Monitoring Data Record

Project Title: R-2635C Western Wake Freeway COE Action ID: 2007-02903-292
Stream Name: UT Reedy Branch – Site 3 DWQ Number: 20071470
City, County and other Location Information: UT Reedy Branch is located along I-540 just south of Beaver Creek Commons Drive in Apex, NC.
Date Construction Completed: March 2011
Monitoring Year: (4) of 5
Ecoregion: 8 digit HUC unit 03020201
USGS Quad Name and Coordinates: 35.741277, -78.891054
Rosgen Classification:
Length of Project: 640' Urban or Rural: Urban Watershed Size:
Monitoring DATA collected by: M. Green, J. Young, J. Elliott, and P. Allen Date: 8/18/14
Applicant Information:
Name: NCDOT Roadside Environmental Unit
Address: 1425 Rock Quarry Road Raleigh, NC 27610
Telephone Number: (919) 861-3772 Email address: mlgreen@ncdot.gov

Consultant Information:
Name:
Address:
Telephone Number: Email address:
Project Status: Complete

Monitoring Level required by COE and DWQ (404 permit/ 401 Cert.): Level **1** ~~2~~ ~~3~~
Monitoring Level 1 requires completion of *Section 1, Section 2 and Section 3*

Permit States: **COE (2007-02903-292)** The permittee shall monitor the completed stream relocation in accordance with Monitoring Level 2 of the US Army Corps of Engineers, Wilmington District, Stream Mitigation Guidelines of April 2003. Monitoring will be conducted two times per year (spring and fall) each year of a 5-year monitoring period. The monitoring reports, including reference photographs, plant survival data and visual inspection notes identifying specific problem areas, will be submitted to the Corps of Engineers, Wilmington Regulatory Field Office within 60 days of completion of the monitoring. The monitoring report will also include a discussion of any deviations from the as-built condition and an evaluation of the significance of these deviations to channel stability. The success of the stream relocation as project mitigation will be evaluated based on those success criteria listed in the referenced Stream Mitigation Guidelines.

DWQ (20071470) The permittee shall visually monitor the vegetative plantings to assess and ensure complete stabilization of the mitigation stream segments. Riparian area success shall be determined by conducting stem counts to ensure a tree survival rate of 320 stems/acre. The monitoring shall be conducted annually for a minimum of 3 year after final planting. Photo documentation shall be utilized to document the success of the riparian vegetation and submitted to DWQ in a final report within sixty (60) days after completing monitoring. After 3 years the NC Turnpike Authority shall contact the DWQ to schedule a site visit to "close out" the mitigation site.

Section 1. PHOTO REFERENCE SITES
(Monitoring at all levels must complete this section)

Total number of reference photo locations at this site:
There are 8 photos taken at 4 permanent photo point locations looking up and down stream. Photos were also took at the vegetation plots, site overview, cross sections, bank pins, and bank scouring and headcutting areas.

Dates reference photos have been taken at this site: 7/7/11, 1/18/12, 7/16/12, 1/14/13, 6/20/13, 1/23/14, 8/18/14

Individual from whom additional photos can be obtained (name, address, phone):

Other Information relative to site photo reference: A site map is included with this report showing the photo point locations.

Section 2. PLANT SURVIVAL
Attach plan sheet indicating reference photos.

Identify specific problem areas (missing, stressed, damaged or dead plantings):

Estimated causes, and proposed/required remedial action:

ADDITIONAL COMMENTS: Planting was completed at this stream relocation in March 2011. NCDOT met with the resource agencies and the contractor in November 2012. The site was restaked with an additional 300 live stakes along the creek bank in December 2012 and planted with additional bareroot seedlings in January 2013 where dead or missing planted vegetation was noted during the 2012 summer evaluation. This additional planting increased the at planting total for Plot#1. The following planted species were planted on the streambank: black willow and silky dogwood live stakes and in the buffer area: tulip poplar, sycamore, river birch, and green ash seedlings. Two 50 x 50 foot vegetation plots were set in the buffer area in May 2011. Year 4 tree survival counts were conducted on 8/18/14. Year 4 summer evaluation found 579 trees per acre surviving which is well above the 320 trees per acre minimum. NCDOT will continue to monitor plant survival at this stream relocation for 2015.

Plot #	Tulip Poplar	Sycamore	River Birch	Green Ash	Total (Year 4)	Total (at planting)	Density (Trees Per Acre)
1	2	8	7	16	33	41	547
2	1	5	6	23	35	39	610
Year 4 Average Density (Trees/Acre)							**579**
Year 3 Average Density							612
Year 2 Average Density							571
Year 1 Average Density							618

Section 3. CHANNEL STABILITY

Visual Inspection: The entire stream project as well as each in-stream structure and bank stabilization/revetment structure must be evaluated and problems addressed.

Report on the visual inspection of channel stability. Physical measurements of channel stability/morphology will not be required. Include a discussion of any deviations from as-built and an evaluation of the significance of these deviations and whether they are indicative of a stabilizing or destabilizing situation.

The UT to Reedy Branch stream relocation has continued to show some signs of bank scouring and headcuting for the Year 4 Summer evaluation with little to no change since the last evaluation. See areas noted below. There is Triassic rock along this stream relocation which is a attributing factor to the bank scouring and headcutting. NCDOT met with the resource agencies and the contractor in November 2012. The resource agencies had no concerns with the existing stream stability issues at that time.

On May 20, 2014, NCDOT met onsite with regulatory agencies to review the bank scouring and headcutting areas. The regulatory agencies requested NCDOT to install bank pins within the bank scouring areas to determine how much of the banks were eroding over time.

On May 28, 2014, NCDOT set 3 cross sections and 4 bank pins within the 3 previously noted eroded areas.

On August 18, 2014, NCDOT monitored the site by re-shooting the cross sections (see cross section graphs & photos below), measuring the bank pins (see bank pin photos below), and taking photos of the site (see site photos below). The 3 cross sections showed that the stream was stable along these sections, except for, the right bank at Cross Section #2 which showed some right bank scouring. The 4 bank pins showed that the majority of these areas are eroding. Bank Pin #1 showed the bank had eroded approximately 2 feet, Bank Pin #2 showed no bank erosion, Bank Pin #3 showed the bank had eroded approximately 1.53 feet, and Bank Pin #4 showed the bank had eroded approximately 1.82 feet over a 3 month period.

NCDOT plans to scope a consultant to review the site to see what could be done to repair the eroding banks. NCDOT will continue to monitor the stream stability at the UT to Reedy Branch site in 2015.

Section 4. DEBIT LEDGER

The entire UT to Reedy Branch stream mitigation site was used for the R-2635C project to compensate for unavoidable stream impacts.

8/18/14	Station 320+80-L- (additional photo)	Station 320+20L- (additional photo)	Station 319+50-L- (additional photo)	Station 319+00-L- (additional photo)	Station 318+50-L- (additional photo)	Station 317+70-L- (additional photo)
Structure Type						
Is water piping through or around structure?						
Head cut or down cut present?						Headcut downstream of PP#4
Bank or scour erosion present?	Bank scouring along left bank b/t PP#2 and PP#3	Bank scouring along right bank b/t PP#2 and PP#3	Bank scouring along right bank b/t PP#3 and PP#4	Bank erosion on left bank b/t PP#3 and PP#4	Bank scouring on left bank upstream of PP#4	Bank scouring on right bank downstream of PP#4
Other problems noted?						
Bankfull event dates and how it was noted	Wrack Line 7/16/12	Wrack Line 1/14/13	Wrack Line 6/20/13	Wrack Line 8/18/14		

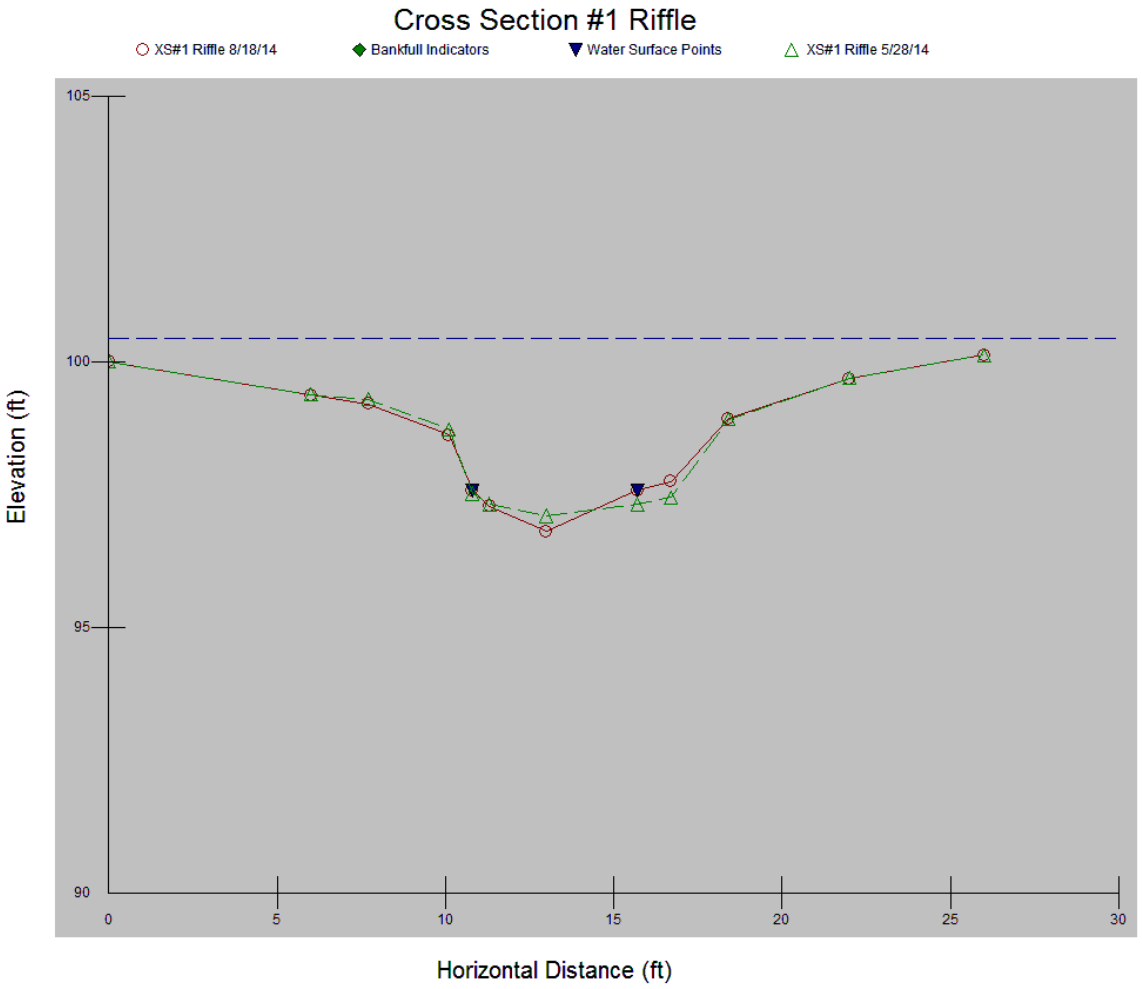


Photo of Cross Section #1

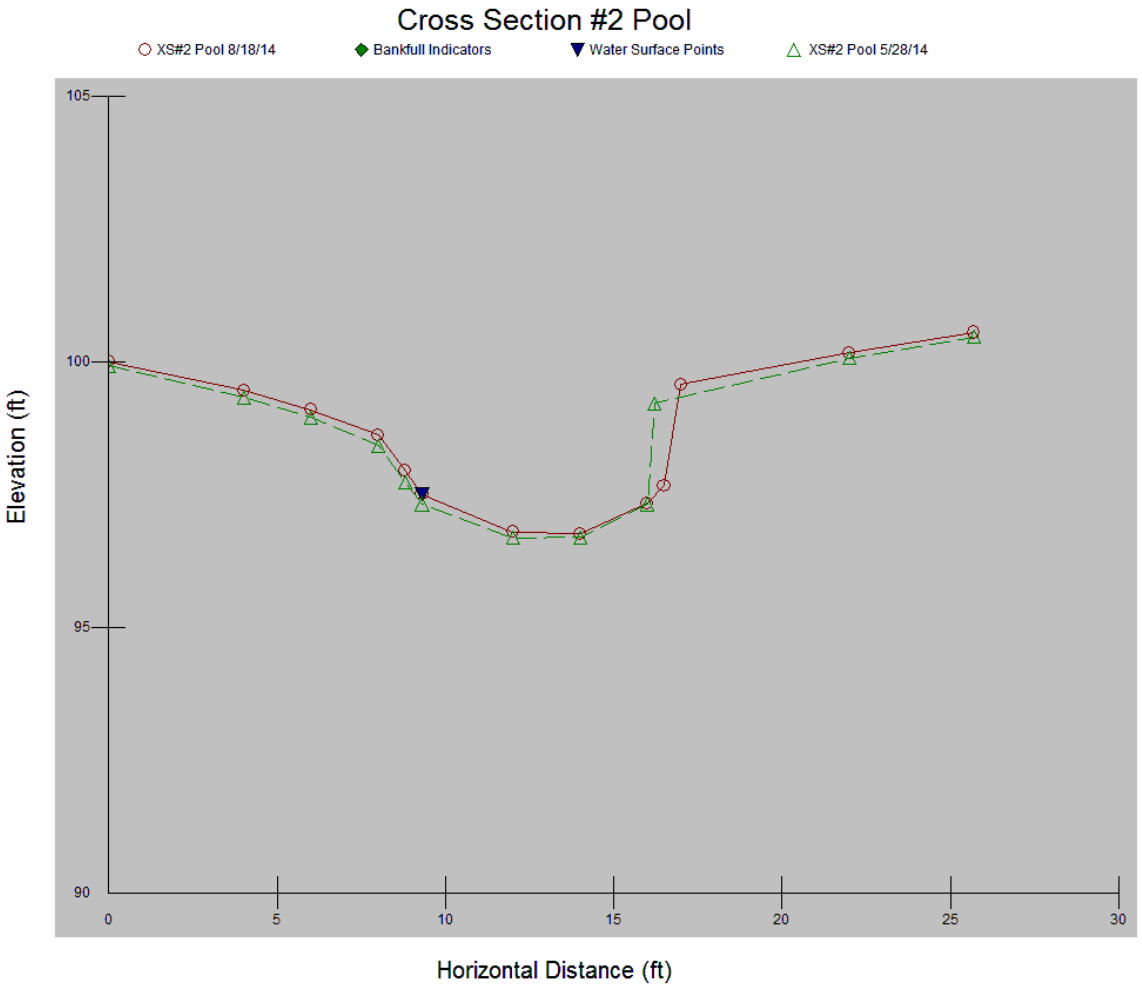


Photo of Cross Section #2

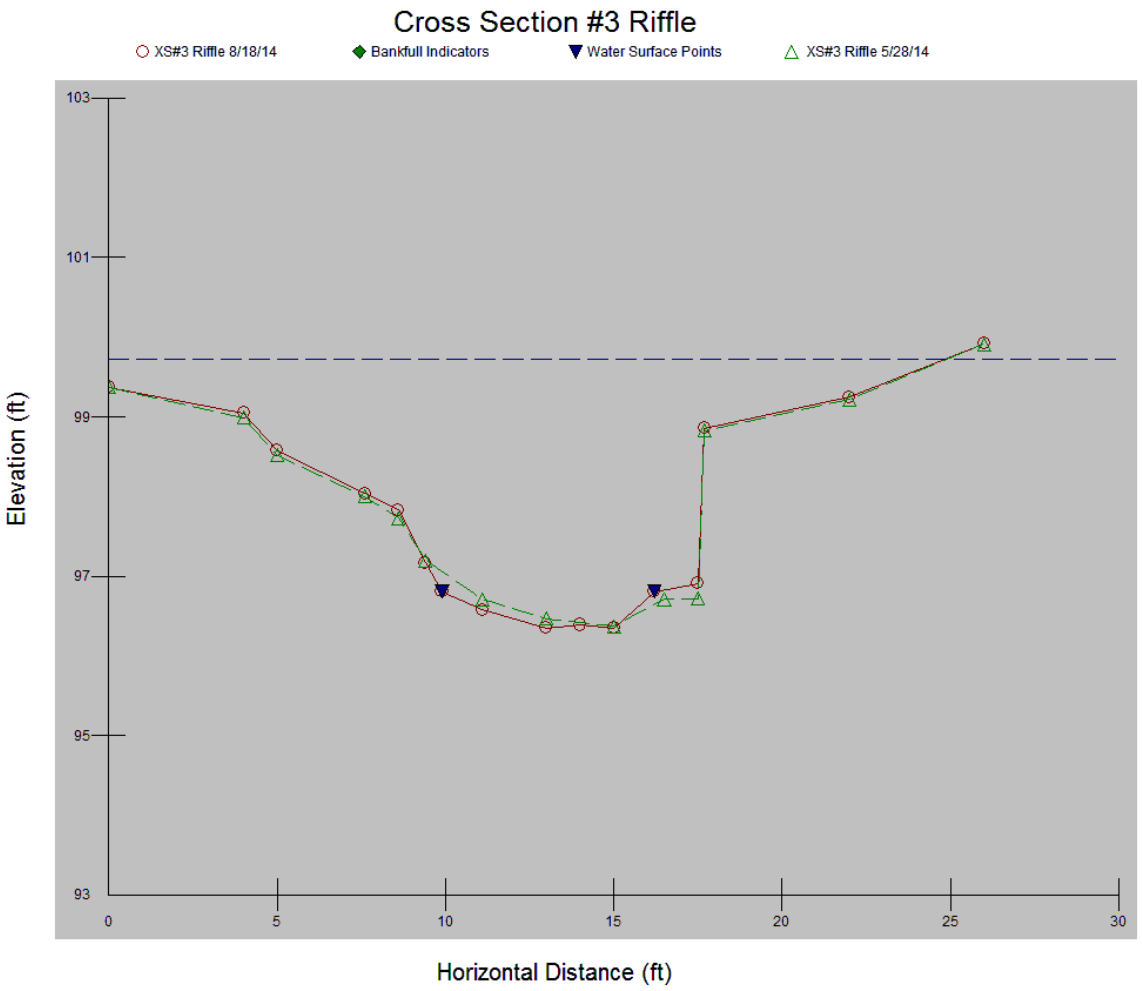


Photo of Cross Section #3

UT to Reedy Branch

Photo Point #1 (Upstream)

Photo Point #1 (Downstream)

Photo Point #2 (Upstream)

Photo Point #2 (Downstream)

Photo Point #3 (Upstream)

Photo Point #3 (Downstream)

UT to Reedy Branch

Photo Point #4 (Upstream) (Crossvane #2)

Photo Point #4 (Downstream)

Crossvane #1

Vegetation Plot #1

Vegetation Plot #2

Overview Photo of Site

UT to Reedy Branch

Left Bank Scouring @ Sta.320+80-L

Bank Pin #1 set horizontal into bank @ Sta. 320+80-L-

Bank Pin #2 set perpendicular into bank @ Sta. 320+80-L-

Right Bank Scouring @ Sta. 320+20-L-

Bank Pin #3 @ Sta. 320+40-L-

UT to Reedy Branch

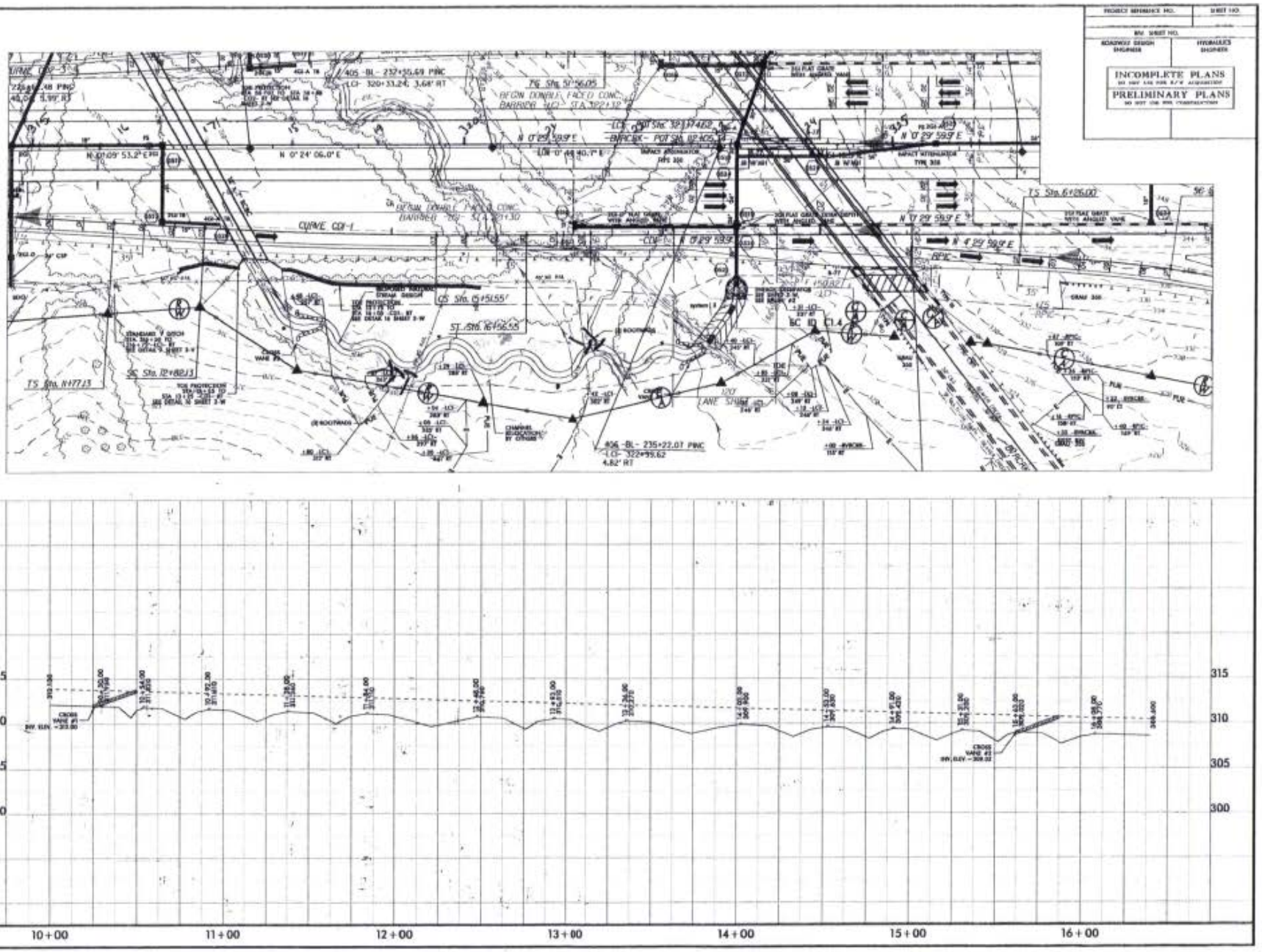
Bank Pin #4 @ Sta. 319+50

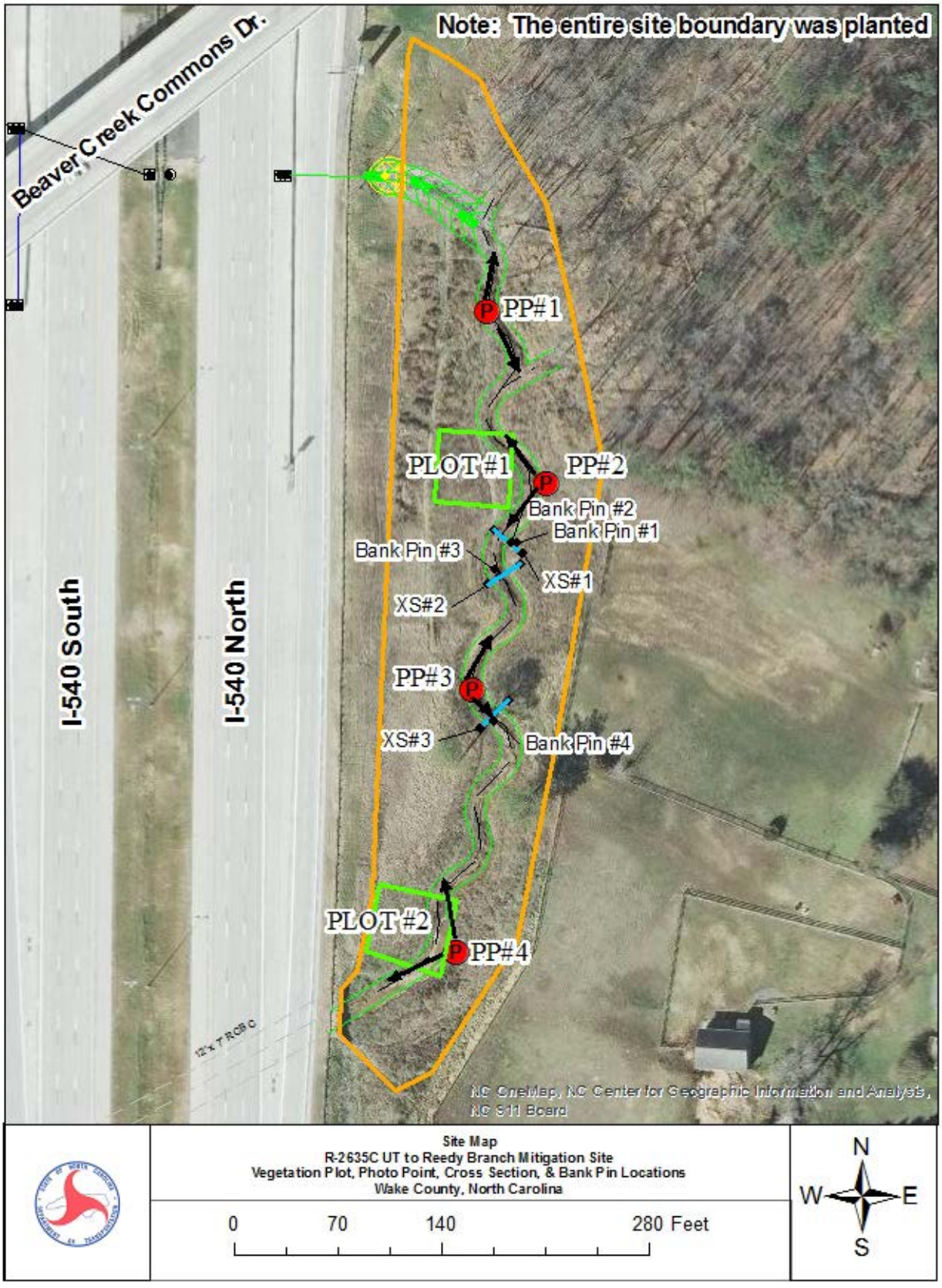
Left Bank Erosion @ Sta. 319+00–L-

Left bank scouring @ Sta. 318+50

Right bank scouring and headcut @ Sta. 317+70-L-

Year 4 Summer – August 2014

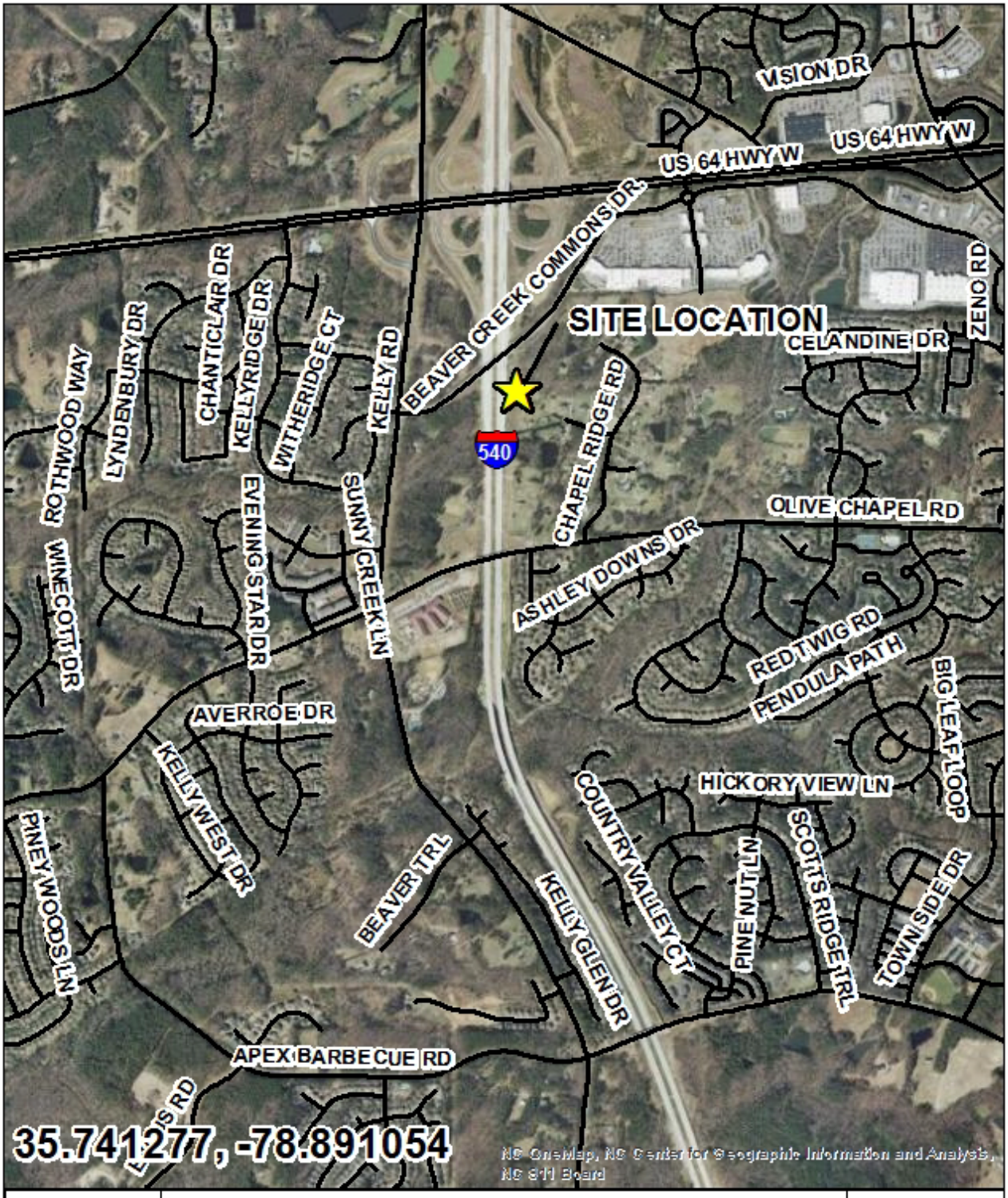

INCOMPLETE PLANS
PRELIMINARY PLANS
315
310
305
300
10+00
11+00
12+00
13+00
14+00
15+00
16+00



Site Map
R-2635C UT to Reedy Branch Mitigation Site
Vegetation Plot, Photo Point, Cross Section, & Bank Pin Locations
Wake County, North Carolina

0 70 140 280 Feet

N
W E
S



Vicinity Map
R-2635C Reedy Branch - Site 3
Wake County, North Carolina

0 0.25 0.5 1 Miles

N
W E
S