

Channel Mitigation Monitoring Sheets I, II, III, AND IV  
Monitoring Data Record

Project Title: R-2633A COE Action ID: SAW 1994-03552  
Stream Name: Bishop Branch DWR Number: 20100867  
DCM Number: 20100138

City, County and other Location Information: Brunswick County, approximately 7 miles southwest of Leland in Bishop, NC on NC 87 (Maco Rd NE) where it departs from US 17 (Ocean Highway E).

Date Construction Completed: \_\_\_\_\_ Final Planting: Dec. 2013 Monitoring Year: ( 3 ) of 3  
Ecoregion: Carolina Flatwoods 8 digit HUC unit 03030005  
USGS Quad Name and Coordinates: 34.181505, -78.084210

**Rosgen Classification:** \_\_\_\_\_

Length of Project: 66ft. of stream restoration, 570ft. of stream preservation, 0.63 acres of wetland restoration, and 2.95 acres of wetland preservation

Urban or Rural: Rural Watershed Size: 1.38 sq. mi.

Monitoring DATA collected by: M. Green, B. Bradley, P. Allen Date: 8-1-16

**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](mailto:mlgreen@ncdot.gov)

**Consultant Information:**

Name: \_\_\_\_\_

Address: \_\_\_\_\_

Telephone Number: \_\_\_\_\_ Email address: \_\_\_\_\_

**Project Status:** Complete

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**Monitoring Level required by COE and DWR (404 permit/ 401 Cert.):** Level 1

**Mitigation Plan states:** NCDOT shall monitor the restoration site by visual observation and photo points for survival and aerial cover of vegetation. NCDOT shall monitor the site for a minimum of three years or until the site is deemed successful. Monitoring will be initiated upon completion of the site planting.

**Permit states:** The permittee shall visually monitor the vegetative plantings to assess and ensure complete stabilization of the mitigation restoration area. Vegetative success shall be determined by conducting stem counts to ensure a tree survival rate of at least 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 NCDWR in a final report within sixty (60) days after completing monitoring. After 3 years the NCDOT shall contact NCDWR to schedule a site visit to “close out” the mitigation site. Success of the mitigation site shall be determined by NCDWR during an on-site visit at or near the end of the monitoring period.

Section 1. PHOTO REFERENCE SITES

*(Monitoring at all levels must complete this section)*

**Total number of reference photo locations at this site:** A total of 4 photos were taken from 3 photo point locations

**Dates reference photos have been taken at this site:** 6/24/14, 8/3/15, 8/1/16

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: NCDOT completed planting this site in December 2013 with silky dogwood and elderberry live stakes along the streambank and water oak, tulip poplar, willow oak, swamp blackgum, baldcypress, and swamp chestnut oak bareroot seedlings within the wetland restoration area. Two vegetation plots were set in the planted area. Plant survival counts were conducted during August 2016 monitoring evaluation with the results showing an average density of 490 trees per acre, which is well above the minimum success criteria of 320 trees per acre after the third year of monitoring. Other species noted on site included black willow, *Juncus* sp., woolgrass, fennel, cattail, red maple, *Sagittaria* sp., sedge, alder, sycamore, wax myrtle, pine and various grasses. On May 3, 2016, approximately 40 tag alder plugs were planted along the streambank as requested by the ACOE. The streambank is well vegetated with the following hardwood species noted along the banks: sycamore, tag alder, elderberry, black willow, sweetgum, and buttonbush. NCDOT proposes to discontinue plant survival monitoring at this site.

If required to complete Level 1 and Level 2 monitoring only stop here; otherwise, complete section 3.

Plot #	Water Oak	Tulip Poplar	Willow Oak	Swamp Blackgum	Baldcypress	Swamp Chestnut Oak	Total (Year 3)	Total (at planting)	Density (Trees/Acre)
1	4		7	7		6	24	31	526
2	1		1	12	3	7	24	36	453
<b>Year 3 Average Density</b>									<b>490</b>
Year 2 Average Density									583
Year 1 Average Density									553

**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 restoration of the Bishop Branch site involved the removal of the existing pavement and roadway fill of NC 87 Maco Road as well as the existing 72” by 96” CMA and associated headwall. Bishop Branch is stable for the Year 3 monitoring evaluation. NCDOT proposes to discontinue monitoring channel stability at the Bishop Branch Mitigation Site.

Date Inspected	Station Number				
Structure Type					
Is water piping through or around structure?					
Head cut or down cut present?					
Bank or scour erosion present?					
Other problems noted?					

Bankfull event dates and how it was noted	Wrack Line 8/3/15				
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**Section 4. DEBIT LEDGER**

The Bishop Branch mitigation site was constructed to provide 66ft of stream restoration at a 1:1 ratio, 570ft. of stream preservation at a 5:1 ratio, 0.63 acres of wetland restoration at a 1:1 ratio, and 2.95 acres of wetland preservation at a 5:1 ratio\_ which was used entirely for the R-2633A project to compensate for unavoidable stream and wetland impacts.

# Bishop Branch



PP #1 looking South



PP #2 looking West (Upstream)



PP #2 looking East (Downstream)



PP #3 looking North

August 2016

REVISIONS

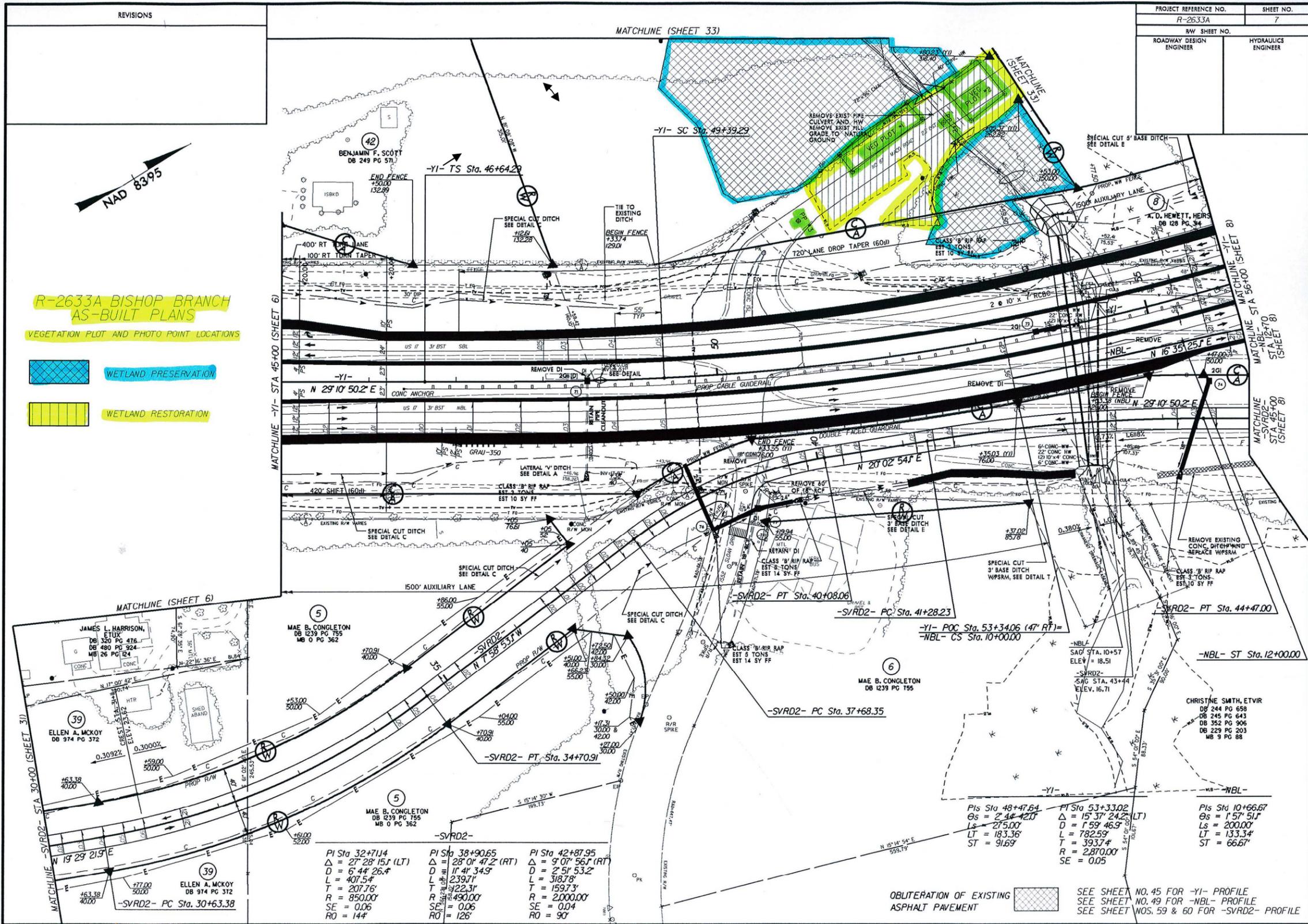
PROJECT REFERENCE NO. R-2633A	SHEET NO. 7
R/W SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



**R-2633A BISHOP BRANCH AS-BUILT PLANS**  
VEGETATION PLOT AND PHOTO POINT LOCATIONS

 WETLAND PRESERVATION

 WETLAND RESTORATION

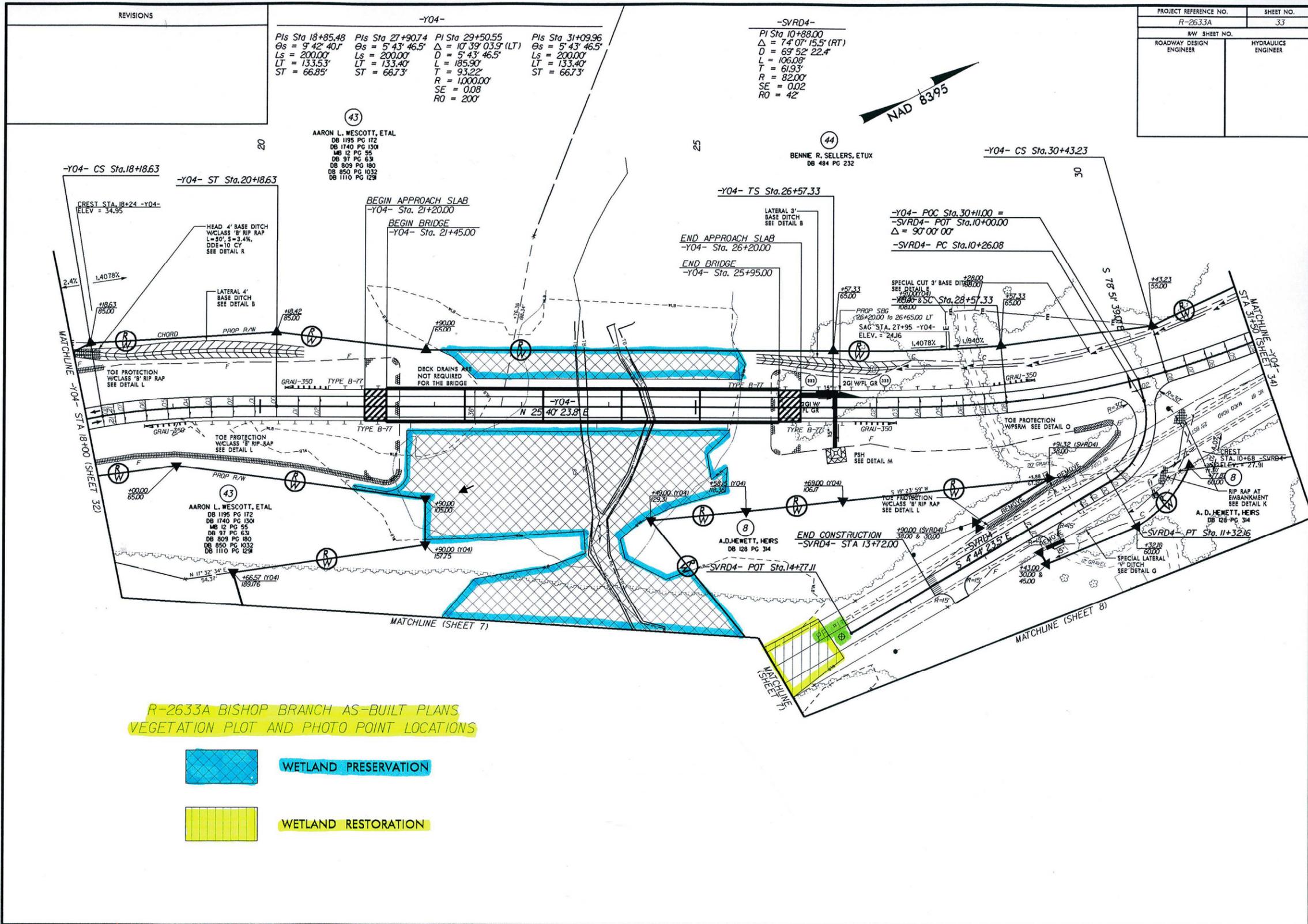


PI Sta 32+71.4 $\Delta = 27^\circ 28' 15.1''$ (LT) $D = 6' 44' 26.4''$ $L = 407.54'$ $T = 207.76'$ $R = 850.00'$ $SE = 0.06$ $RO = 144'$	PI Sta 38+90.65 $\Delta = 28^\circ 01' 47.2''$ (RT) $D = 11' 41' 34.9''$ $L = 239.71'$ $T = 122.31'$ $R = 490.00'$ $SE = 0.06$ $RO = 126'$	PI Sta 42+87.95 $\Delta = 9^\circ 07' 56.1''$ (RT) $D = 2' 51' 53.2''$ $L = 318.78'$ $T = 159.73'$ $R = 2,000.00'$ $SE = 0.04$ $RO = 90'$
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PI Sta 48+47.64 $\Delta = 2^\circ 44' 42.0''$ $Ls = 275.00'$ $LT = 183.36'$ $ST = 91.69'$	PI Sta 53+33.02 $\Delta = 15^\circ 37' 24.2''$ (LT) $D = 1' 59' 46.9''$ $L = 782.59'$ $T = 393.74'$ $R = 2,870.00'$ $SE = 0.05$	PI Sta 10+66.67 $\Delta = 1^\circ 57' 51.1''$ $Ls = 200.00'$ $LT = 133.34'$ $ST = 66.67'$
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OBLETION OF EXISTING ASPHALT PAVEMENT 

SEE SHEET NO. 45 FOR -YI- PROFILE  
SEE SHEET NO. 49 FOR -NBL- PROFILE  
SEE SHEET NOS. 59 & 60 FOR -SVRD2- PROFILE



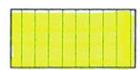
REVISIONS	

-Y04-			
PIs Sta 18+85.48	PIs Sta 27+90.74	PI Sta 29+50.55	PIs Sta 31+09.96
Es = 9' 42" 40.7'	Es = 5' 43" 46.5'	Δ = 10' 39" 03.9' (LT)	Es = 5' 43" 46.5'
Ls = 200.00'	Ls = 200.00'	D = 5' 43" 46.5'	Ls = 200.00'
LT = 133.53'	LT = 133.40'	L = 185.90'	LT = 133.40'
ST = 66.85'	ST = 66.73'	T = 93.22'	ST = 66.73'
		R = 1,000.00'	
		SE = 0.08	
		RO = 200'	

-SVRD4-	
PI Sta 10+88.00	Δ = 74' 07" 15.5' (RT)
D = 69' 52" 22.4'	L = 106.08'
T = 61.93'	R = 82.00'
SE = 0.02	RO = 42'

PROJECT REFERENCE NO.	SHEET NO.
R-2633A	33
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER

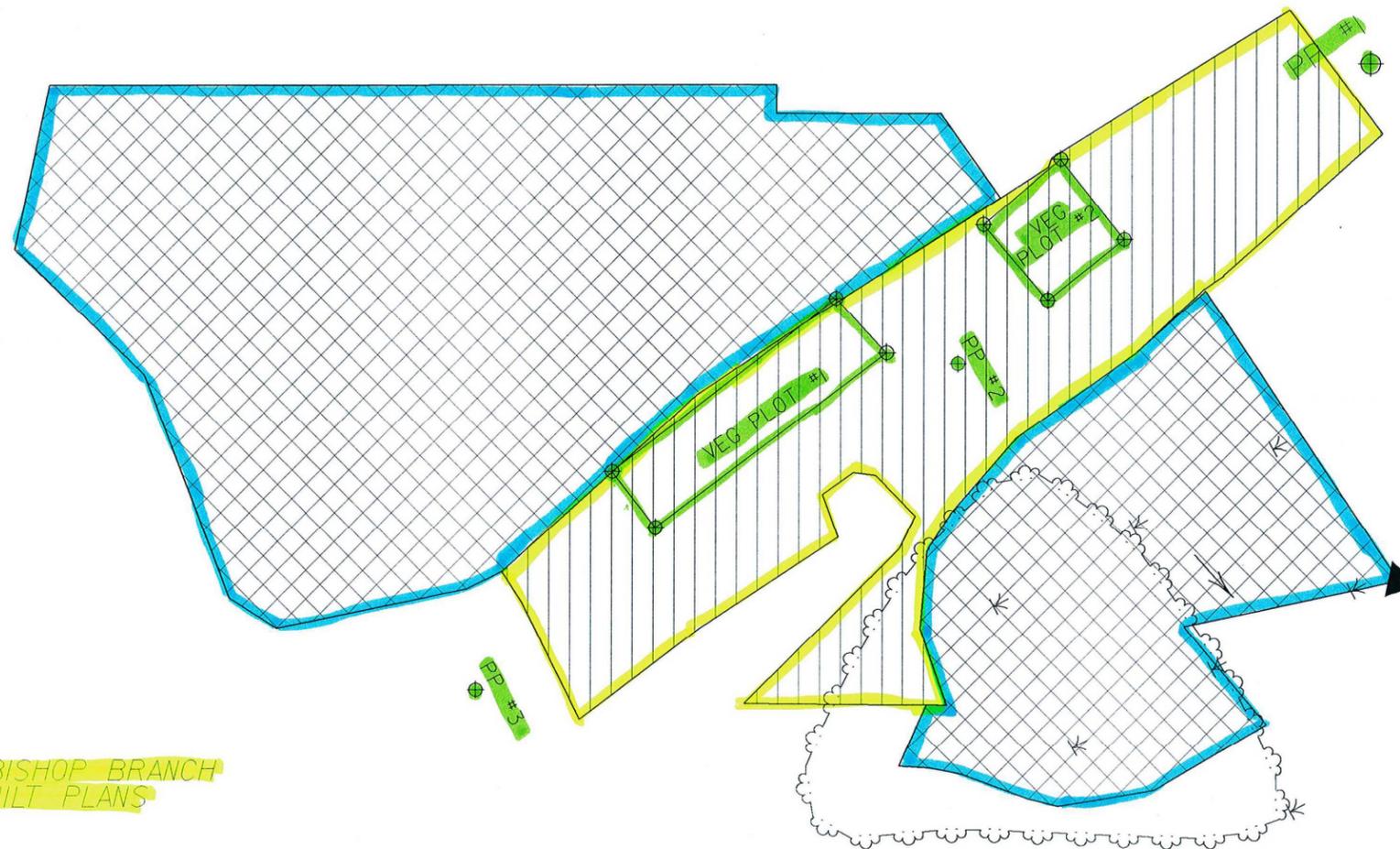
R-2633A BISHOP BRANCH AS-BUILT PLANS  
VEGETATION PLOT AND PHOTO POINT LOCATIONS

-  WETLAND PRESERVATION
-  WETLAND RESTORATION

\$FILES \$DATES

# WETLAND REFORESTATION PLANTING PLAN

PROJECT REFERENCE NO. R-2633A	SHEET NO. RF-3
RW SHEET NO.	
ROADWAY DESIGN ENGINEER	HYDRAULICS ENGINEER



R-2633A BISHOP BRANCH  
AS-BUILT PLANS

-  WETLAND PRESERVATION AREA
-  WETLAND HARDWOOD REFORESTATION AREA SEE REFORESTATION DETAIL SHEET RF-1



VICINITY MAP - R-2633A  
Bishop Road  
Brunswick County, North Carolina

