | | | | | | 13.9 | | | | | | | 9.1 | | | | | | | 14.0 | | | | | | | 15.7 | | | | | | |
| Bankfull Entrenchment Ratio | 5.4 | | | | | | | 5.5 | | | | | | | 5.0 | | | | | | | 4.9 | | | | | | | 9.6 | | | | | | |
| Bankfull Bank Height Ratio | 1.0 | | | | | | | 1.0 | | | | | | | 1.0 | | | | | | | 1.0 | | | | | | | 1.0 | | | | | | |
| Cross Sectional Area between end pins (ft ²) | 75.3 | | | | | | | 78.7 | | | | | | | 119.5 | | | | | | | 58.3 | | | | | | | 66.5 | | | | | | |
| d50 (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Cross Section 6 (Riffle) | | | | | | | Cross Section 7 (Riffle) | | | | | | | Cross Section 8 (Riffle) | | | | | | | Cross Section 9 (Pool) | | | | | | | | | | | | | |
| Based on fixed baseline bankfull elevation¹ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ | Base | MY1 | MY2 | MY3 | MY4 | MY5 | MY+ |
| Record elevation (datum) used | 100 | | | | | | | 100 | | | | | | | 100 | | | | | | | 100 | | | | | | | | | | | | | |
| Bankfull Width (ft) | 18.9 | | | | | | | 7.9 | | | | | | | 13.5 | | | | | | | 18.5 | | | | | | | | | | | | | |
| Floodprone Width (ft) | 220.0 | | | | | | | 100.0 | | | | | | | 50.0 | | | | | | | 50.0 | | | | | | | | | | | | | |
| Bankfull Mean Depth (ft) | 1.2 | | | | | | | 0.7 | | | | | | | 0.6 | | | | | | | 1.1 | | | | | | | | | | | | | |
| Bankfull Max Depth (ft) | 1.9 | | | | | | | 1.2 | | | | | | | 1.4 | | | | | | | 2.7 | | | | | | | | | | | | | |
| Bankfull Cross Sectional Area (ft ²) | 23.0 | | | | | | | 5.3 | | | | | | | 7.8 | | | | | | | 20.7 | | | | | | | | | | | | | |
| Bankfull Width/Depth Ratio | 15.6 | | | | | | | 12.0 | | | | | | | 23.3 | | | | | | | 16.6 | | | | | | | | | | | | | |
| Bankfull Entrenchment Ratio | 11.6 | | | | | | | 12.6 | | | | | | | 3.7 | | | | | | | 2.7 | | | | | | | | | | | | | |
| Bankfull Bank Height Ratio | 1.0 | | | | | | | 1.0 | | | | | | | 1.0 | | | | | | | 1.0 | | | | | | | | | | | | | |
| Cross Sectional Area between end pins (ft ²) | 41.4 | | | | | | | 31.3 | | | | | | | 42.6 | | | | | | | 95.8 | | | | | | | | | | | | | |
| d50 (mm) | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

¹ = Widths and depths for monitoring resurvey will be based on the baseline bankfull datum regardless of dimensional/depositional development. Input the elevation used as the datum, which should be consistent and based on the baseline datum established. If the performer has inherited the project and cannot acquire the datum used for prior years this must be discussed with EEP. If this cannot be resolved in time for a given years report submission a footnote in this should be included that states: "It is uncertain if the monitoring datum has been consistent over the monitoring history, which may influence calculated values. Additional data from a prior performer is being acquired to provide confirmation. Values will be recalculated in a future submission based on a consistent datum if determined to be necessary."

Figure 2.0. Longitudinal Profile -UT to Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347

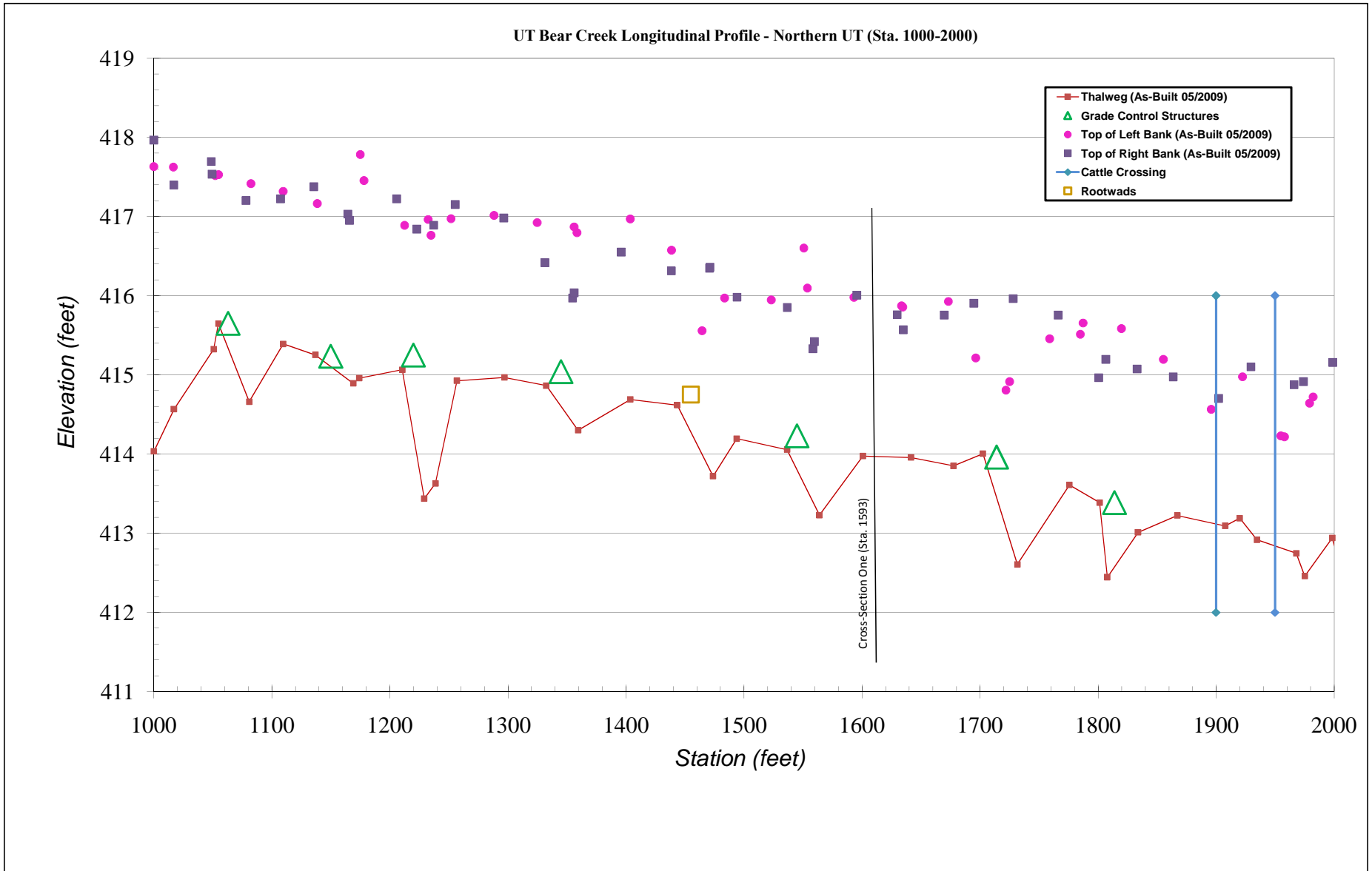


Figure 2.1. Longitudinal Profile -UT to Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347

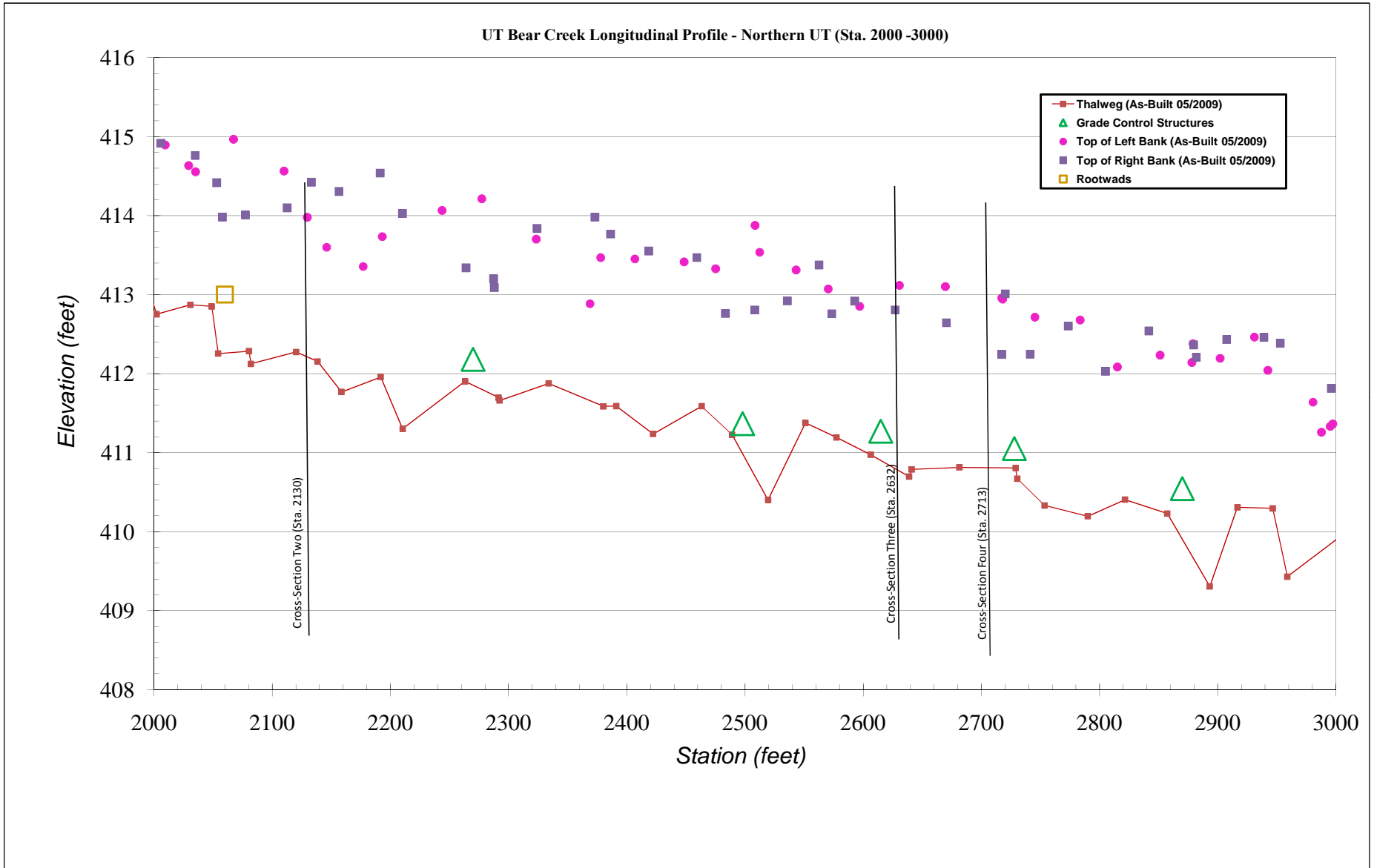


Figure 2.2. Longitudinal Profile -UT to Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347

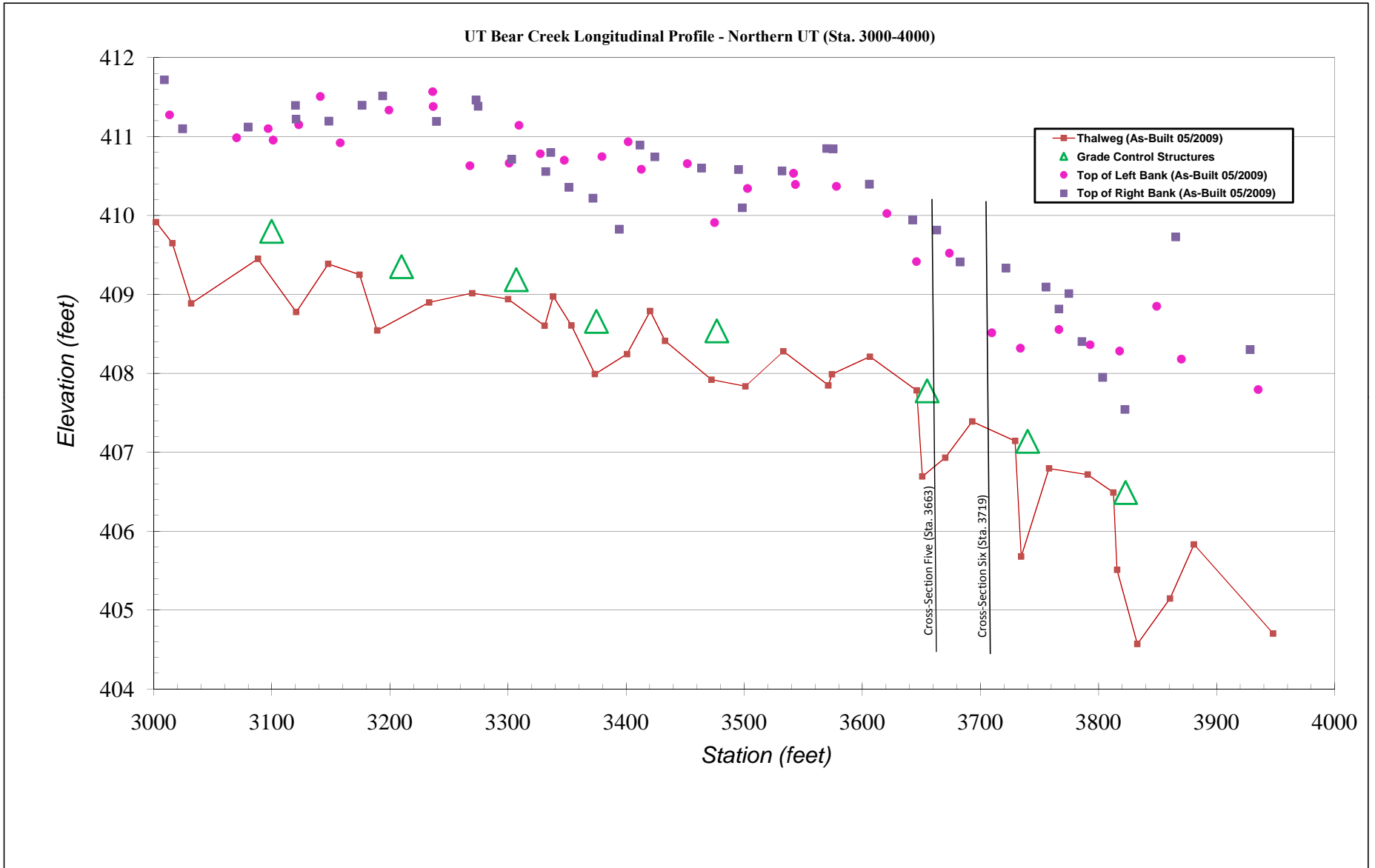


Figure 2.3. Longitudinal Profile -UT to Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347

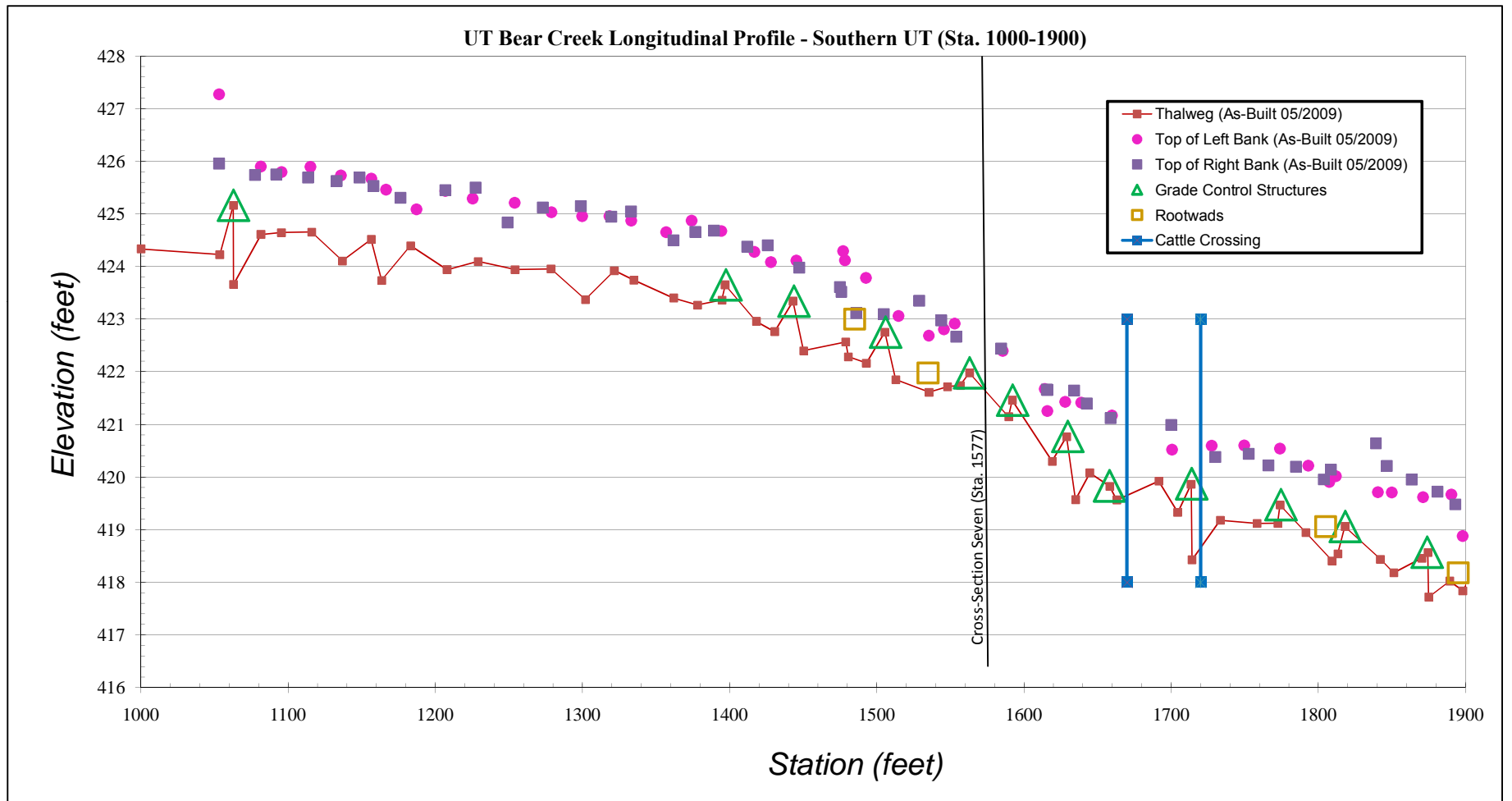


Figure 2.4. Longitudinal Profile -UT to Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347

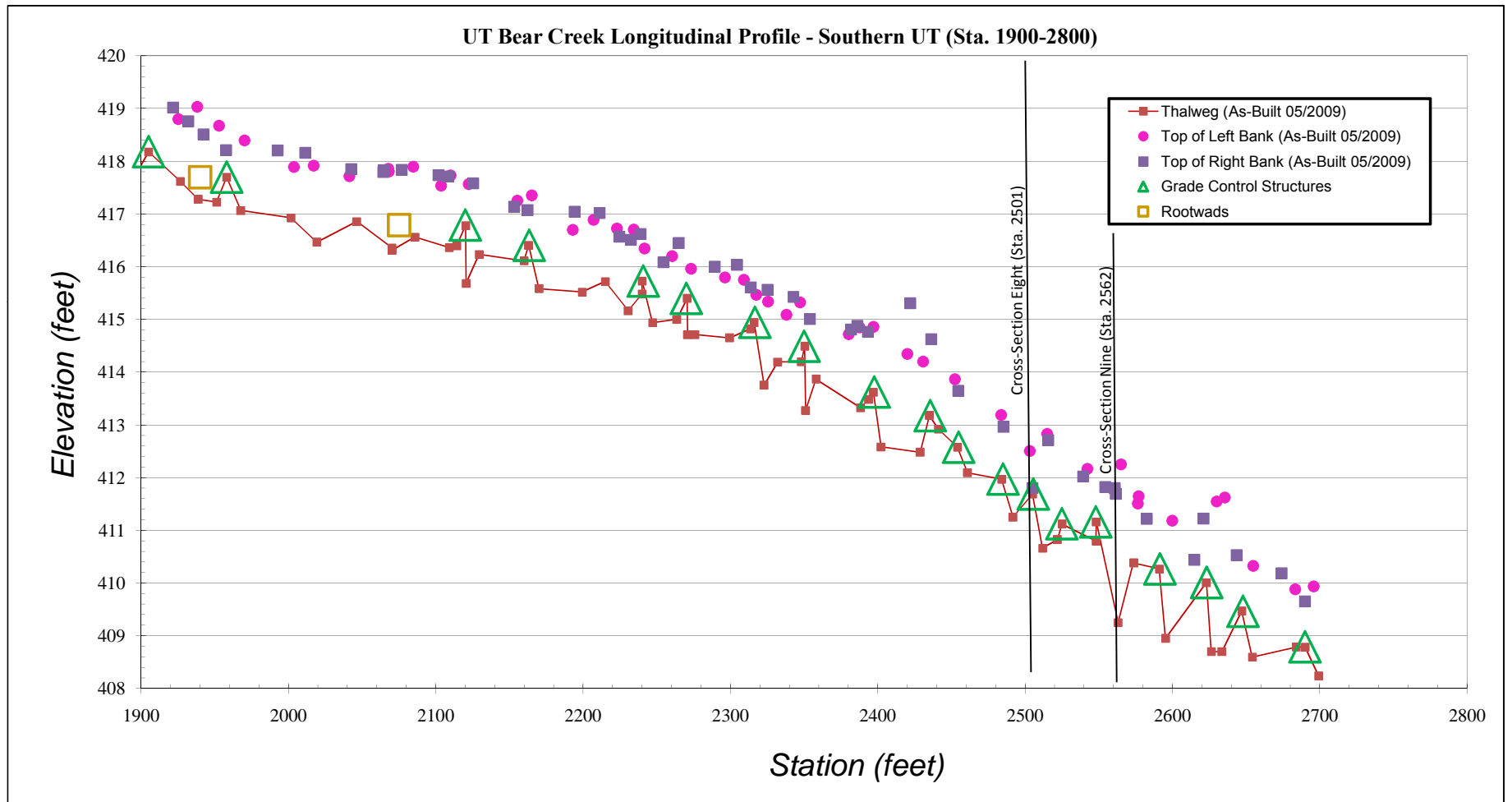


Figure 3.0. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

River Basin: Cape Fear
Watershed: UT to Bear Creek
XS ID XS 1 (riffle)
Reach: Northern
Date: 4/20/2010
Field Crew: S.D. and C.H.

SUMMARY DATA

Bankfull Width (ft) 18.5
 Floodprone Width (ft) 100.0
 Bankfull Mean Depth (ft) 1.4
 Bankfull Max Depth (ft) 2.2
 Bankfull Area (ft²) 26.3
 Width/Depth Ratio 13.0
 Entrenchment Ratio 5.4
 Bank Height Ratio 1.0
 Cross Sectional Area 75.3
 Wetted Perimeter (ft) 19.45
 Hydraulic Radius (ft) 1.35

Stream Type: C4



View of cross-section XS-1 looking downstream

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.59 | 100.05 | |
| 0 | 4.64 | 100.00 | |
| 3.8 | 5.41 | 99.23 | |
| 8.7 | 5.58 | 99.06 | |
| 11.8 | 5.51 | 99.13 | TOB/BKF |
| 14.3 | 6.3 | 98.34 | |
| 16 | 6.78 | 97.86 | |
| 16.6 | 7.53 | 97.11 | |
| 18.5 | 7.75 | 96.89 | TW |
| 20.2 | 7.51 | 97.13 | |
| 21.5 | 7.72 | 96.92 | |
| 22.7 | 7.7 | 96.94 | |
| 24.2 | 7.53 | 97.11 | |
| 25.4 | 7.39 | 97.25 | |
| 27.4 | 6.41 | 98.23 | |
| 30.3 | 5.5 | 99.14 | |
| 31.8 | 5.39 | 99.25 | TOB/BKF |
| 33.6 | 5.51 | 99.13 | |
| 36.2 | 5.86 | 98.78 | |
| 37.7 | 5.61 | 99.03 | |
| 42.6 | 5.7 | 98.94 | |
| 48.9 | 5.66 | 98.98 | |
| 52.5 | 5.39 | 99.25 | |
| 57 | 5.08 | 99.56 | |
| 58.9 | 4.81 | 99.83 | |
| 58.9 | 4.68 | 99.96 | |

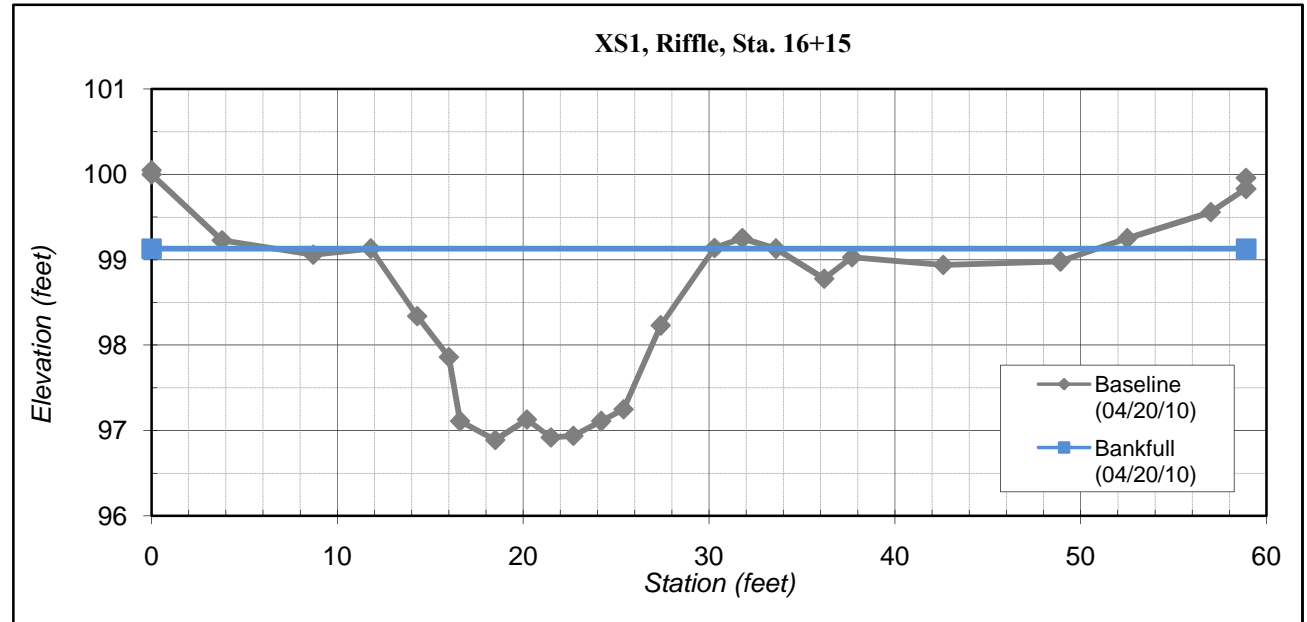


Figure 3.1. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

| | |
|---------------------|------------------|
| River Basin: | Cape Fear |
| Watershed: | UT to Bear Creek |
| XS ID | XS 2 (riffle) |
| Reach: | Northern |
| Date: | 4/20/2010 |
| Field Crew: | S.D. and C.H. |

SUMMARY DATA

| | |
|----------------------------------|-------|
| Bankfull Width (ft) | 18.3 |
| Floodprone Width (ft) | 100.0 |
| Bankfull Mean Depth (ft) | 1.3 |
| Bankfull Max Depth (ft) | 2.1 |
| Bankfull Area (ft ²) | 24.0 |
| Width/Depth Ratio | 13.9 |
| Entrenchment Ratio | 5.5 |
| Bank Height Ratio | 1.0 |
| Cross Sectional Area | 78.7 |
| Wetted Perimeter (ft) | 19.15 |
| Hydraulic Radius (ft) | 1.25 |

Stream Type: C4



View of cross-section XS-2 looking downstream

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.15 | 100.06 | |
| 0 | 4.21 | 100 | |
| 4.6 | 5.05 | 99.16 | |
| 8.6 | 5.53 | 98.68 | |
| 12.3 | 5.69 | 98.52 | |
| 14.7 | 5.42 | 98.79 | |
| 16.1 | 5.24 | 98.97 | TOB/BKF |
| 17.8 | 5.47 | 98.74 | |
| 19 | 6.01 | 98.2 | |
| 20.3 | 6.66 | 97.55 | |
| 21.4 | 6.84 | 97.37 | |
| 22 | 7 | 97.21 | on rock |
| 22.7 | 7.29 | 96.92 | |
| 24.2 | 7.38 | 96.83 | |
| 25.3 | 7.46 | 96.75 | TW |
| 26.3 | 7.38 | 96.83 | |
| 27.6 | 7.34 | 96.87 | |
| 29.3 | 7.41 | 96.8 | |
| 30.1 | 7.44 | 96.77 | |
| 31.3 | 6.49 | 97.72 | |
| 33.6 | 5.77 | 98.44 | |
| 35.5 | 5.39 | 98.82 | TOB/BKF |
| 37.2 | 5.43 | 98.78 | |
| 41.9 | 5.49 | 98.72 | |
| 45.6 | 5.29 | 98.92 | |
| 49.7 | 4.59 | 99.62 | |
| 53 | 3.86 | 100.35 | |
| 53 | 3.8 | 100.41 | |

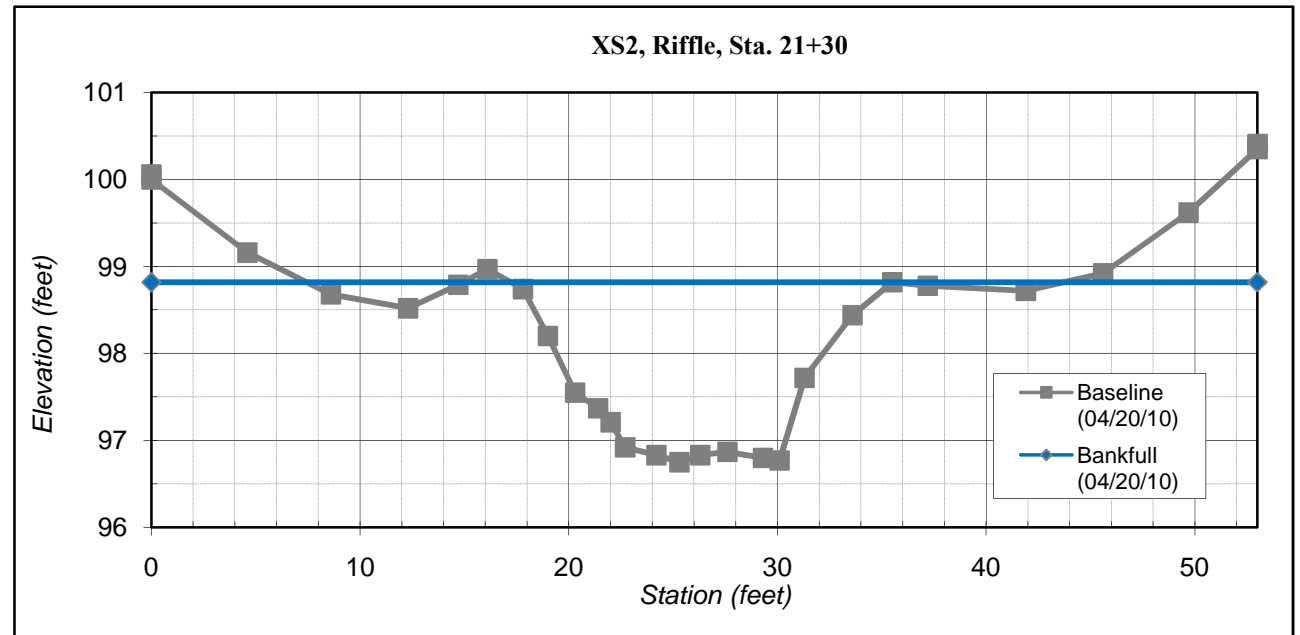


Figure 3.2. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

| | |
|---------------------|------------------|
| River Basin: | Cape Fear |
| Watershed: | UT to Bear Creek |
| XS ID | XS 3 (pool) |
| Reach: | Northern |
| Date: | 4/20/2010 |
| Field Crew: | S.D. and C.H. |

SUMMARY DATA

| | |
|----------------------------------|-------|
| Bankfull Width (ft) | 20.0 |
| Floodprone Width (ft) | 100.0 |
| Bankfull Mean Depth (ft) | 2.2 |
| Bankfull Max Depth (ft) | 3.9 |
| Bankfull Area (ft ²) | 44.2 |
| Width/Depth Ratio | 9.1 |
| Entrenchment Ratio | 5.0 |
| Bank Height Ratio | 1.0 |
| Cross Sectional Area | 119.5 |
| Wetted Perimeter (ft) | 23.09 |
| Hydraulic Radius (ft) | 1.91 |



Stream Type: C4

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.91 | 100.12 | |
| 0 | 5.03 | 100 | |
| 4.8 | 5.38 | 99.65 | |
| 9.2 | 5.61 | 99.42 | |
| 12.5 | 5.67 | 99.36 | |
| 17.5 | 5.63 | 99.4 | |
| 20 | 5.58 | 99.45 | TOB/BKF |
| 22 | 6.15 | 98.88 | |
| 24.1 | 6.79 | 98.24 | |
| 25.1 | 8.71 | 96.32 | |
| 27.8 | 9.08 | 95.95 | |
| 28.9 | 9.21 | 95.82 | |
| 29.8 | 9.29 | 95.74 | |
| 31.7 | 9.47 | 95.56 | TW |
| 32.9 | 9.32 | 95.71 | |
| 33.7 | 8.96 | 96.07 | |
| 35.5 | 8.51 | 96.52 | |
| 36.3 | 6.41 | 98.62 | |
| 37 | 6.25 | 98.78 | |
| 40.3 | 5.52 | 99.51 | TOB/BKF |
| 44.4 | 5.5 | 99.53 | |
| 46.3 | 5.51 | 99.52 | |
| 49 | 5.46 | 99.57 | |
| 53.1 | 5.52 | 99.51 | |
| 57.3 | 5.43 | 99.6 | |
| 61.3 | 5.59 | 99.44 | |
| 63.4 | 5.42 | 99.61 | |
| 66 | 5.55 | 99.48 | |
| 72 | 5.06 | 99.97 | |
| 74.7 | 4.75 | 100.28 | |

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|-------|
| 78.6 | 4.43 | 100.6 | |
| 78.6 | 4.3 | 100.73 | |

View of cross-section XS-3 looking downstream

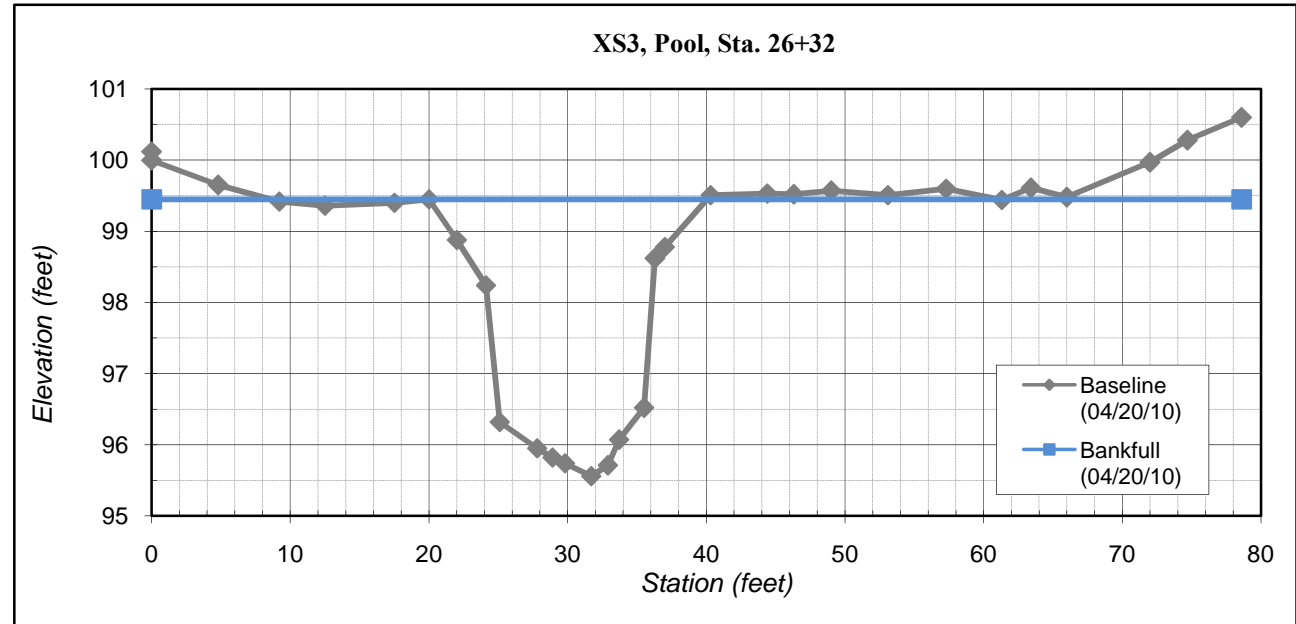


Figure 3.3. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

River Basin: Cape Fear
Watershed: UT to Bear Creek
XS ID XS 4 (riffle)
Reach: Northern
Date: 4/20/2010
Field Crew: S.D. and C.H.

SUMMARY DATA

Bankfull Width (ft) 20.3
 Floodprone Width (ft) 100.0
 Bankfull Mean Depth (ft) 1.5
 Bankfull Max Depth (ft) 2.4
 Bankfull Area (ft²) 29.5
 Width/Depth Ratio 14.0
 Entrenchment Ratio 4.9
 Bank Height Ratio 1.0
 Cross Sectional Area 58.3
 Wetted Perimeter (ft) 21.38
 Hydraulic Radius (ft) 1.38

Stream Type: C4



View of cross-section XS-4 looking downstream

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 5.29 | 100.12 | |
| 0 | 5.41 | 100 | |
| 3.2 | 5.55 | 99.86 | |
| 6.4 | 5.48 | 99.93 | |
| 9.1 | 5.64 | 99.77 | |
| 10.7 | 5.83 | 99.58 | |
| 11.6 | 5.58 | 99.83 | |
| 14 | 5.6 | 99.81 | |
| 16.3 | 5.78 | 99.63 | |
| 18.2 | 5.86 | 99.55 | |
| 20.2 | 5.95 | 99.46 | |
| 22 | 5.93 | 99.48 | |
| 23.5 | 5.63 | 99.78 | TOB/BKF |
| 24.7 | 5.81 | 99.6 | |
| 27.4 | 6.96 | 98.45 | |
| 28.2 | 7.5 | 97.91 | |
| 28.8 | 7.71 | 97.7 | |
| 30.5 | 7.89 | 97.52 | |
| 31.6 | 7.93 | 97.48 | |
| 33 | 7.85 | 97.56 | |
| 34.2 | 7.88 | 97.53 | |
| 34.9 | 7.92 | 97.49 | |
| 35.6 | 7.81 | 97.6 | |
| 36.9 | 7.98 | 97.43 | TW |
| 37.8 | 7.93 | 97.48 | |
| 38.6 | 7.07 | 98.34 | |
| 39.9 | 6.68 | 98.73 | |
| 42 | 5.92 | 99.49 | |
| 43.1 | 5.64 | 99.77 | |
| 43.8 | 5.63 | 99.78 | TOB/BKF |

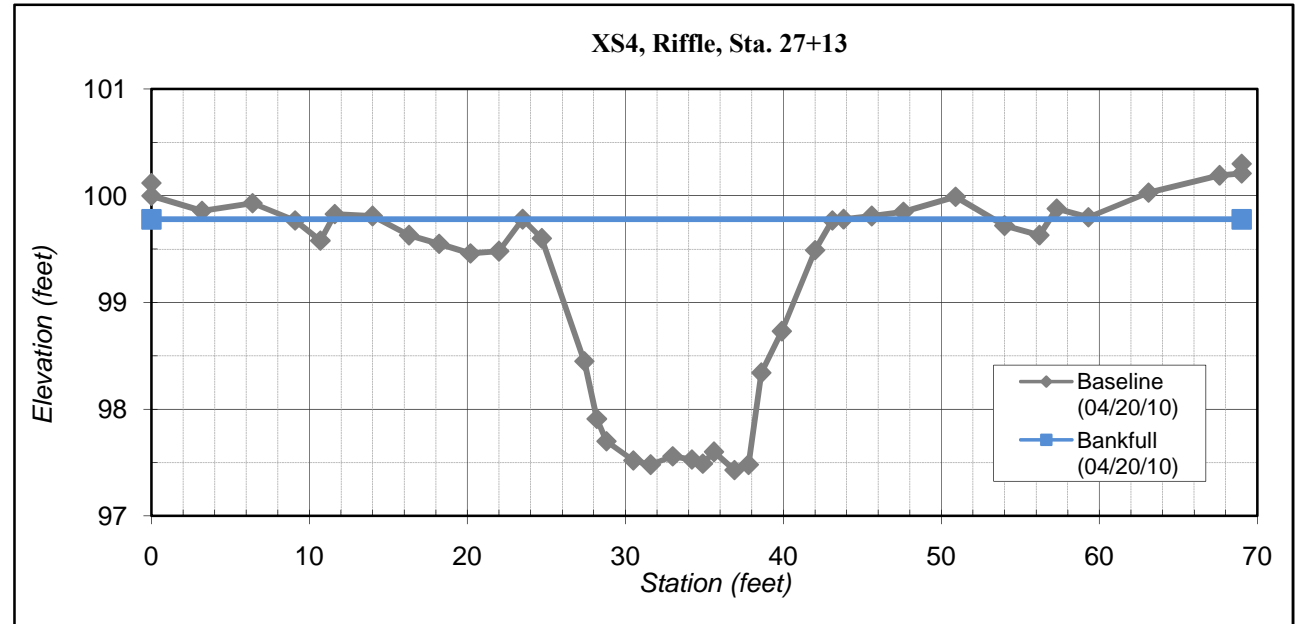


Figure 3.3. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|-------|
| 45.6 | 5.6 | 99.81 | |
| 47.6 | 5.56 | 99.85 | |
| 50.9 | 5.42 | 99.99 | |
| 54 | 5.69 | 99.72 | |
| 56.2 | 5.78 | 99.63 | |
| 57.3 | 5.53 | 99.88 | |
| 59.3 | 5.61 | 99.8 | |
| 63.1 | 5.38 | 100.03 | |
| 67.6 | 5.22 | 100.19 | |
| 69 | 5.2 | 100.21 | |
| 69 | 5.11 | 100.3 | |

Figure 3.4. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

River Basin: Cape Fear
Watershed: UT to Bear Creek
XS ID XS 5 (pool)
Reach: Northern
Date: 4/20/2010
Field Crew: S.D. and C.H.

SUMMARY DATA

Bankfull Width (ft) 22.9
 Floodprone Width (ft) 220.0
 Bankfull Mean Depth (ft) 1.5
 Bankfull Max Depth (ft) 3.8
 Bankfull Area (ft²) 33.3
 Width/Depth Ratio 15.7
 Entrenchment Ratio 9.6
 Bank Height Ratio 1.0
 Cross Sectional Area 66.5
 Wetted Perimeter (ft) 25.86
 Hydraulic Radius (ft) 1.29

Stream Type: C4



View of cross-section XS-5 looking downstream

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.75 | 100.08 | |
| 0 | 4.83 | 100 | |
| 2.7 | 5.33 | 99.5 | |
| 4.6 | 5.48 | 99.35 | |
| 5.7 | 5.32 | 99.51 | |
| 7.1 | 5.11 | 99.72 | |
| 9.2 | 5.37 | 99.46 | |
| 9.9 | 5.53 | 99.3 | |
| 11.6 | 5.49 | 99.34 | |
| 13.8 | 5.39 | 99.44 | |
| 16 | 5.71 | 99.12 | |
| 18.3 | 5.91 | 98.92 | |
| 19 | 5.93 | 98.9 | TOB/BKF |
| 20.1 | 6.21 | 98.62 | |
| 21.4 | 6.6 | 98.23 | |
| 21.7 | 6.95 | 97.88 | |
| 22.5 | 7.25 | 97.58 | |
| 23.4 | 7.24 | 97.59 | |
| 23.7 | 8.61 | 96.22 | |
| 25.2 | 8.95 | 95.88 | |
| 26.6 | 9.4 | 95.43 | TW |
| 28.1 | 9.17 | 95.66 | |
| 28.9 | 9.16 | 95.67 | |
| 29.5 | 8.81 | 96.02 | |
| 30.2 | 7.04 | 97.79 | |
| 32.3 | 6.92 | 97.91 | |
| 35.4 | 5.97 | 98.86 | |
| 38.3 | 5.63 | 99.2 | TOB/BKF |
| 40.3 | 5.57 | 99.26 | |
| 43.1 | 5.47 | 99.36 | |

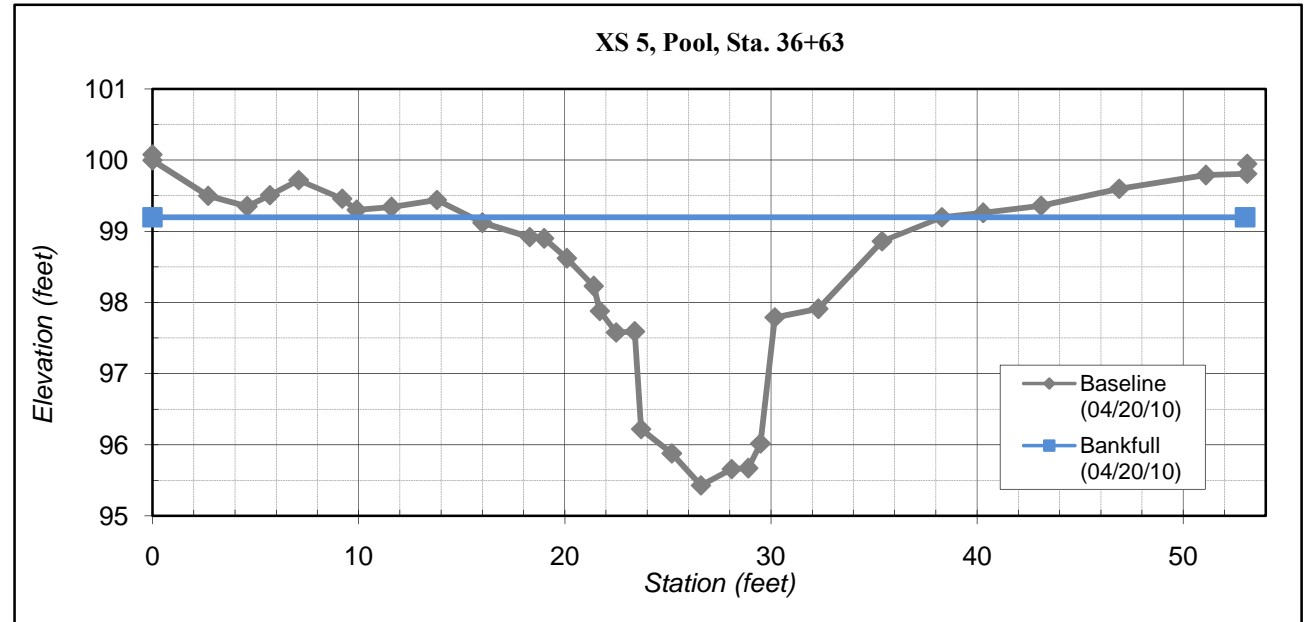


Figure 3.4. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|-------|
| 46.9 | 5.23 | 99.6 | |
| 51.1 | 5.04 | 99.79 | |
| 53.1 | 5.02 | 99.81 | |
| 53.1 | 4.88 | 99.95 | |

Figure 3.5. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

River Basin: Cape Fear
Watershed: UT to Bear Creek
XS ID XS 6 (riffle)
Reach: Northern
Date: 4/20/2010
Field Crew: S.D. and C.H.

SUMMARY DATA

Bankfull Width (ft) 18.9
 Floodprone Width (ft) 220.0
 Bankfull Mean Depth (ft) 1.2
 Bankfull Max Depth (ft) 1.9
 Bankfull Area (ft²) 23.0
 Width/Depth Ratio 15.6
 Entrenchment Ratio 11.6
 Bank Height Ratio 1.0
 Cross Sectional Area 41.4
 Wetted Perimeter (ft) 19.65
 Hydraulic Radius (ft) 1.17

Stream Type: C4



View of cross-section XS-6 looking downstream

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 5.82 | 100.12 | |
| 0 | 5.94 | 100 | |
| 2.8 | 5.69 | 100.25 | |
| 6 | 5.89 | 100.05 | |
| 8 | 6.25 | 99.69 | |
| 9.4 | 6.02 | 99.92 | |
| 12.8 | 6 | 99.94 | |
| 13.1 | 6.14 | 99.8 | |
| 16.4 | 6.05 | 99.89 | |
| 17.9 | 6.02 | 99.92 | |
| 20.2 | 6.26 | 99.68 | |
| 21.3 | 6.2 | 99.74 | TOB/BKF |
| 22.5 | 6.39 | 99.55 | |
| 24.3 | 7.2 | 98.74 | |
| 25 | 7.29 | 98.65 | |
| 25.6 | 7.8 | 98.14 | |
| 27.6 | 8.01 | 97.93 | |
| 28.3 | 8.13 | 97.81 | |
| 29.9 | 7.94 | 98 | |
| 31.3 | 7.72 | 98.22 | |
| 33.4 | 7.8 | 98.14 | TW |
| 35 | 7.56 | 98.38 | |
| 36.6 | 7.61 | 98.33 | |
| 37.7 | 7.19 | 98.75 | |
| 39.3 | 6.51 | 99.43 | |
| 40.5 | 6.11 | 99.83 | |
| 42.4 | 5.82 | 100.12 | TOB/BKF |
| 44 | 5.82 | 100.12 | |
| 46.9 | 5.71 | 100.23 | |
| 48.5 | 5.63 | 100.31 | |

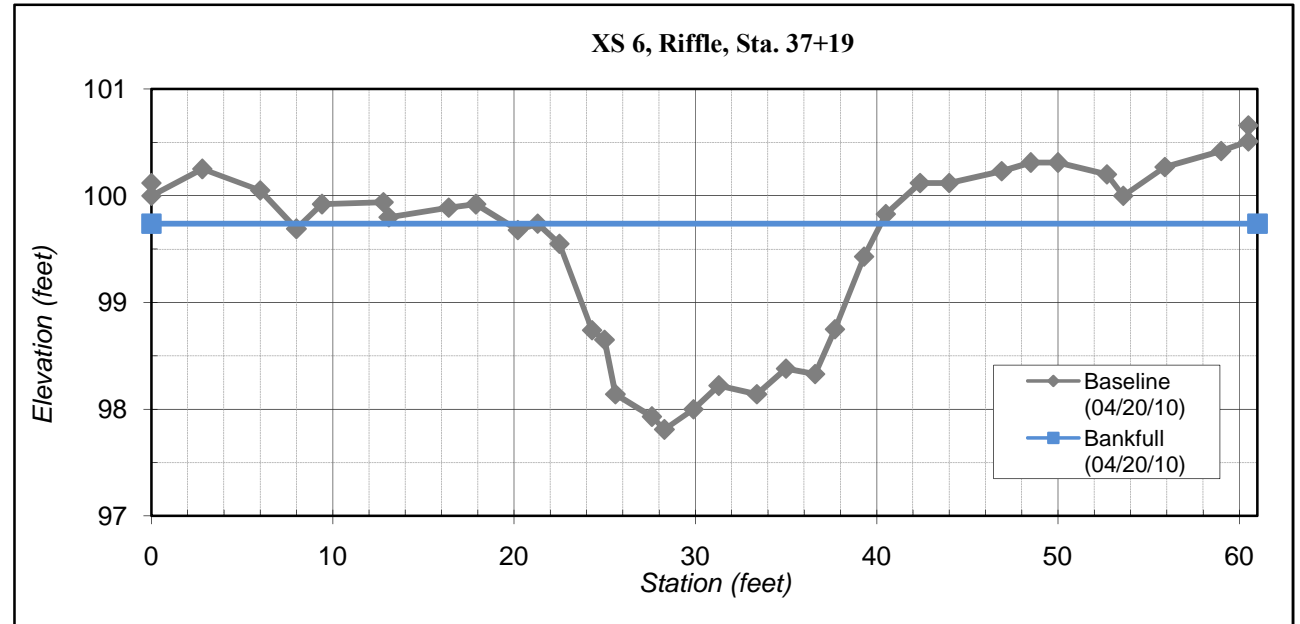


Figure 3.5. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|-------|
| 50 | 5.63 | 100.31 | |
| 52.7 | 5.74 | 100.2 | |
| 53.6 | 5.94 | 100 | |
| 55.9 | 5.67 | 100.27 | |
| 59 | 5.52 | 100.42 | |
| 60.5 | 5.43 | 100.51 | |
| 60.5 | 5.28 | 100.66 | |

Figure 3.6. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

| | |
|---------------------|------------------|
| River Basin: | Cape Fear |
| Watershed: | UT to Bear Creek |
| XS ID | XS 7 (riffle) |
| Reach: | Southern |
| Date: | 4/20/2010 |
| Field Crew: | S.D. and C.H. |

SUMMARY DATA

| | |
|----------------------------------|-------|
| Bankfull Width (ft) | 7.9 |
| Floodprone Width (ft) | 100.0 |
| Bankfull Mean Depth (ft) | 0.7 |
| Bankfull Max Depth (ft) | 1.2 |
| Bankfull Area (ft ²) | 5.3 |
| Width/Depth Ratio | 12.0 |
| Entrenchment Ratio | 12.6 |
| Bank Height Ratio | 1.0 |
| Cross Sectional Area | 31.3 |
| Wetted Perimeter (ft) | 8.53 |
| Hydraulic Radius (ft) | 0.62 |

Stream Type: C4



View of cross-section XS-7 looking downstream

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 5.31 | 100.16 | |
| 0 | 5.47 | 100.00 | |
| 3.5 | 5.54 | 99.93 | |
| 6.2 | 5.51 | 99.96 | |
| 9.9 | 5.58 | 99.89 | |
| 12.7 | 5.56 | 99.91 | |
| 15 | 5.52 | 99.95 | |
| 16.9 | 5.57 | 99.90 | |
| 17.5 | 5.55 | 99.92 | TOB/BKF |
| 18.6 | 5.85 | 99.62 | |
| 19.8 | 6.37 | 99.10 | |
| 20.2 | 6.82 | 98.65 | |
| 20.8 | 6.77 | 98.70 | |
| 21.5 | 6.8 | 98.67 | |
| 22 | 6.83 | 98.64 | TWG |
| 22.6 | 6.74 | 98.73 | |
| 23.1 | 6.36 | 99.11 | |
| 25.2 | 5.72 | 99.75 | |
| 25.7 | 5.62 | 99.85 | TOB/BKF |
| 27.1 | 5.61 | 99.86 | |
| 31.3 | 5.55 | 99.92 | |
| 34.7 | 5.58 | 99.89 | |
| 37.5 | 5.69 | 99.78 | |
| 39.5 | 5.54 | 99.93 | |
| 41.3 | 5.35 | 100.12 | |
| 41.9 | 5.45 | 100.02 | |
| 42.7 | 5.5 | 99.97 | |
| 43.5 | 5.24 | 100.23 | |
| 45.4 | 5.05 | 100.42 | |
| 45.4 | 4.97 | 100.5 | |

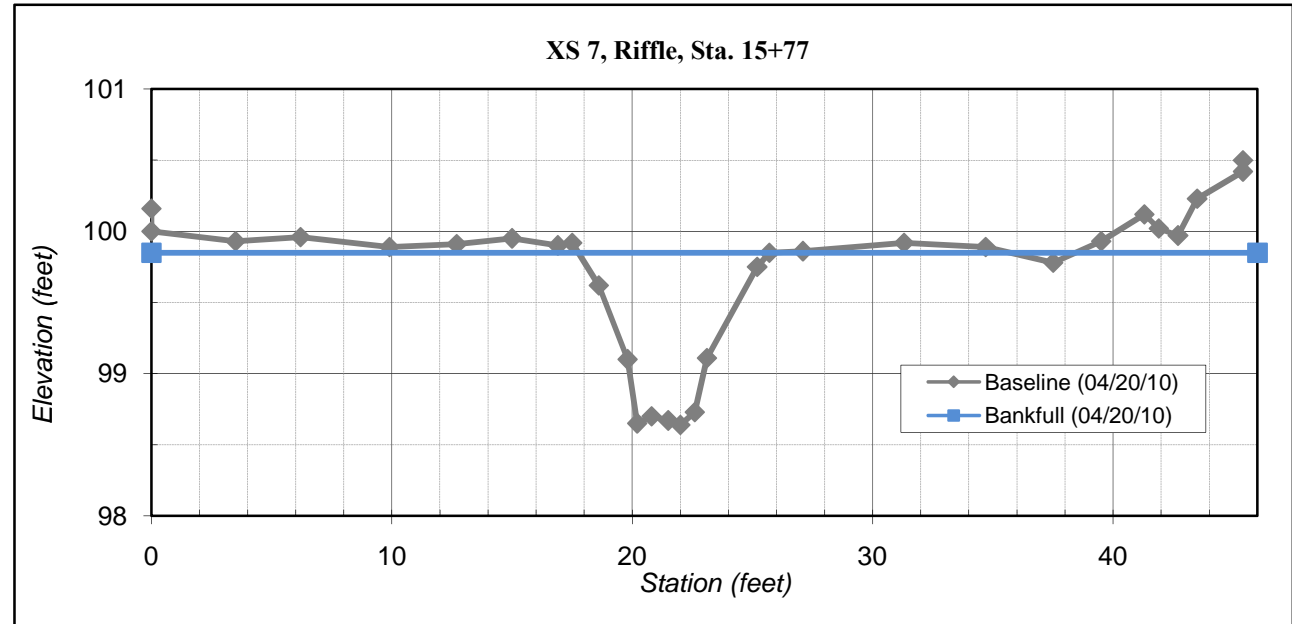


Figure 3.7. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

River Basin: Cape Fear
Watershed: UT to Bear Creek
XS ID XS 8 (riffle)
Reach: Southern
Date: 4/20/2010
Field Crew: S.D. and C.H.

SUMMARY DATA

Bankfull Width (ft) 13.5
 Floodprone Width (ft) 50.0
 Bankfull Mean Depth (ft) 0.6
 Bankfull Max Depth (ft) 1.4
 Bankfull Area (ft²) 7.8
 Width/Depth Ratio 23.3
 Entrenchment Ratio 3.7
 Bank Height Ratio 1.0
 Cross Sectional Area 42.6
 Wetted Perimeter (ft) 11.15
 Hydraulic Radius (ft) 0.67

Stream Type: C4



View of cross-section XS-8 looking downstream

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.19 | 100.20 | |
| 0 | 4.39 | 100.00 | |
| 2.4 | 4.52 | 99.87 | |
| 5 | 5.01 | 99.38 | |
| 8.6 | 5.51 | 98.88 | |
| 10.7 | 5.69 | 98.70 | |
| 11.7 | 5.73 | 98.66 | BKF/TOB |
| 13.2 | 5.97 | 98.42 | |
| 14.1 | 6.27 | 98.12 | |
| 14.9 | 6.71 | 97.68 | |
| 15.6 | 7.09 | 97.30 | |
| 16 | 7.17 | 97.22 | TWG |
| 16.8 | 7.11 | 97.28 | |
| 17.7 | 7.09 | 97.30 | |
| 18.6 | 7.03 | 97.36 | |
| 19.1 | 6.7 | 97.69 | |
| 20.3 | 6.29 | 98.10 | |
| 21.7 | 5.84 | 98.55 | |
| 22.7 | 5.79 | 98.60 | BKF/TOB |
| 25.4 | 5.76 | 98.63 | |
| 28.6 | 5.74 | 98.65 | |
| 31.1 | 5.72 | 98.67 | |
| 33.8 | 5.44 | 98.95 | |
| 36.5 | 5.49 | 98.90 | |
| 39.2 | 5.54 | 98.85 | |
| 41.5 | 5.38 | 99.01 | |
| 41.5 | 5.17 | 99.22 | |

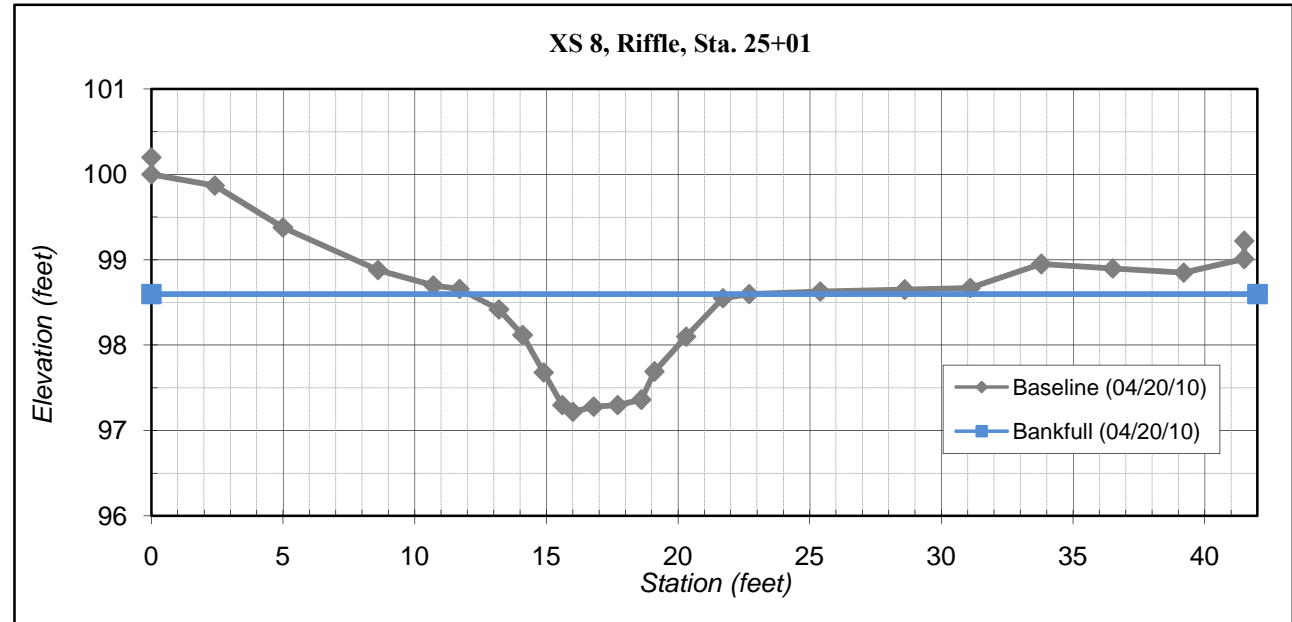


Figure 3.8. Cross Section Plots, Photos, and Raw Data Tables - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (#92347)

River Basin: Cape Fear
Watershed: UT to Bear Creek
XS ID XS 9 (pool)
Reach: Northern
Date: 4/20/2010
Field Crew: S.D. and C.H.

SUMMARY DATA

Bankfull Width (ft) 18.5
 Floodprone Width (ft) 50.0
 Bankfull Mean Depth (ft) 1.1
 Bankfull Max Depth (ft) 2.7
 Bankfull Area (ft²) 20.7
 Width/Depth Ratio 16.6
 Entrenchment Ratio 2.7
 Bank Height Ratio 1.0
 Cross Sectional Area 95.8
 Wetted Perimeter (ft) 19.92
 Hydraulic Radius (ft) 1.04

Stream Type: C4



View of cross-section XS-9 looking downstream

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.18 | 100.17 | |
| 0 | 4.35 | 100.00 | |
| 4.8 | 5.27 | 99.08 | |
| 9 | 5.76 | 98.59 | |
| 13.7 | 6.11 | 98.24 | BKF/TOB |
| 15.3 | 6.57 | 97.78 | |
| 16.6 | 7.12 | 97.23 | |
| 17.3 | 7.69 | 96.66 | |
| 17.9 | 8.56 | 95.79 | |
| 19.2 | 9 | 95.35 | TWG |
| 19.9 | 9.02 | 95.33 | |
| 21 | 8.93 | 95.42 | |
| 21.9 | 8.56 | 95.79 | |
| 22.8 | 8.41 | 95.94 | |
| 23.3 | 8.23 | 96.12 | |
| 23.7 | 7.8 | 96.55 | |
| 24.9 | 7.68 | 96.67 | |
| 25.8 | 7.19 | 97.16 | |
| 26.8 | 6.83 | 97.52 | |
| 28.7 | 6.64 | 97.71 | |
| 33.1 | 6.36 | 97.99 | BKF/TOB |
| 39.7 | 6.2 | 98.15 | |
| 44.5 | 6.1 | 98.25 | |
| 48.8 | 5.83 | 98.52 | |
| 53.4 | 5.87 | 98.48 | |
| 58.5 | 5.78 | 98.57 | |
| 62 | 5.64 | 98.71 | |
| 63.2 | 5.51 | 98.84 | |
| 63.2 | 5.4 | 98.95 | |

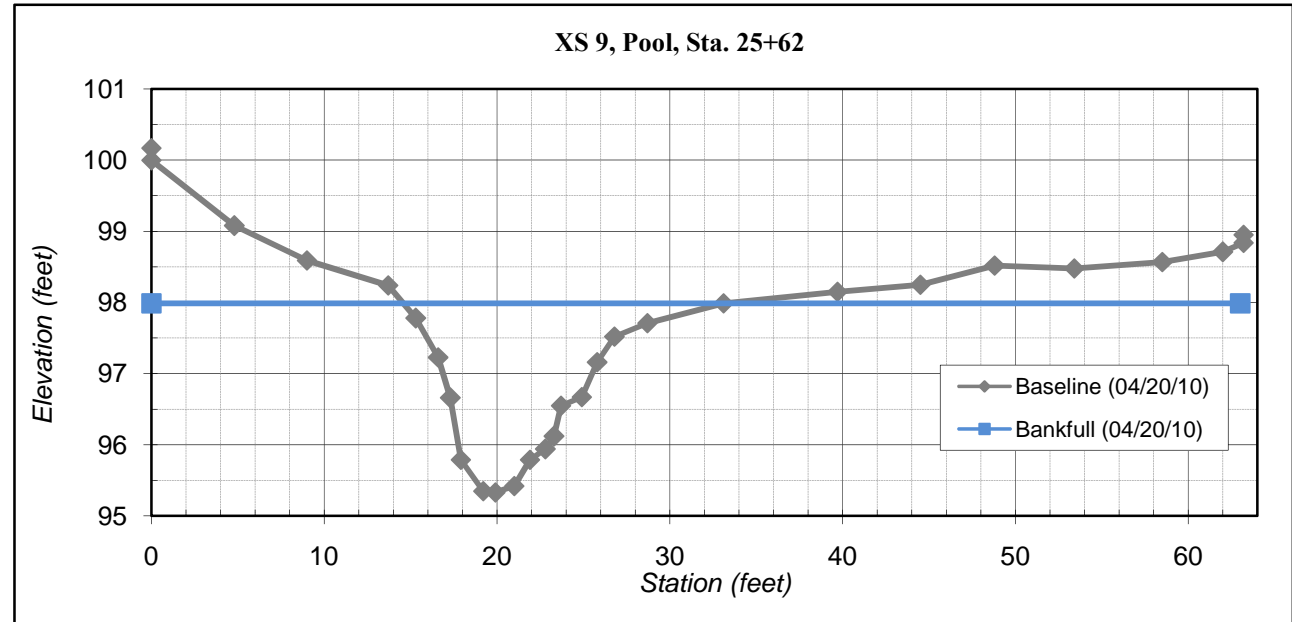


Figure 4.0. Stream Photo Station Photo - UT Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347



PP 1 Looking at northern UT from NC 902 (Sta. 0+0)(3/25/10)



PP 2 Looking Downstream on northern UT (Sta. 13+60)(3/24/10)



PP 3 From CE corner looking upstream on northern UT (Sta. 15+30)(3/24/10)



PP 4 Looking at floodplain interceptor on northern UT (Sta. 17+55)(3/24/10)

Figure 4.1. Stream Photo Station Photo - UT Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347



PP 5 At cattle crossing looking downstream (Sta. 19+30)(03/24/10)



PP 6 Looking upstream on northern UT (Sta. 22+95)(03/24/10)



PP 7 Looking downstream on northern UT (28+95)(03/24/10)



PP 8 Looking upstream on northern UT (33+30)(03/24/10)

Figure 4.2. Stream Photo Station Photo - UT Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347



PP 9 Looking upstream on northern UT (Sta. 38+50)(03/24/10)



PP 10 Looking upstream at confluence with Bear Creek (Sta. 39+75)(03/24/10)



PP 11 Looking at southern UT from NC 902 (Sta. 0+0)(3/25/10)



PP 12 Looking downstream on southern UT (12+10)(03/25/10)

Figure 4.3. Stream Photo Station Photo - UT Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347



PP 13 Looking upstream on southern UT (Sta. 14+45)(03/25/10)



PP 14 Looking downstream on southern UT (Sta. 16+90)(03/25/10)



PP 15 Looking downstream on southern UT (Sta. 20+80)(03/25/10)



PP 16 Looking downstream on southern UT (Sta. 24+20)(03/25/10)

Figure 4.4. Stream Photo Station Photo - UT Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347



PP 17 From CE corner looking upstream on southern UT(Sta. 24+35)(03/25/10)



PP 18 Looking upstream on southern UT (Sta. 27+00)(03/25/10)

Figure 5.0. Pebble Counts - Baseline Monitoring - 2010 - UT to Bear Creek Stream Restoration (EEP Project #92347)

| Cross Section Four-Northern UT | | | 2010 | | |
|--------------------------------|--------------------|-----------|---------|---------|-------|
| Descript. | Material | Size (mm) | Total # | Class % | Cum % |
| Silt/Clay | Silt/Clay | .062 | 37 | 37 | 37 |
| Sand | Very Fine Sand | .125 | 1 | 1 | 38 |
| | Fine Sand | .25 | 2 | 2 | 40 |
| | Medium Sand | 0.5 | 12 | 12 | 52 |
| | Coarse Sand | 1.0 | 5 | 5 | 57 |
| | Very Course Sand | 2 | 5 | 5 | 62 |
| Gravel | Very Fine Gravel | 4.0 | 6.0 | 6 | 68 |
| | Fine Gravel | 5.7 | 3 | 3 | 71 |
| | Fine Gravel | 8 | 0 | 0 | 71 |
| | Medium Gravel | 1.3 | 2 | 2 | 73 |
| | Medium Gravel | 16 | 2 | 2 | 75 |
| | Coarse Gravel | 22.6 | 3 | 3 | 78 |
| | Coarse Gravel | 32 | 5 | 5 | 83 |
| | Very Course Gravel | 45 | 2 | 2 | 85 |
| | Very Course Gravel | 64 | 7 | 7 | 92 |
| Cobble | Small Cobble | 90 | 4 | 4 | 96 |
| | Small Cobble | 128 | 3 | 3 | 99 |
| | Medium Cobble | 180 | 1 | 1 | 100 |
| | Large Cobble | 256 | | 0 | 100 |
| Boulder | Small Boulders | 362 | | 0 | 100 |
| | Small Boulders | 512 | | 0 | 100 |
| | Medium Boulders | 1024 | | 0 | 100 |
| | Large Boulders | 2048 | | 0 | 100 |
| Bedrock | Bedrock | 40096 | | 0 | 100 |
| Total | | | 100 | | |

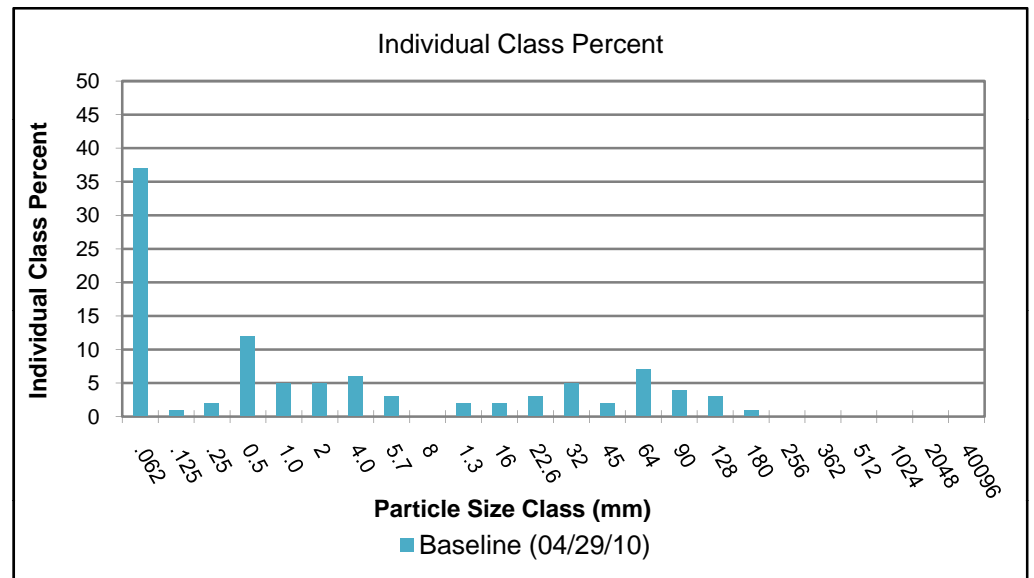
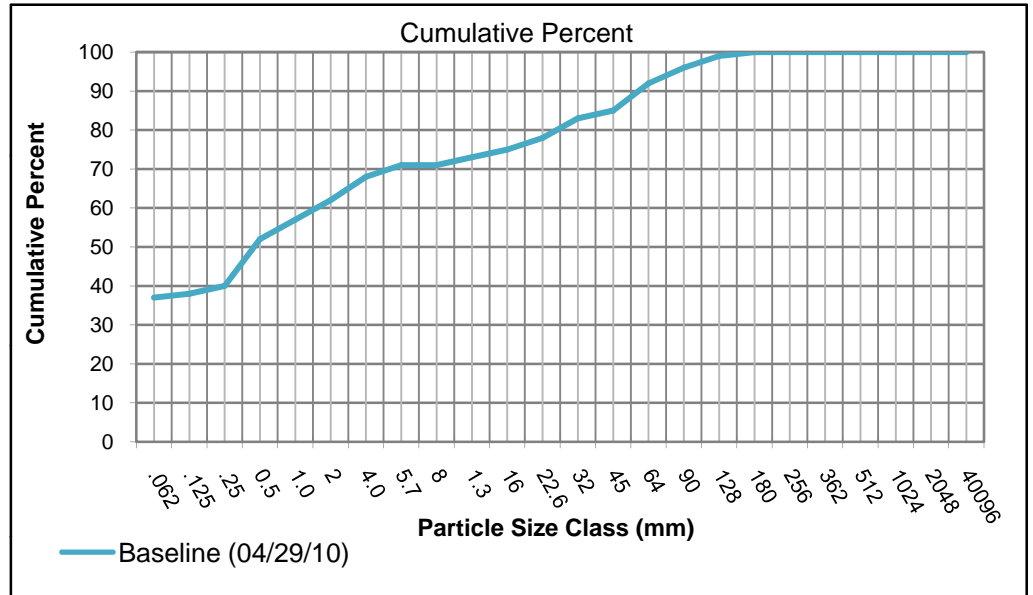
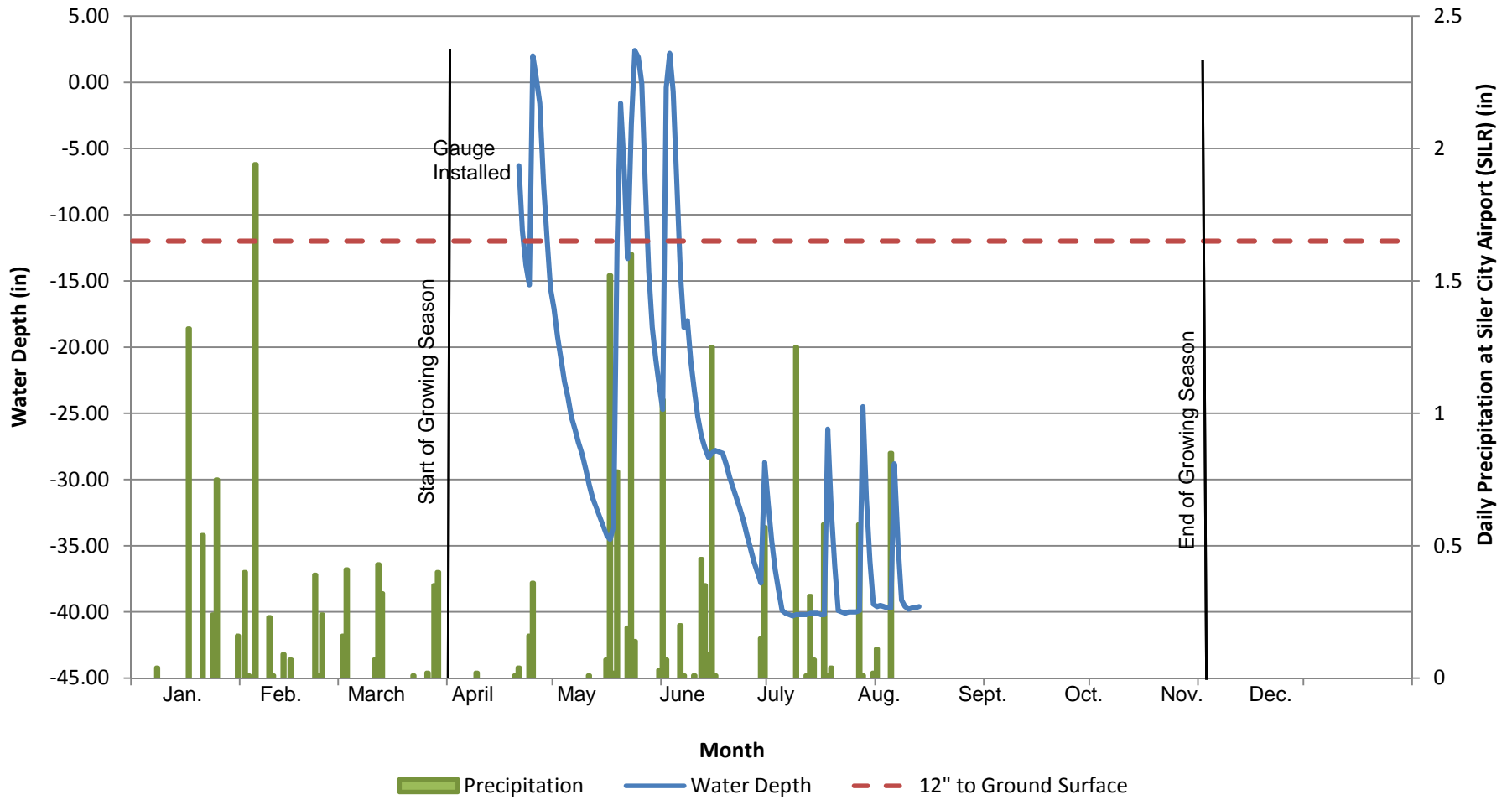


Figure 6.0 UT to Bear Creek (EEP #92347)-2010
Monitoring Gauge 9BEA457



e-Table. Raw Cross Section Survey Data Spreadsheets

Cross Section: 1
Monitoring Year: Baseline **Date:** 4/20/2010
Feature: Riffle

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.59 | 100.05 | |
| 0 | 4.64 | 100.00 | |
| 3.8 | 5.41 | 99.23 | |
| 8.7 | 5.58 | 99.06 | |
| 11.8 | 5.51 | 99.13 | TOB/BKF |
| 14.3 | 6.3 | 98.34 | |
| 16 | 6.78 | 97.86 | |
| 16.6 | 7.53 | 97.11 | |
| 18.5 | 7.75 | 96.89 | TW |
| 20.2 | 7.51 | 97.13 | |
| 21.5 | 7.72 | 96.92 | |
| 22.7 | 7.7 | 96.94 | |
| 24.2 | 7.53 | 97.11 | |
| 25.4 | 7.39 | 97.25 | |
| 27.4 | 6.41 | 98.23 | |
| 30.3 | 5.5 | 99.14 | |
| 31.8 | 5.39 | 99.25 | TOB/BKF |
| 33.6 | 5.51 | 99.13 | |
| 36.2 | 5.86 | 98.78 | |
| 37.7 | 5.61 | 99.03 | |
| 42.6 | 5.7 | 98.94 | |
| 48.9 | 5.66 | 98.98 | |
| 52.5 | 5.39 | 99.25 | |
| 57 | 5.08 | 99.56 | |
| 58.9 | 4.81 | 99.83 | |
| 58.9 | 4.68 | 99.96 | |

Cross Section: 2
Monitoring Year: Baseline **Date:** 4/20/2010
Feature: Riffle

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.15 | 100.06 | |
| 0 | 4.21 | 100.00 | |
| 4.6 | 5.05 | 99.16 | |
| 8.6 | 5.53 | 98.68 | |
| 12.3 | 5.69 | 98.52 | |
| 14.7 | 5.42 | 98.79 | |
| 16.1 | 5.24 | 98.97 | TOB/BKF |
| 17.8 | 5.47 | 98.74 | |
| 19 | 6.01 | 98.20 | |
| 20.3 | 6.66 | 97.55 | |
| 21.4 | 6.84 | 97.37 | |
| 22 | 7 | 97.21 | on rock |
| 22.7 | 7.29 | 96.92 | |
| 24.2 | 7.38 | 96.83 | |
| 25.3 | 7.46 | 96.75 | TW |
| 26.3 | 7.38 | 96.83 | |
| 27.6 | 7.34 | 96.87 | |
| 29.3 | 7.41 | 96.80 | |
| 30.1 | 7.44 | 96.77 | |
| 31.3 | 6.49 | 97.72 | |
| 33.6 | 5.77 | 98.44 | |
| 35.5 | 5.39 | 98.82 | TOB/BKF |
| 37.2 | 5.43 | 98.78 | |
| 41.9 | 5.49 | 98.72 | |
| 45.6 | 5.29 | 98.92 | |
| 49.7 | 4.59 | 99.62 | |
| 53 | 3.86 | 100.35 | |
| 53 | 3.8 | 100.41 | |

Cross Section: 3
Monitoring Year: Baseline **Date:** 4/20/2010
Feature: Pool

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.91 | 100.12 | |
| 0 | 5.03 | 100.00 | |
| 4.8 | 5.38 | 99.65 | |
| 9.2 | 5.61 | 99.42 | |
| 12.5 | 5.67 | 99.36 | |
| 17.5 | 5.63 | 99.40 | |
| 20 | 5.58 | 99.45 | TOB/BKF |
| 22 | 6.15 | 98.88 | |
| 24.1 | 6.79 | 98.24 | |
| 25.1 | 8.71 | 96.32 | |
| 27.8 | 9.08 | 95.95 | |
| 28.9 | 9.21 | 95.82 | |
| 29.8 | 9.29 | 95.74 | |
| 31.7 | 9.47 | 95.56 | TW |
| 32.9 | 9.32 | 95.71 | |
| 33.7 | 8.96 | 96.07 | |
| 35.5 | 8.51 | 96.52 | |

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 36.3 | 6.41 | 98.62 | |
| 37 | 6.25 | 98.78 | |
| 40.3 | 5.52 | 99.51 | TOB/BKF |
| 44.4 | 5.5 | 99.53 | |
| 46.3 | 5.51 | 99.52 | |
| 49 | 5.46 | 99.57 | |
| 53.1 | 5.52 | 99.51 | |
| 57.3 | 5.43 | 99.60 | |
| 61.3 | 5.59 | 99.44 | |
| 63.4 | 5.42 | 99.61 | |
| 66 | 5.55 | 99.48 | |
| 72 | 5.06 | 99.97 | |
| 74.7 | 4.75 | 100.28 | |
| 78.6 | 4.43 | 100.6 | |
| 78.6 | 4.3 | 100.73 | |

Cross Section: 4

Monitoring Year: Baseline

Date: 4/20/2010

Feature: Riffle

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 5.29 | 100.12 | |
| 0 | 5.41 | 100.00 | |
| 3.2 | 5.55 | 99.86 | |
| 6.4 | 5.48 | 99.93 | |
| 9.1 | 5.64 | 99.77 | |
| 10.7 | 5.83 | 99.58 | |
| 11.6 | 5.58 | 99.83 | |
| 14 | 5.6 | 99.81 | |
| 16.3 | 5.78 | 99.63 | |
| 18.2 | 5.86 | 99.55 | |
| 20.2 | 5.95 | 99.46 | |
| 22 | 5.93 | 99.48 | |
| 23.5 | 5.63 | 99.78 | TOB/BKF |
| 24.7 | 5.81 | 99.60 | |
| 27.4 | 6.96 | 98.45 | |
| 28.2 | 7.5 | 97.91 | |
| 28.8 | 7.71 | 97.70 | |
| 30.5 | 7.89 | 97.52 | |
| 31.6 | 7.93 | 97.48 | |
| 33 | 7.85 | 97.56 | |
| 34.2 | 7.88 | 97.53 | |
| 34.9 | 7.92 | 97.49 | |
| 35.6 | 7.81 | 97.60 | |
| 36.9 | 7.98 | 97.43 | TW |
| 37.8 | 7.93 | 97.48 | |
| 38.6 | 7.07 | 98.34 | |
| 39.9 | 6.68 | 98.73 | |
| 42 | 5.92 | 99.49 | |
| 43.1 | 5.64 | 99.77 | |
| 43.8 | 5.63 | 99.78 | TOB/BKF |
| 45.6 | 5.6 | 99.81 | |
| 47.6 | 5.56 | 99.85 | |
| 50.9 | 5.42 | 99.99 | |
| 54 | 5.69 | 99.72 | |
| 56.2 | 5.78 | 99.63 | |
| 57.3 | 5.53 | 99.88 | |
| 59.3 | 5.61 | 99.8 | |
| 63.1 | 5.38 | 100.03 | |
| 67.6 | 5.22 | 100.19 | |
| 69 | 5.2 | 100.21 | |
| 69 | 5.11 | 100.3 | |

Cross Section: 5

Monitoring Year: Baseline

Date: 4/20/2010

Feature: Pool

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.75 | 100.08 | |
| 0 | 4.83 | 100.00 | |
| 2.7 | 5.33 | 99.50 | |
| 4.6 | 5.48 | 99.35 | |
| 5.7 | 5.32 | 99.51 | |
| 7.1 | 5.11 | 99.72 | |
| 9.2 | 5.37 | 99.46 | |
| 9.9 | 5.53 | 99.30 | |
| 11.6 | 5.49 | 99.34 | |
| 13.8 | 5.39 | 99.44 | |
| 16 | 5.71 | 99.12 | |
| 18.3 | 5.91 | 98.92 | |
| 19 | 5.93 | 98.90 | TOB/BKF |
| 20.1 | 6.21 | 98.62 | |
| 21.4 | 6.6 | 98.23 | |
| 21.7 | 6.95 | 97.88 | |
| 22.5 | 7.25 | 97.58 | |
| 23.4 | 7.24 | 97.59 | |
| 23.7 | 8.61 | 96.22 | |
| 25.2 | 8.95 | 95.88 | |
| 26.6 | 9.4 | 95.43 | TW |
| 28.1 | 9.17 | 95.66 | |
| 28.9 | 9.16 | 95.67 | |
| 29.5 | 8.81 | 96.02 | |
| 30.2 | 7.04 | 97.79 | |
| 32.3 | 6.92 | 97.91 | |
| 35.4 | 5.97 | 98.86 | |
| 38.3 | 5.63 | 99.2 | TOB/BKF |
| 40.3 | 5.57 | 99.26 | |
| 43.1 | 5.47 | 99.36 | |
| 46.9 | 5.23 | 99.6 | |
| 51.1 | 5.04 | 99.79 | |
| 53.1 | 5.02 | 99.81 | |
| 53.1 | 4.88 | 99.95 | |

Cross Section: 6
Monitoring Year: Baseline **Date:** 4/20/2010
Feature: Riffle

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 5.82 | 100.12 | |
| 0 | 5.94 | 100.00 | |
| 2.8 | 5.69 | 100.25 | |
| 6 | 5.89 | 100.05 | |
| 8 | 6.25 | 99.69 | |
| 9.4 | 6.02 | 99.92 | |
| 12.8 | 6 | 99.94 | |
| 13.1 | 6.14 | 99.80 | |
| 16.4 | 6.05 | 99.89 | |
| 17.9 | 6.02 | 99.92 | |
| 20.2 | 6.26 | 99.68 | |
| 21.3 | 6.2 | 99.74 | TOB/BKF |
| 22.5 | 6.39 | 99.55 | |
| 24.3 | 7.2 | 98.74 | |
| 25 | 7.29 | 98.65 | |
| 25.6 | 7.8 | 98.14 | |
| 27.6 | 8.01 | 97.93 | |
| 28.3 | 8.13 | 97.81 | |
| 29.9 | 7.94 | 98.00 | |
| 31.3 | 7.72 | 98.22 | |
| 33.4 | 7.8 | 98.14 | TW |
| 35 | 7.56 | 98.38 | |
| 36.6 | 7.61 | 98.33 | |
| 37.7 | 7.19 | 98.75 | |
| 39.3 | 6.51 | 99.43 | |
| 40.5 | 6.11 | 99.83 | |
| 42.4 | 5.82 | 100.12 | TOB/BKF |
| 44 | 5.82 | 100.12 | |
| 46.9 | 5.71 | 100.23 | |
| 48.5 | 5.63 | 100.31 | |
| 50 | 5.63 | 100.31 | |
| 52.7 | 5.74 | 100.2 | |
| 53.6 | 5.94 | 100 | |
| 55.9 | 5.67 | 100.27 | |
| 59 | 5.52 | 100.42 | |
| 60.5 | 5.43 | 100.51 | |
| 60.5 | 5.28 | 100.66 | |

Cross Section: 7
Monitoring Year: Baseline **Date:** 4/20/2010
Feature: Riffle

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 5.31 | 100.16 | |
| 0 | 5.47 | 100.00 | |
| 3.5 | 5.54 | 99.93 | |
| 6.2 | 5.51 | 99.96 | |
| 9.9 | 5.58 | 99.89 | |
| 12.7 | 5.56 | 99.91 | |
| 15 | 5.52 | 99.95 | |
| 16.9 | 5.57 | 99.90 | |
| 17.5 | 5.55 | 99.92 | TOB/BKF |
| 18.6 | 5.85 | 99.62 | |
| 19.8 | 6.37 | 99.10 | |
| 20.2 | 6.82 | 98.65 | |
| 20.8 | 6.77 | 98.70 | |
| 21.5 | 6.8 | 98.67 | |
| 22 | 6.83 | 98.64 | TWG |
| 22.6 | 6.74 | 98.73 | |
| 23.1 | 6.36 | 99.11 | |
| 25.2 | 5.72 | 99.75 | |
| 25.7 | 5.62 | 99.85 | TOB/BKF |
| 27.1 | 5.61 | 99.86 | |
| 31.3 | 5.55 | 99.92 | |
| 34.7 | 5.58 | 99.89 | |
| 37.5 | 5.69 | 99.78 | |
| 39.5 | 5.54 | 99.93 | |
| 41.3 | 5.35 | 100.12 | |
| 41.9 | 5.45 | 100.02 | |
| 42.7 | 5.5 | 99.97 | |
| 43.5 | 5.24 | 100.23 | |
| 45.4 | 5.05 | 100.42 | |
| 45.4 | 4.97 | 100.5 | |

Cross Section: 8
Monitoring Year: Baseline **Date:** 4/20/2010
Feature: Riffle

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.19 | 100.20 | |
| 0 | 4.39 | 100.00 | |
| 2.4 | 4.52 | 99.87 | |
| 5 | 5.01 | 99.38 | |
| 8.6 | 5.51 | 98.88 | |
| 10.7 | 5.69 | 98.70 | |
| 11.7 | 5.73 | 98.66 | BKF/TOB |
| 13.2 | 5.97 | 98.42 | |
| 14.1 | 6.27 | 98.12 | |
| 14.9 | 6.71 | 97.68 | |
| 15.6 | 7.09 | 97.30 | |
| 16 | 7.17 | 97.22 | TWG |
| 16.8 | 7.11 | 97.28 | |
| 17.7 | 7.09 | 97.30 | |
| 18.6 | 7.03 | 97.36 | |
| 19.1 | 6.7 | 97.69 | |
| 20.3 | 6.29 | 98.10 | |
| 21.7 | 5.84 | 98.55 | |
| 22.7 | 5.79 | 98.60 | BKF/TOB |
| 25.4 | 5.76 | 98.63 | |
| 28.6 | 5.74 | 98.65 | |
| 31.1 | 5.72 | 98.67 | |
| 33.8 | 5.44 | 98.95 | |
| 36.5 | 5.49 | 98.90 | |
| 39.2 | 5.54 | 98.85 | |
| 41.5 | 5.38 | 99.01 | |
| 41.5 | 5.17 | 99.22 | |

Cross Section: 9
Monitoring Year: Baseline **Date:** 4/20/2010
Feature: Pool

| Station | Rod Ht. | Elevation | Notes |
|---------|---------|-----------|---------|
| 0 | 4.18 | 100.17 | |
| 0 | 4.35 | 100.00 | |
| 4.8 | 5.27 | 99.08 | |
| 9 | 5.76 | 98.59 | |
| 13.7 | 6.11 | 98.24 | BKF/TOB |
| 15.3 | 6.57 | 97.78 | |
| 16.6 | 7.12 | 97.23 | |
| 17.3 | 7.69 | 96.66 | |
| 17.9 | 8.56 | 95.79 | |
| 19.2 | 9 | 95.35 | TWG |
| 19.9 | 9.02 | 95.33 | |
| 21 | 8.93 | 95.42 | |
| 21.9 | 8.56 | 95.79 | |
| 22.8 | 8.41 | 95.94 | |
| 23.3 | 8.23 | 96.12 | |
| 23.7 | 7.8 | 96.55 | |
| 24.9 | 7.68 | 96.67 | |
| 25.8 | 7.19 | 97.16 | |
| 26.8 | 6.83 | 97.52 | |
| 28.7 | 6.64 | 97.71 | |
| 33.1 | 6.36 | 97.99 | BKF/TOB |
| 39.7 | 6.2 | 98.15 | |
| 44.5 | 6.1 | 98.25 | |
| 48.8 | 5.83 | 98.52 | |
| 53.4 | 5.87 | 98.48 | |
| 58.5 | 5.78 | 98.57 | |
| 62 | 5.64 | 98.71 | |
| 63.2 | 5.51 | 98.84 | |
| 63.2 | 5.4 | 98.95 | |

e-Table. Raw Longitudinal Profile Survey Data Spreadsheets

Reach: Southern

Monitoring Year: Baseline

Date: May 2010

| Northing | Easting | Elevation | Notes | Length | Station |
|-----------|------------|-----------|-----------|--------|---------|
| 676017.17 | 1882205.27 | 424.33 | inv36" | 0.00 | 1000.00 |
| 675998.85 | 1882259.17 | 427.27 | top-left | 0.00 | 1053.00 |
| 675987.39 | 1882249.74 | 425.96 | top-right | 0.00 | 1053.00 |
| 675993.46 | 1882253.39 | 424.23 | clchannel | 53.64 | 1053.64 |
| 675986.14 | 1882258.89 | 425.16 | toprock | 9.16 | 1062.81 |
| 675986.10 | 1882258.96 | 423.66 | toerock | 0.08 | 1062.89 |
| 675969.26 | 1882266.11 | 425.74 | top-right | 24.42 | 1077.42 |
| 675973.97 | 1882272.78 | 425.90 | top-left | 28.37 | 1081.37 |
| 675970.23 | 1882268.99 | 424.61 | clchannel | 18.78 | 1081.66 |
| 675957.36 | 1882274.47 | 425.75 | top-right | 14.54 | 1091.96 |
| 675962.73 | 1882281.38 | 425.80 | top-left | 14.15 | 1095.51 |
| 675959.91 | 1882278.30 | 424.65 | clchannel | 13.89 | 1095.56 |
| 675946.95 | 1882293.25 | 425.69 | top-right | 21.47 | 1113.43 |
| 675953.33 | 1882298.61 | 425.90 | top-left | 19.63 | 1115.15 |
| 675950.08 | 1882296.14 | 424.66 | clchannel | 20.37 | 1115.93 |
| 675935.95 | 1882309.31 | 425.63 | top-right | 19.47 | 1132.90 |
| 675941.61 | 1882315.71 | 425.73 | top-left | 20.73 | 1135.87 |
| 675938.05 | 1882313.30 | 424.11 | clchannel | 20.96 | 1136.88 |
| 675922.31 | 1882316.78 | 425.69 | top-right | 15.55 | 1148.45 |
| 675920.97 | 1882322.85 | 424.51 | clchannel | 19.57 | 1156.45 |
| 675924.09 | 1882326.52 | 425.67 | top-left | 20.58 | 1156.46 |
| 675913.80 | 1882320.79 | 425.53 | top-right | 9.41 | 1157.86 |
| 675914.40 | 1882325.54 | 423.74 | clchannel | 7.10 | 1163.55 |
| 675914.42 | 1882329.17 | 425.46 | top-left | 10.03 | 1166.48 |
| 675895.44 | 1882323.21 | 425.31 | top-right | 18.52 | 1176.38 |
| 675894.77 | 1882326.78 | 424.40 | clchannel | 19.68 | 1183.23 |
| 675893.69 | 1882330.52 | 425.09 | top-left | 20.78 | 1187.26 |
| 675875.20 | 1882336.87 | 425.44 | top-left | 19.55 | 1206.81 |
| 675866.10 | 1882331.33 | 425.45 | top-right | 30.45 | 1206.83 |
| 675870.67 | 1882332.95 | 423.94 | clchannel | 24.88 | 1208.11 |
| 675863.62 | 1882351.38 | 425.29 | top-left | 18.56 | 1225.37 |
| 675855.80 | 1882349.06 | 425.51 | top-right | 20.50 | 1227.33 |
| 675859.35 | 1882350.61 | 424.10 | clchannel | 20.97 | 1229.08 |
| 675848.30 | 1882369.47 | 424.84 | top-right | 21.75 | 1249.08 |
| 675853.56 | 1882377.99 | 425.21 | top-left | 28.45 | 1253.82 |
| 675850.53 | 1882374.27 | 423.94 | clchannel | 25.25 | 1254.33 |
| 675828.62 | 1882383.11 | 425.12 | top-right | 23.95 | 1273.02 |
| 675829.78 | 1882387.11 | 423.96 | clchannel | 24.40 | 1278.73 |
| 675832.37 | 1882391.19 | 425.04 | top-left | 24.96 | 1278.79 |
| 675806.66 | 1882396.74 | 425.15 | top-right | 25.84 | 1298.87 |
| 675814.21 | 1882401.47 | 424.96 | top-left | 20.87 | 1299.66 |
| 675809.92 | 1882399.17 | 423.37 | clchannel | 23.24 | 1301.97 |
| 675805.84 | 1882418.16 | 424.96 | top-left | 18.67 | 1318.33 |
| 675798.76 | 1882415.82 | 424.95 | top-right | 20.65 | 1319.52 |
| 675801.76 | 1882417.18 | 423.92 | clchannel | 19.77 | 1321.74 |
| 675793.56 | 1882428.16 | 425.05 | top-right | 13.39 | 1332.91 |
| 675802.58 | 1882432.52 | 424.88 | top-left | 14.72 | 1333.05 |
| 675797.62 | 1882429.56 | 423.74 | clchannel | 13.06 | 1334.79 |
| 675804.59 | 1882456.22 | 424.66 | top-left | 23.78 | 1356.83 |
| 675796.88 | 1882456.94 | 424.50 | top-right | 28.97 | 1361.88 |
| 675801.16 | 1882456.48 | 423.40 | clchannel | 27.15 | 1361.95 |
| 675806.53 | 1882473.44 | 424.88 | top-left | 17.33 | 1374.17 |
| 675796.52 | 1882471.72 | 424.66 | top-right | 14.78 | 1376.67 |
| 675802.50 | 1882472.68 | 423.27 | clchannel | 16.25 | 1378.20 |

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|-----------|------------|--------|-------------|-------|---------|
| 675791.52 | 1882483.25 | 424.69 | top-right | 12.56 | 1389.23 |
| 675795.94 | 1882490.59 | 424.68 | top-left | 20.15 | 1394.32 |
| 675793.85 | 1882486.75 | 423.36 | clchannel | 16.52 | 1394.72 |
| 675772.78 | 1882495.92 | 424.38 | top-right | 22.62 | 1411.85 |
| 675777.12 | 1882502.75 | 424.28 | top-left | 22.40 | 1416.73 |
| 675774.49 | 1882499.95 | 422.96 | clchannel | 23.42 | 1418.14 |
| 675760.91 | 1882503.31 | 424.41 | top-right | 13.99 | 1425.84 |
| 675768.47 | 1882509.98 | 424.09 | top-left | 11.27 | 1428.00 |
| 675764.12 | 1882506.94 | 422.76 | clchannel | 12.51 | 1430.65 |
| 675760.32 | 1882525.29 | 424.12 | top-left | 17.35 | 1445.34 |
| 675752.27 | 1882522.89 | 423.98 | top-right | 21.40 | 1447.23 |
| 675755.30 | 1882524.45 | 422.40 | clchannel | 19.60 | 1450.25 |
| 675742.64 | 1882548.87 | 423.61 | top-right | 27.71 | 1474.95 |
| 675742.21 | 1882549.70 | 423.52 | top-right | 0.93 | 1475.88 |
| 675749.50 | 1882555.04 | 424.30 | top-left | 31.65 | 1477.00 |
| 675748.70 | 1882555.96 | 424.12 | top-left | 1.22 | 1478.21 |
| 675746.51 | 1882551.67 | 422.57 | clchannel | 28.60 | 1478.85 |
| 675745.75 | 1882553.27 | 422.29 | clchannel | 1.77 | 1480.63 |
| 675734.53 | 1882556.19 | 423.12 | top-right | 10.05 | 1485.93 |
| 675736.70 | 1882563.81 | 423.79 | top-left | 14.34 | 1492.55 |
| 675735.04 | 1882559.40 | 422.17 | clchannel | 12.34 | 1492.97 |
| 675715.82 | 1882555.29 | 423.10 | top-right | 18.74 | 1504.67 |
| 675722.58 | 1882559.28 | 422.75 | rockw/root | 12.46 | 1505.43 |
| 675715.19 | 1882559.47 | 421.85 | clchannel | 7.39 | 1512.82 |
| 675714.67 | 1882562.77 | 423.06 | top-left | 22.05 | 1514.61 |
| 675691.84 | 1882552.91 | 423.35 | top-right | 24.09 | 1528.76 |
| 675694.07 | 1882561.20 | 422.69 | top-left | 20.66 | 1535.27 |
| 675692.47 | 1882557.52 | 421.61 | clchannel | 22.80 | 1535.62 |
| 675679.70 | 1882561.75 | 422.98 | top-right | 15.01 | 1543.77 |
| 675686.22 | 1882567.84 | 422.81 | top-left | 10.29 | 1545.56 |
| 675681.96 | 1882564.15 | 421.72 | clchannel | 12.43 | 1548.05 |
| 675681.32 | 1882573.26 | 422.92 | top-left | 7.30 | 1552.86 |
| 675673.83 | 1882569.97 | 422.67 | top-right | 10.11 | 1553.88 |
| 675677.29 | 1882571.43 | 421.74 | clchannel | 8.65 | 1556.70 |
| 675662.42 | 1882598.36 | 422.44 | top-right | 30.60 | 1584.48 |
| 675670.11 | 1882603.95 | 422.40 | top-left | 32.68 | 1585.53 |
| 675666.47 | 1882602.47 | 421.15 | clchannel | 32.88 | 1589.58 |
| 675652.72 | 1882626.59 | 421.68 | top-left | 28.54 | 1614.08 |
| 675644.64 | 1882623.63 | 421.67 | top-right | 30.90 | 1615.37 |
| 675644.53 | 1882623.27 | 421.66 | top-right | 0.38 | 1615.75 |
| 675651.25 | 1882627.53 | 421.26 | top-left | 1.74 | 1615.82 |
| 675647.68 | 1882625.32 | 420.30 | clchannel | 29.58 | 1619.15 |
| 675650.39 | 1882639.65 | 421.43 | top-left | 12.15 | 1627.97 |
| 675642.65 | 1882641.47 | 421.65 | top-right | 18.30 | 1634.05 |
| 675646.42 | 1882641.17 | 419.57 | clchannel | 15.90 | 1635.05 |
| 675651.42 | 1882650.52 | 421.42 | top-left | 10.92 | 1638.89 |
| 675643.30 | 1882650.02 | 421.40 | top-right | 8.57 | 1642.63 |
| 675647.75 | 1882650.74 | 420.08 | clchannel | 9.66 | 1644.71 |
| 675643.01 | 1882663.40 | 419.83 | step rock | 13.52 | 1658.23 |
| 675637.77 | 1882665.13 | 421.12 | top-right | 16.09 | 1658.72 |
| 675644.53 | 1882670.23 | 421.17 | top-left | 20.88 | 1659.77 |
| 675641.45 | 1882667.98 | 419.56 | clchannel | 4.84 | 1663.07 |
| 675626.15 | 1882691.98 | 419.92 | cl12'gravel | 28.46 | 1691.53 |
| 675616.11 | 1882700.17 | 420.99 | top-right | 41.20 | 1699.91 |
| 675622.35 | 1882704.43 | 420.52 | top-left | 40.76 | 1700.53 |
| 675619.34 | 1882703.01 | 419.33 | clchannel | 12.96 | 1704.50 |
| 675616.10 | 1882711.52 | 419.87 | step rock | 9.11 | 1713.61 |
| 675615.58 | 1882711.48 | 418.43 | toerock | 0.52 | 1714.13 |

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|-----------|------------|--------|-----------|-------|---------|
| 675613.31 | 1882729.82 | 420.60 | top-left | 26.95 | 1727.48 |
| 675605.53 | 1882728.37 | 420.38 | top-right | 30.12 | 1730.03 |
| 675608.86 | 1882729.47 | 419.18 | clchannel | 19.20 | 1733.33 |
| 675612.62 | 1882751.92 | 420.60 | top-left | 22.11 | 1749.59 |
| 675598.41 | 1882749.89 | 420.44 | top-right | 22.67 | 1752.70 |
| 675602.28 | 1882753.63 | 419.12 | clchannel | 25.04 | 1758.36 |
| 675589.62 | 1882759.78 | 420.23 | top-right | 13.24 | 1765.94 |
| 675591.54 | 1882762.56 | 419.12 | clchannel | 13.97 | 1772.33 |
| 675593.12 | 1882766.26 | 420.54 | top-left | 24.20 | 1773.79 |
| 675572.40 | 1882767.28 | 420.20 | top-right | 18.78 | 1784.72 |
| 675574.47 | 1882771.27 | 418.95 | clchannel | 19.17 | 1791.50 |
| 675575.55 | 1882774.37 | 420.22 | top-left | 19.35 | 1793.14 |
| 675557.00 | 1882778.23 | 419.96 | top-right | 18.90 | 1803.62 |
| 675564.09 | 1882782.88 | 419.91 | top-left | 14.28 | 1807.42 |
| 675553.28 | 1882781.35 | 420.15 | top-right | 4.85 | 1808.47 |
| 675559.23 | 1882780.64 | 418.41 | clchannel | 17.89 | 1809.39 |
| 675561.30 | 1882786.30 | 420.02 | top-left | 4.41 | 1811.84 |
| 675557.75 | 1882784.13 | 418.54 | clchannel | 3.79 | 1813.18 |
| 675546.50 | 1882811.15 | 420.65 | top-right | 30.56 | 1839.03 |
| 675554.68 | 1882814.04 | 419.72 | top-left | 28.51 | 1840.35 |
| 675550.96 | 1882812.39 | 418.44 | clchannel | 29.07 | 1842.24 |
| 675545.46 | 1882818.47 | 420.21 | top-right | 7.39 | 1846.42 |
| 675552.04 | 1882823.05 | 419.71 | top-left | 9.39 | 1849.74 |
| 675548.70 | 1882821.02 | 418.18 | clchannel | 8.93 | 1851.17 |
| 675533.62 | 1882830.53 | 419.95 | top-right | 16.90 | 1863.32 |
| 675535.27 | 1882834.69 | 418.46 | clchannel | 19.16 | 1870.33 |
| 675536.49 | 1882837.59 | 419.62 | top-left | 21.29 | 1871.04 |
| 675531.73 | 1882836.66 | 418.57 | step rock | 4.05 | 1874.38 |
| 675531.35 | 1882837.11 | 417.72 | toerock | 0.58 | 1874.97 |
| 675518.13 | 1882838.82 | 419.73 | top-right | 17.57 | 1880.89 |
| 675518.51 | 1882843.33 | 418.02 | clchannel | 14.27 | 1889.23 |
| 675519.96 | 1882847.56 | 419.67 | top-left | 19.30 | 1890.33 |
| 675508.06 | 1882845.48 | 419.48 | top-right | 12.07 | 1892.96 |
| 675513.03 | 1882851.00 | 418.88 | top-left | 7.74 | 1898.07 |
| 675510.67 | 1882847.76 | 417.84 | clchannel | 9.01 | 1898.24 |
| 675492.98 | 1882869.79 | 419.02 | top-right | 28.61 | 1921.57 |
| 675499.86 | 1882874.61 | 418.80 | top-left | 27.03 | 1925.10 |
| 675496.42 | 1882872.23 | 417.62 | clchannel | 28.31 | 1926.56 |
| 675488.00 | 1882878.96 | 418.76 | top-right | 10.43 | 1932.00 |
| 675493.52 | 1882885.74 | 419.04 | top-left | 12.81 | 1937.91 |
| 675490.68 | 1882883.02 | 417.28 | clchannel | 12.22 | 1938.78 |
| 675480.06 | 1882885.38 | 418.51 | top-right | 10.22 | 1942.22 |
| 675480.50 | 1882890.05 | 417.23 | clchannel | 12.38 | 1951.16 |
| 675481.05 | 1882893.78 | 418.68 | top-left | 14.84 | 1952.75 |
| 675464.59 | 1882885.70 | 418.21 | top-right | 15.47 | 1957.69 |
| 675464.01 | 1882889.02 | 417.07 | clchannel | 16.52 | 1967.68 |
| 675463.79 | 1882892.60 | 418.40 | top-left | 17.30 | 1970.06 |
| 675429.94 | 1882882.12 | 418.21 | top-right | 34.84 | 1992.53 |
| 675430.24 | 1882885.63 | 416.93 | clchannel | 33.94 | 2001.62 |
| 675430.40 | 1882889.03 | 417.90 | top-left | 33.58 | 2003.64 |
| 675412.33 | 1882888.74 | 418.17 | top-right | 18.81 | 2011.34 |
| 675418.88 | 1882895.77 | 417.92 | top-left | 13.34 | 2016.97 |
| 675414.17 | 1882892.70 | 416.47 | clchannel | 17.55 | 2019.17 |
| 675407.96 | 1882917.45 | 417.72 | top-left | 24.28 | 2041.25 |
| 675400.91 | 1882917.72 | 417.86 | top-right | 31.14 | 2042.49 |
| 675404.46 | 1882918.09 | 416.86 | clchannel | 27.19 | 2046.36 |
| 675396.45 | 1882939.14 | 417.80 | top-right | 21.88 | 2064.36 |
| 675396.26 | 1882939.26 | 417.83 | top-right | 0.24 | 2064.60 |

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|-----------|------------|--------|-----------|-------|---------|
| 675404.44 | 1882943.68 | 417.86 | top-left | 26.47 | 2067.72 |
| 675404.38 | 1882943.98 | 417.81 | top-left | 0.31 | 2068.03 |
| 675401.39 | 1882941.64 | 416.36 | clchannel | 23.74 | 2070.10 |
| 675401.33 | 1882941.94 | 416.32 | clchannel | 0.31 | 2070.41 |
| 675388.54 | 1882948.74 | 417.84 | top-right | 12.22 | 2076.82 |
| 675392.77 | 1882955.78 | 417.90 | top-left | 16.55 | 2084.58 |
| 675390.54 | 1882952.91 | 416.57 | clchannel | 15.39 | 2085.80 |
| 675367.50 | 1882962.22 | 417.74 | top-right | 24.98 | 2101.81 |
| 675376.46 | 1882965.43 | 417.54 | top-left | 18.96 | 2103.53 |
| 675364.94 | 1882968.20 | 417.71 | top-right | 6.50 | 2108.31 |
| 675370.46 | 1882964.49 | 416.36 | clchannel | 23.18 | 2108.98 |
| 675374.15 | 1882971.39 | 417.74 | top-left | 6.39 | 2109.93 |
| 675368.64 | 1882969.41 | 416.40 | clchannel | 5.24 | 2114.23 |
| 675367.54 | 1882975.34 | 416.79 | toprock | 6.03 | 2120.26 |
| 675367.46 | 1882975.55 | 415.69 | step rock | 0.23 | 2120.49 |
| 675371.74 | 1882983.40 | 417.57 | top-left | 12.24 | 2122.17 |
| 675362.92 | 1882985.02 | 417.59 | top-right | 16.95 | 2125.26 |
| 675367.28 | 1882984.41 | 416.23 | clchannel | 8.86 | 2129.35 |
| 675363.91 | 1883012.86 | 417.14 | top-right | 27.86 | 2153.12 |
| 675371.07 | 1883016.48 | 417.26 | top-left | 33.08 | 2155.26 |
| 675368.47 | 1883014.85 | 416.11 | clchannel | 30.47 | 2159.81 |
| 675360.89 | 1883021.54 | 417.08 | top-right | 9.18 | 2162.30 |
| 675367.43 | 1883025.56 | 417.35 | top-left | 9.79 | 2165.04 |
| 675363.39 | 1883023.74 | 415.58 | clchannel | 10.23 | 2170.04 |
| 675356.61 | 1883051.31 | 416.71 | top-left | 27.93 | 2192.97 |
| 675348.54 | 1883050.85 | 417.05 | top-right | 31.81 | 2194.11 |
| 675352.52 | 1883050.90 | 415.52 | clchannel | 29.25 | 2199.29 |
| 675362.75 | 1883063.84 | 416.89 | top-left | 13.95 | 2206.93 |
| 675354.63 | 1883066.78 | 417.02 | top-right | 17.06 | 2211.16 |
| 675358.34 | 1883065.44 | 415.72 | clchannel | 15.66 | 2214.96 |
| 675368.37 | 1883078.69 | 416.73 | top-left | 15.88 | 2222.80 |
| 675359.90 | 1883079.03 | 416.57 | top-right | 13.33 | 2224.49 |
| 675364.66 | 1883079.73 | 415.17 | clchannel | 15.63 | 2230.59 |
| 675359.27 | 1883086.76 | 416.51 | top-right | 7.76 | 2232.25 |
| 675366.00 | 1883089.85 | 416.71 | top-left | 11.41 | 2234.21 |
| 675356.03 | 1883092.62 | 416.62 | top-right | 6.70 | 2238.95 |
| 675362.28 | 1883088.81 | 415.49 | clchannel | 9.39 | 2239.98 |
| 675362.11 | 1883096.22 | 416.35 | top-left | 7.46 | 2241.67 |
| 675359.04 | 1883095.16 | 414.94 | clchannel | 7.13 | 2247.10 |
| 675347.33 | 1883105.49 | 416.09 | top-right | 15.53 | 2254.48 |
| 675351.72 | 1883111.63 | 416.20 | top-left | 18.59 | 2260.26 |
| 675349.66 | 1883108.72 | 415.00 | clchannel | 16.49 | 2263.59 |
| 675337.68 | 1883109.30 | 416.45 | top-right | 10.38 | 2264.86 |
| 675343.43 | 1883111.73 | 415.40 | step rock | 6.92 | 2270.51 |
| 675343.03 | 1883111.86 | 414.71 | toerock | 0.42 | 2270.93 |
| 675339.40 | 1883115.65 | 415.96 | top-left | 12.96 | 2273.22 |
| 675338.22 | 1883113.21 | 414.71 | clchannel | 4.99 | 2275.92 |
| 675313.87 | 1883114.53 | 416.00 | top-right | 24.38 | 2289.24 |
| 675317.18 | 1883121.48 | 415.80 | top-left | 22.98 | 2296.19 |
| 675315.15 | 1883117.80 | 414.65 | clchannel | 23.53 | 2299.45 |
| 675301.36 | 1883123.19 | 416.04 | top-right | 15.21 | 2304.45 |
| 675306.79 | 1883129.05 | 415.76 | top-left | 12.85 | 2309.04 |
| 675303.44 | 1883125.59 | 414.82 | clchannel | 14.06 | 2313.51 |
| 675295.39 | 1883130.14 | 415.61 | top-right | 9.17 | 2313.62 |
| 675301.66 | 1883135.75 | 415.47 | top-left | 8.44 | 2317.48 |
| 675298.65 | 1883133.59 | 413.75 | clchannel | 9.32 | 2322.83 |
| 675290.65 | 1883140.48 | 415.57 | top-right | 11.37 | 2324.99 |
| 675298.57 | 1883142.99 | 415.34 | top-left | 7.87 | 2325.35 |

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|-----------|------------|--------|-----------|-------|---------|
| 675294.11 | 1883141.65 | 414.20 | clchannel | 9.25 | 2332.08 |
| 675298.57 | 1883155.54 | 415.09 | top-left | 12.55 | 2337.90 |
| 675291.15 | 1883158.12 | 415.43 | top-right | 17.65 | 2342.64 |
| 675303.54 | 1883163.49 | 415.33 | top-left | 9.37 | 2347.27 |
| 675295.08 | 1883157.67 | 414.20 | clchannel | 16.06 | 2348.14 |
| 675295.93 | 1883159.71 | 414.49 | step rock | 2.21 | 2350.34 |
| 675296.24 | 1883160.28 | 413.28 | toerock | 0.65 | 2350.99 |
| 675297.37 | 1883167.36 | 415.01 | top-right | 11.13 | 2353.78 |
| 675300.83 | 1883165.62 | 413.87 | clchannel | 7.04 | 2358.04 |
| 675316.62 | 1883193.68 | 414.72 | top-left | 32.91 | 2380.18 |
| 675309.32 | 1883192.78 | 414.81 | top-right | 28.09 | 2381.87 |
| 675307.53 | 1883196.68 | 414.88 | top-right | 4.29 | 2386.16 |
| 675314.82 | 1883200.74 | 414.85 | top-left | 7.28 | 2387.46 |
| 675313.19 | 1883193.12 | 413.33 | clchannel | 30.15 | 2388.19 |
| 675303.03 | 1883202.06 | 414.77 | top-right | 7.01 | 2393.17 |
| 675310.97 | 1883198.28 | 413.49 | clchannel | 5.62 | 2393.80 |
| 675307.93 | 1883207.16 | 414.86 | top-left | 9.42 | 2396.88 |
| 675305.62 | 1883204.74 | 412.59 | clchannel | 8.39 | 2402.19 |
| 675295.59 | 1883226.69 | 414.35 | top-left | 23.10 | 2419.98 |
| 675285.68 | 1883225.02 | 415.31 | top-right | 28.78 | 2421.95 |
| 675290.47 | 1883226.55 | 412.48 | clchannel | 26.56 | 2428.75 |
| 675296.46 | 1883237.36 | 414.21 | top-left | 10.71 | 2430.69 |
| 675286.89 | 1883239.29 | 414.63 | top-right | 14.32 | 2436.27 |
| 675292.01 | 1883238.66 | 412.92 | clchannel | 12.21 | 2440.96 |
| 675296.85 | 1883258.88 | 413.87 | top-left | 21.52 | 2452.21 |
| 675289.13 | 1883257.50 | 413.65 | top-right | 18.35 | 2454.61 |
| 675293.32 | 1883258.56 | 412.09 | clchannel | 19.94 | 2460.90 |
| 675290.45 | 1883289.67 | 413.19 | top-left | 31.45 | 2483.66 |
| 675282.73 | 1883287.38 | 412.97 | top-right | 30.57 | 2485.18 |
| 675285.92 | 1883288.48 | 411.25 | clchannel | 30.82 | 2491.72 |
| 675282.56 | 1883307.44 | 412.51 | top-left | 19.45 | 2503.11 |
| 675277.39 | 1883306.27 | 411.80 | top-right | 19.62 | 2504.80 |
| 675279.24 | 1883307.38 | 410.67 | clchannel | 20.04 | 2511.76 |
| 675277.07 | 1883317.77 | 412.83 | top-left | 11.69 | 2514.80 |
| 675269.80 | 1883313.99 | 412.71 | top-right | 10.83 | 2515.63 |
| 675273.56 | 1883315.73 | 410.83 | clchannel | 10.10 | 2521.86 |
| 675254.73 | 1883332.30 | 412.03 | top-right | 23.71 | 2539.34 |
| 675259.56 | 1883338.74 | 412.17 | top-left | 27.33 | 2542.12 |
| 675256.95 | 1883335.91 | 410.80 | clchannel | 26.14 | 2548.00 |
| 675254.46 | 1883337.19 | 411.16 | j-hook | 0.27 | 2548.27 |
| 675239.92 | 1883334.83 | 411.82 | top-right | 15.03 | 2554.37 |
| 675233.94 | 1883332.54 | 411.81 | top-right | 6.40 | 2560.77 |
| 675233.39 | 1883332.24 | 411.69 | top-right | 0.63 | 2561.40 |
| 675240.24 | 1883341.14 | 409.25 | clchannel | 14.76 | 2563.03 |
| 675238.10 | 1883346.51 | 412.26 | top-left | 22.82 | 2564.95 |
| 675230.74 | 1883336.77 | 410.39 | clchannel | 10.45 | 2573.48 |
| 675230.70 | 1883336.55 | 410.38 | clchannel | 0.23 | 2573.70 |
| 675228.83 | 1883339.90 | 411.51 | top-left | 11.38 | 2576.33 |
| 675228.35 | 1883339.69 | 411.65 | top-left | 0.53 | 2576.86 |
| 675217.05 | 1883319.01 | 411.22 | top-right | 21.02 | 2582.42 |
| 675214.49 | 1883322.33 | 408.95 | clchannel | 21.56 | 2595.26 |
| 675210.50 | 1883325.32 | 411.19 | top-left | 22.92 | 2599.78 |
| 675191.12 | 1883299.80 | 410.44 | top-right | 32.27 | 2614.69 |
| 675186.20 | 1883295.73 | 411.23 | top-right | 6.38 | 2621.08 |
| 675189.74 | 1883303.56 | 408.70 | clchannel | 31.07 | 2626.33 |
| 675186.69 | 1883306.93 | 411.55 | top-left | 30.08 | 2629.86 |
| 675184.00 | 1883299.19 | 408.70 | clchannel | 7.21 | 2633.54 |
| 675181.74 | 1883304.45 | 411.62 | top-left | 5.54 | 2635.39 |

| | | | | | |
|-----------|------------|--------|-----------|-------|---------|
| 675164.67 | 1883289.52 | 410.53 | top-right | 22.41 | 2643.48 |
| 675164.23 | 1883293.41 | 408.60 | clchannel | 20.60 | 2654.14 |
| 675163.52 | 1883298.03 | 410.33 | top-left | 19.32 | 2654.71 |
| 675134.12 | 1883288.78 | 410.19 | top-right | 30.56 | 2674.05 |
| 675135.04 | 1883296.00 | 409.88 | top-left | 28.56 | 2683.27 |
| 675134.50 | 1883292.55 | 408.79 | clchannel | 29.74 | 2683.88 |
| 675118.34 | 1883290.46 | 409.66 | top-right | 15.86 | 2689.91 |
| 675123.23 | 1883300.12 | 409.94 | top-left | 12.51 | 2695.77 |
| 675119.59 | 1883295.87 | 408.24 | clchannel | 15.27 | 2699.15 |

e-Table. Raw Longitudinal Profile Survey Data Spreadsheets

Reach: Northern

Monitoring Year: Baseline

Date: May 2010

| Northing | Easting | Elevation | Notes | Length | Station |
|-----------|------------|-----------|-----------|--------|-----------|
| 677822.16 | 1883795.72 | 414.04 | clchannel | 0.00 | 1000.00 |
| 677826.34 | 1883805.85 | 417.63 | top-left | 0.00 | 1000 |
| 677813.51 | 1883783.35 | 417.96 | top-right | 0.00 | 1000.00 |
| 677811.05 | 1883812.20 | 417.62 | top-left | 16.55 | 1016.5535 |
| 677801.66 | 1883795.48 | 417.40 | top-right | 16.95 | 1016.95 |
| 677806.63 | 1883802.92 | 414.57 | clchannel | 17.12 | 1017.12 |
| 677774.11 | 1883811.17 | 417.69 | top-right | 31.71 | 1048.66 |
| 677773.53 | 1883811.66 | 417.53 | top-right | 0.76 | 1049.41 |
| 677777.55 | 1883819.79 | 415.32 | clchannel | 33.62 | 1050.74 |
| 677780.03 | 1883829.58 | 417.52 | top-left | 35.56 | 1052.1094 |
| 677773.84 | 1883821.28 | 415.65 | clchannel | 4.00 | 1054.73 |
| 677777.58 | 1883830.69 | 417.53 | top-left | 2.69 | 1054.7983 |
| 677745.82 | 1883819.29 | 417.20 | top-right | 28.74 | 1078.15 |
| 677749.00 | 1883829.16 | 414.66 | clchannel | 26.06 | 1080.79 |
| 677751.60 | 1883839.58 | 417.42 | top-left | 27.46 | 1082.2606 |
| 677719.59 | 1883832.15 | 417.22 | top-right | 29.21 | 1107.37 |
| 677726.39 | 1883850.06 | 417.32 | top-left | 27.30 | 1109.5596 |
| 677722.83 | 1883841.16 | 415.39 | clchannel | 28.79 | 1109.58 |
| 677693.63 | 1883843.25 | 417.38 | top-right | 28.24 | 1135.61 |
| 677697.96 | 1883852.38 | 415.25 | clchannel | 27.28 | 1136.87 |
| 677699.51 | 1883860.85 | 417.16 | top-left | 28.97 | 1138.5254 |
| 677665.26 | 1883848.67 | 417.03 | top-right | 28.87 | 1164.48 |
| 677664.04 | 1883849.27 | 416.95 | top-right | 1.37 | 1165.85 |
| 677666.43 | 1883858.44 | 414.89 | clchannel | 32.11 | 1168.98 |
| 677661.70 | 1883859.98 | 414.96 | clchannel | 4.97 | 1173.95 |
| 677663.78 | 1883867.99 | 417.78 | top-left | 36.44 | 1174.9606 |
| 677660.64 | 1883868.04 | 417.45 | top-left | 3.14 | 1178.1049 |
| 677624.18 | 1883849.75 | 417.22 | top-right | 39.86 | 1205.70 |
| 677625.16 | 1883858.92 | 415.07 | clchannel | 36.55 | 1210.50 |
| 677626.25 | 1883867.47 | 416.89 | top-left | 34.39 | 1212.4994 |
| 677607.53 | 1883854.02 | 416.84 | top-right | 17.19 | 1222.90 |
| 677606.69 | 1883860.59 | 413.44 | clchannel | 18.55 | 1229.06 |
| 677608.96 | 1883877.34 | 416.96 | top-left | 19.91 | 1232.4069 |
| 677606.55 | 1883877.00 | 416.76 | top-left | 2.43 | 1234.8372 |
| 677594.28 | 1883859.32 | 416.89 | top-right | 14.27 | 1237.16 |
| 677597.99 | 1883864.45 | 413.63 | clchannel | 9.51 | 1238.57 |
| 677593.42 | 1883887.78 | 416.97 | top-left | 16.99 | 1251.8246 |
| 677581.44 | 1883872.10 | 417.15 | top-right | 18.11 | 1255.28 |
| 677587.39 | 1883879.20 | 414.93 | clchannel | 18.16 | 1256.73 |
| 677575.91 | 1883919.68 | 417.01 | top-left | 36.39 | 1288.2138 |
| 677561.07 | 1883907.96 | 416.98 | top-right | 41.25 | 1296.53 |
| 677567.71 | 1883914.34 | 414.97 | clchannel | 40.28 | 1297.01 |
| 677558.29 | 1883951.70 | 416.92 | top-left | 36.55 | 1324.7653 |
| 677545.46 | 1883939.21 | 416.42 | top-right | 34.93 | 1331.46 |
| 677551.17 | 1883945.70 | 414.87 | clchannel | 35.45 | 1332.46 |
| 677528.89 | 1883955.69 | 415.97 | top-right | 23.37 | 1354.82 |
| 677533.74 | 1883971.10 | 416.87 | top-left | 31.28 | 1356.0495 |
| 677527.62 | 1883955.45 | 416.04 | top-right | 1.29 | 1356.11 |
| 677531.30 | 1883971.48 | 416.79 | top-left | 2.47 | 1358.5222 |
| 677532.11 | 1883964.82 | 414.30 | clchannel | 27.00 | 1359.46 |
| 677487.98 | 1883960.71 | 416.55 | top-right | 39.99 | 1396.11 |
| 677488.14 | 1883970.02 | 414.69 | clchannel | 44.28 | 1403.74 |
| 677486.77 | 1883979.49 | 416.97 | top-left | 45.24 | 1403.7606 |
| 677445.85 | 1883965.56 | 416.31 | top-right | 42.41 | 1438.52 |

e-Table. Raw Longitudinal Profile Survey Data Spreadsheets

Reach: Northern

Monitoring Year: Baseline

Date: May 2010

| Northing | Easting | Elevation | Notes | Length | Station |
|-----------|------------|-----------|---------------|--------|-----------|
| 677452.05 | 1883981.74 | 416.57 | top-left | 34.79 | 1438.5535 |
| 677448.55 | 1883972.95 | 414.62 | clchannel | 39.69 | 1443.43 |
| 677427.71 | 1883990.85 | 415.56 | top-left | 25.99 | 1464.5425 |
| 677417.07 | 1883980.30 | 416.35 | top-right | 32.33 | 1470.84 |
| 677416.82 | 1883980.63 | 416.36 | top-right | 0.42 | 1471.26 |
| 677420.83 | 1883985.35 | 413.72 | clchannel | 30.37 | 1473.80 |
| 677419.02 | 1884007.77 | 415.97 | top-left | 19.03 | 1483.5691 |
| 677411.02 | 1884002.80 | 414.19 | clchannel | 20.02 | 1493.82 |
| 677404.67 | 1884000.01 | 415.98 | top-right | 22.88 | 1494.14 |
| 677406.26 | 1884045.24 | 415.95 | top-left | 39.58 | 1523.1508 |
| 677397.99 | 1884043.50 | 414.06 | clchannel | 42.73 | 1536.55 |
| 677390.55 | 1884040.18 | 415.85 | top-right | 42.57 | 1536.71 |
| 677391.99 | 1884068.87 | 416.60 | top-left | 27.60 | 1550.7516 |
| 677389.56 | 1884070.62 | 416.10 | top-left | 3.00 | 1553.7502 |
| 677379.51 | 1884058.92 | 415.33 | top-right | 21.76 | 1558.47 |
| 677379.50 | 1884060.17 | 415.42 | top-right | 1.24 | 1559.71 |
| 677385.58 | 1884067.89 | 413.23 | clchannel | 27.37 | 1563.92 |
| 677359.50 | 1884096.15 | 415.98 | top-left | 39.44 | 1593.1889 |
| 677349.91 | 1884080.44 | 416.01 | top-right | 35.87 | 1595.58 |
| 677354.58 | 1884087.71 | 413.98 | clchannel | 36.80 | 1600.72 |
| 677318.39 | 1884093.84 | 415.76 | top-right | 34.25 | 1629.83 |
| 677322.56 | 1884112.32 | 415.87 | top-left | 40.32 | 1633.5091 |
| 677321.55 | 1884112.38 | 415.86 | top-left | 1.02 | 1634.5265 |
| 677313.96 | 1884096.63 | 415.57 | top-right | 5.24 | 1635.07 |
| 677317.95 | 1884105.61 | 413.96 | clchannel | 40.77 | 1641.48 |
| 677279.95 | 1884103.06 | 415.75 | top-right | 34.61 | 1669.68 |
| 677283.86 | 1884121.04 | 415.93 | top-left | 38.67 | 1673.196 |
| 677282.51 | 1884112.28 | 413.85 | clchannel | 36.06 | 1677.54 |
| 677255.71 | 1884109.46 | 415.90 | top-right | 25.07 | 1694.75 |
| 677260.83 | 1884124.09 | 415.21 | top-left | 23.23 | 1696.4269 |
| 677258.04 | 1884116.81 | 414.01 | clchannel | 24.88 | 1702.43 |
| 677239.60 | 1884138.31 | 414.81 | top-left | 25.55 | 1721.9765 |
| 677239.50 | 1884141.48 | 414.91 | top-left | 3.17 | 1725.1463 |
| 677226.60 | 1884125.82 | 415.96 | top-right | 33.39 | 1728.14 |
| 677232.03 | 1884130.13 | 412.61 | clchannel | 29.23 | 1731.65 |
| 677228.53 | 1884173.51 | 415.46 | top-left | 33.86 | 1759.0024 |
| 677211.45 | 1884160.85 | 415.75 | top-right | 38.16 | 1766.30 |
| 677218.17 | 1884171.92 | 413.61 | clchannel | 44.02 | 1775.68 |
| 677224.34 | 1884199.18 | 415.51 | top-left | 26.01 | 1785.0148 |
| 677223.35 | 1884201.30 | 415.65 | top-left | 2.34 | 1787.3509 |
| 677207.10 | 1884194.83 | 414.96 | top-right | 34.26 | 1800.56 |
| 677215.17 | 1884197.35 | 413.39 | clchannel | 25.61 | 1801.29 |
| 677204.73 | 1884200.44 | 415.19 | top-right | 6.09 | 1806.65 |
| 677212.32 | 1884203.20 | 412.44 | clchannel | 6.51 | 1807.80 |
| 677213.22 | 1884232.23 | 415.58 | top-left | 32.55 | 1819.9003 |
| 677195.42 | 1884225.26 | 415.07 | top-right | 26.51 | 1833.16 |
| 677204.55 | 1884228.19 | 413.01 | clchannel | 26.17 | 1833.96 |
| 677194.48 | 1884262.37 | 415.20 | top-left | 35.49 | 1855.3904 |
| 677181.47 | 1884252.42 | 414.97 | top-right | 30.53 | 1863.69 |
| 677187.66 | 1884256.76 | 413.22 | clchannel | 33.20 | 1867.16 |
| 677172.39 | 1884296.27 | 414.57 | top-left | 40.47 | 1895.8556 |
| 677159.74 | 1884284.14 | 414.70 | top-right | 38.45 | 1902.14 |
| 677166.14 | 1884291.13 | 413.09 | clchannel | 40.54 | 1907.71 |
| 677159.32 | 1884301.42 | 413.19 | cl18'stonecro | 12.35 | 1920.06 |

e-Table. Raw Longitudinal Profile Survey Data Spreadsheets

Reach: Northern

Monitoring Year: Baseline

Date: May 2010

| Northing | Easting | Elevation | Notes | Length | Station |
|-----------|------------|-----------|-----------|--------|-----------|
| 677158.66 | 1884319.09 | 414.98 | top-left | 26.62 | 1922.4804 |
| 677145.60 | 1884307.62 | 415.10 | top-right | 27.41 | 1929.55 |
| 677150.61 | 1884313.10 | 412.92 | clchannel | 14.57 | 1934.63 |
| 677142.48 | 1884347.20 | 414.23 | top-left | 32.44 | 1954.9158 |
| 677141.64 | 1884350.06 | 414.22 | top-left | 2.99 | 1957.903 |
| 677127.78 | 1884339.52 | 414.87 | top-right | 36.54 | 1966.09 |
| 677134.45 | 1884342.25 | 412.75 | clchannel | 33.33 | 1967.96 |
| 677124.54 | 1884346.74 | 414.91 | top-right | 7.91 | 1974.00 |
| 677132.93 | 1884349.27 | 412.46 | clchannel | 7.18 | 1975.14 |
| 677141.82 | 1884371.43 | 414.64 | top-left | 21.37 | 1979.2688 |
| 677141.76 | 1884374.37 | 414.72 | top-left | 2.94 | 1982.2082 |
| 677131.98 | 1884372.54 | 412.94 | clchannel | 23.28 | 1998.42 |
| 677124.21 | 1884371.63 | 415.16 | top-right | 24.90 | 1998.90 |
| 677132.49 | 1884376.26 | 412.75 | clchannel | 3.76 | 2002.19 |
| 677125.25 | 1884378.51 | 414.92 | top-right | 6.95 | 2005.85 |
| 677152.73 | 1884399.31 | 414.90 | top-left | 27.25 | 2009.4537 |
| 677159.06 | 1884418.19 | 414.63 | top-left | 19.91 | 2029.3616 |
| 677143.34 | 1884402.73 | 412.87 | clchannel | 28.60 | 2030.79 |
| 677135.01 | 1884405.90 | 414.76 | top-right | 29.08 | 2034.93 |
| 677159.94 | 1884424.00 | 414.56 | top-left | 5.88 | 2035.239 |
| 677150.52 | 1884419.30 | 412.85 | clchannel | 18.06 | 2048.85 |
| 677143.79 | 1884421.74 | 414.42 | top-right | 18.11 | 2053.04 |
| 677152.25 | 1884424.47 | 412.26 | clchannel | 5.45 | 2054.30 |
| 677144.99 | 1884426.44 | 413.98 | top-right | 4.85 | 2057.89 |
| 677156.21 | 1884455.89 | 414.97 | top-left | 32.11 | 2067.3534 |
| 677140.29 | 1884445.47 | 414.01 | top-right | 19.60 | 2077.49 |
| 677148.92 | 1884450.37 | 412.29 | clchannel | 26.11 | 2080.41 |
| 677147.91 | 1884451.56 | 412.12 | clchannel | 1.56 | 2081.97 |
| 677123.75 | 1884483.73 | 414.56 | top-left | 42.76 | 2110.1162 |
| 677114.58 | 1884469.44 | 414.10 | top-right | 35.15 | 2112.64 |
| 677118.71 | 1884476.35 | 412.28 | clchannel | 38.31 | 2120.28 |
| 677107.62 | 1884495.00 | 413.98 | top-left | 19.68 | 2129.7919 |
| 677097.99 | 1884481.54 | 414.42 | top-right | 20.53 | 2133.17 |
| 677104.17 | 1884487.12 | 412.16 | clchannel | 18.09 | 2138.37 |
| 677095.30 | 1884505.66 | 413.60 | top-left | 16.29 | 2146.0815 |
| 677083.71 | 1884500.08 | 414.31 | top-right | 23.41 | 2156.58 |
| 677091.17 | 1884502.77 | 411.77 | clchannel | 20.34 | 2158.71 |
| 677084.24 | 1884534.55 | 413.36 | top-left | 30.94 | 2177.02 |
| 677070.74 | 1884532.32 | 414.54 | top-right | 34.75 | 2191.33 |
| 677079.24 | 1884533.63 | 411.96 | clchannel | 33.09 | 2191.80 |
| 677086.20 | 1884550.55 | 413.73 | top-left | 16.12 | 2193.1441 |
| 677070.13 | 1884551.26 | 414.03 | top-right | 18.95 | 2210.28 |
| 677075.59 | 1884551.86 | 411.30 | clchannel | 18.59 | 2210.39 |
| 677100.31 | 1884599.24 | 414.07 | top-left | 50.69 | 2243.8334 |
| 677092.73 | 1884601.76 | 411.90 | clchannel | 52.76 | 2263.15 |
| 677083.20 | 1884603.45 | 413.34 | top-right | 53.80 | 2264.08 |
| 677099.64 | 1884632.78 | 414.21 | top-left | 33.55 | 2277.3831 |
| 677082.50 | 1884626.66 | 413.20 | top-right | 23.22 | 2287.30 |
| 677082.62 | 1884627.25 | 413.09 | top-right | 0.61 | 2287.91 |
| 677092.87 | 1884630.19 | 411.70 | clchannel | 28.43 | 2291.58 |
| 677092.62 | 1884630.98 | 411.66 | clchannel | 0.83 | 2292.41 |
| 677070.19 | 1884668.19 | 413.70 | top-left | 46.05 | 2323.4375 |
| 677058.69 | 1884654.34 | 413.84 | top-right | 36.14 | 2324.05 |
| 677064.69 | 1884661.70 | 411.88 | clchannel | 41.52 | 2333.93 |

e-Table. Raw Longitudinal Profile Survey Data Spreadsheets

Reach: Northern

Monitoring Year: Baseline

Date: May 2010

| Northing | Easting | Elevation | Notes | Length | Station |
|-----------|------------|-----------|-----------|--------|-----------|
| 677036.91 | 1884699.19 | 412.89 | top-left | 45.49 | 2368.9234 |
| 677026.66 | 1884691.35 | 413.98 | top-right | 48.95 | 2373.00 |
| 677037.33 | 1884708.25 | 413.47 | top-left | 9.07 | 2377.9946 |
| 677032.19 | 1884694.83 | 411.59 | clchannel | 46.41 | 2380.34 |
| 677021.12 | 1884703.50 | 413.77 | top-right | 13.35 | 2386.35 |
| 677028.65 | 1884704.92 | 411.59 | clchannel | 10.69 | 2391.03 |
| 677033.39 | 1884736.83 | 413.45 | top-left | 28.86 | 2406.8507 |
| 677016.41 | 1884735.40 | 413.55 | top-right | 32.24 | 2418.60 |
| 677024.78 | 1884735.93 | 411.24 | clchannel | 31.25 | 2422.28 |
| 677033.04 | 1884778.54 | 413.42 | top-left | 41.70 | 2448.5531 |
| 677014.64 | 1884776.02 | 413.47 | top-right | 40.66 | 2459.25 |
| 677023.92 | 1884776.95 | 411.59 | clchannel | 41.03 | 2463.32 |
| 677030.18 | 1884805.04 | 413.33 | top-left | 26.65 | 2475.2068 |
| 677013.99 | 1884800.20 | 412.76 | top-right | 24.19 | 2483.44 |
| 677023.13 | 1884802.74 | 411.23 | clchannel | 25.80 | 2489.12 |
| 677001.49 | 1884821.80 | 412.81 | top-right | 24.96 | 2508.41 |
| 677015.63 | 1884835.00 | 413.88 | top-left | 33.31 | 2508.5185 |
| 677011.93 | 1884836.39 | 413.54 | top-left | 3.96 | 2512.4742 |
| 677009.84 | 1884830.08 | 410.40 | clchannel | 30.40 | 2519.51 |
| 676977.85 | 1884835.80 | 412.92 | top-right | 27.47 | 2535.88 |
| 676985.07 | 1884851.44 | 413.31 | top-left | 30.79 | 2543.2621 |
| 676981.45 | 1884844.01 | 411.38 | clchannel | 31.62 | 2551.14 |
| 676953.78 | 1884847.54 | 413.38 | top-right | 26.78 | 2562.66 |
| 676960.43 | 1884862.97 | 413.07 | top-left | 27.21 | 2570.4694 |
| 676944.30 | 1884852.80 | 412.76 | top-right | 10.84 | 2573.50 |
| 676957.45 | 1884854.61 | 411.19 | clchannel | 26.24 | 2577.37 |
| 676928.15 | 1884863.52 | 412.92 | top-right | 19.38 | 2592.88 |
| 676937.44 | 1884876.39 | 412.85 | top-left | 26.61 | 2597.0832 |
| 676932.79 | 1884870.26 | 410.97 | clchannel | 29.21 | 2606.58 |
| 676900.17 | 1884883.18 | 412.81 | top-right | 34.20 | 2627.09 |
| 676912.23 | 1884898.58 | 413.12 | top-left | 33.59 | 2630.6748 |
| 676907.68 | 1884890.43 | 410.70 | clchannel | 32.21 | 2638.79 |
| 676905.76 | 1884891.58 | 410.79 | clchannel | 2.23 | 2641.02 |
| 676885.11 | 1884926.52 | 413.10 | top-left | 38.94 | 2669.6131 |
| 676871.35 | 1884915.63 | 412.64 | top-right | 43.39 | 2670.47 |
| 676877.62 | 1884920.38 | 410.81 | clchannel | 40.27 | 2681.29 |
| 676855.28 | 1884963.70 | 412.96 | top-left | 47.66 | 2717.2778 |
| 676842.44 | 1884952.46 | 412.24 | top-right | 46.82 | 2717.30 |
| 676854.49 | 1884963.72 | 412.94 | top-left | 0.80 | 2718.0741 |
| 676839.54 | 1884953.08 | 413.01 | top-right | 2.96 | 2720.26 |
| 676848.52 | 1884958.10 | 410.81 | clchannel | 47.64 | 2728.93 |
| 676847.30 | 1884958.70 | 410.67 | clchannel | 1.36 | 2730.29 |
| 676826.22 | 1884969.40 | 412.25 | top-right | 21.07 | 2741.33 |
| 676836.63 | 1884984.30 | 412.71 | top-left | 27.24 | 2745.3166 |
| 676831.70 | 1884975.81 | 410.33 | clchannel | 23.16 | 2753.45 |
| 676797.58 | 1884984.13 | 412.60 | top-right | 32.20 | 2773.54 |
| 676802.61 | 1885001.71 | 412.68 | top-left | 38.22 | 2783.5332 |
| 676799.60 | 1884993.37 | 410.20 | clchannel | 36.59 | 2790.04 |
| 676767.82 | 1884994.59 | 412.03 | top-right | 31.54 | 2805.08 |
| 676772.76 | 1885011.90 | 412.08 | top-left | 31.54 | 2815.074 |
| 676770.32 | 1885005.08 | 410.41 | clchannel | 31.53 | 2821.57 |
| 676733.14 | 1885006.35 | 412.54 | top-right | 36.62 | 2841.69 |
| 676739.00 | 1885024.88 | 412.24 | top-left | 36.17 | 2851.2396 |
| 676736.10 | 1885015.21 | 410.23 | clchannel | 35.69 | 2857.26 |

e-Table. Raw Longitudinal Profile Survey Data Spreadsheets

Reach: Northern

Monitoring Year: Baseline

Date: May 2010

| Northing | Easting | Elevation | Notes | Length | Station |
|-----------|------------|-----------|-----------|--------|-----------|
| 676716.47 | 1885039.46 | 412.14 | top-left | 26.84 | 2878.0801 |
| 676716.34 | 1885040.49 | 412.38 | top-left | 1.03 | 2879.1139 |
| 676700.19 | 1885025.16 | 412.36 | top-right | 37.94 | 2879.63 |
| 676700.39 | 1885027.39 | 412.21 | top-right | 2.24 | 2881.87 |
| 676704.01 | 1885031.44 | 409.31 | clchannel | 35.96 | 2893.22 |
| 676701.91 | 1885058.30 | 412.19 | top-left | 22.93 | 2902.0452 |
| 676686.10 | 1885048.67 | 412.43 | top-right | 25.63 | 2907.50 |
| 676694.29 | 1885052.73 | 410.31 | clchannel | 23.40 | 2916.62 |
| 676692.14 | 1885085.57 | 412.46 | top-left | 28.96 | 2931.0075 |
| 676672.92 | 1885077.32 | 412.46 | top-right | 31.53 | 2939.04 |
| 676689.01 | 1885096.46 | 412.04 | top-left | 11.33 | 2942.3378 |
| 676682.63 | 1885080.22 | 410.30 | clchannel | 29.86 | 2946.49 |
| 676670.01 | 1885090.89 | 412.39 | top-right | 13.89 | 2952.92 |
| 676680.11 | 1885092.36 | 409.43 | clchannel | 12.40 | 2958.89 |
| 676685.96 | 1885134.60 | 411.64 | top-left | 38.27 | 2980.6033 |
| 676684.37 | 1885141.60 | 411.26 | top-left | 7.17 | 2987.7773 |
| 676684.49 | 1885148.99 | 411.33 | top-left | 7.39 | 2995.1702 |
| 676667.33 | 1885134.02 | 411.81 | top-right | 43.21 | 2996.13 |
| 676683.44 | 1885150.93 | 411.36 | top-left | 2.21 | 2997.3786 |
| 676676.93 | 1885135.24 | 409.92 | clchannel | 43.00 | 3001.88 |
| 676666.70 | 1885146.90 | 411.72 | top-right | 12.90 | 3009.02 |
| 676682.04 | 1885166.91 | 411.28 | top-left | 16.04 | 3013.4152 |
| 676676.40 | 1885149.13 | 409.65 | clchannel | 13.89 | 3015.78 |
| 676667.38 | 1885162.39 | 411.10 | top-right | 15.51 | 3024.53 |
| 676676.35 | 1885165.06 | 408.89 | clchannel | 15.94 | 3031.71 |
| 676661.29 | 1885219.88 | 410.99 | top-left | 56.89 | 3070.3058 |
| 676645.40 | 1885213.38 | 411.12 | top-right | 55.53 | 3080.06 |
| 676651.32 | 1885215.73 | 409.45 | clchannel | 56.51 | 3088.23 |
| 676660.47 | 1885246.53 | 411.10 | top-left | 26.66 | 3096.9636 |
| 676661.14 | 1885250.66 | 410.96 | top-left | 4.18 | 3101.1462 |
| 676639.46 | 1885252.94 | 411.40 | top-right | 40.00 | 3120.06 |
| 676639.83 | 1885253.17 | 411.22 | top-right | 0.44 | 3120.50 |
| 676650.42 | 1885248.09 | 408.78 | clchannel | 32.37 | 3120.59 |
| 676671.53 | 1885269.69 | 411.15 | top-left | 21.68 | 3122.8268 |
| 676685.42 | 1885281.55 | 411.51 | top-left | 18.27 | 3141.0953 |
| 676660.44 | 1885273.35 | 409.39 | clchannel | 27.18 | 3147.77 |
| 676652.85 | 1885277.71 | 411.20 | top-right | 27.78 | 3148.28 |
| 676698.45 | 1885292.19 | 410.92 | top-left | 16.82 | 3157.915 |
| 676679.57 | 1885291.59 | 409.25 | clchannel | 26.43 | 3174.21 |
| 676672.73 | 1885297.60 | 411.40 | top-right | 28.13 | 3176.40 |
| 676691.96 | 1885299.95 | 408.54 | clchannel | 14.94 | 3189.15 |
| 676687.74 | 1885306.71 | 411.52 | top-right | 17.56 | 3193.96 |
| 676738.26 | 1885303.26 | 411.34 | top-left | 41.32 | 3199.2378 |
| 676734.37 | 1885312.22 | 408.90 | clchannel | 44.15 | 3233.30 |
| 676773.76 | 1885313.71 | 411.57 | top-left | 37.01 | 3236.2477 |
| 676774.22 | 1885313.73 | 411.38 | top-left | 0.46 | 3236.7074 |
| 676730.76 | 1885321.66 | 411.19 | top-right | 45.54 | 3239.50 |
| 676800.95 | 1885329.45 | 410.63 | top-left | 31.01 | 3267.7169 |
| 676769.38 | 1885322.03 | 409.02 | clchannel | 36.35 | 3269.66 |
| 676762.45 | 1885332.61 | 411.46 | top-right | 33.53 | 3273.04 |
| 676764.10 | 1885332.57 | 411.39 | top-right | 1.65 | 3274.68 |
| 676796.20 | 1885336.33 | 408.94 | clchannel | 30.39 | 3300.05 |
| 676823.33 | 1885354.09 | 410.66 | top-left | 33.28 | 3301.0006 |
| 676790.27 | 1885343.63 | 410.71 | top-right | 28.41 | 3303.09 |

e-Table. Raw Longitudinal Profile Survey Data Spreadsheets

Reach: Northern

Monitoring Year: Baseline

Date: May 2010

| Northing | Easting | Elevation | Notes | Length | Station |
|-----------|------------|-----------|-----------|--------|-----------|
| 676829.10 | 1885360.02 | 411.14 | top-left | 8.28 | 3309.2759 |
| 676836.59 | 1885376.56 | 410.78 | top-left | 18.15 | 3327.4288 |
| 676816.73 | 1885359.47 | 408.60 | clchannel | 30.93 | 3330.98 |
| 676810.25 | 1885364.53 | 410.56 | top-right | 28.91 | 3332.01 |
| 676811.22 | 1885368.65 | 410.80 | top-right | 4.23 | 3336.24 |
| 676820.56 | 1885365.59 | 408.97 | clchannel | 7.22 | 3338.21 |
| 676843.04 | 1885395.70 | 410.70 | top-left | 20.20 | 3347.6327 |
| 676818.85 | 1885382.10 | 410.36 | top-right | 15.47 | 3351.70 |
| 676827.54 | 1885379.45 | 408.61 | clchannel | 15.52 | 3353.72 |
| 676825.28 | 1885401.32 | 410.22 | top-right | 20.27 | 3371.97 |
| 676835.04 | 1885397.86 | 407.99 | clchannel | 19.88 | 3373.60 |
| 676843.48 | 1885427.62 | 410.75 | top-left | 31.92 | 3379.5547 |
| 676827.68 | 1885423.43 | 409.83 | top-right | 22.24 | 3394.21 |
| 676835.19 | 1885424.99 | 408.24 | clchannel | 27.13 | 3400.74 |
| 676837.20 | 1885448.93 | 410.93 | top-left | 22.22 | 3401.7709 |
| 676821.36 | 1885439.85 | 410.89 | top-right | 17.60 | 3411.81 |
| 676832.05 | 1885458.89 | 410.59 | top-left | 11.21 | 3412.9773 |
| 676829.24 | 1885443.73 | 408.79 | clchannel | 19.66 | 3420.39 |
| 676815.36 | 1885450.92 | 410.74 | top-right | 12.59 | 3424.40 |
| 676825.04 | 1885455.64 | 408.41 | clchannel | 12.63 | 3433.03 |
| 676815.88 | 1885494.26 | 410.66 | top-left | 38.90 | 3451.8729 |
| 676801.52 | 1885487.93 | 410.60 | top-right | 39.51 | 3463.90 |
| 676808.41 | 1885491.16 | 407.92 | clchannel | 39.22 | 3472.25 |
| 676816.26 | 1885517.37 | 409.91 | top-left | 23.11 | 3474.9852 |
| 676799.56 | 1885519.15 | 410.58 | top-right | 31.28 | 3495.19 |
| 676800.51 | 1885522.35 | 410.10 | top-right | 3.34 | 3498.52 |
| 676807.45 | 1885519.97 | 407.84 | clchannel | 28.83 | 3501.07 |
| 676831.15 | 1885540.91 | 410.34 | top-left | 27.85 | 3502.8341 |
| 676815.10 | 1885552.55 | 410.57 | top-right | 33.55 | 3532.07 |
| 676824.41 | 1885547.27 | 408.28 | clchannel | 32.14 | 3533.21 |
| 676859.26 | 1885567.96 | 410.53 | top-left | 39.02 | 3541.8516 |
| 676859.96 | 1885569.38 | 410.39 | top-left | 1.58 | 3543.4285 |
| 676842.91 | 1885578.38 | 410.85 | top-right | 37.95 | 3570.02 |
| 676852.36 | 1885573.25 | 407.85 | clchannel | 38.16 | 3571.37 |
| 676853.67 | 1885575.84 | 407.99 | clchannel | 2.91 | 3574.27 |
| 676846.63 | 1885582.17 | 410.85 | top-right | 5.31 | 3575.33 |
| 676880.03 | 1885597.61 | 410.37 | top-left | 34.64 | 3578.069 |
| 676863.35 | 1885607.98 | 410.40 | top-right | 30.76 | 3606.09 |
| 676871.71 | 1885602.43 | 408.21 | clchannel | 32.13 | 3606.40 |
| 676898.01 | 1885636.52 | 410.03 | top-left | 42.86 | 3620.9313 |
| 676880.38 | 1885640.49 | 409.94 | top-right | 36.70 | 3642.79 |
| 676900.38 | 1885661.37 | 409.42 | top-left | 24.97 | 3645.8964 |
| 676889.63 | 1885637.89 | 407.78 | clchannel | 39.73 | 3646.13 |
| 676890.64 | 1885642.45 | 406.69 | clchannel | 4.67 | 3650.80 |
| 676881.09 | 1885660.85 | 409.82 | top-right | 20.37 | 3663.15 |
| 676891.72 | 1885661.91 | 406.93 | clchannel | 19.50 | 3670.30 |
| 676893.80 | 1885688.45 | 409.52 | top-left | 27.86 | 3673.7608 |
| 676877.22 | 1885680.25 | 409.41 | top-right | 19.78 | 3682.94 |
| 676886.15 | 1885684.02 | 407.39 | clchannel | 22.80 | 3693.10 |
| 676879.67 | 1885721.49 | 408.51 | top-left | 35.94 | 3709.6986 |
| 676861.76 | 1885715.85 | 409.33 | top-right | 38.81 | 3721.75 |
| 676871.77 | 1885717.36 | 407.14 | clchannel | 36.30 | 3729.40 |
| 676875.44 | 1885745.32 | 408.32 | top-left | 24.20 | 3733.8957 |
| 676871.05 | 1885722.40 | 405.68 | clchannel | 5.10 | 3734.50 |

e-Table. Raw Longitudinal Profile Survey Data Spreadsheets

Reach: Northern

Monitoring Year: Baseline

Date: May 2010

| Northing | Easting | Elevation | Notes | Length | Station |
|-----------|------------|-----------|-----------|--------|-----------|
| 676856.83 | 1885749.41 | 409.09 | top-right | 33.92 | 3755.67 |
| 676868.61 | 1885745.87 | 406.80 | clchannel | 23.59 | 3758.09 |
| 676881.74 | 1885777.31 | 408.56 | top-left | 32.61 | 3766.5064 |
| 676857.95 | 1885760.19 | 408.82 | top-right | 10.84 | 3766.51 |
| 676859.18 | 1885768.56 | 409.01 | top-right | 8.46 | 3774.97 |
| 676864.37 | 1885778.31 | 408.40 | top-right | 11.04 | 3786.01 |
| 676873.51 | 1885778.22 | 406.72 | clchannel | 32.72 | 3790.81 |
| 676883.76 | 1885803.61 | 408.36 | top-left | 26.38 | 3792.882 |
| 676866.88 | 1885795.72 | 407.95 | top-right | 17.60 | 3803.61 |
| 676874.93 | 1885800.00 | 406.49 | clchannel | 21.83 | 3812.63 |
| 676874.28 | 1885803.05 | 405.51 | clchannel | 3.12 | 3815.75 |
| 676874.82 | 1885826.97 | 408.28 | top-left | 25.01 | 3817.8946 |
| 676857.98 | 1885812.29 | 407.54 | top-right | 18.81 | 3822.41 |
| 676865.35 | 1885817.63 | 404.57 | clchannel | 17.11 | 3832.86 |
| 676854.72 | 1885851.15 | 408.85 | top-left | 31.45 | 3849.3417 |
| 676851.08 | 1885841.42 | 405.15 | clchannel | 27.74 | 3860.59 |
| 676822.97 | 1885837.43 | 409.73 | top-right | 43.10 | 3865.52 |
| 676835.48 | 1885859.36 | 408.18 | top-left | 20.92 | 3870.2611 |
| 676831.77 | 1885847.70 | 405.83 | clchannel | 20.30 | 3880.90 |
| 676767.68 | 1885867.52 | 408.30 | top-right | 62.94 | 3928.46 |
| 676780.11 | 1885893.33 | 407.79 | top-left | 64.96 | 3935.2167 |
| 676775.42 | 1885883.97 | 404.70 | clchannel | 67.02 | 3947.91 |
| 676727.50 | 1885934.38 | 408.67 | top-left | 66.73 | 4001.9476 |
| 676699.76 | 1885913.42 | 409.36 | top-right | 81.98 | 4010.44 |

Appendix C. Vegetation Data

| | |
|----------------|--|
| Table 7.0 | Vegetation Plot Attribute Data |
| Table 8.0 | CVS Vegetation Metadata Table |
| Table 9.0 | CVS Stem Count Total and Planted by Plot and Species |
| Figure 7.0-7.2 | Vegetation Plot Photos |

**Table 7.0 Vegetation Plot Attribute Table
UT to Bear Creek (NCEEP# 92347)**

| Plot ID | Community Type | Planting Zone ID | Reach ID | Associated Gauge(s) | Method | CVS Level |
|---------|--------------------------|------------------|-------------|------------------------------|--------|-----------|
| 1 | Piedmont Alluvial Forest | NA | Northern UT | | CVS | I & II |
| 2 | Piedmont Alluvial Forest | NA | Northern UT | | CVS | I & II |
| 3 | Piedmont Alluvial Forest | NA | Northern UT | | CVS | I & II |
| 4 | Piedmont Alluvial Forest | NA | Northern UT | | CVS | I & II |
| 5 | Riparian Wetland | NA | Northern UT | 2 Ecotone groundwater gauges | CVS | I & II |
| 6 | Piedmont Alluvial Forest | NA | Northern UT | | CVS | I & II |
| 7 | Piedmont Alluvial Forest | NA | Northern UT | | CVS | I & II |
| 8 | Piedmont Alluvial Forest | NA | Southern UT | | CVS | I & II |
| 9 | Piedmont Alluvial Forest | NA | Southern UT | | CVS | I & II |
| 10 | Piedmont Alluvial Forest | NA | Southern UT | | CVS | I & II |
| 11 | Piedmont Alluvial Forest | NA | Southern UT | | CVS | I & II |
| 12 | Piedmont Alluvial Forest | NA | Southern UT | | CVS | I & II |

Table 8.0 CVS Vegetation Metadata Table - UT Bear Creek Stream Restoration (#92347) - Baseline Monitoring (2010)

| | |
|---------------------------|--|
| Report Prepared By | Sean Doig |
| Date Prepared | 5/19/2010 9:53 |
| database name | 92347UTBear.mdb |
| database location | C:\Documents and Settings\Owner\Desktop\EEP 2009 |
| computer name | GATELAP |
| file size | 46141440 |

DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT-----

| | |
|--------------------------------------|---|
| Metadata | Description of database file, the report worksheets, and a summary of project(s) and project data. |
| Proj, planted | Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes. |
| Proj, total stems | Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems. |
| Plots | List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.). |
| Vigor | Frequency distribution of vigor classes for stems for all plots. |
| Vigor by Spp | Frequency distribution of vigor classes listed by species. |
| Damage | List of most frequent damage classes with number of occurrences and percent of total stems impacted by each. |
| Damage by Spp | Damage values tallied by type for each species. |
| Damage by Plot | Damage values tallied by type for each plot. |
| Planted Stems by Plot and Spp | A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded. |
| ALL Stems by Plot and spp | A matrix of the count of total living stems of each species (planted and natural volunteers combined) for each plot; dead and missing stems are excluded. |

PROJECT SUMMARY-----

| | |
|------------------------------------|--|
| Project Code | 92,347 |
| project Name | UT to Bear Creek |
| Description | Northern and Southern Uts to Bear Creek just east of NC 902. |
| River Basin | Cape Fear |
| length(ft) | 4,877 |
| stream-to-edge width (ft) | 50 |
| area (sq m) | 45,304.23 |
| Required Plots (calculated) | 12 |
| Sampled Plots | 12 |

Table 9. Planted and Total Stem Counts - UT Bear Creek (#92347) - Baseline Monitoring (2010)

| Species | CommonName | Type | Plot 1 | | Plot 2 | | Plot 3 | | Plot 4 | | Plot 5 | | Plot 6 | |
|-----------------------------------|---------------------|------|--------|------|--------|------|--------|------|--------|------|--------|------|--------|------|
| | | | P | T | P | T | P | T | P | T | P | T | P | T |
| <i>Acer rubrum</i> | red maple | T | | | | | | | | | | 2 | | |
| <i>Aesculus sylvatica</i> | painted buckeye | S | | | | | | | | | | | | |
| <i>Alnus serrulata</i> | hazel alder | S | | | | | | | | | | | | |
| <i>Baccharis halimifolia</i> | eastern baccharis | S | 0 | 2 | | | | | | | | | | |
| <i>Betula nigra</i> | river birch | T | 1 | 1 | 1 | 1 | 2 | 3 | 2 | 2 | 1 | 1 | | |
| <i>Celtis laevigata</i> | sugarberry | T | | | | | 1 | 1 | 1 | 1 | | | 1 | 1 |
| <i>Cephalanthus occidentalis</i> | common buttonbush | S | | | | | | | | | 12 | 12 | | |
| <i>Fraxinus pennsylvanica</i> | green ash | T | 0 | 18 | 1 | 19 | 4 | 68 | 1 | 24 | 18 | 48 | 2 | 23 |
| <i>Gleditsia triacanthos</i> | honeylocust | T | | | 2 | 4 | 1 | 1 | | | | | | |
| <i>Ligustrum sinense</i> | Chinese privet | S | 0 | 1 | 0 | 2 | 0 | 3 | 0 | 1 | | | | |
| <i>Liquidambar styraciflua</i> | sweetgum | T | | | | | | | | | 0 | 4 | | |
| <i>Nyssa</i> | tupelo | T | | | | | 2 | 2 | | | | | | |
| <i>Nyssa sylvatica</i> | blackgum | T | | | | | | | 1 | 1 | | | 1 | 1 |
| <i>Platanus occidentalis</i> | American sycamore | T | 1 | 1 | | | | | 1 | 1 | 0 | 2 | 6 | 6 |
| <i>Quercus</i> | oak | T | 1 | 1 | | | | | | | | | 1 | 1 |
| <i>Quercus falcata</i> | southern red oak | T | | | 1 | 1 | | | | | | | | |
| <i>Quercus michauxii</i> | swamp chestnut oak | T | | | | | 2 | 2 | 1 | 1 | | | | |
| <i>Quercus nigra</i> | water oak | T | | | | | | | 0 | 1 | | | | |
| <i>Quercus phellos</i> | willow oak | T | | | | | 1 | 1 | | | | | | |
| <i>Rubus argutus</i> | sawtooth blackberry | S | | | | | 0 | 3 | 1 | 1 | | | | |
| <i>Salix</i> | willow | S | | | | | | | | | | | | |
| <i>Salix nigra</i> | black willow | S | | 14 | | | 0 | 1 | 1 | 1 | | | | |
| <i>Symphoricarpos orbiculatus</i> | coralberry | S | | 2 | 1 | 3 | | | | | | | 0 | 1 |
| <i>Ulmus</i> | elm | T | | | | | | | | | 0 | 5 | | |
| <i>Ulmus alata</i> | winged elm | T | | | | | | | | | 4 | 4 | | |
| <i>Ulmus americana</i> | American elm | T | | | | | | | | | | | 1 | 1 |
| Unknown | | U | | | 1 | 1 | | | | | | | 2 | 2 |
| Plot area (acres) | | | 0.0247 | | 0.0247 | | 0.0247 | | 0.0247 | | 0.0247 | | 0.0247 | |
| Species Count | | | 3 | 8 | 6 | 7 | 7 | 10 | 8 | 10 | 4 | 8 | 7 | 8 |
| Stem Count | | | 3 | 40 | 7 | 31 | 13 | 85 | 9 | 34 | 35 | 78 | 14 | 36 |
| Stems per Acre | | | 121.5 | 1619 | 283.4 | 1255 | 526.3 | 3441 | 364.4 | 1377 | 1417 | 3158 | 566.8 | 1457 |

Table 9. Planted and Total Stem Counts - UT Bear Creek (#92347) - Baseline Monitoring (2010)

| Species | CommonName | Plot 7 | | Plot 8 | | Plot 9 | | Plot 10 | | Plot 11 | | Plot 12 | | Baseline Mean (2010) | |
|-----------------------------------|---------------------|--------|-------|--------|-------|--------|------|---------|------|---------|------|---------|------|----------------------|-------|
| | | P | T | P | T | P | T | P | T | P | T | P | T | P | T |
| <i>Acer rubrum</i> | red maple | 0 | 2 | | | | | | | | | | | 0 | 2 |
| <i>Aesculus sylvatica</i> | painted buckeye | | | | | | | | | | | 1 | 1 | 1 | 1 |
| <i>Alnus serrulata</i> | hazel alder | | | | | | | 1 | 1 | 1 | 2 | | | 1 | 1.5 |
| <i>Baccharis halimifolia</i> | eastern baccharis | | | | | | | | | | | | | 0 | 2 |
| <i>Betula nigra</i> | river birch | 2 | 2 | 4 | 4 | 4 | 4 | 2 | 2 | 1 | 1 | 1 | 1 | 2 | 2 |
| <i>Celtis laevigata</i> | sugarberry | | | | | | | | | | | | | 1 | 1 |
| <i>Cephalanthus occidentalis</i> | common buttonbush | | | | | | | | | | | | | 12 | 12 |
| <i>Fraxinus pennsylvanica</i> | green ash | 0 | 12 | 1 | 1 | 1 | 14 | 3 | 22 | 0 | 61 | 3 | 31 | 3.8 | 28.4 |
| <i>Gleditsia triacanthos</i> | honeylocust | | | | | | | | | | | | | 1.5 | 2.5 |
| <i>Ligustrum sinense</i> | Chinese privet | 0 | 1 | 0 | 1 | | | | | | | | | 0 | 1.5 |
| <i>Liquidambar styraciflua</i> | sweetgum | | | | | | | | | | | | | 0 | 4 |
| <i>Nyssa</i> | tupelo | | | | | | | | | | | | | 2 | 2 |
| <i>Nyssa sylvatica</i> | blackgum | | | | | | | | | | | 1 | 1 | 1 | 1 |
| <i>Platanus occidentalis</i> | American sycamore | 1 | 1 | | | | | 2 | 2 | 2 | 2 | 1 | 1 | 2.3 | 2 |
| <i>Quercus</i> | oak | | | | | | | | | | | | | 1 | 1 |
| <i>Quercus falcata</i> | southern red oak | | | | | | | | | | | | | 1 | 1 |
| <i>Quercus michauxii</i> | swamp chestnut oak | | | | | | | 2 | 2 | | | | | 1.7 | 1.7 |
| <i>Quercus nigra</i> | water oak | | | | | | | | | | | | | 0 | 1 |
| <i>Quercus phellos</i> | willow oak | 2 | 2 | | | | | | | 5 | 5 | 1 | 1 | 2.3 | 2.3 |
| <i>Rubus argutus</i> | sawtooth blackberry | | | 0 | 1 | 0 | 3 | 0 | 1 | 0 | 6 | 0 | 1 | 0 | 2.3 |
| <i>Salix</i> | willow | | | | | | | 0 | 1 | | | | | 0 | 1 |
| <i>Salix nigra</i> | black willow | | | | | | | | | | | | | 1 | 5.3 |
| <i>Symphoricarpos orbiculatus</i> | coralberry | | | | | | | 0 | 1 | 0 | 44 | | | 1 | 10.2 |
| <i>Ulmus</i> | elm | | | 0 | 2 | | | | | | | | | 0 | 3.5 |
| <i>Ulmus alata</i> | winged elm | | | | | | | | | | | | | 4 | 4 |
| <i>Ulmus americana</i> | American elm | 2 | 2 | | | 0 | 4 | 0 | 3 | 0 | 3 | 0 | 1 | 1.5 | 2.3 |
| Unknown | | | | | | | | | | | | | | 1.5 | 1.5 |
| | Plot area (acres) | 0.0247 | | 0.0247 | | 0.0247 | | 0.0247 | | 0.0247 | | 0.0247 | | | |
| | Species Count | 4 | 7 | 2 | 5 | 2 | 4 | 5 | 9 | 4 | 8 | 6 | 8 | 19 | 27 |
| | Stem Count | 7 | 22 | 5 | 9 | 5 | 25 | 10 | 35 | 9 | 124 | 8 | 38 | 42.5 | 100.0 |
| | Stems per Acre | 283.4 | 890.7 | 202.4 | 364.4 | 202.4 | 1012 | 404.9 | 1417 | 364.4 | 5020 | 323.9 | 1538 | 143.5 | 337.3 |

Figure 7.0. Vegetation Plot Photos - UT Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347



VP 1 (Northern UT Sta. 12+20) (04/14/2010)



VP 2 (Northern UT Sta. 18+15) (04/14/2010)



VP 3 (Northern UT Sta. 24+35) (04/14/2010)



VP 4 (Northern UT Sta. 27+75) (04/14/2010)

Figure 7.1. Vegetation Plot Photos - UT Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347



VP 5 (Northern UT Sta. 29+50) (04/14/2010)



VP 6 (Northern UT Sta. 31+10) (04/14/2010)



VP 7 (Northern UT Sta. 33+75) (04/14/2010)



VP 8 (Southern UT Sta. 12+00) (04/15/2010)

Figure 7.2. Vegetation Plot Photos - UT Bear Creek Stream Restoration - Baseline Monitoring (2010) - Project #92347



VP 9 (Southern UT Sta. 14+45) (04/15/2010)



VP 10 (Southern UT Sta. 19+35) (04/15/2010)



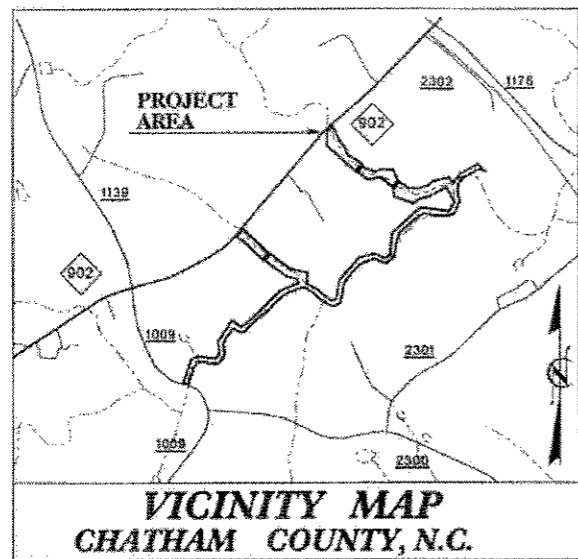
VP 11 (Southern UT Sta. 23+25) (04/15/2010)



VP 12 (Southern UT Sta. 24+55) (04/15/2010)

Appendix D. As-Built Plan Sheets

CONTRACT: BEAR CREEK SCO# 060684901

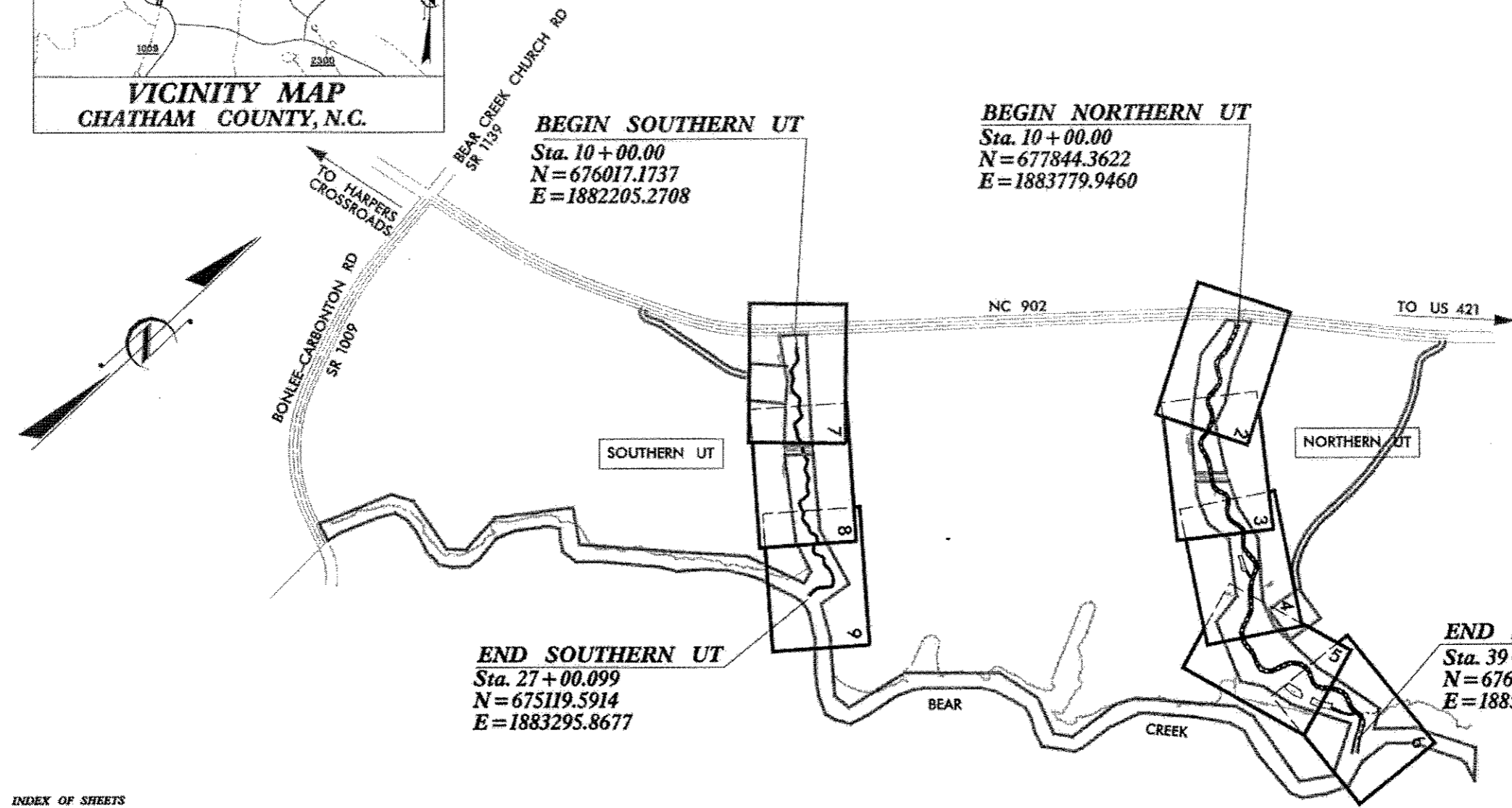
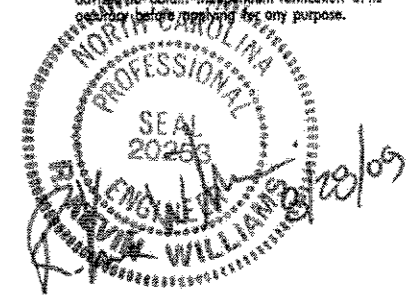


AS BUILT PLANS UT TO BEAR CREEK STREAM RESTORATION

LOCATION: CHATHAM COUNTY, NORTH CAROLINA
 LAT: 35°36'34" N LONG: 79°23'28" W
 TYPE OF WORK: AS BUILT PLANS

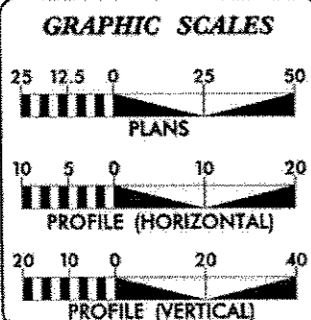
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|-------|-------------|-----------|--------------|
| STATE | PROJECT NO. | SHEET NO. | TOTAL SHEETS |
| N.C. | BEAR CREEK | 1 | |

AS BUILT
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INDEX OF SHEETS
 TITLE SHEET 1
 AS BUILT PLANS 3-9A

DISTURBED AREA = 18.80 Ac.



| DESIGN DATA | |
|--|---|
| NORTHERN UT | SOUTHERN UT |
| DESIGN STREAM TYPE = C4 | DESIGN STREAM TYPE = C4 |
| BANKFULL AREA (FT ²) = 25.8 CROSS-SECTIONED | BANKFULL AREA (FT ²) = 6.0 CROSS-SECTIONED |
| BANKFULL WIDTH (FT) = 19.0 | BANKFULL WIDTH (FT) = 8.5 |
| MAX DEPTH (FT) = 1.9 | MAX DEPTH (FT) = 1.1 |
| WIDTH /DEPTH RATIO = 14 | WIDTH /DEPTH RATIO = 12.0 |
| DRAINAGE AREA (MI ²) = 2.4 | DRAINAGE AREA (MI ²) = 0.3 |
| BANKFULL SLOPE(FT/FT) = 0.0028 | BANKFULL SLOPE(FT/FT) = 0.0041 |

| PROJECT LENGTH | |
|-------------------------------|--------------|
| EXISTING STREAM LENGTH | = 4,467 FEET |
| PROPOSED DESIGN STREAM LENGTH | = 4,878 FEET |
| WETLAND RESTORATION | = 0.40 ACRES |



OWNER CONTACT:

MELONIE ALLEN
 REP PROJECT MANAGER

SALAM MURTADA
 REVIEW COORDINATOR

Prepared in the Office of:
KO & ASSOCIATES, P.C.
 Consulting Engineers
 A Florence & Hatcheson, Inc. Company

5121 KINGDOM WAY
 SUITE 100
 RALEIGH, N.C. 27607
 (919) 851-6066
 FAX: (919) 851-6846

Record Document

R. KEVIN WILLIAMS
 PROJECT ENGINEER

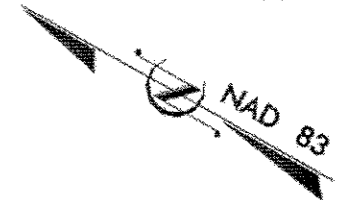
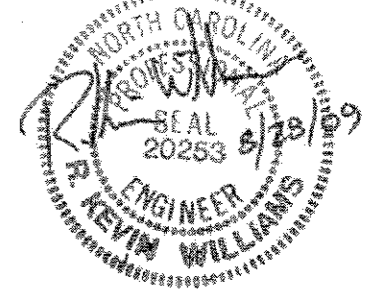
RYAN V. SMITH
 PROJECT DESIGNER

8/25/2009 P:\Construction\As_Built\BearCreek.asbuilt.dgn KO & Associates, P.C.

**ASBUILT PLANS
NORTHERN UT BEAR CREEK**

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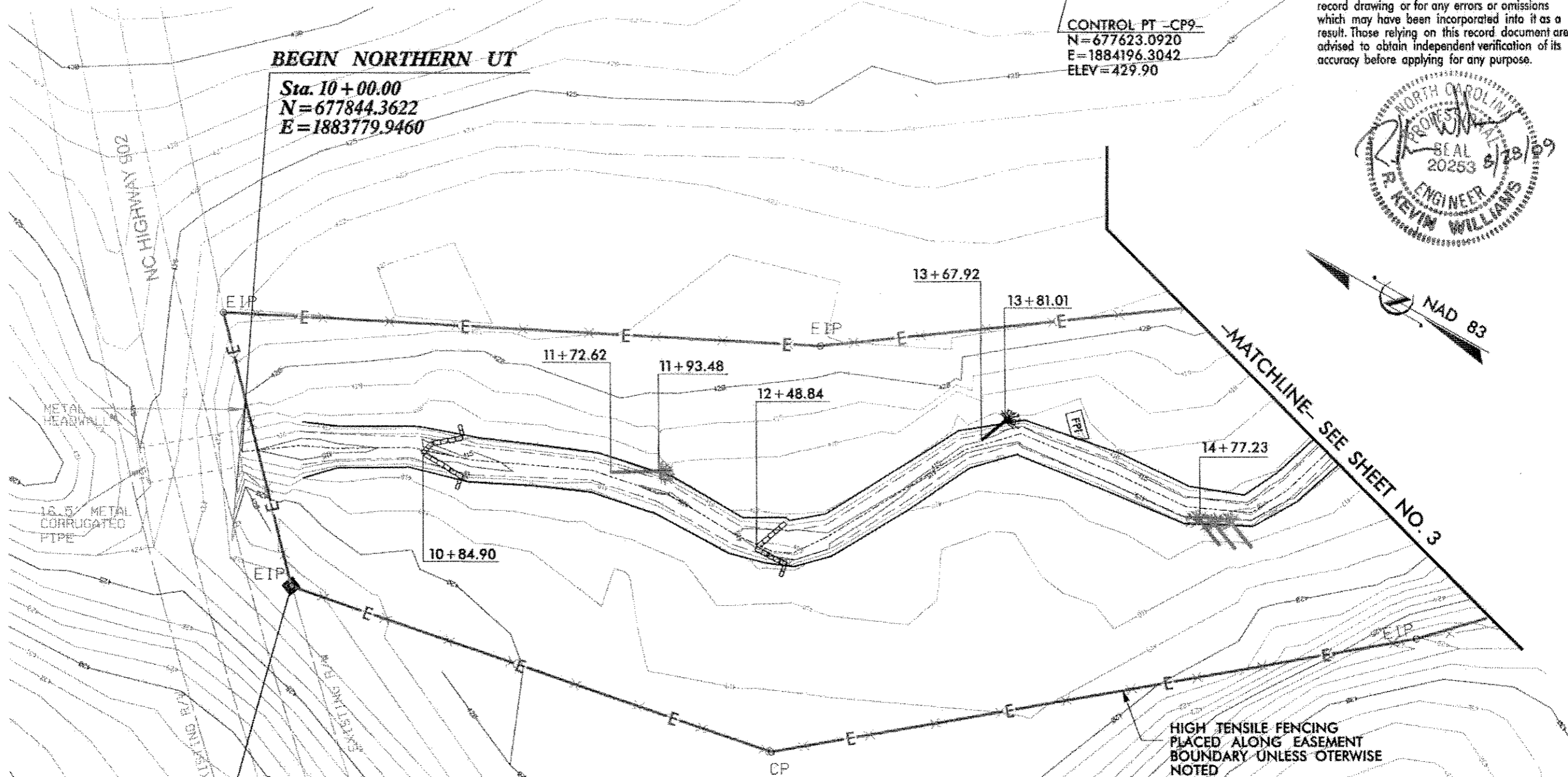


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E = 1883779.9460

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E = 1884196.3042
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CONTROL PT - CP5003 -
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E = 1883736.8146

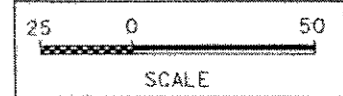


-MATCHLINE- SEE SHEET NO. 3

**HIGH TENSILE FENCING
PLACED ALONG EASEMENT
BOUNDARY UNLESS OTHERWISE
NOTED**

| LEGEND | | | |
|--------|------------------------|--|---------------------|
| | THALWEG | | LOG STEP SEQUENCE |
| | BANKFULL | | LOG SILL |
| | TOE OF SLOPE | | LOG VANE / ROOT WAD |
| | EASEMENT BOUNDARY | | L-VANE |
| | FLOODPLAIN INTERCEPTOR | | ROCK STEP STRUCTURE |
| | | | ROCK CROSS VANE |
| | | | LOG CROSS VANE |

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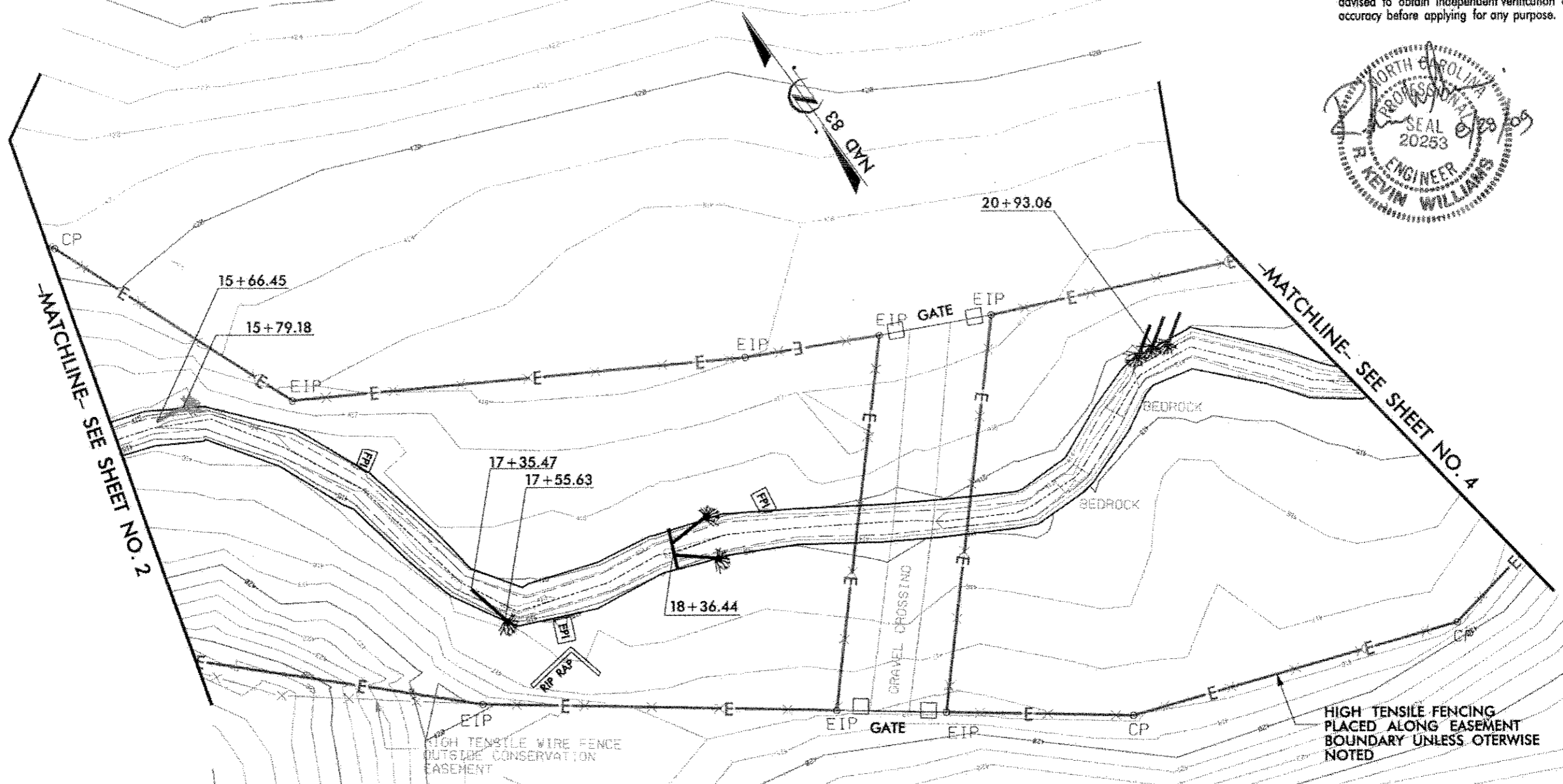
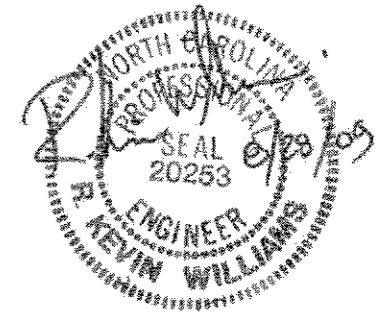
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| CHECKED BY: RKW | TOTAL SHEETS: 509 |

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ASBUILT PLANS NORTHERN UT BEAR CREEK

AS BUILT

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| LEGEND | | | |
|--------|------------------------|--|---------------------|
| | THALWEG | | LOG STEP SEQUENCE |
| | BANKFULL | | LOG SILL |
| | TOE OF SLOPE | | LOG VANE / ROOT WAD |
| | EASEMENT BOUNDARY | | L-VANE |
| | FLOODPLAIN INTERCEPTER | | LOG CROSS VANE |
| | ROCK STEP STRUCTURE | | ROCK CROSS VANE |

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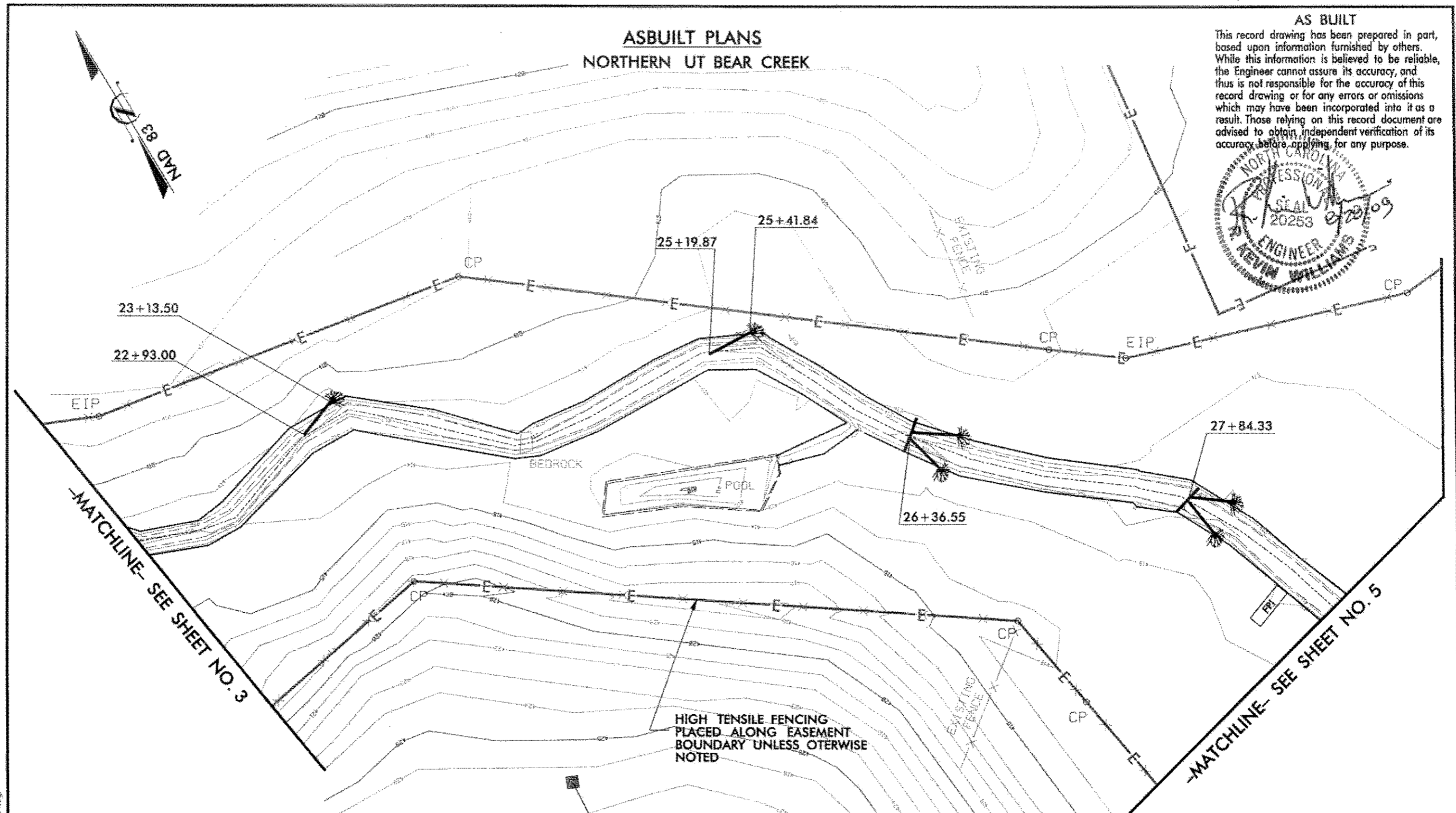
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| KO & ASSOCIATES, P.C. Consulting Engineers A Florence & Hutcheson, Inc. Company <small>5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607 (919) 851-8066</small> | | Record Document |
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 KO & ASSOCIATES, P.C.

ASBUILT PLANS
NORTHERN UT BEAR CREEK

AS BUILT

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-MATCHLINE- SEE SHEET NO. 3

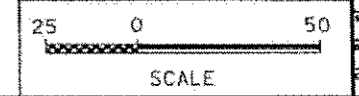
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HIGH TENSILE FENCING PLACED ALONG EASEMENT BOUNDARY UNLESS OTHERWISE NOTED

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|--------|------------------------|--|---------------------|
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| | TOE OF SLOPE | | LOG VANE / ROOT WAD |
| | EASEMENT BOUNDARY | | L-VANE |
| | FLOODPLAIN INTERCEPTER | | ROCK STEP STRUCTURE |
| | | | ROCK CROSS VANE |
| | | | LOG CROSS VANE |

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| | |
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| DESIGNED BY RYS | SHEET NO. 4 |
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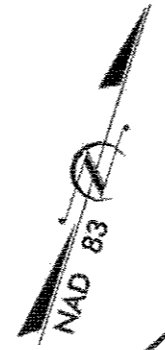
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 07/20/09
 Kevin Williams

ASBUILT PLANS NORTHERN UT BEAR CREEK

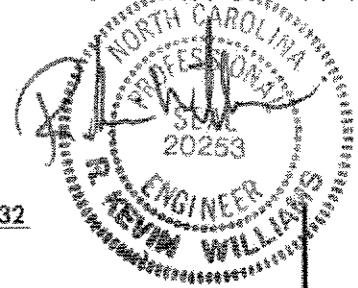
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| LEGEND | | | |
|--------|------------------------|--|---------------------|
| | THALWEG | | LOG STEP SEQUENCE |
| | BANKFULL | | LOG SILL |
| | TOE OF SLOPE | | LOG VANE / ROOT WAD |
| | EASEMENT BOUNDARY | | L-VANE |
| | FLOODPLAIN INTERCEPTER | | ROCK STEP STRUCTURE |
| | | | ROCK CROSS VANE |
| | | | LOG CROSS VANE |

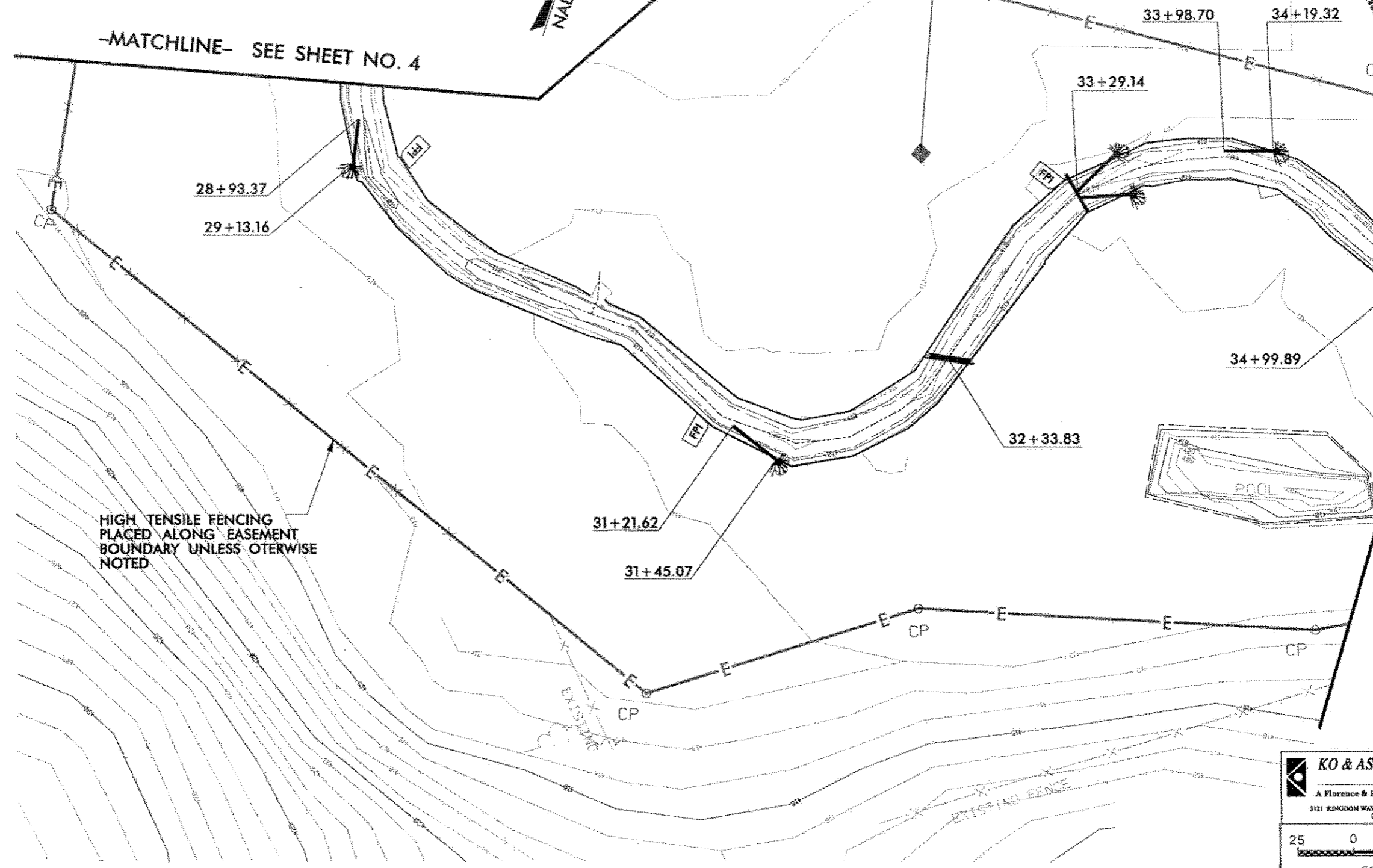


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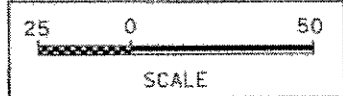
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HIGH TENSILE FENCING
PLACED ALONG EASEMENT
BOUNDARY UNLESS OTHERWISE
NOTED

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(919) 851-5066

Record Document



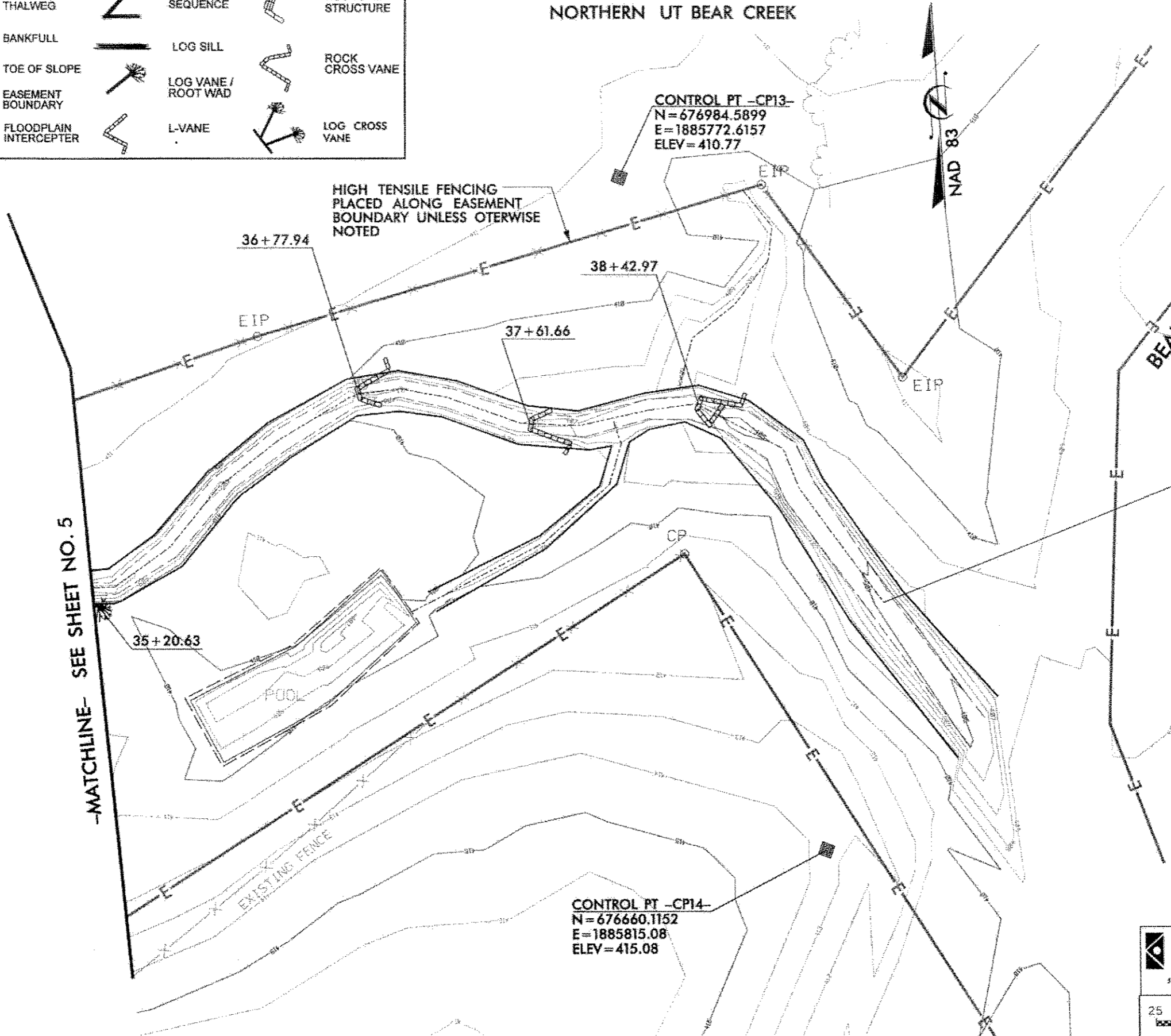
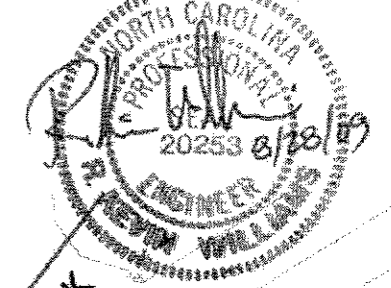
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| DRAWN BY RKW | DATE 5/09 |

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 R. Williams

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| | BANKFULL | | LOG SILL |
| | TOE OF SLOPE | | LOG VANE / ROOT WAD |
| | EASEMENT BOUNDARY | | L-VANE |
| | FLOODPLAIN INTERCEPTER | | LOG CROSS VANE |
| | | | ROCK STEP STRUCTURE |
| | | | ROCK CROSS VANE |

ASBUILT PLANS
NORTHERN UT BEAR CREEK

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-MATCHLINE- SEE SHEET NO. 5

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(919) 851-0066

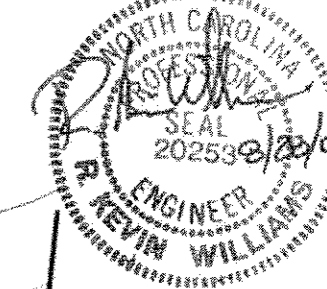


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| NO. 060684901 | COUNTY CHATHAM |
| DESIGNED BY RYS | SHEET NO. 6 |
| DRAWN BY RKW | DATE 5/09 |

**ASBUILT PLANS
SOUTHERN UT BEAR CREEK**

AS BUILT

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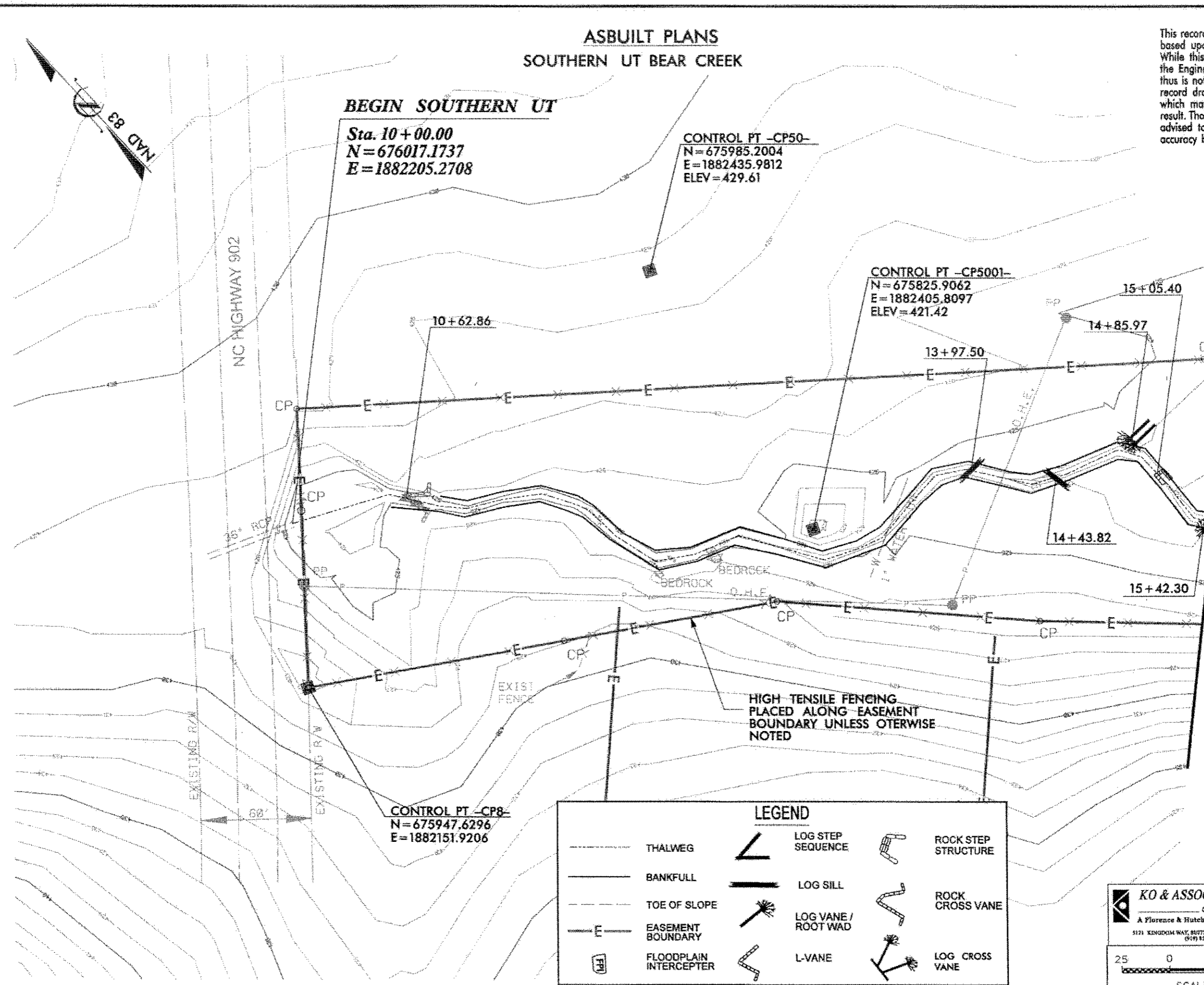
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ELEV=429.61

CONTROL PT -CP5001-
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CONTROL PT -CP8-
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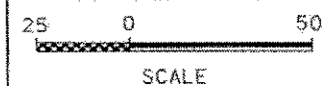
HIGH-TENSILE FENCING
PLACED ALONG EASEMENT
BOUNDARY UNLESS OTHERWISE
NOTED

-MATCHLINE- SEE SHEET NO. 8

| LEGEND | | | |
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| | BANKFULL | | LOG SILL |
| | TOE OF SLOPE | | LOG VANE / ROOT WAD |
| | EASEMENT BOUNDARY | | L-VANE |
| | FLOODPLAIN INTERCEPTOR | | ROCK STEP STRUCTURE |
| | | | ROCK CROSS VANE |
| | | | LOG CROSS VANE |

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Consulting Engineers
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5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607
(919) 851-6664

Record Document



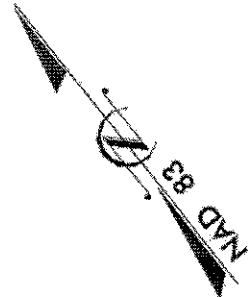
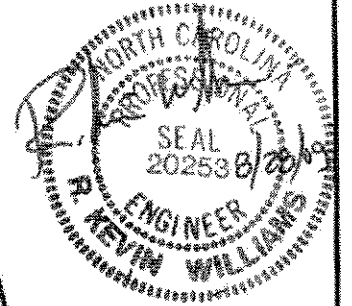
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| DRAWN BY: RVS | SHEET NO.: 7 |
| DATE: 10/11/09 | SCALE: 1"=50' |

8/26/2009
AsBuiltPlansBearCreek.asbuilt.pln, 7.dgn

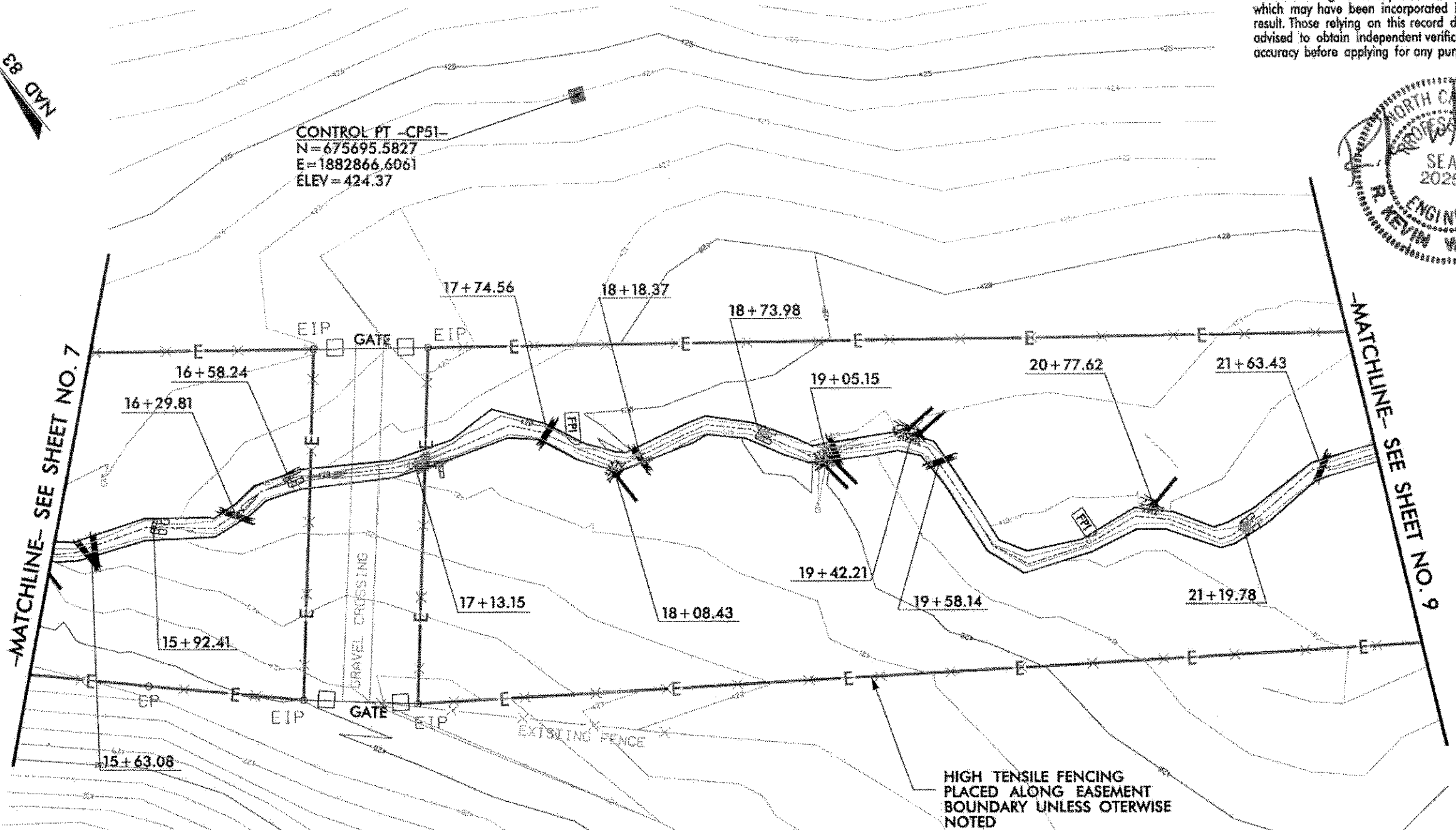
ASBUILT PLANS SOUTHERN UT BEAR CREEK

AS BUILT

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E=1882866.6061
ELEV=424.37



-MATCHLINE- SEE SHEET NO. 7

-MATCHLINE- SEE SHEET NO. 9

HIGH TENSILE FENCING
PLACED ALONG EASEMENT
BOUNDARY UNLESS OTHERWISE
NOTED

| LEGEND | | | |
|--------|------------------------|--|---------------------|
| | THALWEG | | LOG STEP SEQUENCE |
| | BANKFULL | | LOG SILL |
| | TOE OF SLOPE | | LOG VANE / ROOT WAD |
| | EASEMENT BOUNDARY | | L-VANE |
| | FLOODPLAIN INTERCEPTER | | LOG CROSS VANE |
| | | | ROCK STEP STRUCTURE |
| | | | ROCK CROSS VANE |

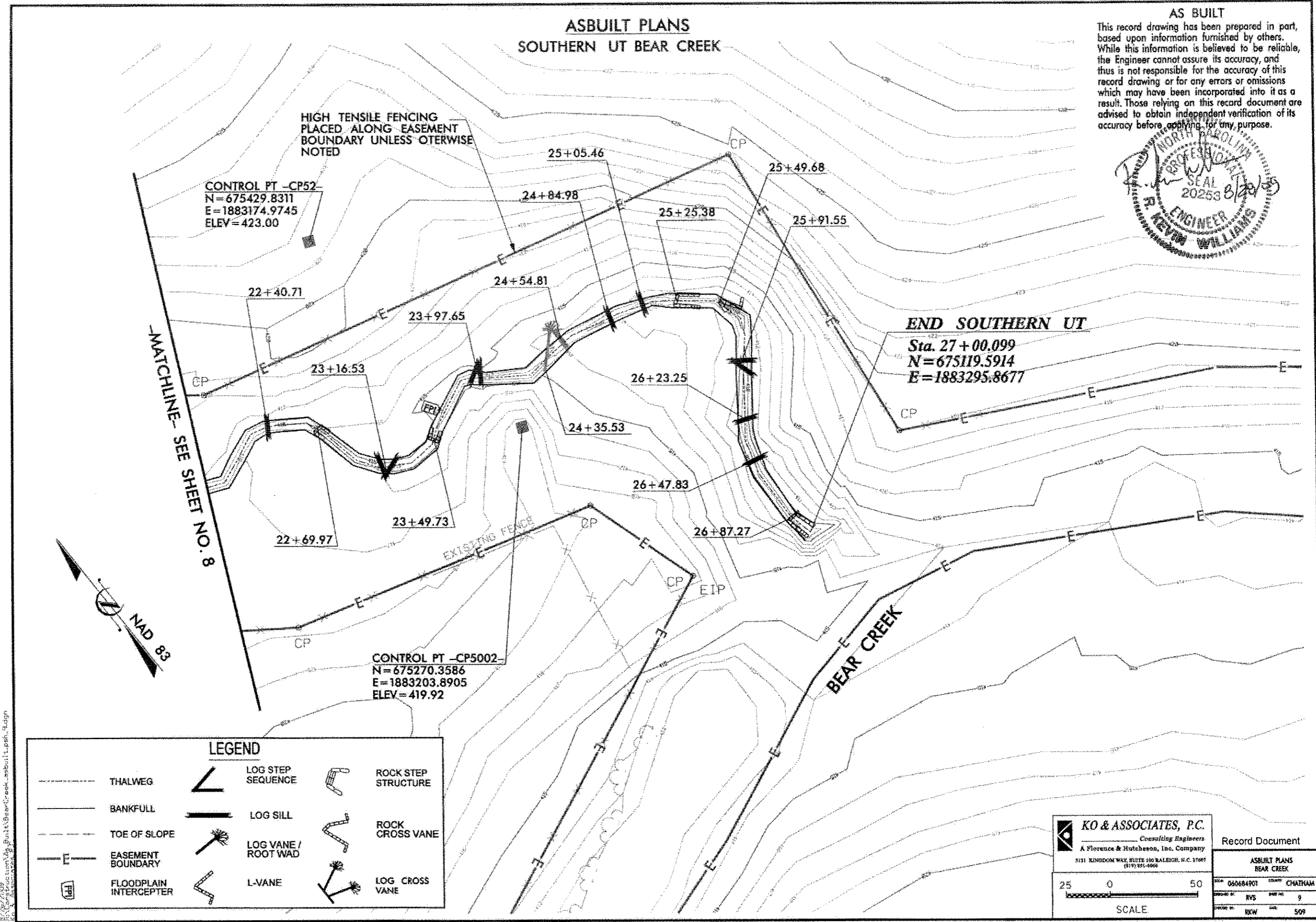
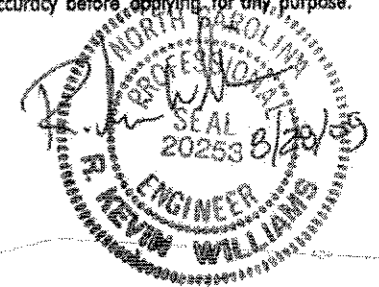
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|---|--|---|
| KO & ASSOCIATES, P.C. Consulting Engineers A Florence & Hutcheson, Inc. Company 5121 KINGDOM WAY, SUITE 100 RALEIGH, N.C. 27607 (919) 851-6065 | | Record Document ASBUILT PLANS BEAR CREEK DRAWING NO. 040684901 SHEET NO. 8 DATE: 8/20/08 DRAWN BY: RVS CHECKED BY: MKW |
| SCALE | | CHATHAM 509 |

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**ASBUILT PLANS
SOUTHERN UT BEAR CREEK**

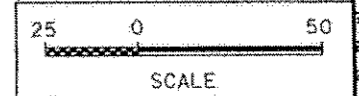
AS BUILT

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| LEGEND | | | |
|--------|------------------------|--|---------------------|
| | THALWEG | | LOG STEP SEQUENCE |
| | BANKFULL | | LOG SILL |
| | TOE OF SLOPE | | LOG VANE / ROOT WAD |
| | EASEMENT BOUNDARY | | L-VANE |
| | FLOODPLAIN INTERCEPTOR | | ROCK STEP STRUCTURE |
| | | | ROCK CROSS VANE |
| | | | LOG CROSS VANE |

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 (919) 921-0666



| | |
|-----------------------------|-----------------|
| Record Document | |
| ASBUILT PLANS BEAR CREEK | |
| SCALE: 060684901 | COUNTY: CHATHAM |
| DESIGNED BY: RVS | SHEET NO: 9 |
| DRAWN BY: RWK | DATE: 509 |

8/20/05
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 R. Williams