

FINAL
Beaverdam Mitigation Project
Harnett County, North Carolina

Cape Fear River Basin No. 03030004
DENR-EEP Contract No. D06029-B

Year 3 Monitoring Report



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Appendix D	2010 Site Photos
Appendix E	2010 Morphologic Monitoring Parameters

1.0 SUMMARY

This Annual Report details the monitoring activities during the 2010 growing season on the Beaverdam Swamp Mitigation Site. Construction of the Site, including planting of trees, was completed in February 2008. The 2010 data represents results from the third year of hydrology and vegetation monitoring for both wetlands and streams.

The design for the Beaverdam Swamp Site involved stream restoration, riverine wetland restoration, and wetland enhancement. After construction, it was determined that the project generated 10,114 linear feet of stream restoration, 292 linear feet of stream enhancement, 9.90 acres of wetland restoration, and 2.04 acres of wetland enhancement. The As-Built survey is included as **Appendix A**.

This Annual Report presents the data from eight automated hydrology monitoring stations, 14 vegetation monitoring plots, three crest gauges, one tipping bucket rain gauge, one funnel rain gauge, 20 cross sections, 3,455 linear feet of profile survey, and photographic reference locations. Data were also collected from three reference automated hydrology monitoring stations.

In 2010, data collected from the groundwater monitoring gauges on the Beaverdam Mitigation Site indicate that five of the eight hydrology monitoring stations at the mitigation Site recorded hydroperiods of at least 10 percent of the growing season. BDAW2 recorded a hydroperiod of 8 percent of the growing season. The remaining gauges (BDAW4 and BDAW6) recorded hydroperiods below five percent. All three of the reference gauges had hydroperiods greater than 10 percent.

Weather station data from the Dunn Weather Station were used in conjunction with the rain gauges located on the Site to document precipitation amounts. The Dunn weather station data for 2010 was below normal limits throughout the growing season. The manual on-site rain gauge was damaged during the winter months and replaced during the March site visit. On-site rainfall amounts during the months of April through June were barely within the normal limits but below the annual averages. Rainfall was below normal limits in July; but was within normal limits in August.

This Annual Monitoring Report documents vegetation survival on 14 vegetation-monitoring plots. The vegetation monitoring documented surviving planted stem density between 340 and 620 stems per acre. All plots have met and exceeded the minimum criteria of 320 stems per acres after three years, and no remedial actions are recommended. Herbaceous vegetation has improved and is now estimated at over 90 percent cover across the Site. Volunteer woody species are present but do not pose a threat to the target natural community. No remedial actions are recommended.

During the 2010 monitoring season, all three crest gauges recorded bankfull events at the Site. The restored stream channel is stable and is providing the intended habitat and hydrologic functions. All monitored cross sections and longitudinal profile for 2010 show little adjustment in stream dimension.

2.0 INTRODUCTION

2.1 PROJECT DESCRIPTION

The Beaverdam Swamp Stream and Wetland Mitigation project is in Harnett County, North Carolina, approximately 3 miles southwest of Erwin (**Figure 1**). The property is on an old floodplain terrace to either side of Bunnlevel Erwin Road (SR 1779). Access is directly from Bunnlevel Erwin Road through pasture and agricultural fields. Construction at the site was completed in February 2008. Groundwater, surface water, and rain gauges were functional beginning in February 2008. This report details the results of the 2010 monitoring season, and represents Year 3 of monitoring for the Site.

The mitigation Site consists of three stream systems and associated riparian wetlands along the floodplain. The three distinct unnamed tributaries (UT) are identified as UT1, UT2, and UT3. The USGS Erwin, NC topographic quadrangle (**Figure 2**) shows UT 1 and UT 2 drain into Beaverdam Swamp and UT3 discharges directly into the Cape Fear River. UT1 has a drainage area of 602 acres (0.94 mi²), UT2 has a drainage area of 147 acres (0.23 mi²), and UT3 has a drainage area of 262 acres (0.41 mi²). Surrounding land use consists of existing forest, open pasture, and agricultural fields. On-site topography, soils, and existing wetland areas demonstrate that the Site historically supported riverine wetlands. A conservation easement protects the restoration and preservation areas (**Figure 3**).

The pre-restoration altered conditions of the stream and the riparian buffer reduced water quality and impaired habitat. Livestock access resulted in the direct input of nutrients and biochemical oxygen demand (BOD) into the stream and wetlands. Hoof-shear created bank instability resulting in heavy sedimentation. Water quality was also diminished due to raised turbidity from bank erosion and elevated water temperatures caused by the lack of tree shading. Habitat was reduced by the diminished water quality and loss of physical habitat such as bed features, woody debris, and a well developed vegetative community. Migrating head-cuts had incised the channels and drained wetlands. There are two wetland restoration areas (WR) associated with UT3 and three wetland enhancement areas (WE) associated with UT1.

2.2 PROJECT PURPOSE

The objective of this project is to provide 10,200 stream mitigation units (SMU) and 9 wetland mitigation units (WMU) to the North Carolina Ecosystem Enhancement Program (EEP) through the full delivery process in the Cape Fear River Basin 03030004110020 hydrologic unit, and to improve riparian and aquatic habitats and water quality through ecological restoration practices. Stream mitigation was provided through restoration and enhancement on three stream systems that are tributaries to Beaverdam Swamp. Riverine wetland mitigation was provided through enhancement and restoration. The site was identified and developed by Environmental Banc and Exchange, LLC (EBX) through the EEP full delivery mitigation process.

Monitoring of the Beaverdam Swamp Site is required to demonstrate successful mitigation based on criteria in the Restoration Plan and through a comparison to reference site conditions. The success criteria components adhere to EEP and USACE guidelines. Hydrology, vegetation, and stream monitoring are conducted on an annual basis. This Annual Monitoring Report details the results of the monitoring efforts for 2010 (Year 3) at the Beaverdam Swamp Mitigation Site.

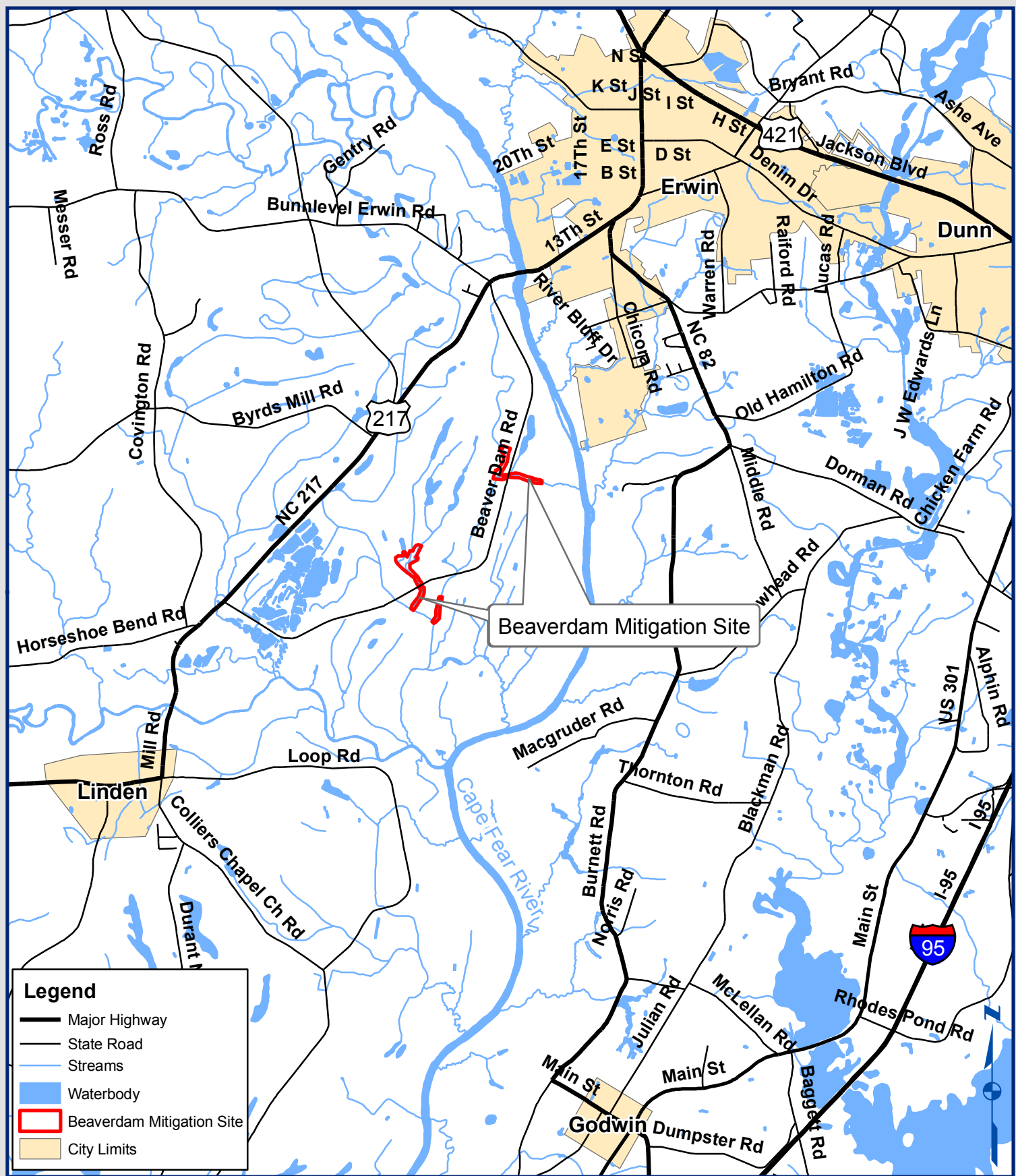


Figure 1.
Beaverdam Creek Mitigation Site
Project Vicinity Map



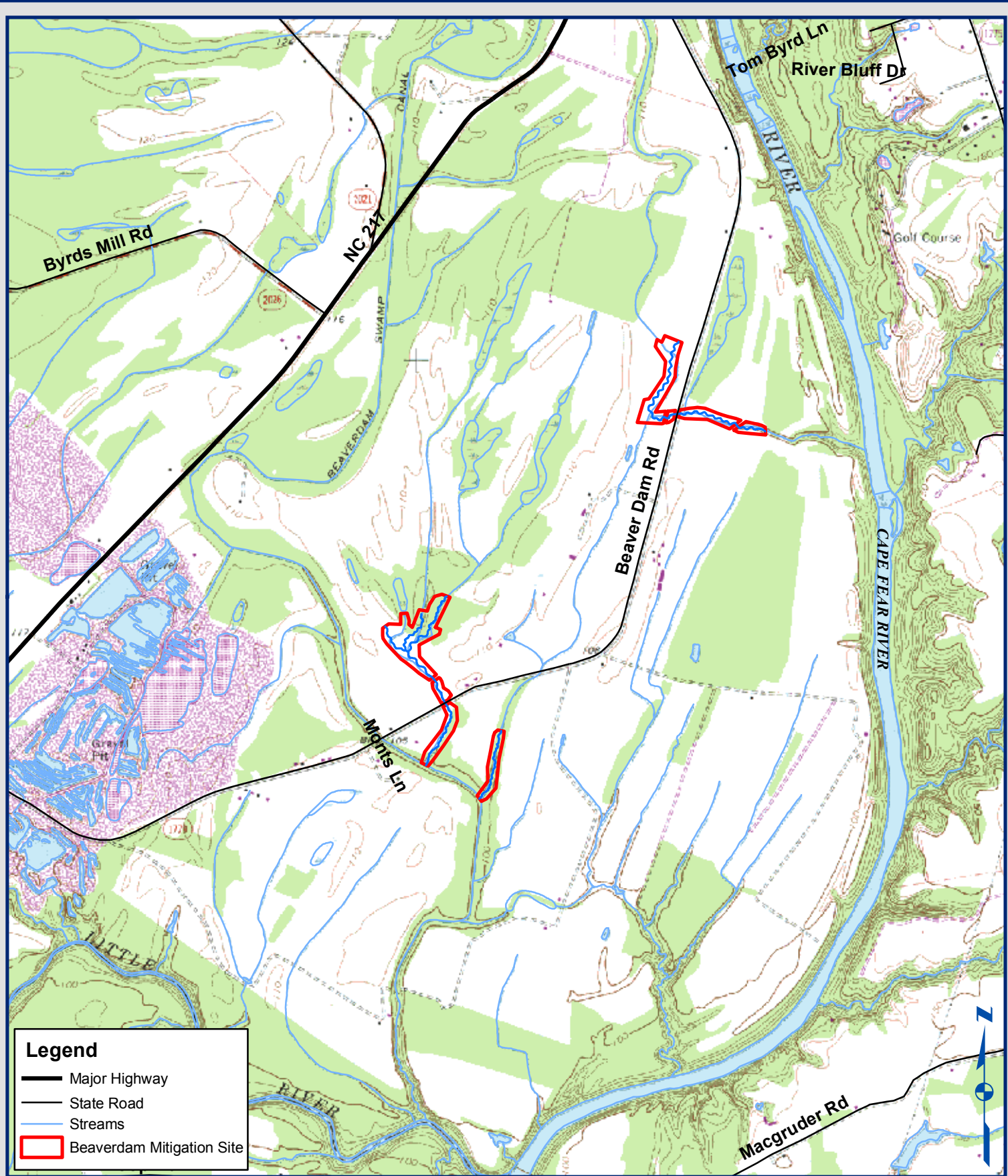


Figure 2.
Beaverdam Creek Mitigation Site
USGS Map

SOURCE: USGS,
 Erwin, NC Quadrangle, 1973

0 1,000 2,000 4,000
 Feet



The Beaverdam Swamp Mitigation Report (May 2008) documented 10,114 linear feet of stream restoration, 292 linear feet of stream enhancement Level II, 9.90 acres of wetland restoration, and 2.04 acres of wetland enhancement, resulting in 10,231 SMUs and 10.9 WMUs for the project (**Table 1**). The raised streambed elevation will provide the hydrology for restoring the wetlands. The wetland and stream restoration will provide multiple ecological and water quality benefits within the Cape Fear River Basin. Benefits include nutrient removal, sediment and BOD reduction, water storage, improved groundwater recharge, improved in-stream and riparian habitat, and restored wetland habitat.

Table 1. Project Mitigation Structure and Objectives

Reach Name	As-Built Length (feet)	Wetland (acres)	WMU	SMU	Restoration Approach
UT1-A/B/C	3,403			3,403	Restoration
UT1-D	829			829	Restoration
UT1-E (Valley)	556			556	Restoration
UT1-F	583			583	Restoration
UT2	1,264			1,264	Restoration
UT3-A/B	3,479			3,479	Restoration
UT3-C	292			117	Enhancement
WR-A		3.70	3.70		Restoration
WR-B		6.20	6.20		Restoration
WE-A		0.80	0.40		Enhancement
WE-B		0.70	0.35		Enhancement
WE-C		0.14	0.07		Enhancement
WE-D		0.40	0.20		Enhancement
Total	10,406	11.94	10.92	10,231	

2.3 PROJECT HISTORY & SCHEDULE

The project was constructed in the fall and winter of 2007/2008, and the five year monitoring is expected to be completed in the fall of 2012 (**Table 2**). **Table 3** lists the project contacts.

Table 2. Project Activity and Reporting History

Month	Activity
February 2008	Construction Completed
February 2008	Planting Completed
February 2008	Post Construction Monitoring Gauges Installed
May 2008	As-Built Report Submitted
November 2008	1st Annual Monitoring Report
November 2009	2nd Annual Monitoring Report
October 2010	3rd Annual Monitoring Report
November 2011	4th Annual Monitoring Report (Scheduled)
November 2012	5th Annual Monitoring Report (Scheduled)

Table 3. Project Contacts

Contact	Firm Information
Project Manager Norton Webster	Environmental Banc & Exchange , LLC (919) 608-9688
Designer Todd St. John, PE	Kimley-Horn and Associates (919) 653-2950
Monitoring Contractor Daniel Ingram	WK Dickson and Co., Inc (919) 782-0495

3.0 HYDROLOGY

3.1 HYDROLOGIC SUCCESS CRITERIA

As stated in the Restoration Plan, the hydrology success criterion for the Site is to restore wetland hydrology at the Site so that water table will remain within 12 inches of the soil surface continuously for at least 10 percent of the growing season (approximately 24 days). The growing season is from March 16 to November 11. Based on daily minimum temperatures greater than 28 degrees Fahrenheit occurring in 5 of 10 years, the growing season for Harnett County is 240 days long. Gauge data will be compared to gauge data from a reference wetland in growing seasons with less than normal rainfall. In periods of low rainfall, if a restoration gauge hydroperiod exceeds the reference gauge hydroperiods, and both exceed five percent of the growing season, then the gauge will be deemed successful. The results of hydrology monitoring across the wetland restoration Site are presented in this annual monitoring report.

3.2 DESCRIPTION OF HYDROLOGY MONITORING EFFORTS

Eight automated HOBO groundwater gauges, one tipping bucket rain gauge, and one funnel rain gauge were installed prior to the beginning of the first growing season (**Figure 3**). Three additional automated groundwater gauges were installed in a reference wetland. Groundwater gauges are installed to a minimum depth of 40 inches below the ground surface. The monitoring protocol for the site specifies that automated monitoring stations will be downloaded and checked for malfunctions on a monthly basis. During monthly site visits, manual groundwater gauges are read, crest gauge readings are taken, and cumulative rainfall totals are collected from the on-site rain gauges. During the 2010 growing season, all eight automated loggers performed well with no periods of missing data.

Automated Gauges

HOBO automatic groundwater gauges record water table elevations four times daily at 06:00, 12:00, 18:00, and 24:00. These automatic gauges employ pressure sensors that record water elevation above the bottom of the sensor (with atmospheric pressure compensation). The calibration water table depth is recorded at monthly downloads. To determine wetland hydroperiods, the automatically recorded data are compared to the calibration data to determine a standard correction factor between the calibration gauge and the automatic gauge for each location. The standard correction factor is applied to correct daily readings. The corrected daily readings are used to determine wetland hydroperiods.

Data Interpretation

Wetland hydroperiods are calculated for four daily water table depth elevations. A hydroperiod is calculated if the water table is equal to or less than 12 inches below ground surface for at least 24 hours. If a gauge falls below -12 inches for four consecutive readings (24 hours) then the hydroperiod ends at the last reading within 12 inches of the ground surface. If a gauge falls below

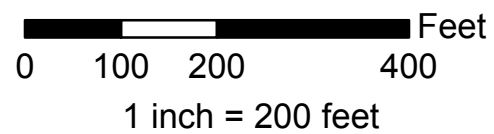
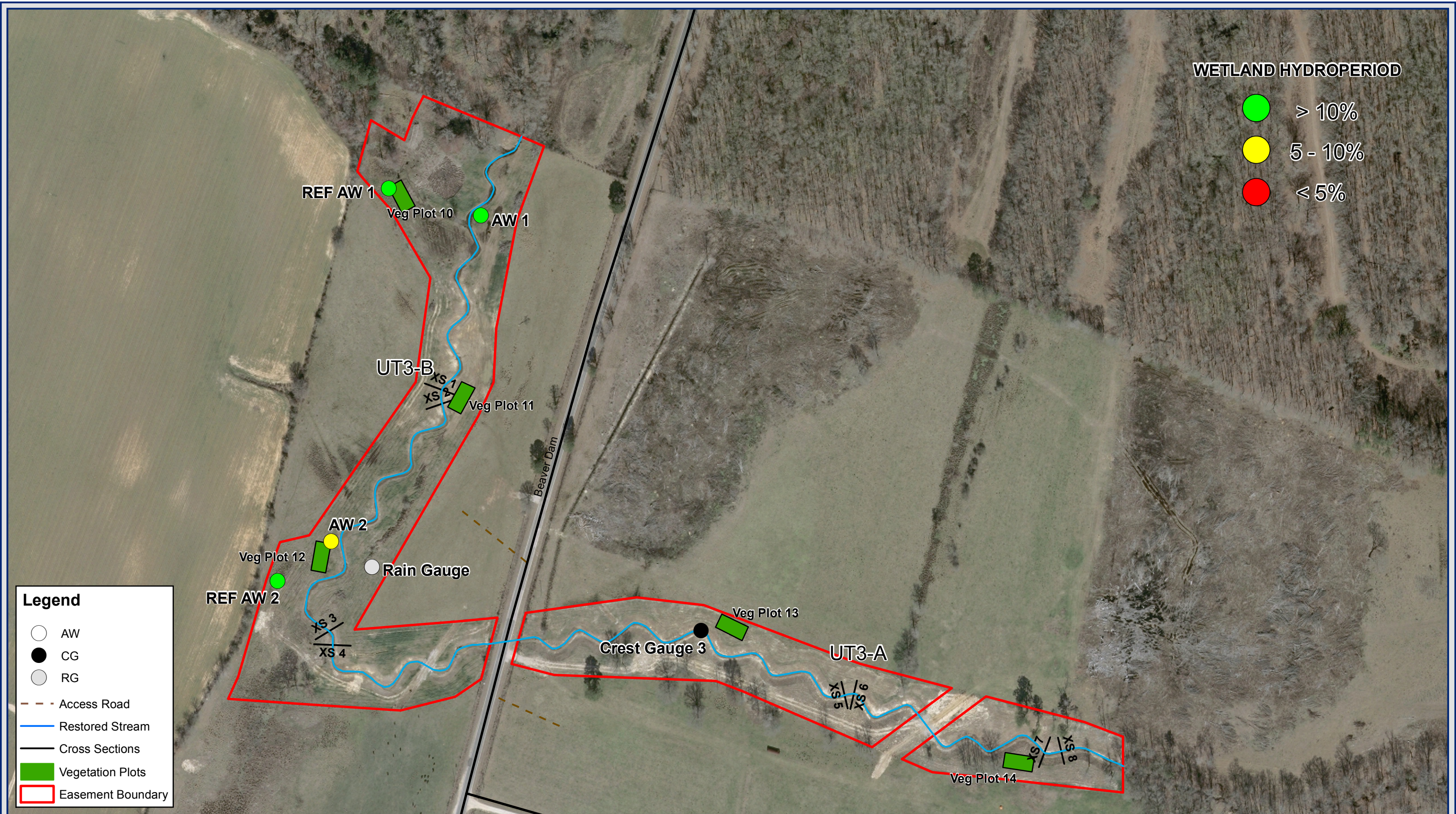


Figure 3a
Beaverdam
2010 Monitoring Site Map

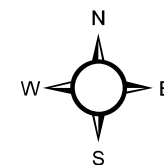
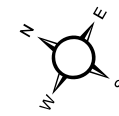




Figure 3b
Beaverdam
2010 Monitoring Site Map



-12 inches for only three readings then maintains a reading above -12 inches for a minimum of 24 hours, the hydroperiod is calculated continuously. This methodology accounts for minor technical malfunctions experienced by the automatic gauges.

3.3 RESULTS OF HYDROLOGY MONITORING

The following hydroperiod statistics were calculated for each monitoring station during the growing season: 1) period of most consecutive days and percent of growing season that the water table was within twelve inches of the surface; 2) cumulative number of days and percent of growing season that the water table was within twelve inches of the soil surface; and 3) number of times that the water table rose to within twelve inches of the soil surface (**Table 4**). Raw hydrograph data collected from the monitoring gauges are provided in **Appendix C**.

Table 4. Hydrologic Monitoring Results

2010 Max Hydroperiod (Growing Season 16-Mar through 11-Nov, 240 days)					
Gauge	Consecutive		Cumulative		Occurrences
	Days	Percent of growing Season	Days	Percent of growing Season	
AW1	48	20	59	25	7
AW2	20	8	20	8	2
AW3	114	48	160	67	7
AW4	1	0	3	1	3
AW5	32	13	39	16	8
AW6	9	4	19	8	9
AW7	32	13	33	14	2
AW8	47	20	47	20	2
REFAW1	58	24	81	34	3
REFAW2	24	10	28	12	5
REFAW3	32	13	36	15	4

The Site was designed to re-integrate the streams with the drained wetlands, restoring stream and wetland habitat features, and re-establishing a native, forested hardwood wetland ecosystem. Hydrology in the riparian areas is driven primarily by high groundwater and overbank flooding. The growing season data collected for the 2010 Year 3 monitoring period indicate that the Site is on track to meet the success criteria as outlined in the Mitigation Plan.

Table 5 lists the minimum depth at which the under performing gauges achieved a 10 percent hydroperiod. These data demonstrate that all of the wetland areas had a water table within 19.13 inches of the surface for considerable portions of the growing season.

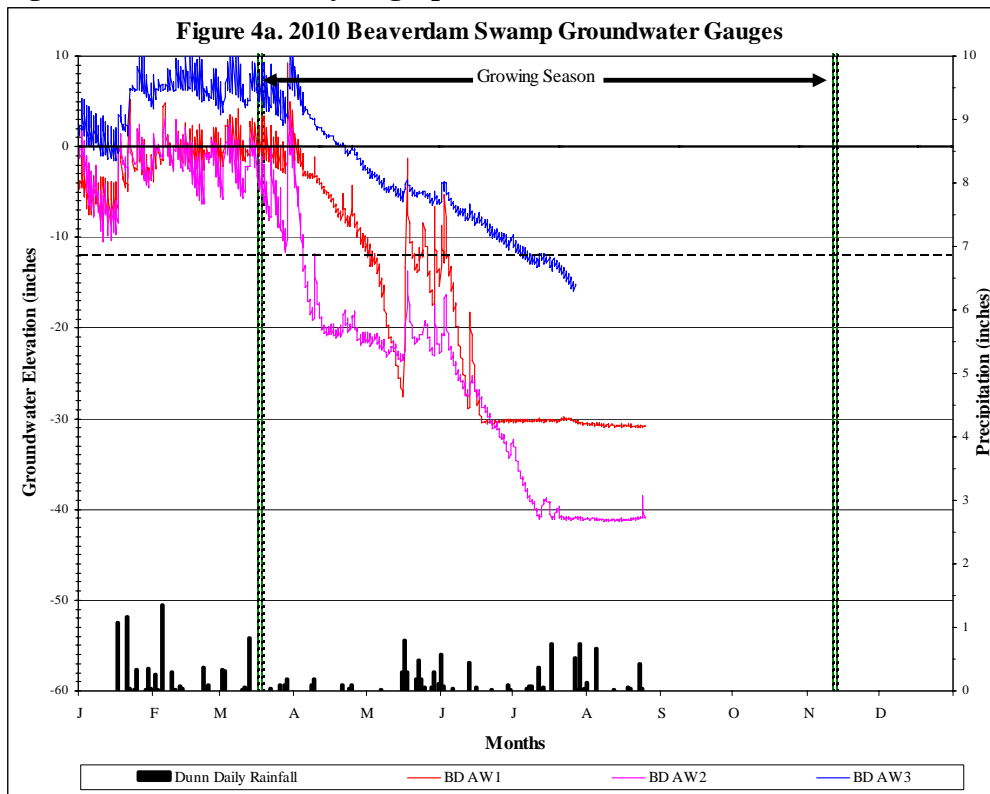
Table 5. Hydroperiod Depths for Unsuccessful Gauges

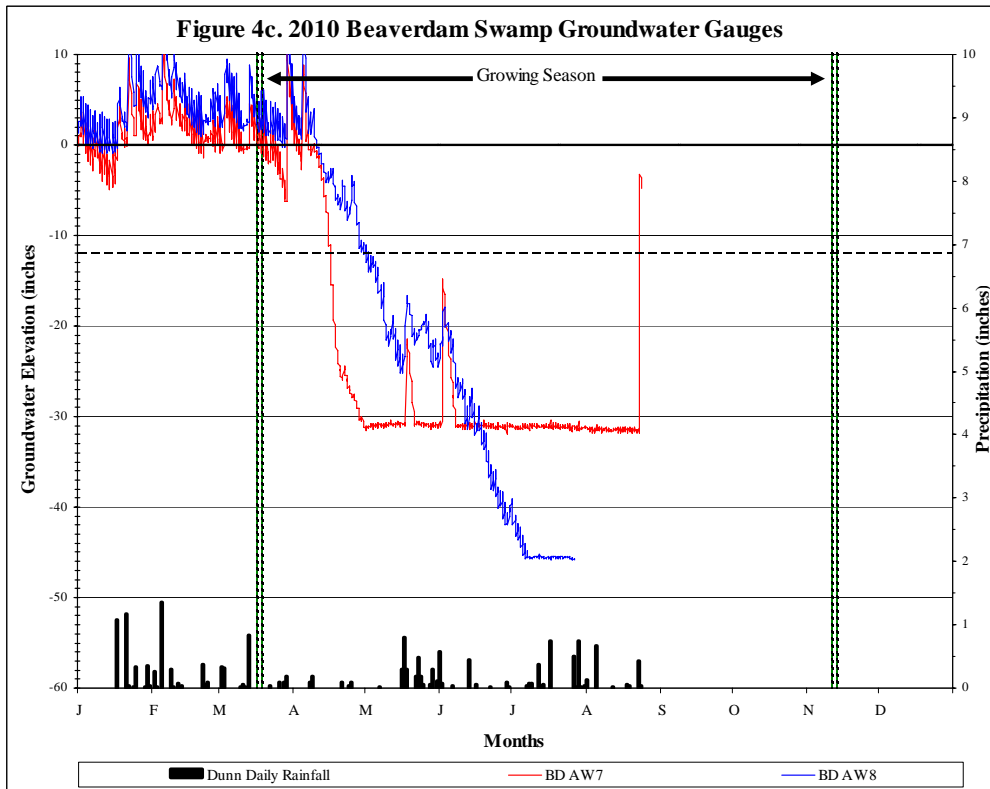
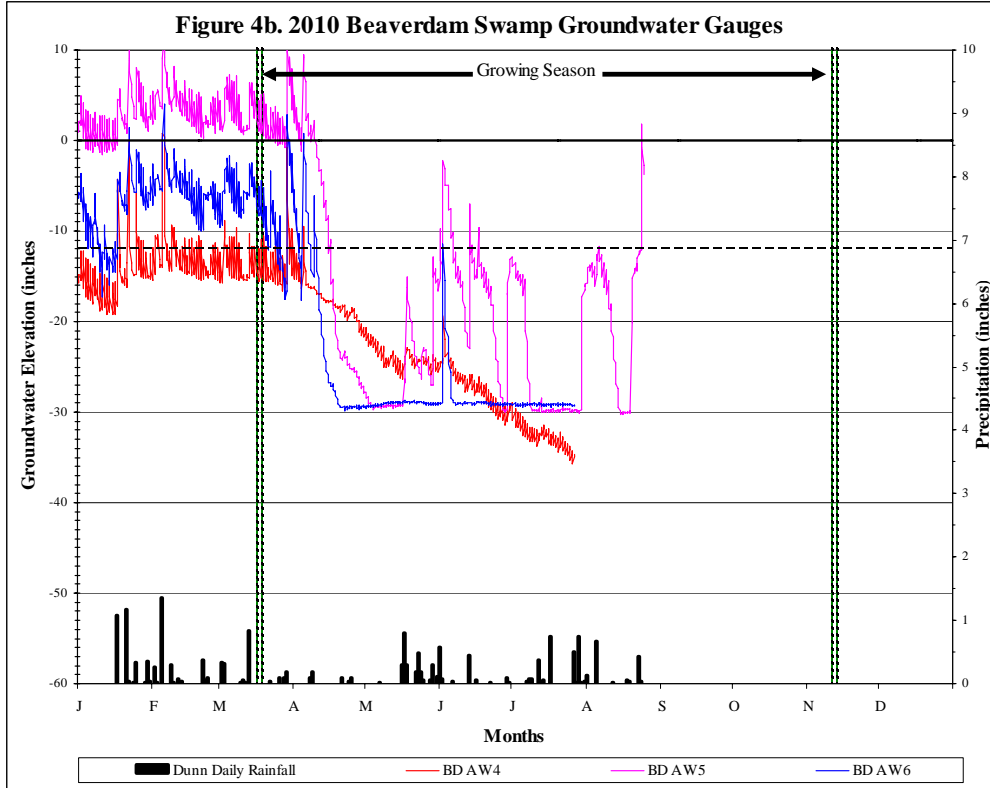
Gauge	10 Percent Hydroperiod Depth
AW2	-19.13
AW4	-16.56
AW6	-17.70

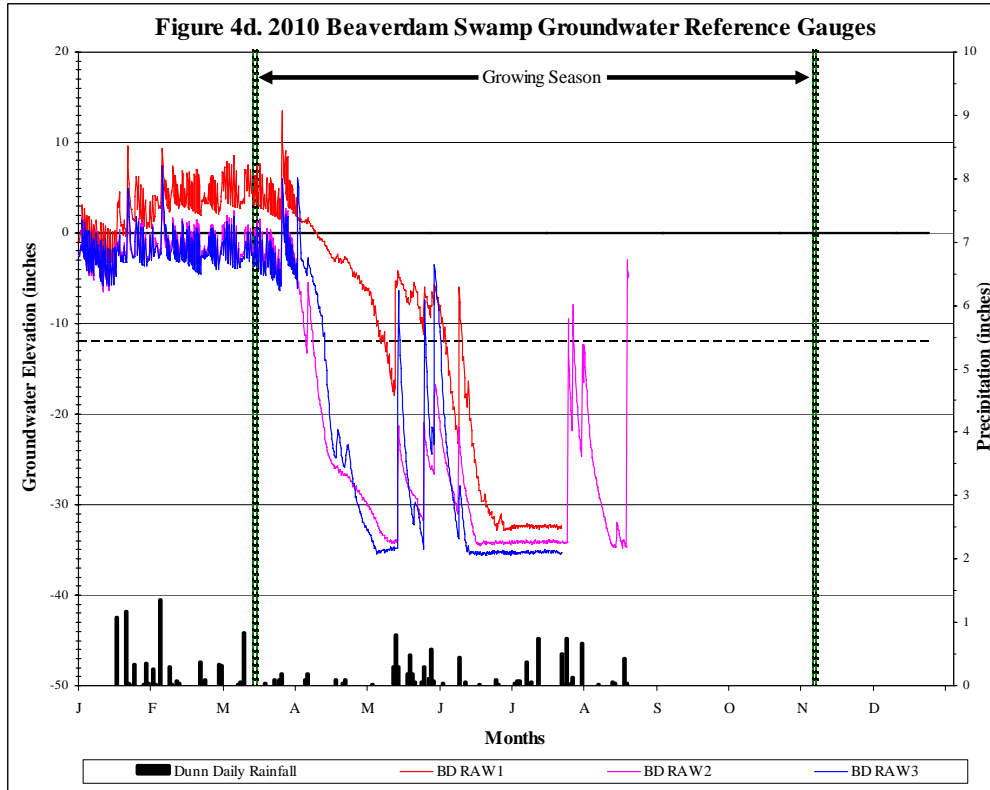
3.3.1 Site Data

Depth of groundwater for each of the monitoring gauges is shown in a graph with precipitation (Figure 4). This hydrograph demonstrates the reaction at each monitoring location of the groundwater level to specific rainfall events. Raw hydrograph data collected from the monitoring gauges is provided in Appendix C.

Figure 4. Groundwater Hydrographs







3.3.2 Reference Data

The approved Mitigation Plan provides that if the rainfall data for any given year during the monitoring period is not normal, the reference wetland data can be assessed to determine if there is a positive correlation between the performance of the restoration Site and the natural hydrology of the reference site. The three reference gauges had hydroperiods ranging from 10 to 24 percent of the growing season.

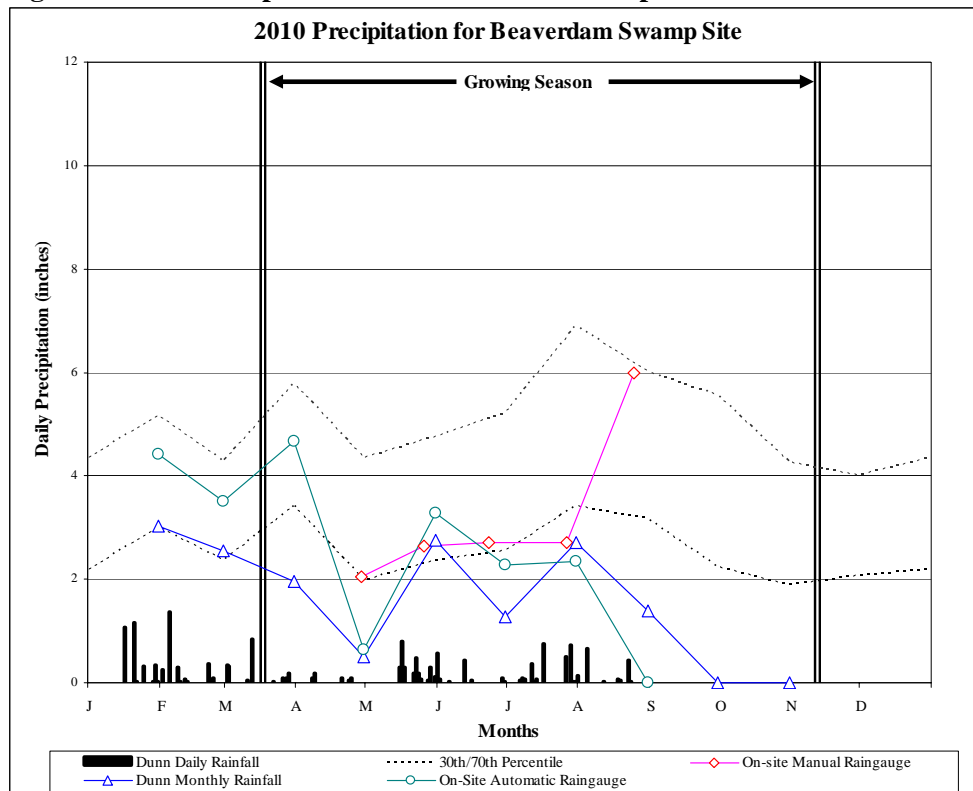
3.3.3 Climate Data

Monthly rainfall for 2010 was compared to historical precipitation for Harnett County (**Table 6** and **Figure 5**). Observed precipitation data were collected from an automated weather station in Dunn (Harnett County). The Dunn weather station data for 2010 was below normal limits for most of the growing season. The manual on-site rain gauge was damaged during the winter months and replaced during the March site visit. On-site rainfall amounts during the months of April through June were barely within the normal limits but below the annual averages. Rainfall was below normal limits in July; but was within normal limits in August. Monthly rainfall data for the Site in September through December was not available at the time this report was compiled.

Table 6. Comparison of Normal Rainfall to 2009 Observed Rainfall

Month	Average	Normal Limits		Dunn Precipitation	On-Site Manual RG	On-Site Automatic RG
		30 Percent	70 Percent			
January	4.12	3.00	5.18	3.02	---	4.41
February	3.59	2.36	4.27	2.56	---	3.50
March	4.71	3.42	5.78	1.96	---	4.67
April	3.25	1.99	4.34	0.63	2.05	0.51
May	3.82	2.37	4.75	2.75	2.64	2.46
June	4.50	2.56	5.22	1.28	2.71	2.28
July	5.64	3.42	6.89	2.71	2.72	2.35
August	4.86	3.17	6.02	1.38	5.98	4.30
September	4.50	2.24	5.56	---	4.90	4.45
October	3.16	1.89	4.26	---	---	---
November	3.08	2.07	4.01	---	---	---
December	3.57	2.18	4.35	---	---	---
Total	48.80	42.45	51.56	16.29	16.10	20.18

Figure 5. 2010 Precipitation for Beaverdam Swamp Site



3.4 HYDROLOGIC CONCLUSIONS

Data collected from the groundwater monitoring gauges on the Beaverdam Mitigation Site in 2010 indicate that five of the eight hydrology monitoring stations recorded hydroperiods of at

least 10 percent of the growing season and meet the hydrologic success criterion for 2010. Two gauges (BDAW4 and BDAW6) experienced hydroperiods of less than 5 percent, but achieved a 10 percent hydroperiod at a depth of no greater than 17.7 inches below the soil surface. The remaining monitoring station (BDAW2) recorded a hydroperiod of 8 percent of growing season. All three of the reference gauges had hydroperiods greater than 10 percent.

Dunn weather station rainfall data indicates that the 2010 growing season rainfall amounts were well below normal for most of the growing season, except for May, when rainfall levels were within the normal range.

4.0 VEGETATION

4.1 VEGETATION SUCCESS CRITERIA

Successful establishment of vegetation in wetland restoration and riparian areas will be the survival of 260-planted stems following Year 5 monitoring. The site must also meet the interim success criterion of the survival of at least 320 planted stems per acre at the end of the Year 3 monitoring period. Up to 20 percent of the species composition may be comprised of volunteers. Remedial action may be required should volunteers present a problem or exceed 20 percent composition.

A digital image photo log will be used to subjectively evaluate the restoration site over time. A series of images over the five-year monitoring period should demonstrate maturation of planted vegetation and volunteer hydrophytic species.

4.2 DESCRIPTION OF SPECIES AND VEGETATION MONITORING

Fourteen vegetation sampling plots were established within the planted restoration areas to monitor the success of planted vegetation. The vegetation plots are 0.05 acres in size. The vegetation plots are distributed across the site, but the precise location and orientation of the plots was random (see locations on as-built drawings in **Appendix A**). The plots cover approximately two percent of the planted area. Twelve tree species were planted on the site (**Table 7**).

Table 7. Planted Tree Species

Common Name	Scientific Name	FAC Status
River Birch	<i>Betula nigra</i>	FACW
Pignut Hickory	<i>Carya glabra</i>	FACU
Green Ash	<i>Fraxinus pennsylvanica</i>	FACW
Black Walnut	<i>Juglans nigra</i>	FACU
Tulip Poplar	<i>Liquidambar styraciflua</i>	FAC+
Swamp Tupelo	<i>Nyssa biflora</i>	OBL
Overcup Oak	<i>Quercus lyrata</i>	OBL
Swamp Chestnut Oak	<i>Quercus michauxii</i>	FACW-
Coastal Willow Oak	<i>Quercus phellos</i>	FACW-
Northern Red Oak	<i>Quercus rubra</i>	FACU
Bald Cypress	<i>Taxodium distichum</i>	OBL
Slippery Elm	<i>Ulmus rubra</i>	FAC

Planted stems inside each plot were flagged with orange or pink flagging to help in locating them in the future. Each stem is tagged with a sequentially numbered aluminum tag.

4.3 RESULTS OF VEGETATION MONITORING

Stem counts for each of the 14 vegetation-monitoring plots were recorded by species (**Table 8**). Most of the planted stems appeared healthy and have recent growth. During Year 1 (2008), a number of the plots were located in areas where livestock accidentally accessed the restoration area and damaged many stems. The access points have since been secured. The damage increased mortality in a number of the plots. Because of mortality during the first year, areas of the Site were supplemented with additional trees.

The planted stems in the monitoring plots ranged from 340 to 620 stems per acre with an average of 473 stems per acre (**Table 9**). Some of the numbered tags have been lost or damaged over the last three years. This may be due to tags being swept over small stems during early flooding or small animal theft.

Table 8. Results of 2010 Vegetation Monitoring by Plot

Species	VP 1	VP 2	VP 3	VP 4	VP 5	VP 6	VP 7	VP 8	VP 9	VP 10	VP 11	VP 12	VP 13	VP 14
Black gum	2	8	2	7	6	5		4	2	10	8	10		
Black walnut	1	1	1		1									
Cypress	2	2	3	3	1				4	14	2	3		
Green ash	14	6	3		4	4	4	7	2		1	7		
Hickory					0						2	4		
Northern Red Oak				1			2				3		9	19
Overcup Oak	1	2	4		4		12	4		5				
River Birch		3		9	2	8	4	2	5	1	3			
Slippery Elm				2			1						13	5
Swamp Chestnut Oak					1			2	4			3		6
Tulip poplar	3	1		2		1		2			1			
Unknown		2		2	0		1		0	0			0	0
Willow oak	1		6	1				3				1	3	1

Table 9. Summary of Vegetation Monitoring Results – Year 3

Plot Number	Stems Planted	2010 Stems	Stems per Acre					
			As-Built	2008 Year 1	2009 Year 2	2010 Year 3	2011 Year 4	2012 Year 5
1	35	24	620	360	540	480		
2	40	25	640	420	580	500		
3	37	19	600	340	420	380		
4	41	25	640	340	520	540		
5	41	19	620	260	500	380		
6	35	18	660	360	380	360		
7	43	24	620	360	600	480		
8	33	24	660	560	540	480		
9	26	17	400	340	340	340		
10	32	29	460	420	600	600		
11	38	20	760	480	440	400		
12	35	28	700	640	640	560		
13	34	25	680	500	540	500		
14	33	31	660	480	480	620		

Average Stems per Acre: 473

Range of Stems per Acre: 340-620

A plan view drawing of the vegetation plots is provided in **Figures 6a** and **6b**. The drawing includes the appropriate information pertaining to vegetation monitoring of the project. The drawing also shows the locations of the following features:

- Vegetation monitoring plots
- Locations of any vegetation problem areas
- Symbology to represent vegetative problem types (if appropriate)

The herbaceous vegetation coverage at the site is over 90 percent with many plots over 95 percent. Due to the existing forest cover around Plots 7, Plot 8, and Plot 9, these plots have the least dense herbaceous coverage. A few small areas in these plots have limited herbaceous cover. Herbaceous coverage across the mitigation site is variable in composition, as would be expected in a natural riparian system. Previous areas observed to have bare soil are well vegetated with common rush and sedges. The areas lacking coverage have scattered individual plants but have not filled in. Diversity in all plots is good. No remedial action is recommended at this time.

In most plots, the herbaceous vegetation shows vigorous growth and diversity. The herbaceous cover is typically dense across most of the site and a number of weeds typical of pasture and disturbed land are present. The most common herbaceous species across the site (occurrence in at least 50 percent of the plots) are dog fennel (*Eupatorium capillifolium*), common rush (*Juncus effusus*), and sawtooth blackberry (*Rubus argutus*). Other species found across the site are Canada goldenrod (*Solidago canadensis*), swamp sunflower (*Helianthus angustifolius*), tall fescue (*Schedonorus phoenix*), Carolina horsenettle (*Solanum carolinense*), beaked panic grass (*Panicum anceps*), deertongue (*Dichantherium clandestinum*), Bluestem (*Andropogon* sp.), and number of different sedges (*Carex* sp.) Overall diversity appears to have increased across the Site and weedy species have decreased in dominance.

Woody volunteer species are also monitored throughout the five-year monitoring period (Table 10). These volunteer species are not always obvious due to germination after construction and planting. Vigor and survival due to the earlier drought may also have affected the volunteer species. In some areas, dense herbaceous cover also obscures smaller volunteer individuals.

Table 10. Volunteer Tree Species

Common Name	Scientific Name	Indicator Status
Red Maple	<i>Acer rubrum</i>	FAC
Eastern Baccharis	<i>Baccharis halimifolia</i>	FAC
River Birch	<i>Betula nigra</i>	FACW
American Hornbeam	<i>Carpinus caroliniana</i>	FAC
Common Buttonbush	<i>Cephalanthus occidentalis</i>	OBL
Persimmon	<i>Diospyros virginiana</i>	FAC
Privet	<i>Ligustrum sinense</i>	FAC
Sweetgum	<i>Liquidambar styraciflua</i>	FAC+
Tuliptree	<i>Liriodendron tulipifera</i>	FAC
Winged Sumac	<i>Rhus copallinum</i>	NI
Winged Elm	<i>Ulmus alata</i>	FACU+

4.4 VEGETATION OBSERVATIONS & CONCLUSIONS

In general, the live stems were healthy and most exhibited significant new growth. In the past, a number of incidents where cattle entered the planted easement area were recorded. This has been corrected and the Site appears to have recovered with healthy vegetative growth across the site. Because of low survival in the initial planting, areas with low survival were replanted during the winter/spring of 2009. The replanted trees appear healthy with new growth. All plots have met the interim success criteria of 320 stems per acres after three years, as documented by this report. For the 2010 monitoring year, the average number of stems per acre on site is 473 and plots range from 340 to 620 stems per acre. No remedial actions are recommended.

Herbaceous vegetation is healthy and locally dense. The plots in the enhancement areas exhibit less herbaceous density due to the forest canopy. Both hydrophytic and non-hydrophytic herbaceous vegetation is found across the site. The most common herbaceous species across the site (occurrence in at least 50 percent of the plots) are dog fennel (*Eupatorium capillifolium*), common rush (*Juncus effusus*), and sawtooth blackberry (*Rubus argutus*).

5.0 STREAM MONITORING

5.1 STREAM SUCCESS CRITERIA

As stated in the approved Mitigation Plan, the stream restoration success criteria for the Site includes the following:

- *Bankfull Events*: Two bankfull flow events must be documented within the five-year monitoring period.
- *Cross-Sections*: There should be little change in as-built cross sections. Cross sections shall be classified using the Rosgen stream classification method and all monitored cross-sections should fall within the quantitative parameters defined for "E" or "C" type channels.

- *Longitudinal Profiles:* The longitudinal profiles should show that the bedform features are remaining stable, e.g. they are not aggrading or degrading. Bedforms observed should be consistent with those observed in "E" and "C" type channels.
- *Photo Reference Stations:* Photographs will be used to subjectively evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation and effectiveness of erosion control measures.
- *Benthic Macroinvertebrates:* Sampling of benthic macroinvertebrates within the restored stream channel shall be conducted for the first three years of post-restoration monitoring.

5.2 STREAM MORPHOLOGY MONITORING PLAN

The stream monitoring program will be implemented to document system development and progress toward achieving the success criteria. The monitoring program will be undertaken for 5 years or until the final success criteria are achieved, whichever is longer.

5.2.1 Cross Sections

Two permanent cross sections will be installed per 1,000 linear feet of stream restoration work, with one located at a riffle and one located at a pool. Each cross section will be marked on both banks with permanent pins to establish the exact transect used. A common benchmark will be used for cross sections to facilitate easy comparison of year-to-year data. The annual cross-section survey will include points measured at all breaks in slope, including top of bank, bankfull, inner berm, edge of water, and thalweg, if the features are present. Riffle cross sections will be classified using the Rosgen stream classification system.

5.2.2 Longitudinal Profile

A longitudinal profile will be measured annually throughout the five-year monitoring period. The profile will be measured along a representative length of restored channel. Measurements will include thalweg, water surface, bankfull, and top of low bank. Each of these measurements will be taken at the head of each feature, for example, shallow, pool, and the max pool depth. The survey will be tied to a permanent benchmark.

5.2.3 Hydrology

The occurrence of bankfull events within the monitoring period will be documented by the use of a crest gauge and photographs. The two crest gauges will record the highest watermark between site visits, and the gauge will be checked monthly to document high flows. Digital images will be used to document the occurrence of debris lines and sediment deposition on the floodplain during monitoring site visits.

5.2.4 Photo Reference Stations

Photographs will be used to subjectively evaluate channel aggradation or degradation, bank erosion, success of riparian vegetation and effectiveness of erosion control measures.

5.3 STREAM MORPHOLOGY MONITORING RESULTS

5.3.1 Cross Sections

The cross sections were surveyed during the monitoring set-up, Year 1, Year 2, and in August 2010 for Year 3. The baseline data has been compared with the Year 1-3 monitoring data in

Appendix B. Compared to the documented baseline data, the Year 3 channel cross sections showed that overall stream dimensions remained stable throughout the growing season. Very little change is noticed through Year 3 Monitoring on most cross sections. Cross Sections 7 and 18 show a slight amount of erosion but present no threat to channel stability.

5.3.2 Longitudinal Profile

A longitudinal profile survey was conducted along six separate reaches of the restoration project, totaling approximately 3,455 linear feet. Survey was conducted in reach UT1-B Upper from STA 112+72 to STA 119+20, in reach UT1-C from STA 107+00 to STA 112+72, in reach UT1-D from STA 154+00 to STA 158+30, in reach UT1-F from STA 182+80 to STA 185+80, in UT3-A from STA 239+00 to STA 335+00, and in reach UT3-B from STA 307+00 to STA 315+20. The longitudinal profile information documents the elevations and locations of known streambed features and in-stream grade control structures according to the As-Built survey plans, as shown in **Appendix A**. The profile and cross sections show that there has been very little adjustment to stream dimension since construction. **Table 11** summarizes stream areas requiring observation. **Figure 6** shows the locations of the stream areas that require observation.

Table 11. Stream Observation Areas

SOA	Feature	STA	Description
SOA1	Rock A-vane	UT1-A 133+30	Minor piping around header rock, No repair needed, will continue to monitor
SOA2	Rock A-vane	UT1-A 134+50	Minor piping around header rock, No repair needed, will continue to monitor
SOA3	Rock A-vane	UT1-B 118+70	Minor piping around header rock, No repair needed, will continue to monitor
SOA4	Right Bank Fencing	UT1-B 119+50	Easement fencing is down at stream crossing, Repair is recommended.
SOA5	Left bank	UT3 329+50 - 331+00	Rills and erosion on left bank, Re-seed with a permanent seed, will continue to monitor

5.3.3 Hydrology

During 2010, three crest gauges were monitored to determine if there were any out-of-bank events in the Beaverdam stream channel (**Table 13**). All three crest gauges recorded bankfull events between February and August. CG1 (UT1-A) had two bankfull events in the months of April and July. CG2 (UT2) recorded only one event in July however, CG3 (UT3-A) had five bankfull events in 2010. The largest stream flow documented for Year 3 by the onsite crest gauges was a flow that occurred during April by CG3 at a height of 1.40 feet.



Legend

- AW
- CG
- RG
- - - Access Road
- Restored Stream
- Cross Sections
- Vegetation Plots
- Easement Boundary

Structure Legend

- ⌘ Rock Cross Weir
- ⌘ Log Cross Weir
- ⌘ Log Vane
- ⌘ Log Grade Control
- Stable and Functional
- Stable and Not Functional
- Unstable and Functional
- Unstable and Not Functional

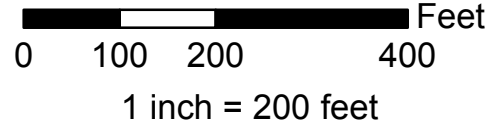


Figure 6a
 Beaverdam Mitigation Project
 2010 Stream Current Conditions Map





Figure 6b
 Beaverdam Mitigation Project
 2010 Stream Current Conditions Map

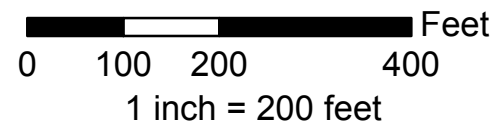


Table 12. Crest Gauge Data

Month Recorded	CG1	CG2	CG3
January	---	---	---
February	---	---	1.25
March	---	---	0.70
April	0.15	---	1.40
May	---	---	0.50
June	---	---	---
July	---	---	---
August	0.10	0.10	0.30
September	---	---	---
October	---	---	---
November	---	---	---
December	---	---	---

5.5 STREAM CONCLUSIONS

In-stream structures installed within the channel include cross vanes, log vanes, rock vanes, log weirs, and step-pools. Visual observations of structures throughout the 2010 growing season indicated that most structures are functioning as designed. Two rock-A-vanes on UT1-A and one on UT1-B are experiencing piping around the header rocks. Header rocks of three rock A-vanes on UT1-A and UT1-B were set too high. On UT1-B at station 119+50 the easement fencing on the right bank has been damaged by a fallen tree. Also on UT3 from station 329+50 to 331+00 on the left bank, a few rills and erosion are present. It is recommended that this area be reseeded with a permanent seed. No major areas of bank erosion or stability issues were observed. The banks and structures will be monitored to ensure that they remain stable. **Table 14** summarizes the morphologic parameters; a more detailed morphologic parameters table is provided in **Appendix E**.

Table 13. Summary of Morphologic Monitoring Parameter

Parameter		Bankfull Xsec Area, Abkf (sq ft)	Avg. Bankfull Width, Wbkf (ft)	Bankfull W/D Ratio	Bankfull Mean Depth, Dbkf (ft)	Bankfull Max Depth, Dmax (ft)
Reach UT1-A	As-Built	9.6	7.6	6.1	1.3	1.9
	Year 1	7.5	7.4	7.3	1	1.7
	Year 2	8	10.2	13.1	0.8	1.8
	Year 3	8.5	9.1	9.8	0.9	1.9
Reach UT1-B Upper	As-Built	5.8	9.9	16.9	0.6	1.1
	Year 1	4.6	9	17.5	0.5	0.9
	Year 2	4.4	9.1	18.8	0.5	0.9
	Year 3	4.5	11.2	28.1	0.4	0.9
Reach UT1-C	As-Built	18.4	16.4	14.6	1.1	2.5
	Year 1	16.5	15.1	13.7	1.1	2.1
	Year 2	9.5	10.1	12.5	0.9	1.6
	Year 3	15.1	16.9	18.8	0.8	2.3
Reach UT1-D	As-Built	6.8	9.8	14	0.7	1.3
	Year 1	9	11.8	15.4	0.8	1.5
	Year 2	8.7	11.5	15.1	0.8	1.5
	Year 3	8.3	12.4	18.4	0.7	1.4
Reach UT1-F	As-Built	5.4	9	15.1	0.6	1.2
	Year 1	4.8	9.2	17.4	0.5	1
	Year 2	5.2	9.9	18.7	0.5	1
	Year 3	4.8	8.9	16.5	0.5	1
Reach UT2	As-Built	9.5	10.5	11.6	0.9	1.7
	Year 1	9.1	10.4	11.9	0.9	1.6
	Year 2	8.9	10.4	12.1	0.9	1.6
	Year 3	9.2	10.7	12.4	0.9	1.7
Reach UT3-A	As-Built	181.1	50.1	13.9	3.6	6.8
	Year 1	176	47.3	12.8	3.8	6.9
	Year 2	4.7	8.2	14.3	0.6	1.3
	Year 3	5.1	9.4	17.2	0.5	1.3
Reach UT3-B Upper	As-Built	14.9	24.1	39.8	0.6	1.4
	Year 1	13.9	23.6	40.7	0.6	1.3
	Year 2	3.4	7.8	18.7	0.4	0.8
	Year 3	15	24.2	39	0.6	1.3

Note: The data presented here are averages of the cross section data for each stream reach. Variations in the data are due to channel adjustment and changes in bankfull elevation.

6.0 CONCLUSIONS AND RECOMMENDATIONS

- Five of the eight hydrology monitoring stations recorded hydroperiods of at least 10 percent of the growing season and meet the hydrologic success criterion for 2010. Two gauges (BDAW4 and BDAW6) experienced hydroperiods of less than 5 percent, but achieved a 10 percent hydroperiod at a depth of no greater than 17.7 inches below the soil surface. The remaining monitoring station (BDAW2) recorded a hydroperiod of 8 percent of growing season. All three of the reference gauges had hydroperiods greater than 10 percent.
- Dunn weather station rainfall data indicates that the 2010 growing season rainfall amounts were well below normal for most of the growing season, except for May, when rainfall levels were within the normal range
- Vegetation monitoring efforts have documented the average number of stems per acre on site to be 473 for the 2010 monitoring year, with the range of stem density being 340 to 620 stems per acre.
- All plots have met and exceeded the minimum criteria of 320 stems per acres after three years, and no remedial actions are recommended.
- Data collected during monitoring Year 3 and observations of conditions at the Site indicate that the project continues to be successful. The stream morphology is generally stable. A few in-stream structures seem to have been installed improperly, with minor occurrences of erosion and deposition. Several structures were stable, although not functioning as designed. It is recommended that the easement fence on UT1-B be fixed to keep cattle out of the easement and the left bank on UT3 be reseeded from 329+50 to 331+00 with a permanent seed. It was concluded that the Site continues to be on track to achieve the stream success criteria specified in the Restoration Plan.
- Vegetation, hydrologic, and stream monitoring will continue through 2012.

APPENDIX A

As-Built Survey

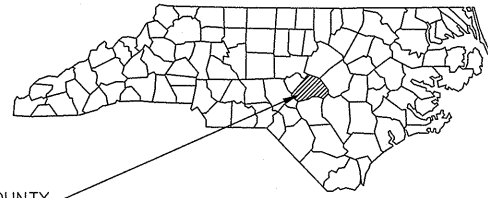
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RECORD SET FOR

BEAVERDAM SWAMP

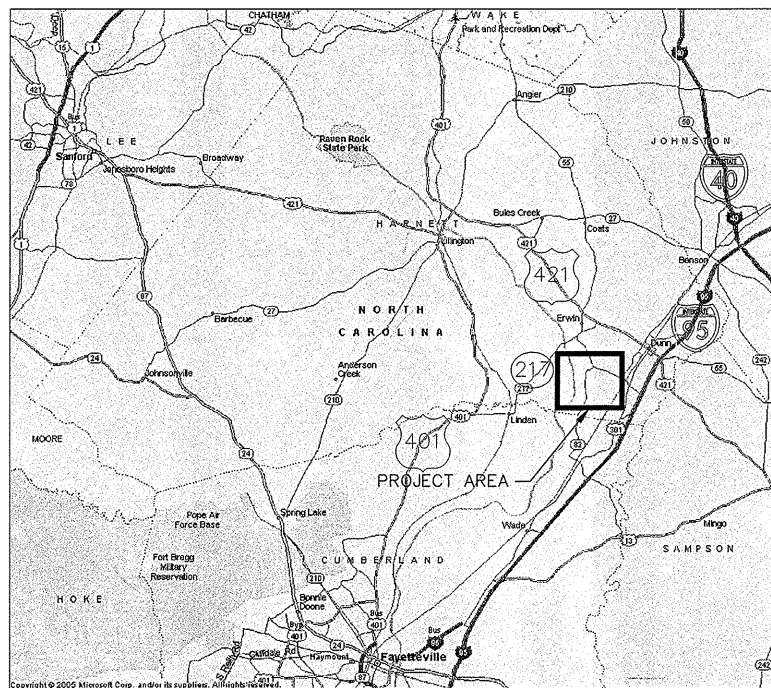
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EBX NEUSE I, LLC

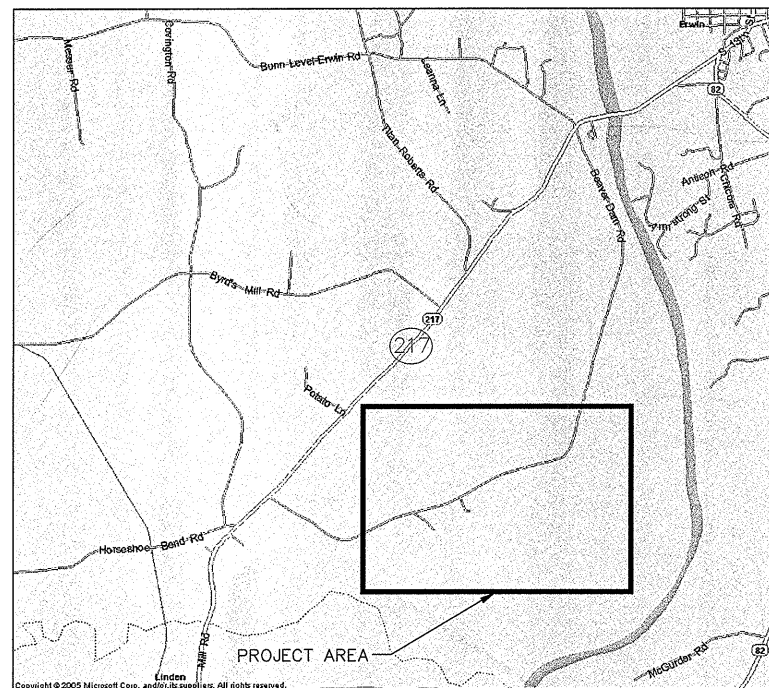


HARNETT COUNTY STATE OF NORTH CAROLINA

HARNETT COUNTY, NORTH CAROLINA
STATE PROJECT NO: D06029-B



VICINITY MAP



LOCATION MAP

INDEX OF SHEETS

SHEET NO.	DESCRIPTION
1	TITLE SHEET
2-3	LEGENDS AND SYMBOLS
4-19	GRADING PLAN AND PROFILE
20-23	TYPICAL CROSS SECTIONS
24-39	PLANTING PLAN

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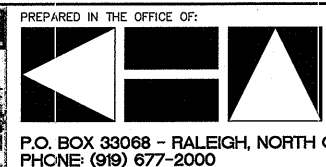
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KINSTON, NC 28501
TEL: 252-522-2500 FAX: 252-522-4747
EMAIL: MATRIXEAST@EARTHLINK.NET

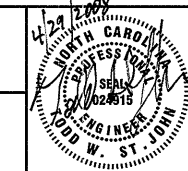
NC-EEP CONTACT: GUY PEARCE (919) 715-1656
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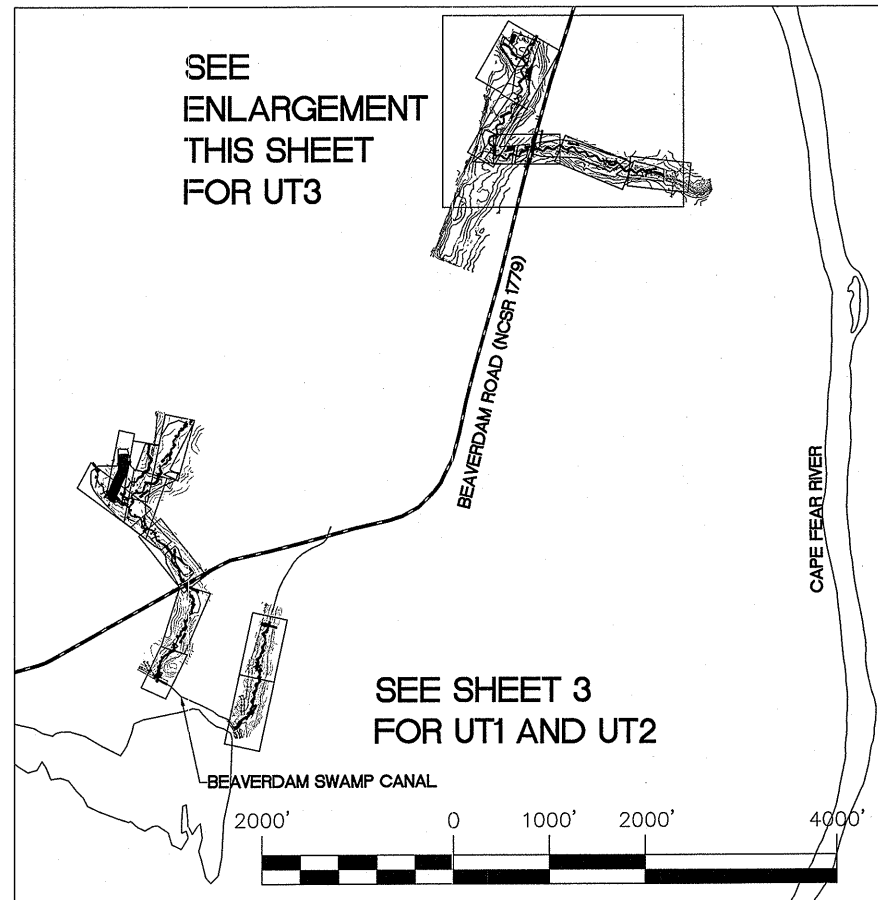
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TITLE: TITLE SHEET



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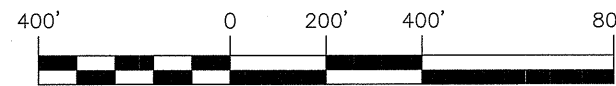
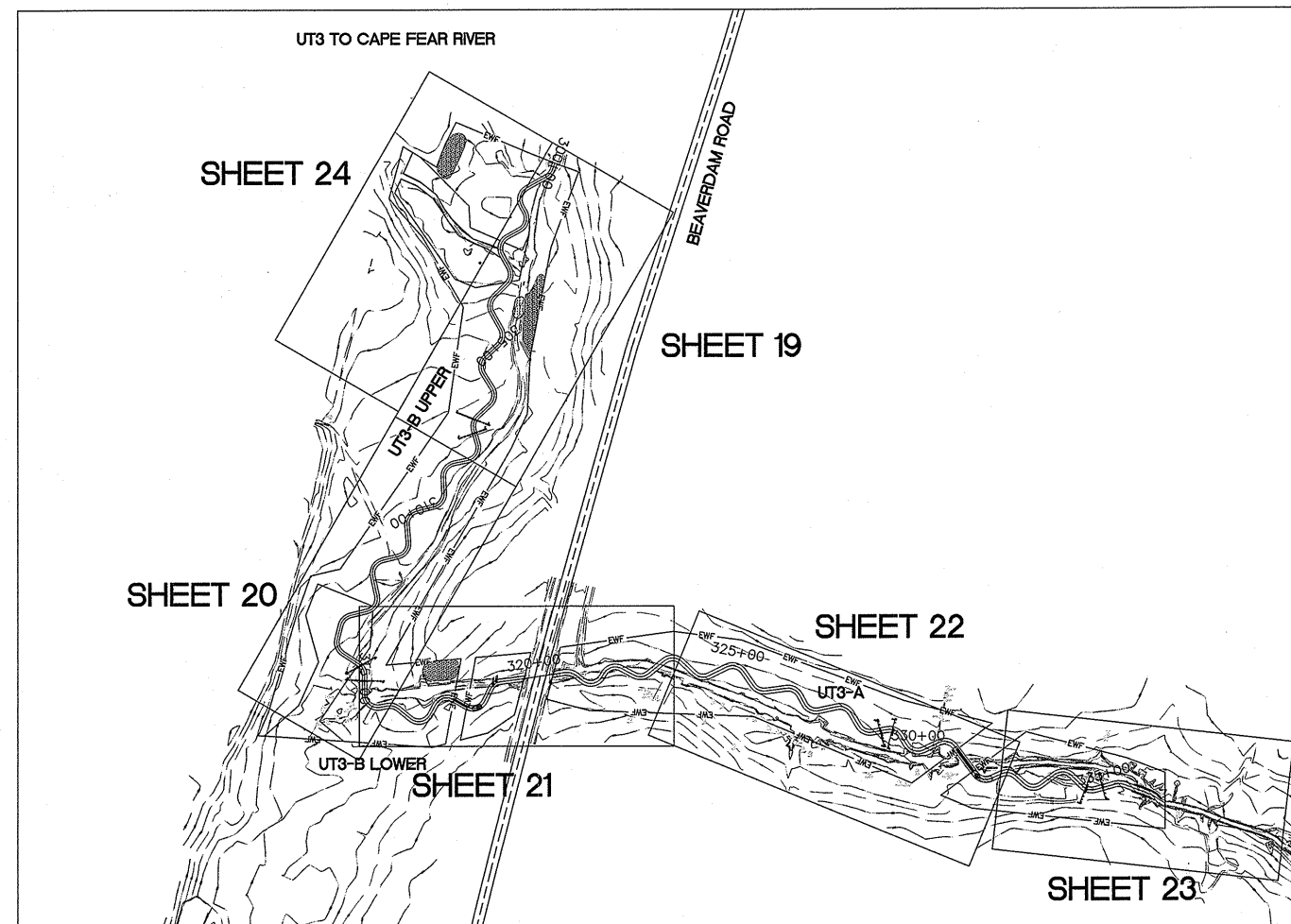
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SITE MAP
N.T.S.

SURVEY LEGEND	
	PROPERTY LINE
	MAJOR CONTOURS
	MINOR CONTOURS
	STREAM CENTERLINE
	TREELINE
	EXISTING WETLAND

LEGEND			
	PROPOSED BANK FULL		ROCK CROSS VANE
	PROPOSED CREEK		LOG SILL
	PERMANENT CONSERVATION EASEMENT		ROCK A-VANE
	STREAM PLUG		ROCK VANE
	CHANNEL BACKFILL		LOG VANE
	WETLAND ENHANCEMENT		LOG CROSS VANE
	WETLAND RESTORATION		STEP POOL

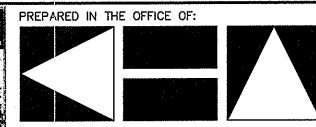
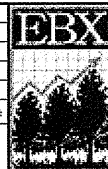


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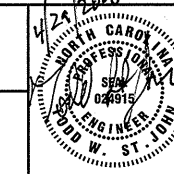
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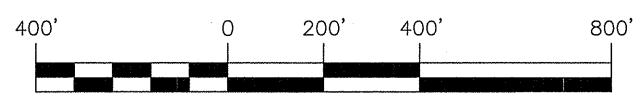
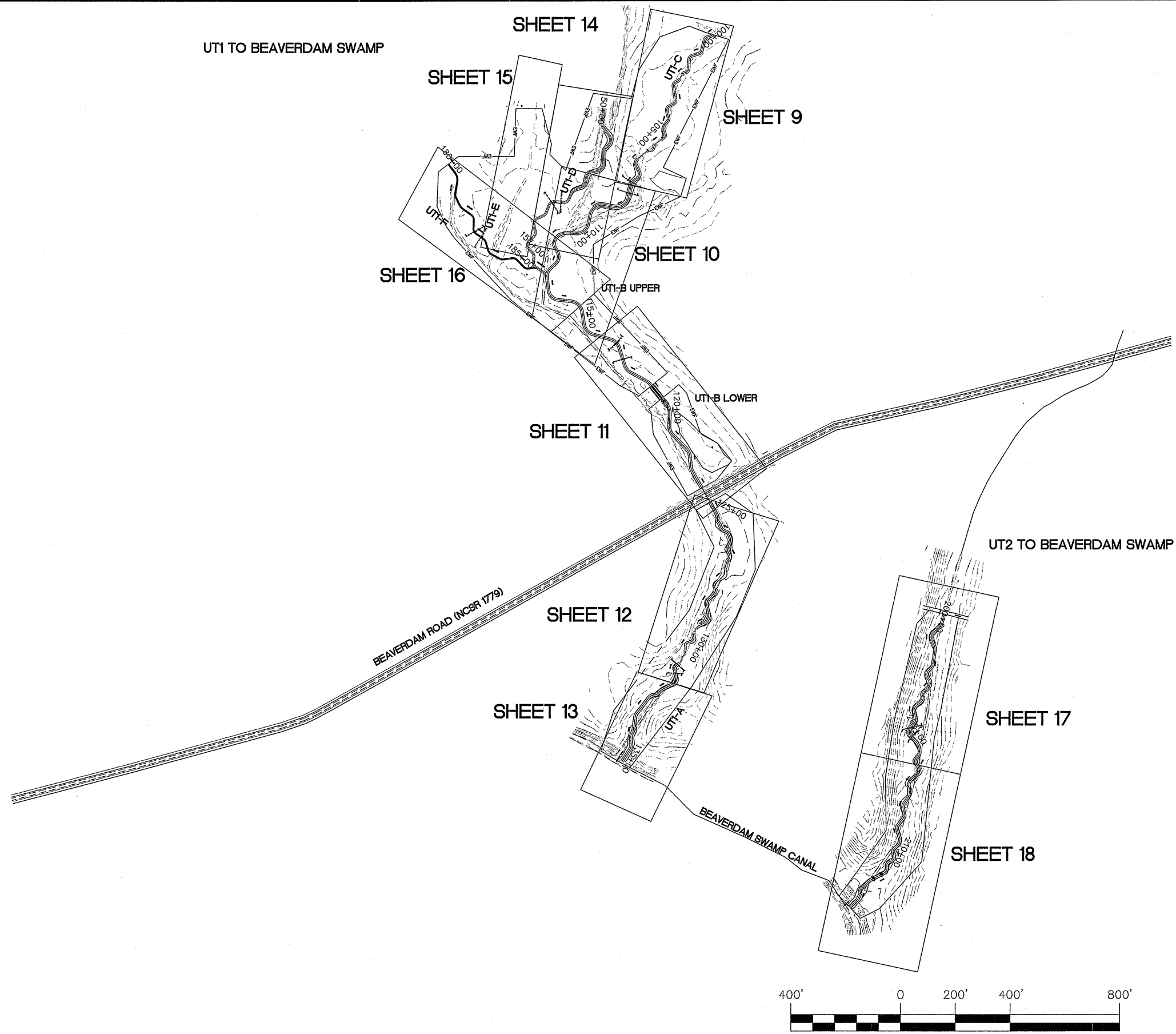


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TITLE: LEGENDS AND SYMBOLS



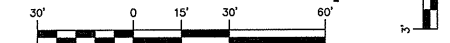
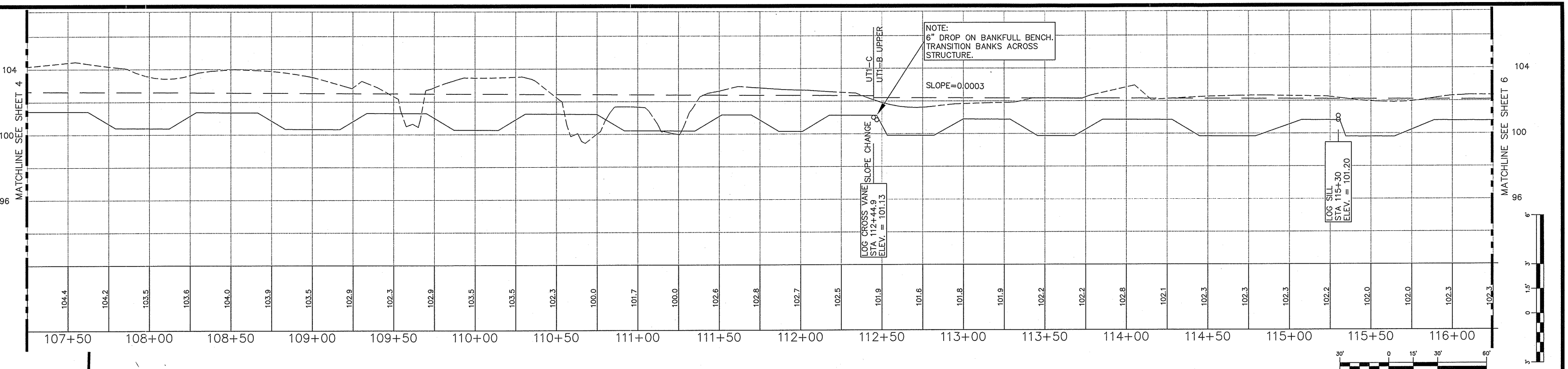
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DRAWN BY: JIK STREAM AND WETLAND RESTORATION
DESIGNED BY: RTL EBX NEUSE I, LLC
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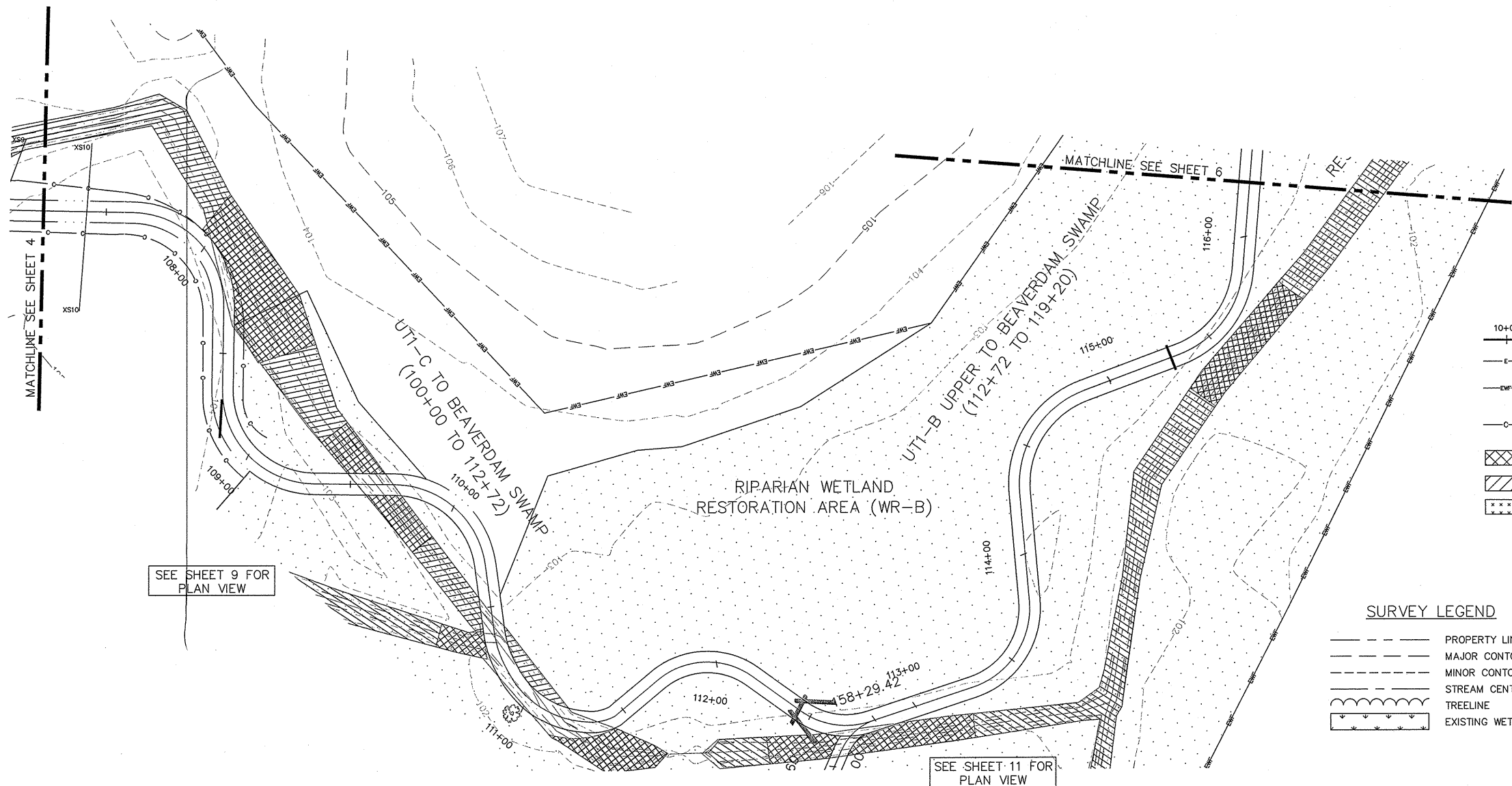
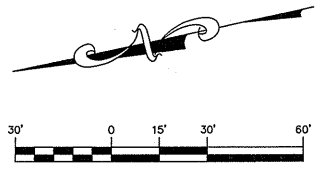
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- PROFILE LEGEND**
- PROPOSED TOP OF BANK
 - Q OF NEW CHANNEL
 - ... EXISTING GROUND—CENTER
 - LOG CROSS VANE
 - LOG SILL
 - ROCK CROSS VANE
 - A-VANE

- LEGEND**
- 10+00 PROPOSED BANK FULL
 - Q OF PROPOSED CREEK
 - PERMANENT CONSERVATION EASEMENT
 - PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
 - CUT LINE (PROVIDED IN FORESTED AREA ONLY)
 - ▨ STREAM PLUG
 - ▨ CHANNEL BACKFILL
 - ▨ WETLAND ENHANCEMENT
 - ROCK CROSS VANE
 - ROCK A-VANE
 - ROCK VANE
 - LOG CROSS VANE
 - ▨ WETLAND RESTORATION
 - ▨ STREAM VALLEY RESTORATION
 - LOG SILL
 - LOG VANE

- SURVEY LEGEND**
- PROPERTY LINE
 - MAJOR CONTOURS
 - MINOR CONTOURS
 - STREAM CENTERLINE
 - TREELINE
 - ▨ EXISTING WETLAND



SEE SHEET 9 FOR PLAN VIEW

SEE SHEET 11 FOR PLAN VIEW

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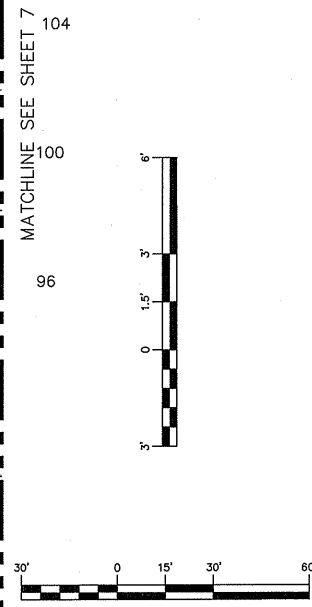
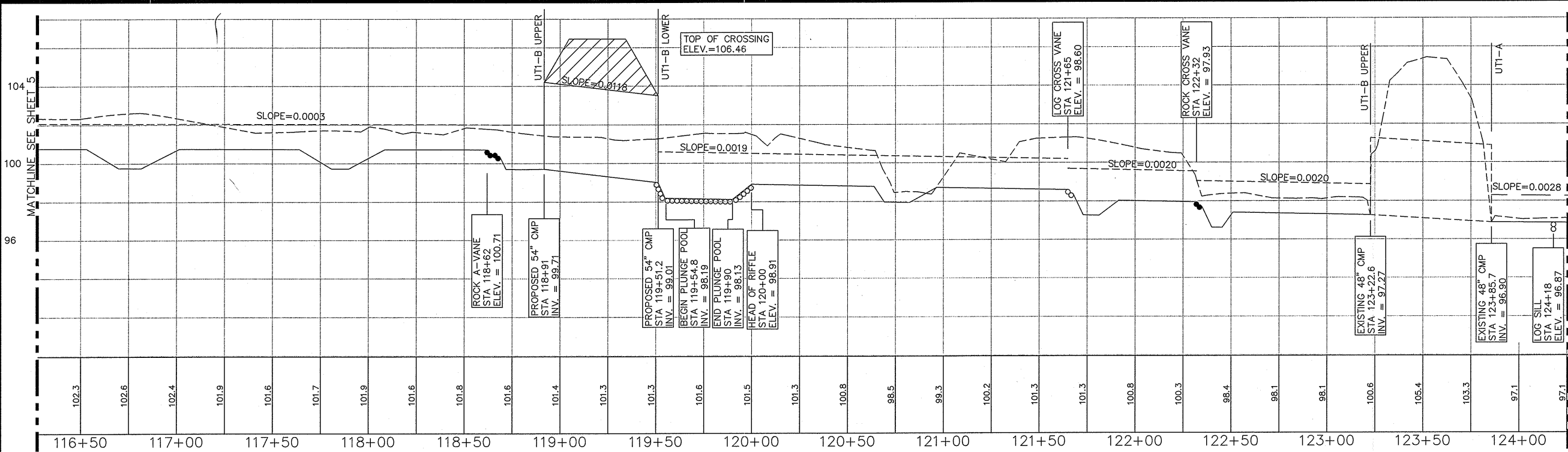


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STREAM AND WETLAND RESTORATION
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JOB NUMBER: 012620010 SHEET NUMBER: 5



PROFILE LEGEND

- PROPOSED TOP OF BANK
- - - - - Q OF NEW CHANNEL
- - - - - EXISTING GROUND-CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- ▲ A-VANE

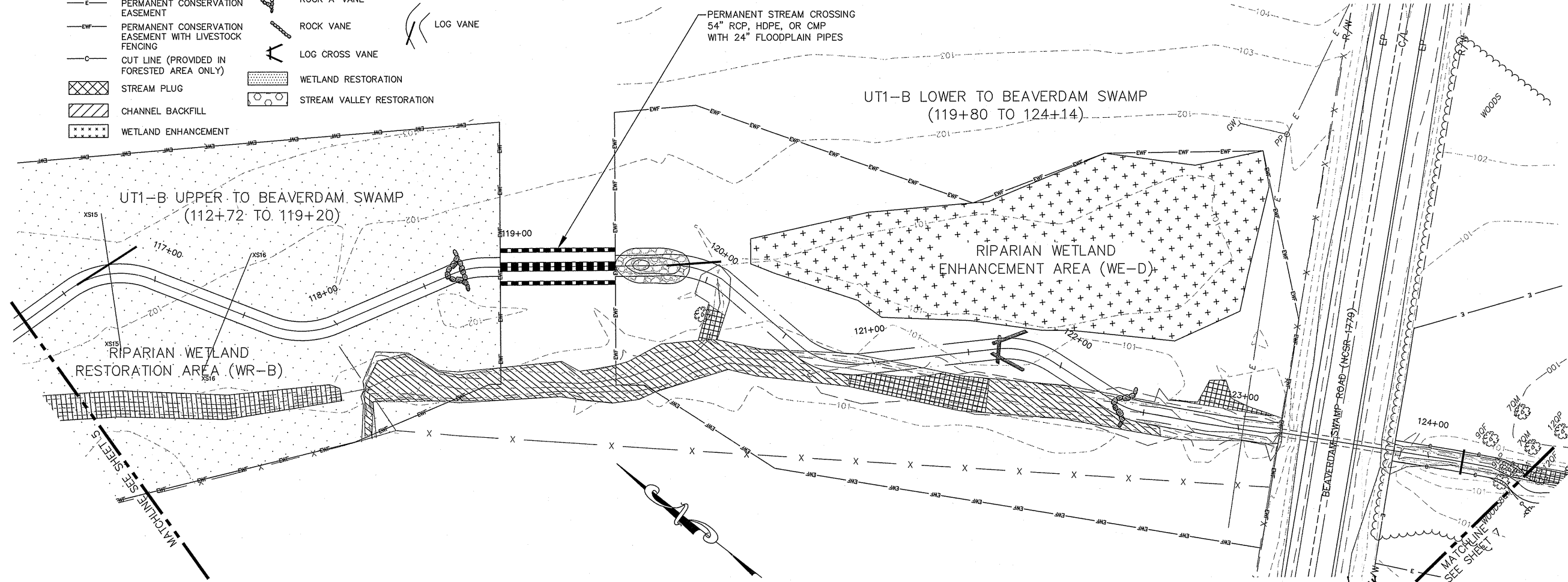
SURVEY LEGEND

- PROPERTY LINE
- - - - - MAJOR CONTOURS
- - - - - MINOR CONTOURS
- - - - - STREAM CENTERLINE
- TREETLINE
- EXISTING WETLAND

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- PROPOSED CREEK
- - - - - PERMANENT CONSERVATION EASEMENT
- - - - - PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- - - - - CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- ▨ STREAM PLUG
- ▨ CHANNEL BACKFILL
- ▨ WETLAND ENHANCEMENT
- ▲ ROCK CROSS VANE
- ▲ ROCK A-VANE
- ▲ ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE
- ▨ WETLAND RESTORATION
- STREAM VALLEY RESTORATION



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CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

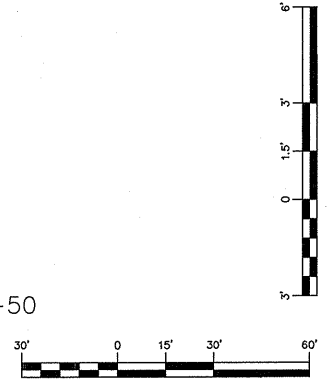
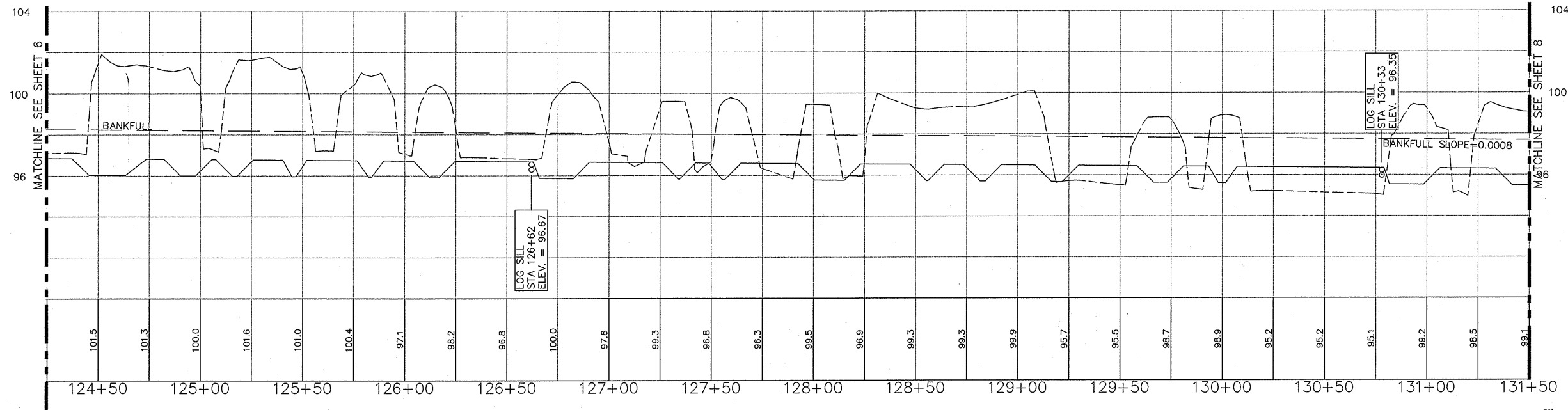
TITLE: GRADING PLAN AND PROFILE

DATE: 02/25/08
PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

DESIGNED BY: JIK
CHECKED BY: RTSJ

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 6



PROFILE LEGEND

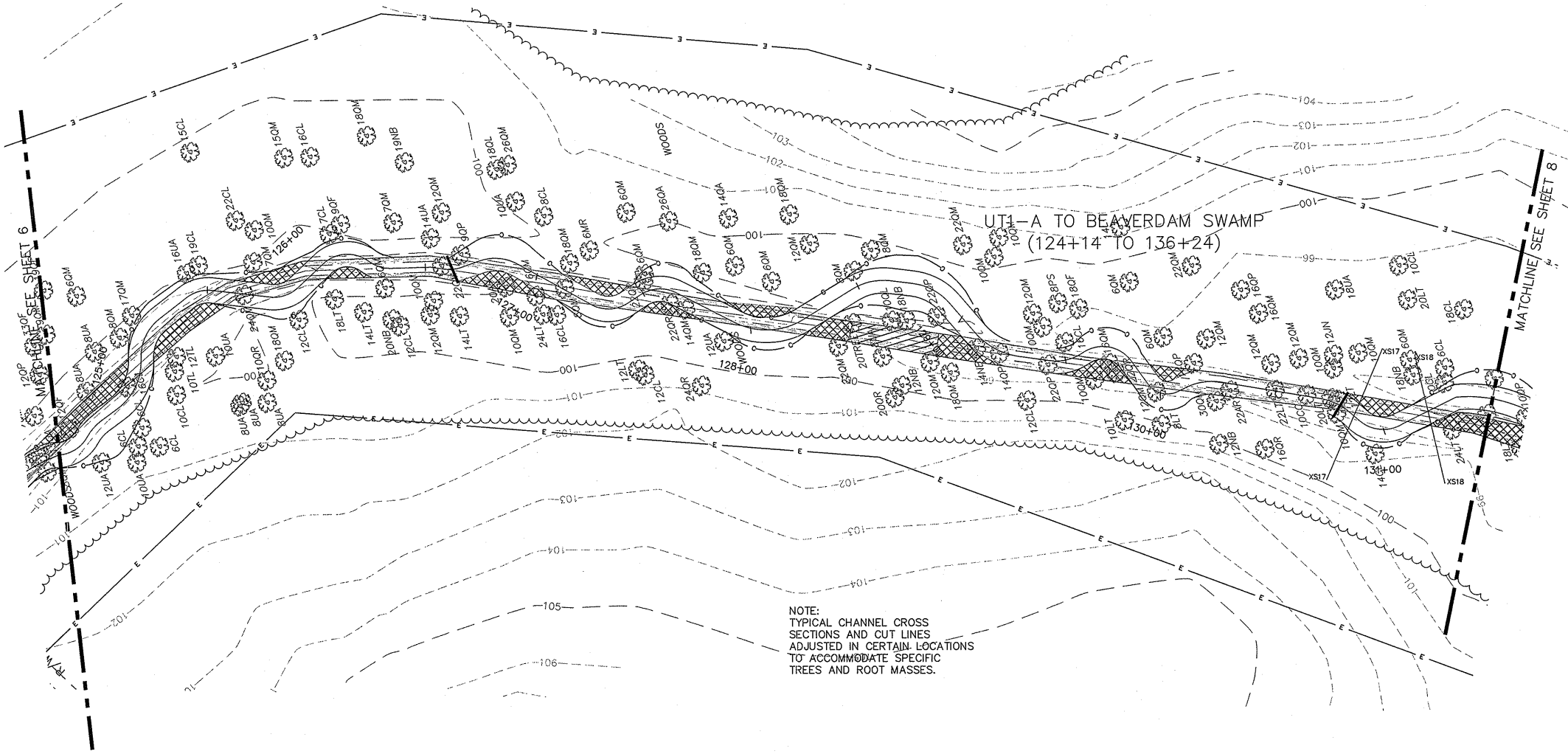
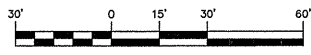
- PROPOSED TOP OF BANK
- Q OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A-VANE

LEGEND

- 10+00 PROPOSED BANK FULL
- Q PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- ▨ STREAM PLUG
- ▨ CHANNEL BACKFILL
- ▨ WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- ▨ WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND



NOTE:
TYPICAL CHANNEL CROSS SECTIONS AND CUT LINES ADJUSTED IN CERTAIN LOCATIONS TO ACCOMMODATE SPECIFIC TREES AND ROOT MASSES.

1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS
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TITLE: GRADING PLAN AND PROFILE



DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 7

PROFILE LEGEND

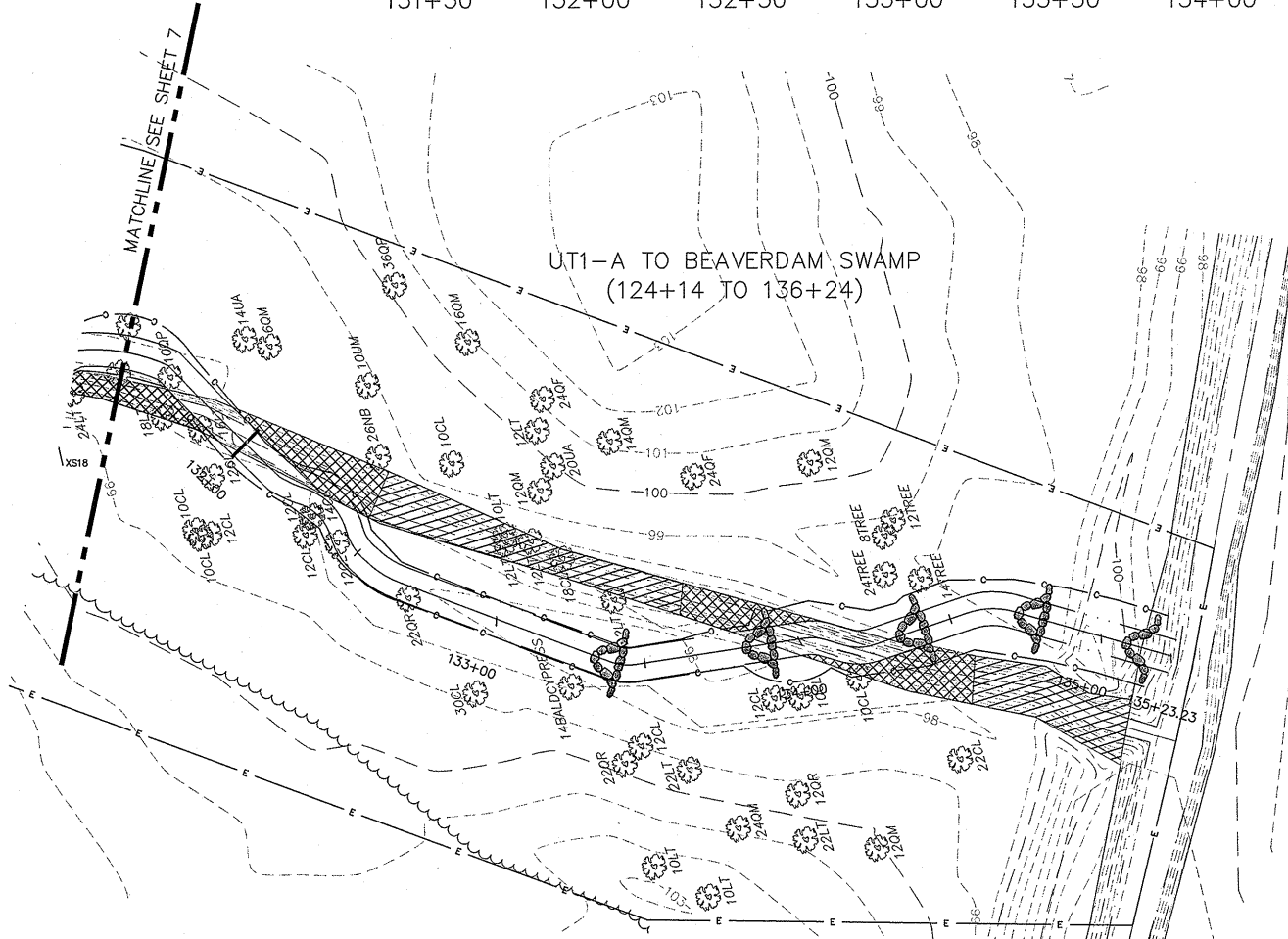
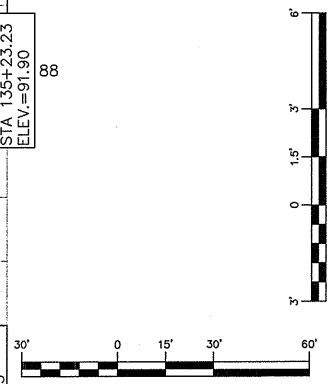
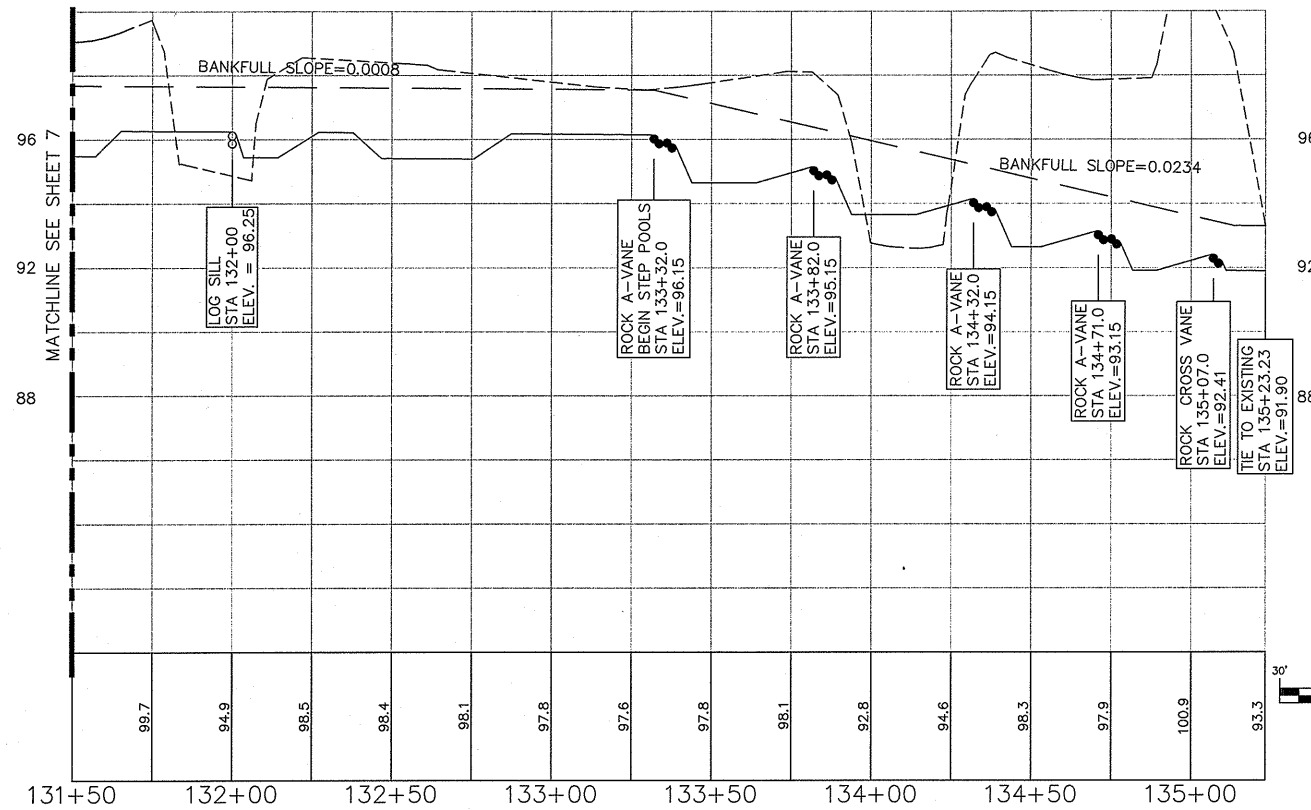
- PROPOSED TOP OF BANK
- C OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A-VANE

LEGEND

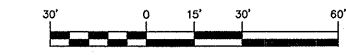
- 10+00 --- PROPOSED BANK FULL
- C OF PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- ▨ STREAM PLUG
- ▨ CHANNEL BACKFILL
- ▨ WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND



NOTE:
TYPICAL CHANNEL CROSS SECTIONS AND CUT LINES ADJUSTED IN CERTAIN LOCATIONS TO ACCOMMODATE SPECIFIC TREES AND ROOT MASSES.



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TITLE: GRADING PLAN AND PROFILE

DATE: 02/25/08
DRAWN BY: JJK
DESIGNED BY: RTL
CHECKED BY: TSJ

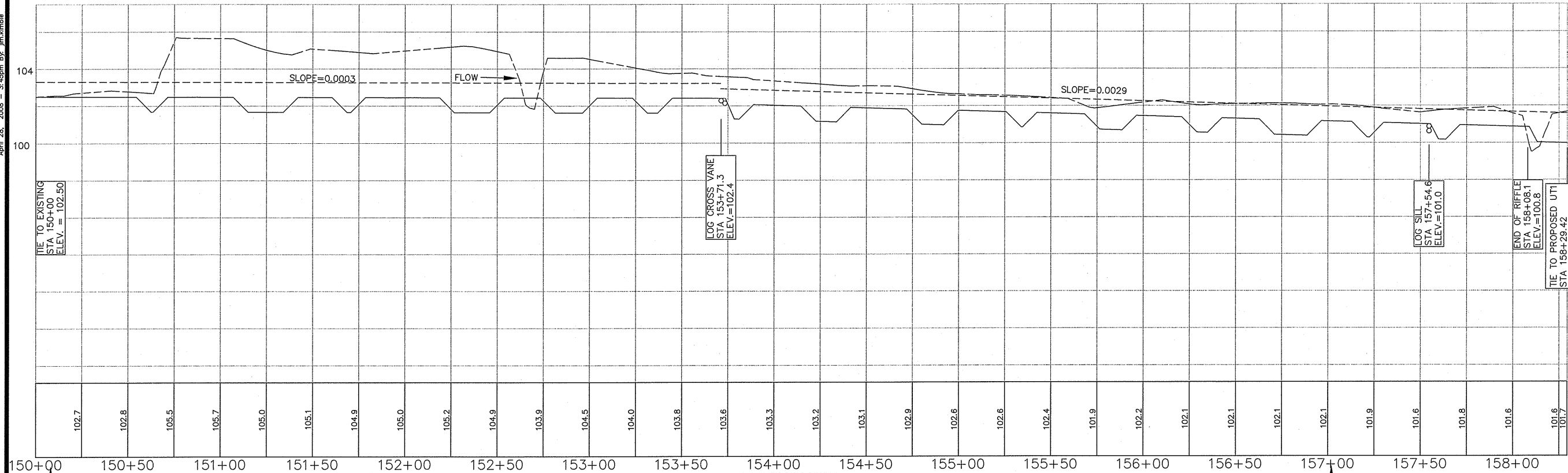
PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

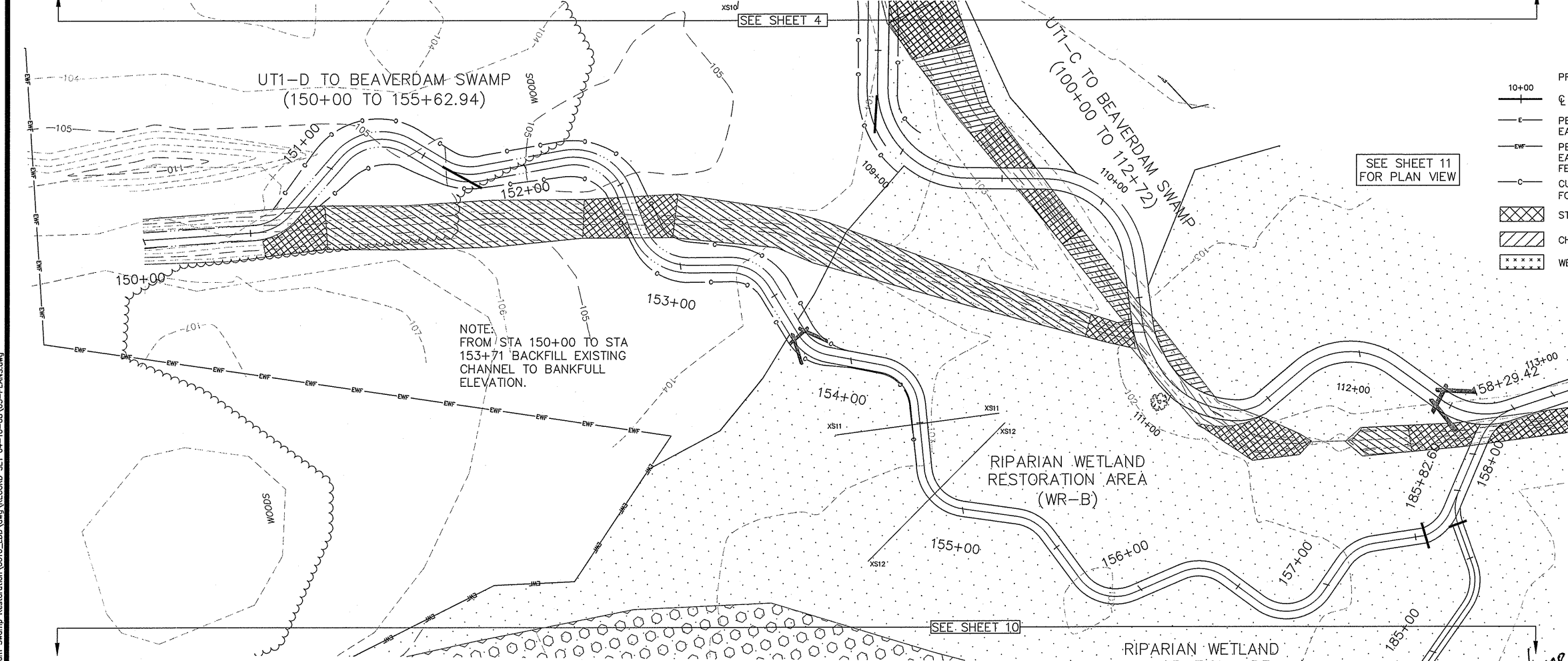
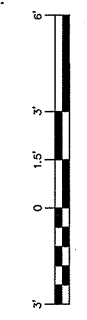
JOB NUMBER: 012620010 SHEET NUMBER: 8

April 28, 2008 - 3:45pm By: Jm.kimble

TIE TO EXISTING
STA 150+00
ELEV. = 102.50



- PROFILE LEGEND**
- PROPOSED TOP OF BANK
 - Q OF NEW CHANNEL
 - EXISTING GROUND-CENTER
 - LOG CROSS VANE
 - LOG SILL
 - ROCK CROSS VANE
 - A-VANE



NOTE:
FROM STA 150+00 TO STA
153+71 BACKFILL EXISTING
CHANNEL TO BANKFULL
ELEVATION.

SEE SHEET 11
FOR PLAN VIEW

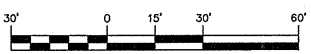
SEE SHEET 10

- LEGEND**
- PROPOSED BANK FULL
 - Q PROPOSED CREEK
 - PERMANENT CONSERVATION EASEMENT
 - PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
 - CUT LINE (PROVIDED IN FORESTED AREA ONLY)
 - STREAM PLUG
 - CHANNEL BACKFILL
 - WETLAND ENHANCEMENT
 - ROCK CROSS VANE
 - ROCK A-VANE
 - ROCK VANE
 - LOG CROSS VANE
 - LOG SILL
 - LOG VANE
 - WETLAND RESTORATION
 - STREAM VALLEY RESTORATION

- SURVEY LEGEND**
- PROPERTY LINE
 - MAJOR CONTOURS
 - MINOR CONTOURS
 - STREAM CENTERLINE
 - TREELINE
 - EXISTING WETLAND

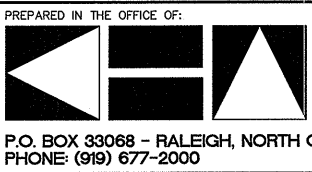


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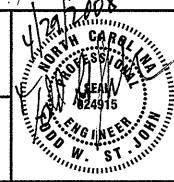
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1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JK	TWS

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CLIENT: **STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM**
TITLE: **GRADING PLAN AND
PROFILE**



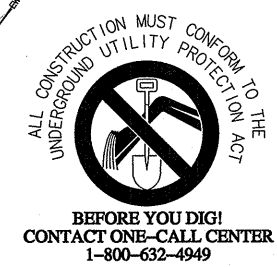
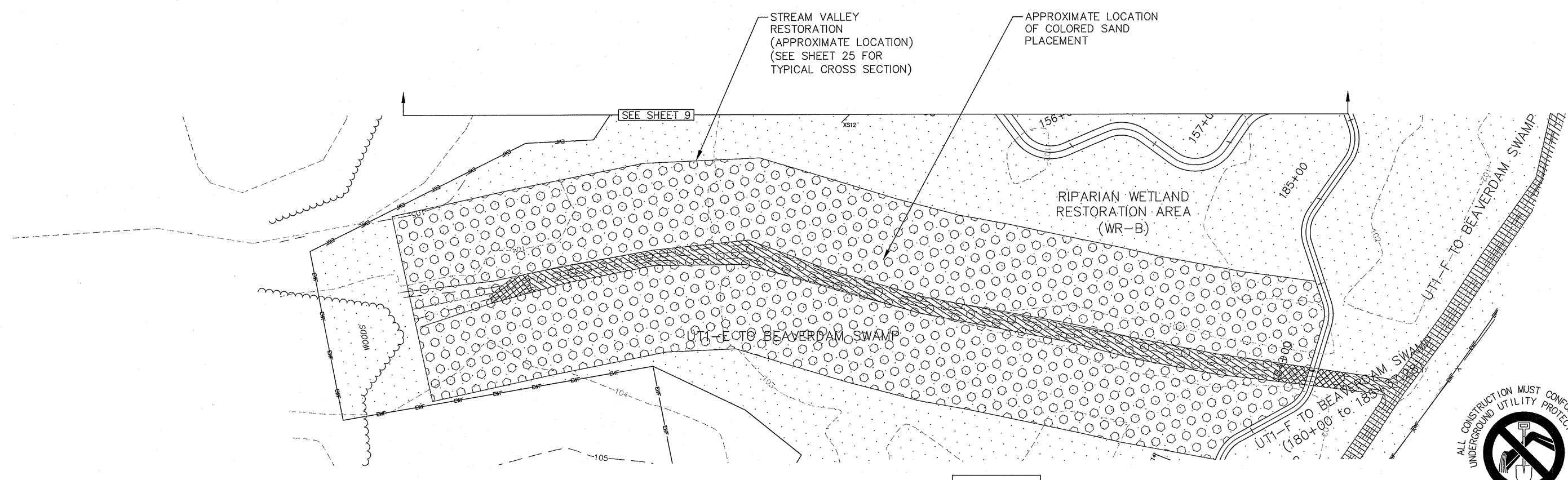
DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: **BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC**

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 9

- | | | | | | |
|---|--|---|--|---|--|
| <p>LEGEND</p> <p>10+00 PROPOSED BANK FULL</p> <p>⊕ PROPOSED CREEK</p> <p>—E— PERMANENT CONSERVATION EASEMENT</p> <p>—EW— PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING</p> <p>—C— CUT LINE (PROVIDED IN FORESTED AREA ONLY)</p> <p>▨ STREAM PLUG</p> <p>▧ CHANNEL BACKFILL</p> <p>▩ WETLAND ENHANCEMENT</p> | | <p>SURVEY LEGEND</p> <p>— — — — — PROPERTY LINE</p> <p>— — — — — MAJOR CONTOURS</p> <p>— — — — — MINOR CONTOURS</p> <p>— — — — — STREAM CENTERLINE</p> <p>— — — — — TREELINE</p> <p>▭ EXISTING WETLAND</p> | | <p>PROFILE LEGEND</p> <p>— — — — — PROPOSED TOP OF BANK</p> <p>⊕ OF NEW CHANNEL</p> <p>— — — — — EXISTING GROUND-CENTER</p> <p>○ LOG CROSS VANE</p> <p>● LOG SILL</p> <p>● ROCK CROSS VANE</p> <p>● A-VANE</p> | |
| <p>⊕ ROCK CROSS VANE</p> <p>⊕ ROCK A-VANE</p> <p>⊕ ROCK VANE</p> <p>⊕ LOG CROSS VANE</p> <p>▨ WETLAND RESTORATION</p> <p>▨ STREAM VALLEY RESTORATION</p> | | <p>⊕ LOG SILL</p> <p>⊕ LOG VANE</p> | | | |



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April 28, 2008 - 3:46pm By: jmkimble

E:\proj\012620010 Beaverdam Swamp Restoration\01010.LDD\Draw\RECORD SET 04-16-08\05-PLANS.dwg

PROFILE LEGEND

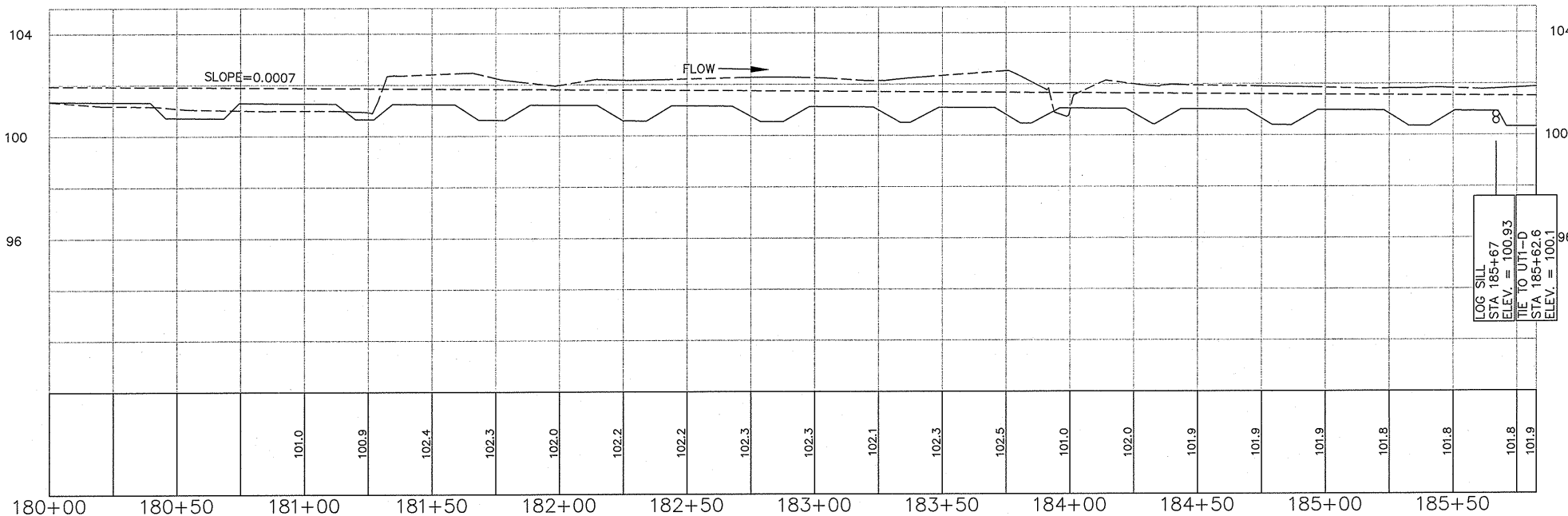
- PROPOSED TOP OF BANK
- Q OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A-VANE

LEGEND

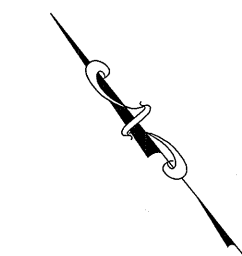
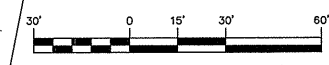
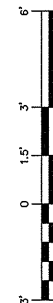
- 10+00
- PROPOSED BANK FULL
- Q PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- ▨ STREAM PLUG
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- ▨ WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

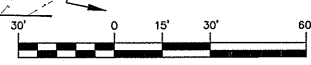
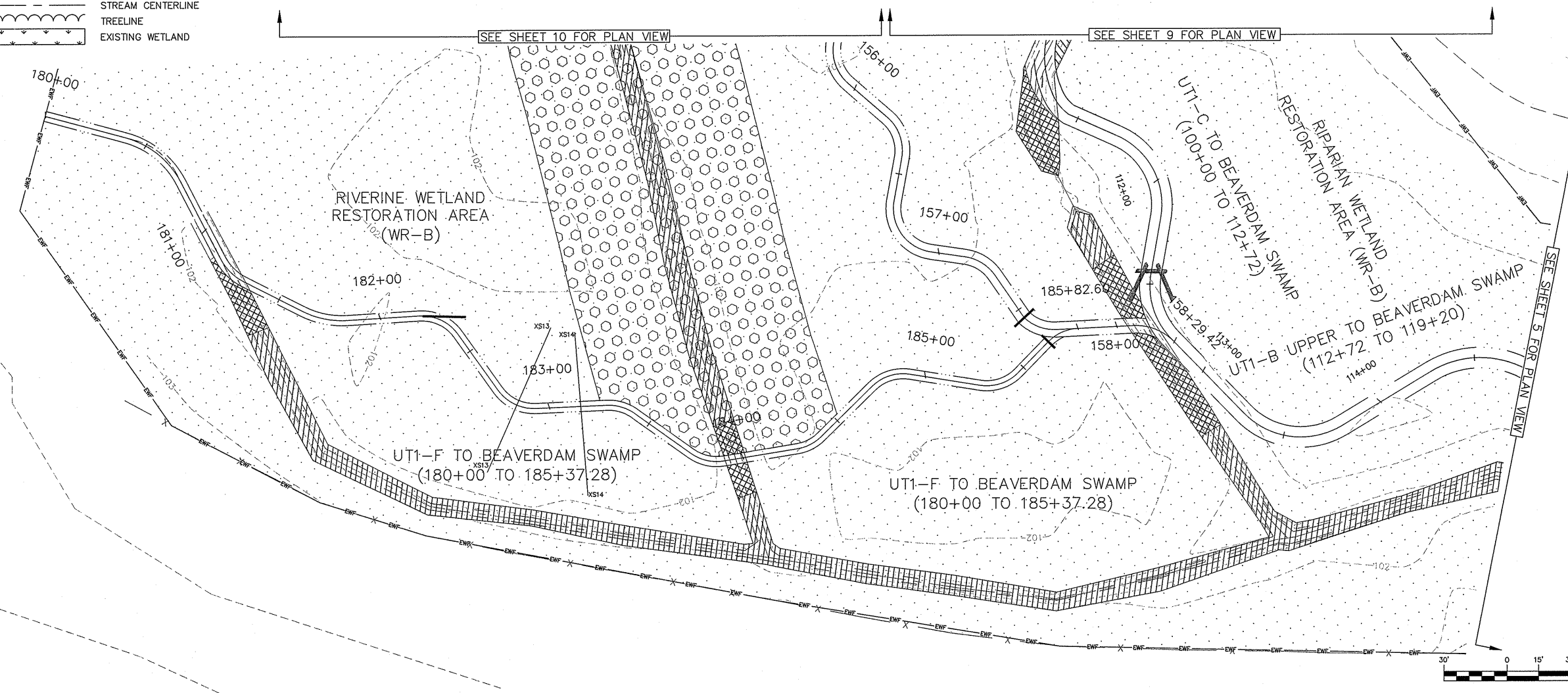
- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND



LOG SILL
STA 185+67
ELEV. = 100.93
TIE TO UT1-D
STA 185+62.6
ELEV. = 100.1

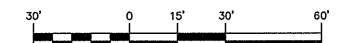
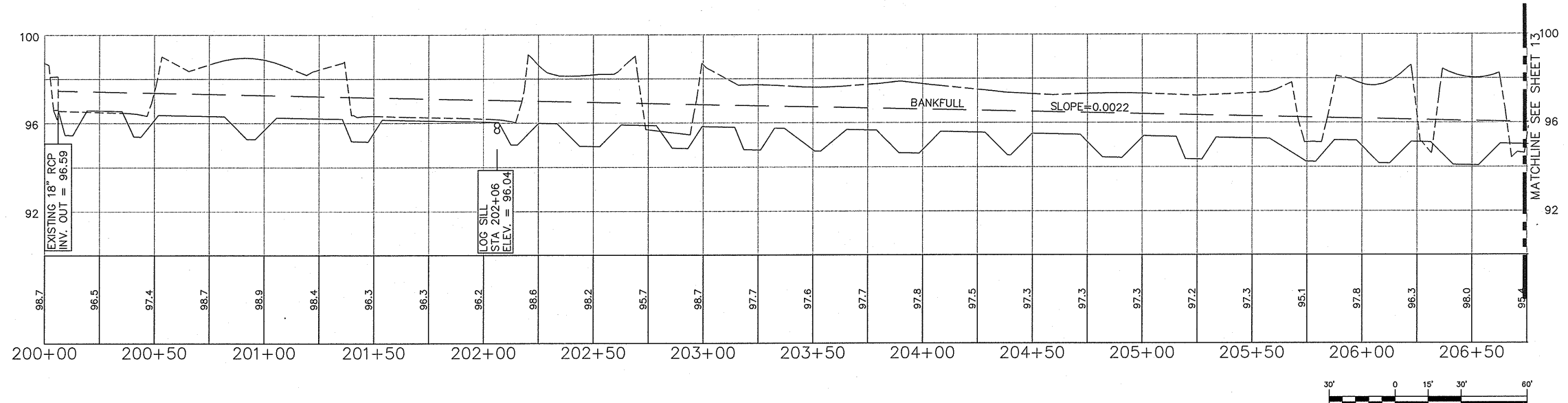


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<p>REV. NO.:</p>	<p>REVISION:</p>	<p>DATE:</p>	<p>DRAWN BY:</p>					<p>CHECKED BY:</p>	

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PROFILE LEGEND

- PROPOSED TOP OF BANK
- @ OF NEW CHANNEL
- EXISTING GROUND-CENTER
- o LOG CROSS VANE
- o LOG SILL
- o ROCK CROSS VANE
- o A-VANE

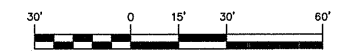
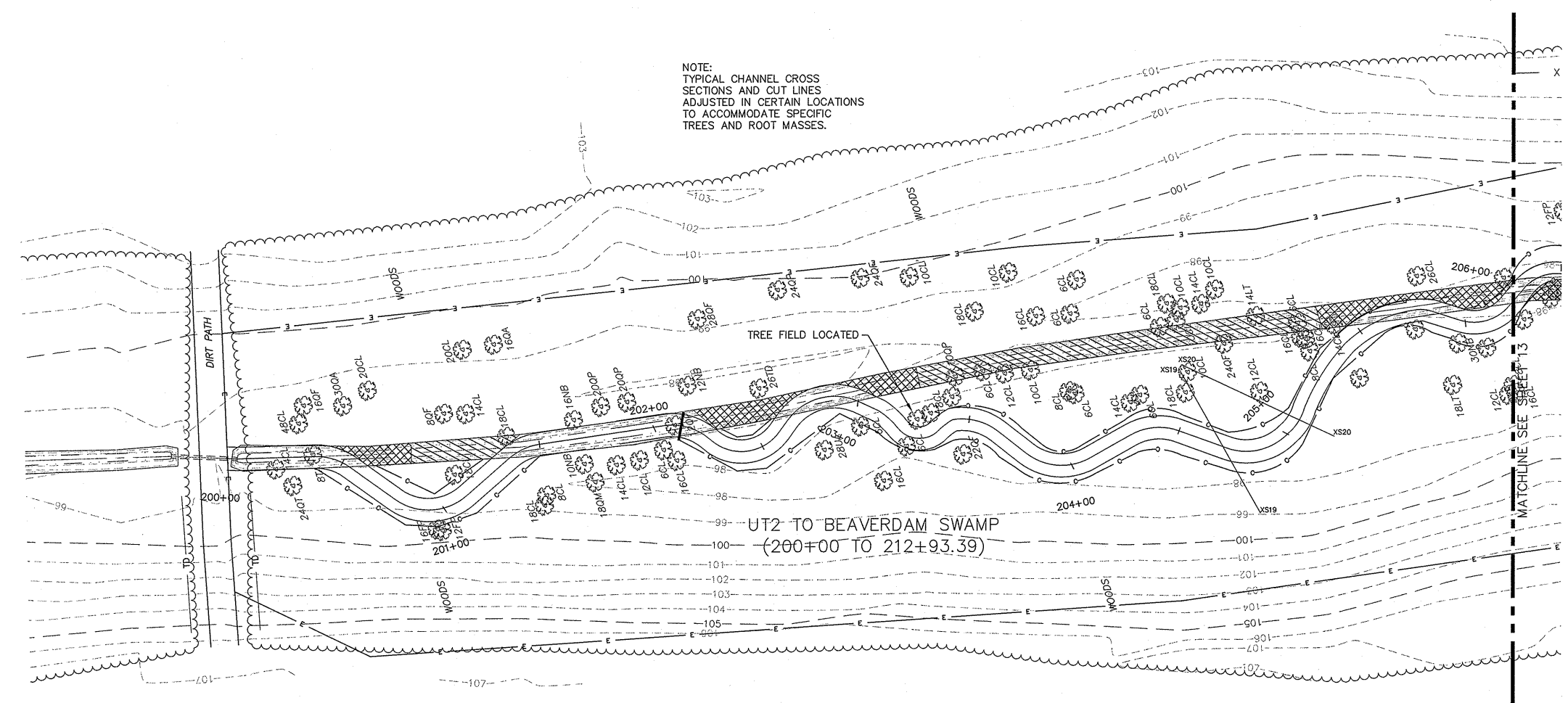
LEGEND

- 10+00 PROPOSED BANK FULL
- @ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- STREAM PLUG
- CHANNEL BACKFILL
- WETLAND ENHANCEMENT
- o ROCK CROSS VANE
- o ROCK A-VANE
- o ROCK VANE
- o LOG CROSS VANE
- o LOG SILL
- o LOG VANE
- WETLAND RESTORATION
- STREAM VALLEY RESTORATION

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

NOTE:
TYPICAL CHANNEL CROSS SECTIONS AND CUT LINES ADJUSTED IN CERTAIN LOCATIONS TO ACCOMMODATE SPECIFIC TREES AND ROOT MASSES.



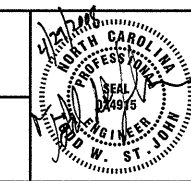
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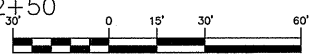
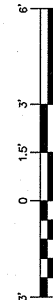
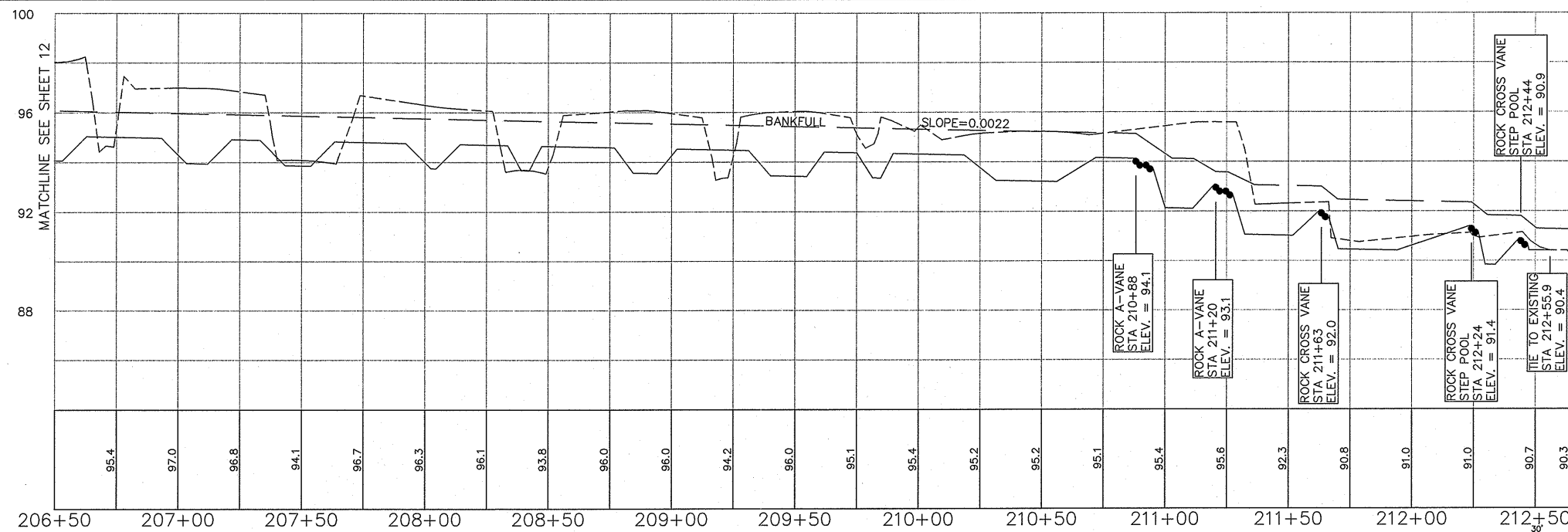


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TITLE: GRADING PLAN AND PROFILE

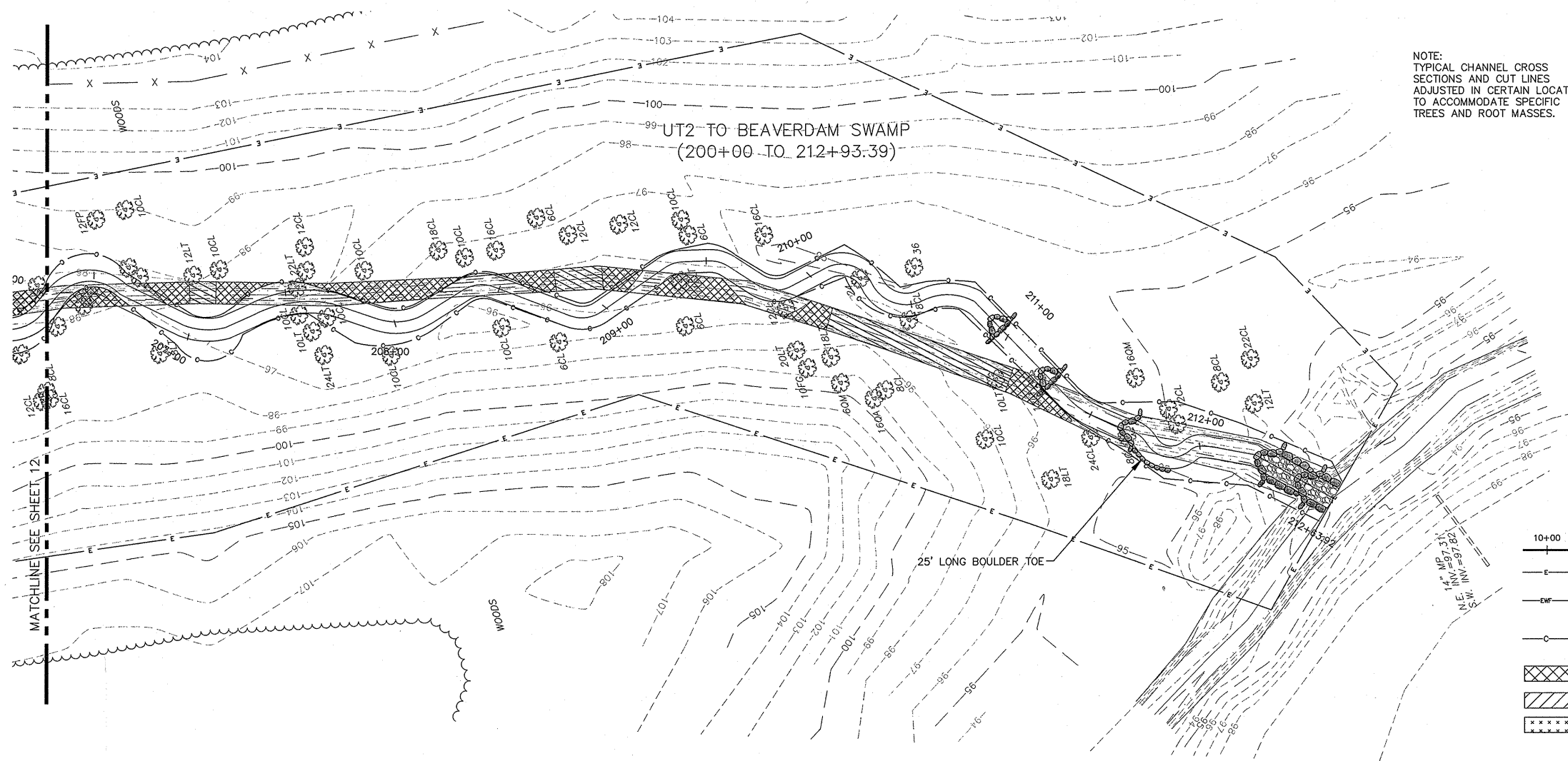


DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ
PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC
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PROFILE LEGEND

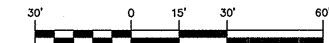
- PROPOSED TOP OF BANK
- C OF NEW CHANNEL
- - - EXISTING GROUND-CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- ▲ A-VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- - - MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

LEGEND

- 10+00 PROPOSED BANK FULL
- C OF PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
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- ▨ WETLAND RESTORATION
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- ▨ LOG SILL
- ▨ LOG VANE



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1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

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CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

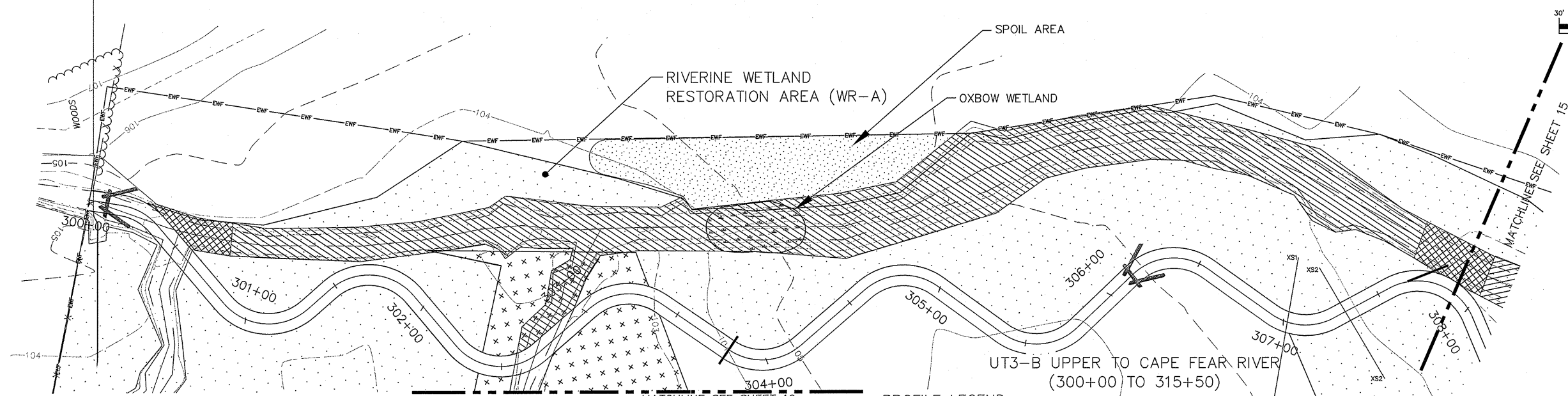
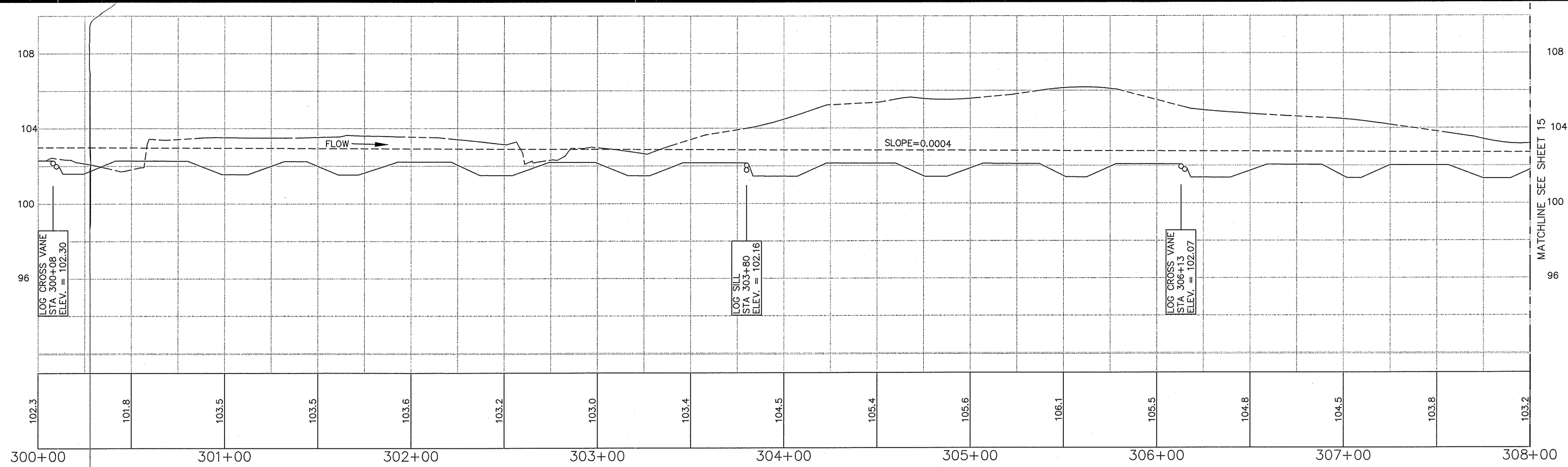
TITLE: GRADING PLAN AND PROFILE

DATE: 02/25/08 PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 13



- LEGEND**
- 10+00
 - PROPOSED BANK FULL
 - PROPOSED CREEK
 - PERMANENT CONSERVATION EASEMENT
 - PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
 - CUT LINE (PROVIDED IN FORESTED AREA ONLY)
 - STREAM PLUG
 - CHANNEL BACKFILL
 - WETLAND ENHANCEMENT
 - ROCK CROSS VANE
 - ROCK A-VANE
 - ROCK VANE
 - LOG CROSS VANE
 - WETLAND RESTORATION
 - STREAM VALLEY RESTORATION
 - LOG SILL
 - LOG VANE
 - SPOIL AREA

- SURVEY LEGEND**
- PROPERTY LINE
 - MAJOR CONTOURS
 - MINOR CONTOURS
 - STREAM CENTERLINE
 - TREELINE
 - EXISTING WETLAND

- PROFILE LEGEND**
- PROPOSED TOP OF BANK
 - NEW CHANNEL
 - EXISTING GROUND-CENTER
 - LOG CROSS VANE
 - LOG SILL
 - ROCK CROSS VANE
 - A-VANE



1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS
REV. No.	REVISION:	DATE	DRAWN BY:	CHECKED BY:

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CLIENT: STATE OF NORTH CAROLINA
 ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

DATE: 02/25/08
 DRAWN BY: JIK
 DESIGNED BY: RTL
 CHECKED BY: TSJ

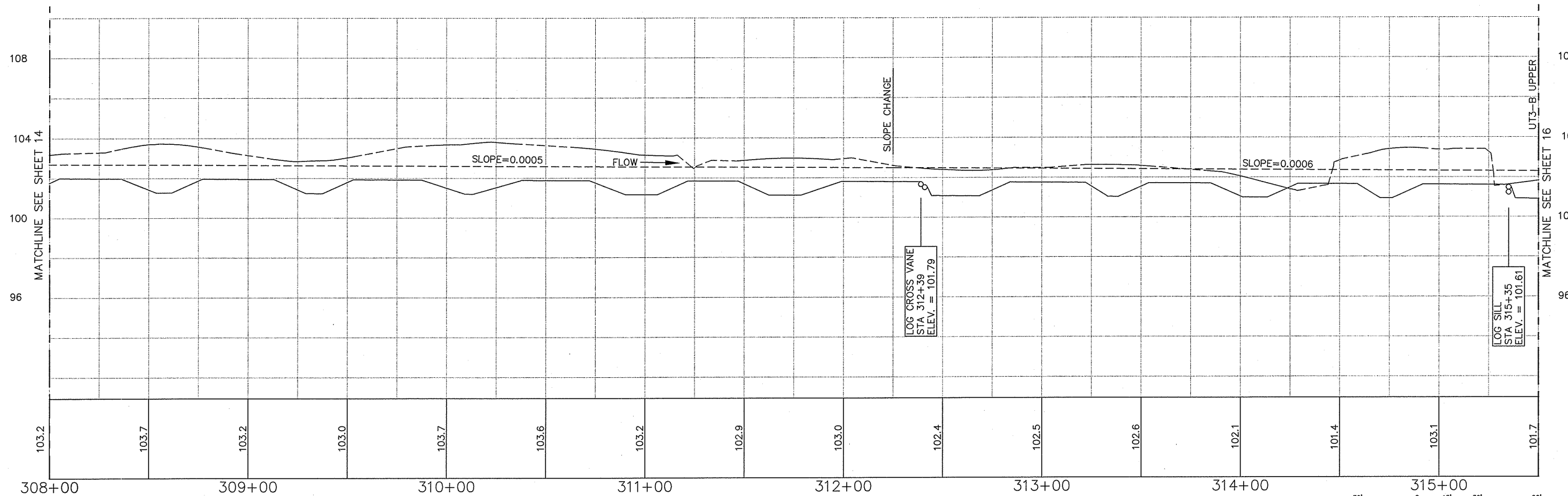
PROJECT: BEAVERDAM SWAMP
 STREAM AND WETLAND RESTORATION
 EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 14

April 28, 2008 - 3:48pm By: jmkimble

T:\env\02262010 Beaverdam Swamp Restoration\0010_LDD\env\RECORD_SET\04-10-08\05-PLANS.dwg



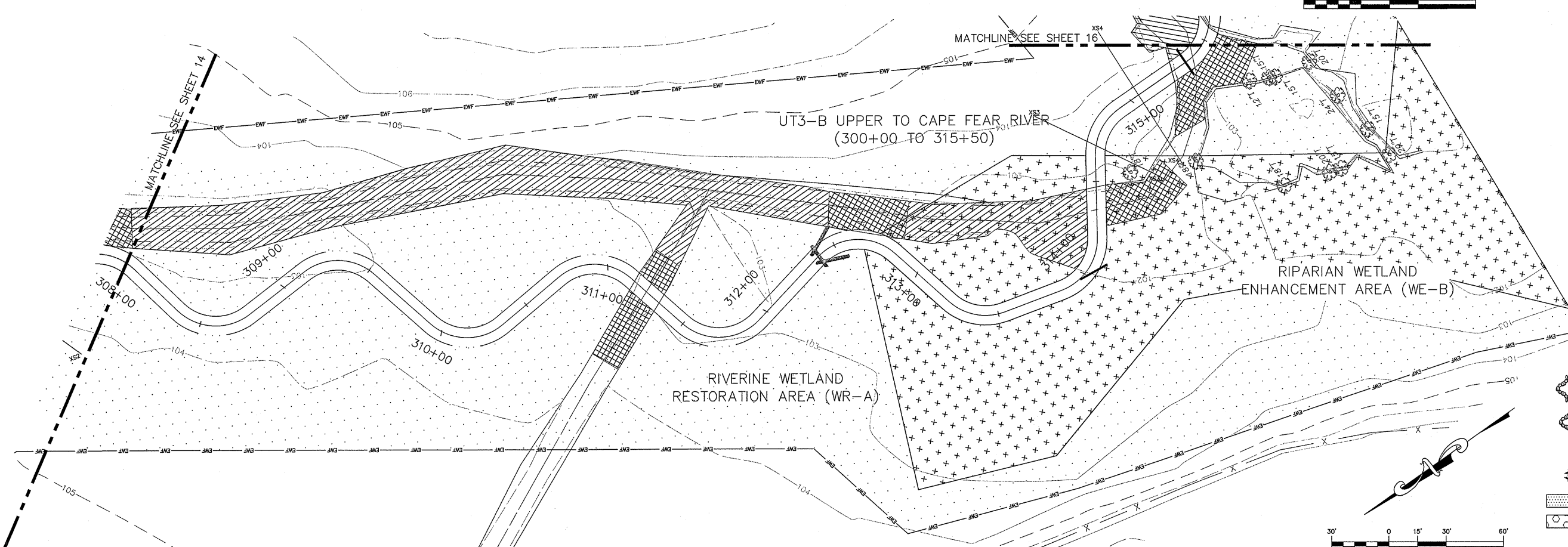
- PROFILE LEGEND**
- PROPOSED TOP OF BANK
 - ö OF NEW CHANNEL
 - - - EXISTING GROUND-CENTER
 - ⊗ LOG CROSS VANE
 - ⊙ LOG SILL
 - ⊗ ROCK CROSS VANE
 - A-VANE

- SURVEY LEGEND**
- PROPERTY LINE
 - - - MAJOR CONTOURS
 - - - MINOR CONTOURS
 - - - STREAM CENTERLINE
 - ~ TREELINE
 - ▨ EXISTING WETLAND



- LEGEND**
- 10+00 PROPOSED BANK FULL
 - ⊗ PROPOSED CREEK
 - PERMANENT CONSERVATION EASEMENT
 - EWF PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
 - C CUT LINE (PROVIDED IN FORESTED AREA ONLY)
 - ▨ STREAM PLUG
 - ▨ CHANNEL BACKFILL
 - ⊗ WETLAND ENHANCEMENT

- ⊗ ROCK CROSS VANE
- ⊙ LOG SILL
- ⊗ ROCK A-VANE
- ⊙ LOG VANE
- ⊗ LOG CROSS VANE
- ▨ WETLAND RESTORATION
- ⊗ STREAM VALLEY RESTORATION



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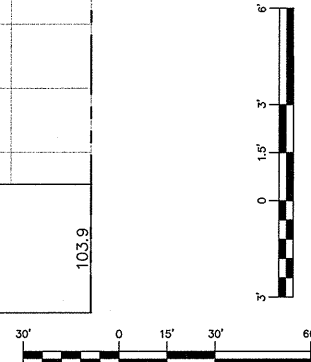
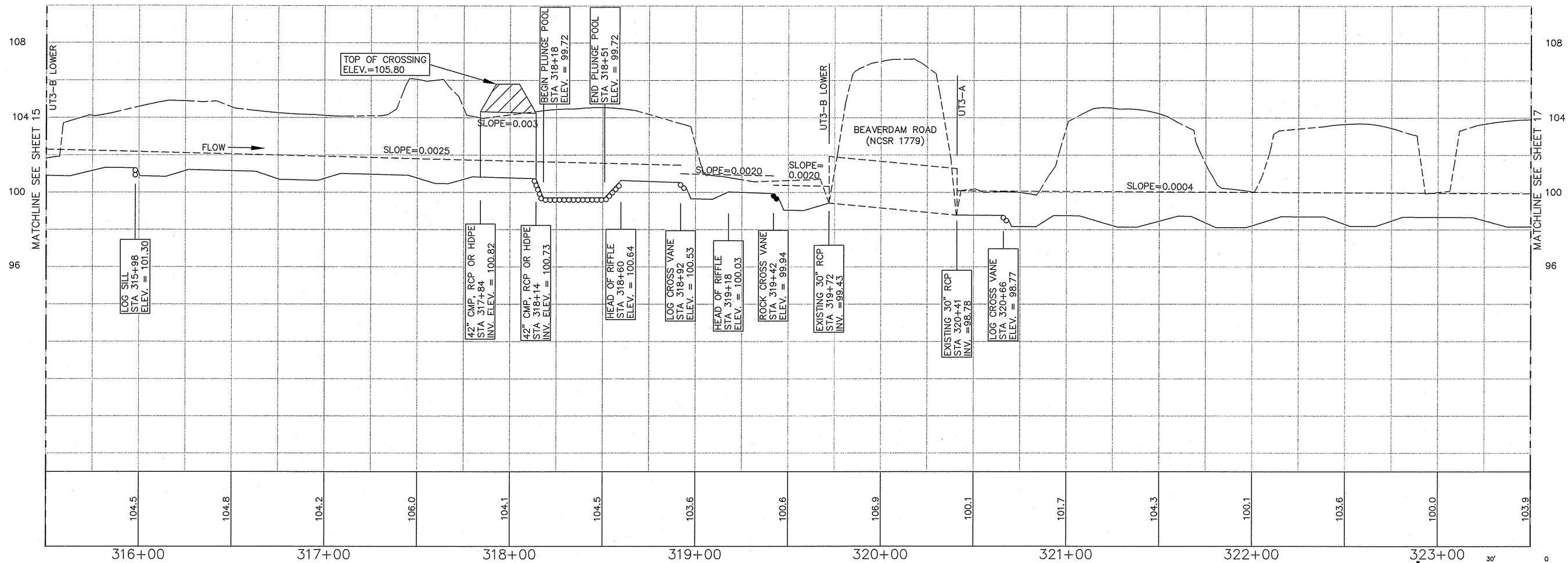
TITLE: GRADING PLAN AND PROFILE

DATE: 02/25/08
DRAWN BY: JJK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

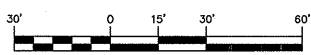
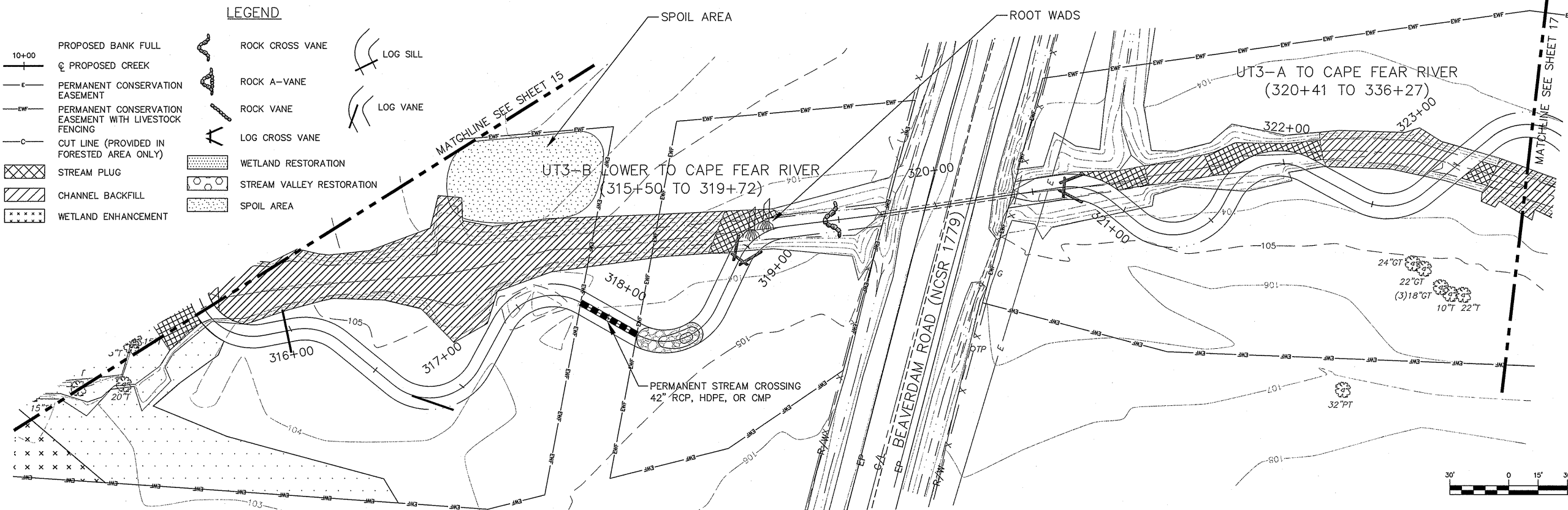
The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 15



- LEGEND**
- 10+00 PROPOSED BANK FULL
 - ⊙ PROPOSED CREEK
 - PERMANENT CONSERVATION EASEMENT
 - PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
 - CUT LINE (PROVIDED IN FORESTED AREA ONLY)
 - ▨ STREAM PLUG
 - ▨ CHANNEL BACKFILL
 - ▨ WETLAND ENHANCEMENT
 - ROCK CROSS VANE
 - ROCK A-VANE
 - ROCK VANE
 - LOG CROSS VANE
 - ▨ WETLAND RESTORATION
 - ▨ STREAM VALLEY RESTORATION
 - ▨ SPOIL AREA
 - LOG SILL
 - LOG VANE

- PROFILE LEGEND**
- PROPOSED TOP OF BANK
 - ⊙ OF NEW CHANNEL
 - EXISTING GROUND-CENTER
 - ⊙ LOG CROSS VANE
 - ⊙ LOG SILL
 - ⊙ ROCK CROSS VANE
 - ⊙ A-VANE
- SURVEY LEGEND**
- PROPERTY LINE
 - MAJOR CONTOURS
 - MINOR CONTOURS
 - STREAM CENTERLINE
 - TREELINE
 - EXISTING WETLAND



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CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

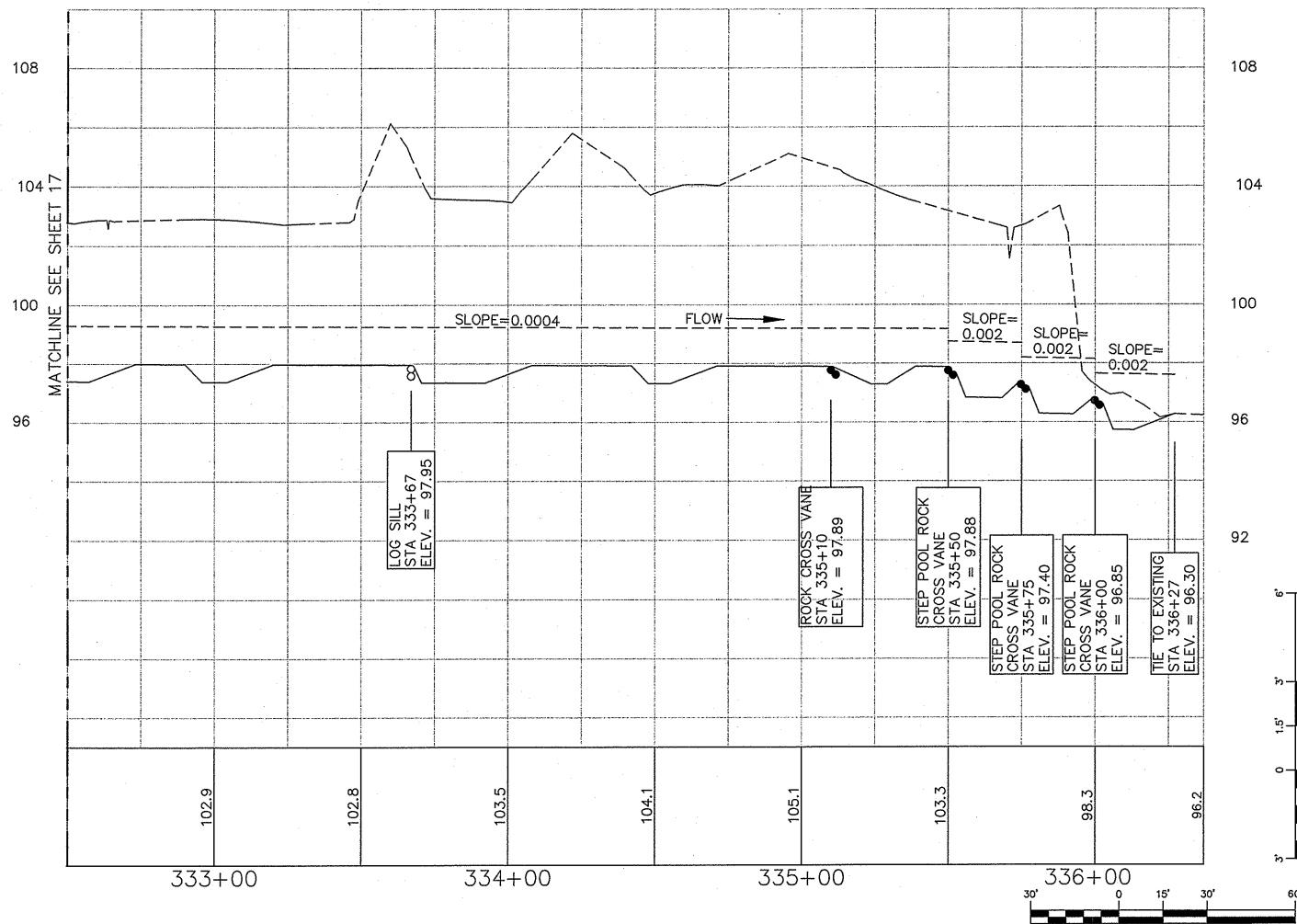
TITLE: GRADING PLAN AND PROFILE

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 16



PROFILE LEGEND

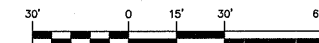
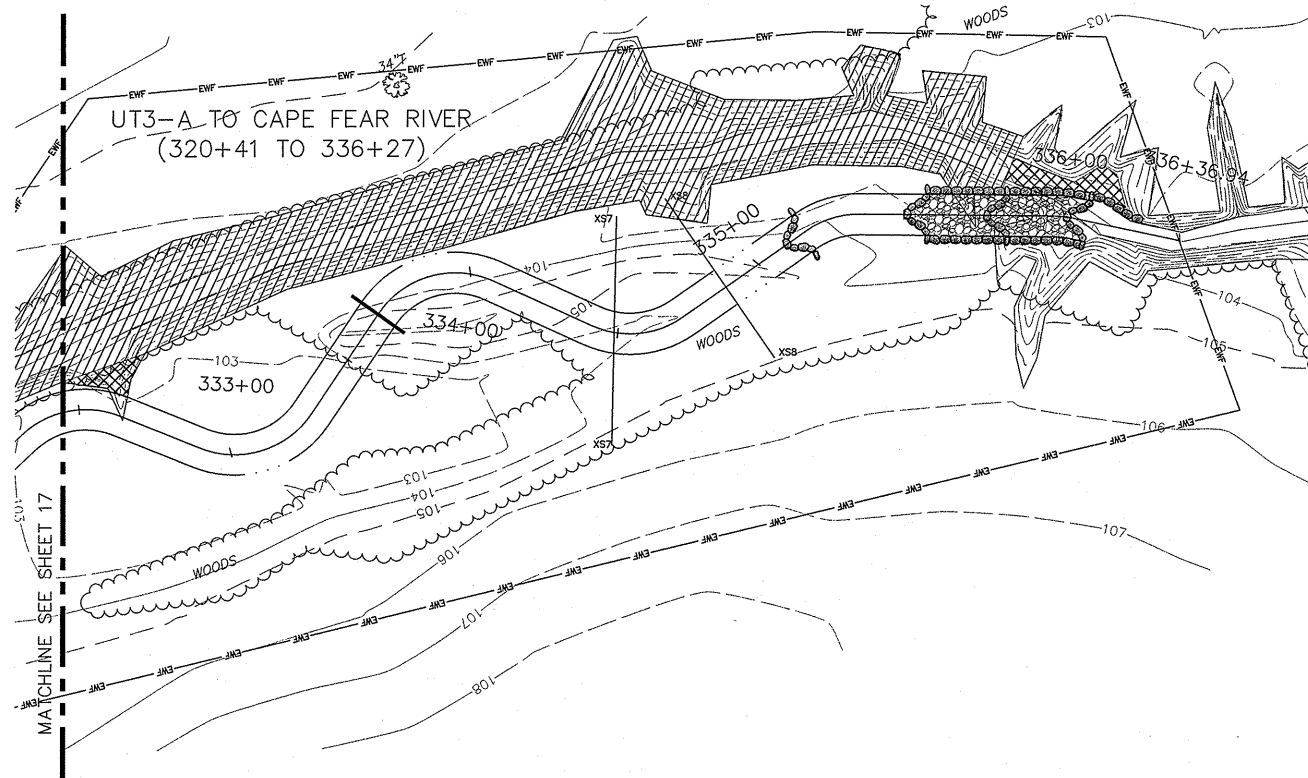
- PROPOSED TOP OF BANK
- Q OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG CROSS VANE
- LOG SILL
- ROCK CROSS VANE
- A-VANE

LEGEND

- 10+00 PROPOSED BANK FULL
- Q PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- CUT LINE (PROVIDED IN FORESTED AREA ONLY)
- ▨ STREAM PLUG
- ▨ CHANNEL BACKFILL
- ▨ WETLAND ENHANCEMENT
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- ▨ WETLAND RESTORATION
- ▨ STREAM VALLEY RESTORATION
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- ▨ EXISTING WETLAND



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1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JK	TWS

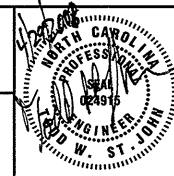
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CLIENT: STATE OF NORTH CAROLINA
 ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE



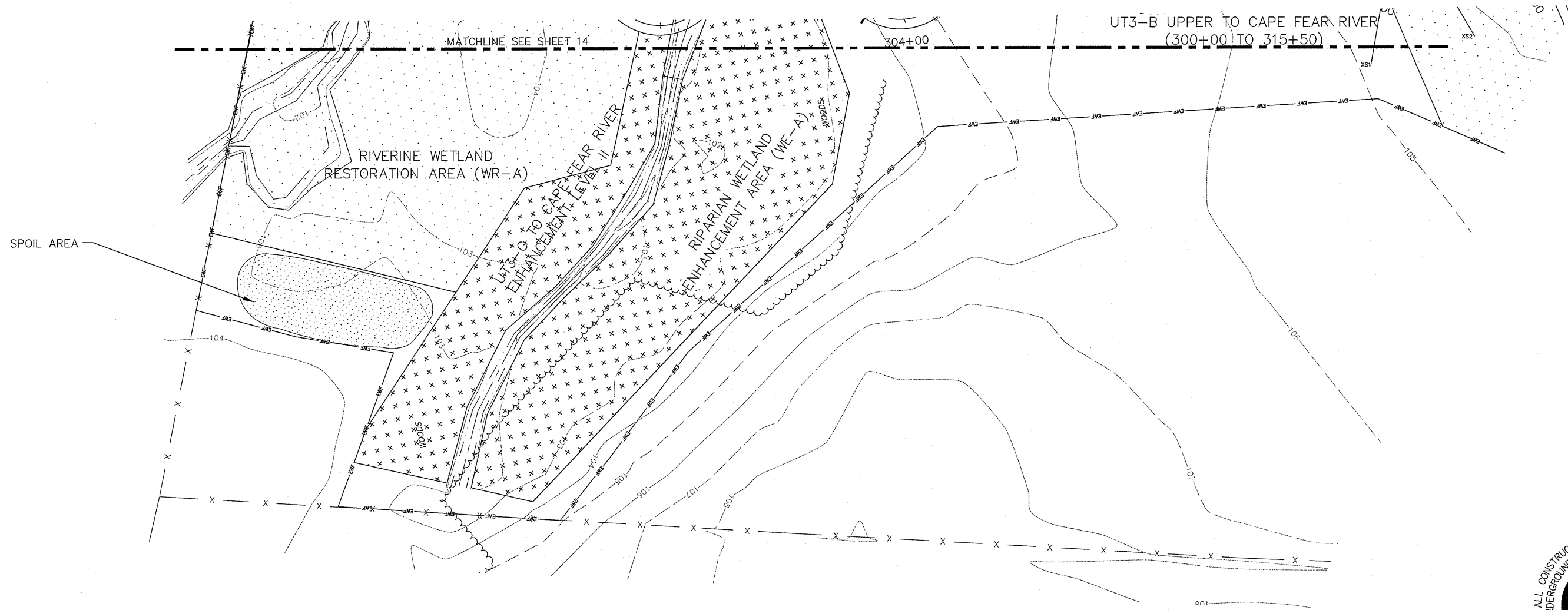
DATE: 02/25/08
 DRAWN BY: JIK
 DESIGNED BY: RTL
 CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
 STREAM AND WETLAND RESTORATION
 EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

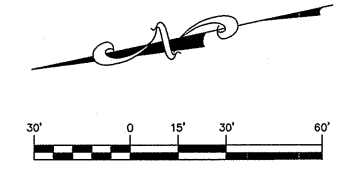
JOB NUMBER: 012620010 SHEET NUMBER: 18

- | | | | | | | | |
|-------|--|--|---------------------------|--|---------------------------|--|-------------------|
| 10+00 | PROPOSED BANK FULL | | ROCK CROSS VANE | | LOG SILL | | PROPERTY LINE |
| | PROPOSED CREEK | | ROCK A-VANE | | LOG VANE | | MAJOR CONTOURS |
| | PERMANENT CONSERVATION EASEMENT | | ROCK VANE | | LOG CROSS VANE | | MINOR CONTOURS |
| | PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING | | WETLAND RESTORATION | | STREAM VALLEY RESTORATION | | STREAM CENTERLINE |
| | CUT LINE (PROVIDED IN FORESTED AREA ONLY) | | STREAM VALLEY RESTORATION | | SPOIL AREA | | TREELINE |
| | STREAM PLUG | | WETLAND ENHANCEMENT | | | | EXISTING WETLAND |
| | CHANNEL BACKFILL | | | | | | |
| | WETLAND ENHANCEMENT | | | | | | |



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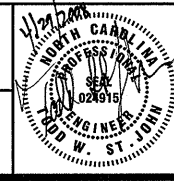
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CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE



DATE: 02/25/08

DRAWN BY: JIK

DESIGNED BY: RTL

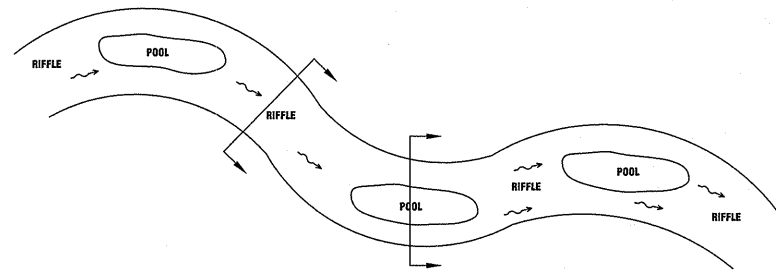
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 19

April 28, 2008 - 3:56pm By: jmkimble



TYPICAL PLAN VIEW SCHEMATIC

NTS

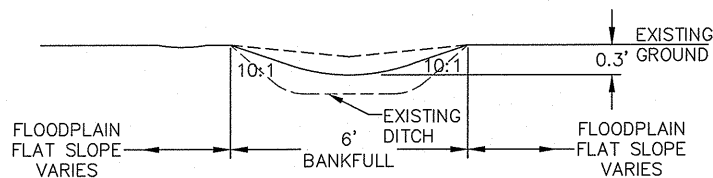
NOTES:

TYPICAL SECTIONS ARE PROVIDED TO GIVE THE GENERAL DIMENSIONS OF THE CHANNEL. FINAL GRADING WILL GIVE THE CHANNEL A MORE "NATURAL" APPEARANCE AND ALLOW A SMOOTH TRANSITION FROM EXISTING CHANNEL TO NEW CHANNEL.

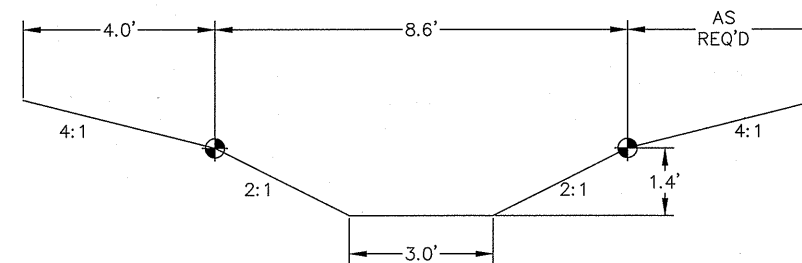
ALL POOLS SHALL BE OVERDUG 1' TO ACCOUNT FOR SEDIMENTATION.

LEGEND:

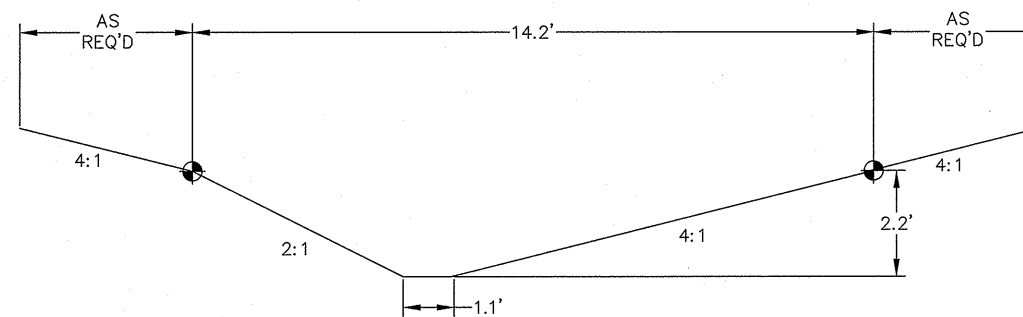
● BANKFULL ELEVATION TO ACT AS VERTICAL CONTROL POINT. POINT SHOULD BE VERIFIED BY DESIGNER BEFORE EARTHWORK BEGINS.



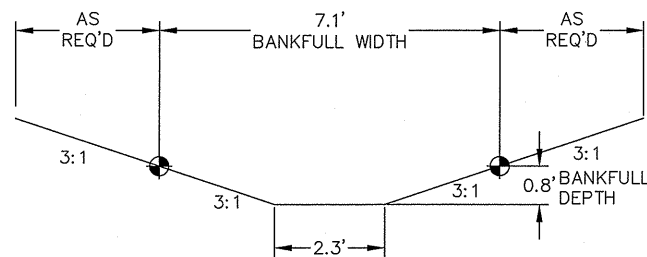
UT1-E VALLEY



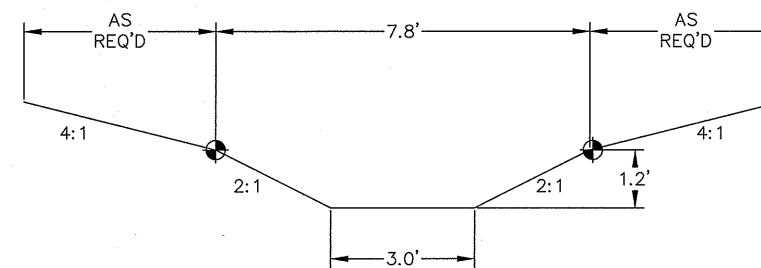
**UT1-A RIFFLE
STA 123+82 TO 135+23**



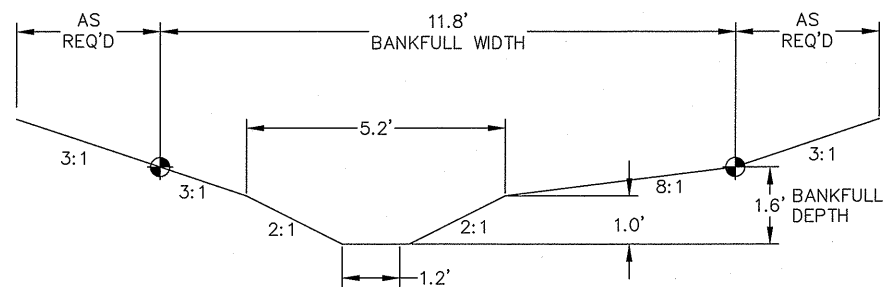
**UT1-A POOL
STA 123+82 TO 135+23**



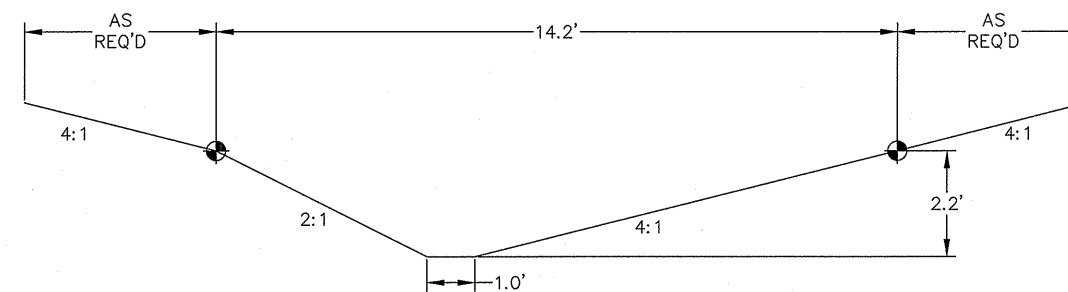
**UT1-D RIFFLE
STA 150+00 TO 155+63**



**UT1-C RIFFLE
STA 100+00 TO 112+63**



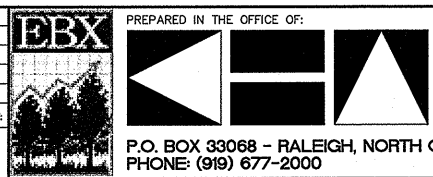
**UT1-D POOL
STA 150+00 TO 155+63**



**UT1-C POOL
STA 100+00 TO 112+63**

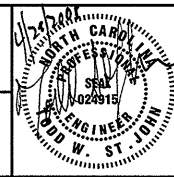
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REV. NO.	REVISION	DATE	DRAWN BY	CHECKED BY
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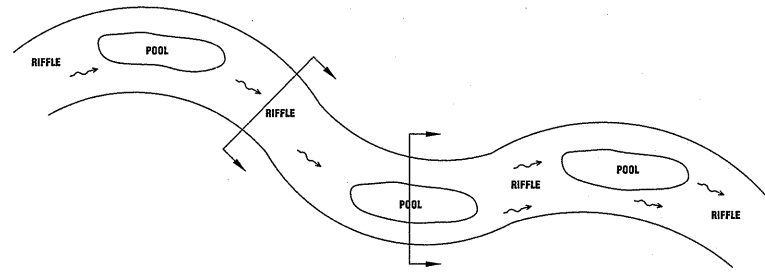
CLIENT: **STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM**
TITLE: **TYPICAL CROSS SECTIONS**



DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ
PROJECT: **BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION**
EBX NEUSE I, LLC
JOB NUMBER: 012620010 SHEET NUMBER: 20

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

April 28, 2008 - 3:50pm By: jmk/kimble



TYPICAL PLAN VIEW SCHEMATIC

NTS

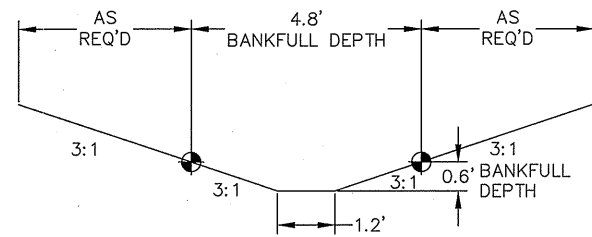
NOTES:

TYPICAL SECTIONS ARE PROVIDED TO GIVE THE GENERAL DIMENSIONS OF THE CHANNEL. FINAL GRADING WILL GIVE THE CHANNEL A MORE "NATURAL" APPEARANCE AND ALLOW A SMOOTH TRANSITION FROM EXISTING CHANNEL TO NEW CHANNEL.

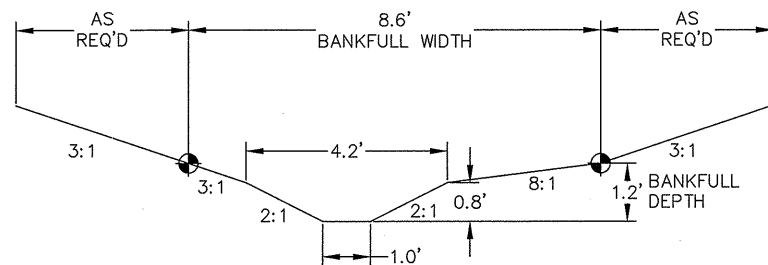
ALL POOLS SHALL BE OVERDUG 1' TO ACCOUNT FOR SEDIMENTATION.

LEGEND:

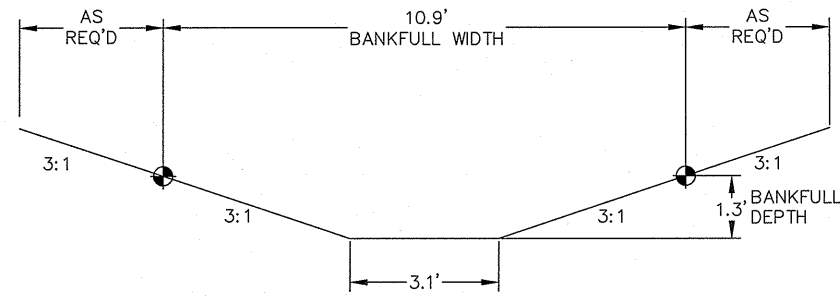
◆ BANKFULL ELEVATION TO ACT AS VERTICAL CONTROL POINT. POINT SHOULD BE VERIFIED BY DESIGNER BEFORE EARTHWORK BEGINS.



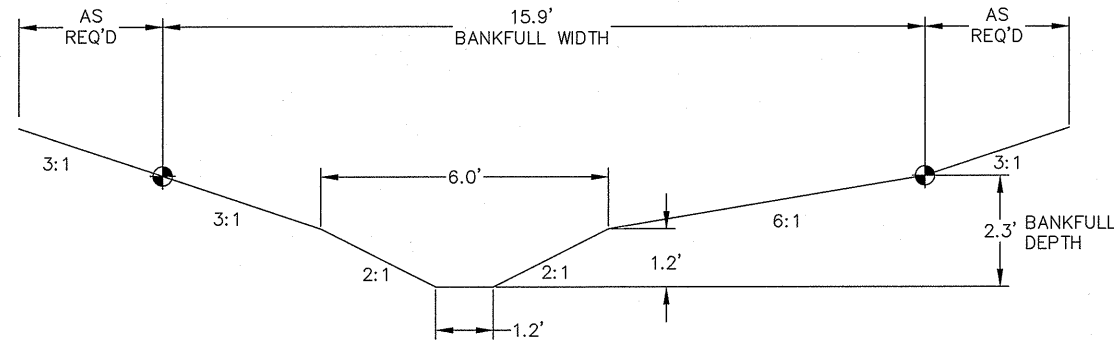
UT1-F RIFFLE
STA 180+00 TO 186+31



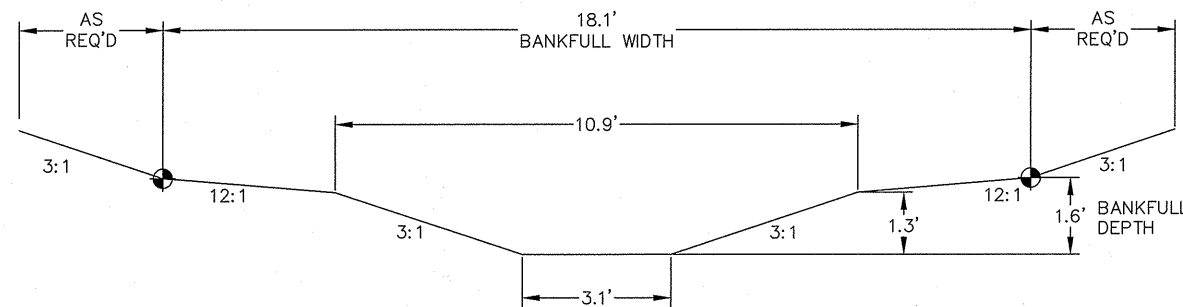
UT1-F POOL
STA 180+00 TO 186+31



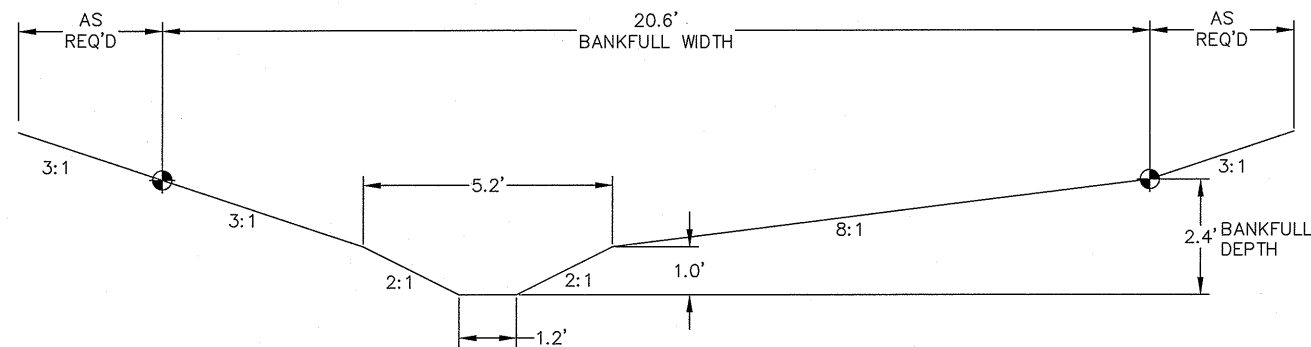
UT1-B UPPER RIFFLE
STA 112+63 TO 118+91



UT1-B UPPER POOL
STA 112+63 TO 118+91



UT1-B LOWER RIFFLE
STA 119+01 TO 123+22

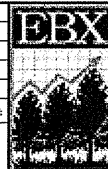


UT1-B LOWER POOL
STA 119+01 TO 123+22

T:\01282010\Restoration_Swamp_Restoration\0110_LDD\dm\RECORD SET 04-10-08\08-TYPICALS.dwg

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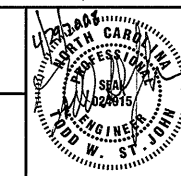
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PHONE: (919) 677-2000 FAX: (919) 677-2050

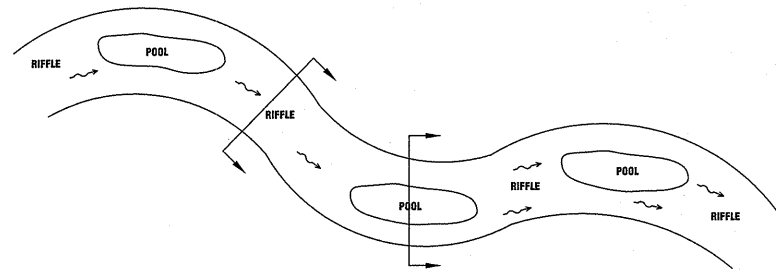
CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM
TITLE: TYPICAL CROSS SECTIONS



DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions. JOB NUMBER: 012620010 SHEET NUMBER: 21



TYPICAL PLAN VIEW SCHEMATIC

NTS

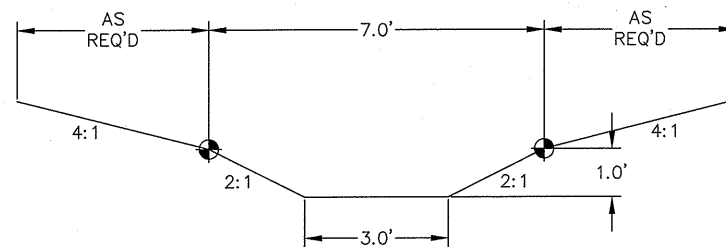
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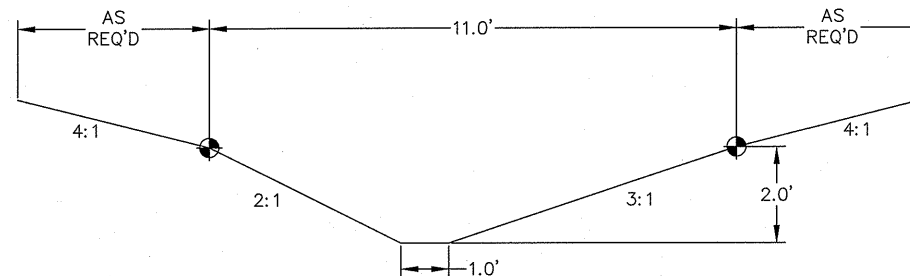
ALL POOLS SHALL BE OVERDUG 1' TO ACCOUNT FOR SEDIMENTATION.

LEGEND:

◆ BANKFULL ELEVATION TO ACT AS VERTICAL CONTROL POINT. POINT SHOULD BE VERIFIED BY DESIGNER BEFORE EARTHWORK BEGINS.



UT2 RIFFLE
STA 200+00 TO 212+63.92



UT2 POOL
STA 200+00 TO 212+62.94

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1	REVISED PER EROSION CONTROL REVIEW	08/23/07	JIK	TWS

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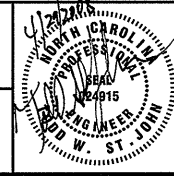


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P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068
PHONE: (919) 677-2000 FAX: (919) 677-2050

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: TYPICAL CROSS SECTIONS

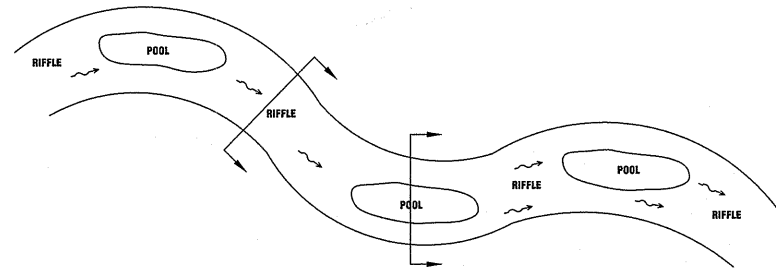


DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 22



TYPICAL PLAN VIEW SCHEMATIC

NTS

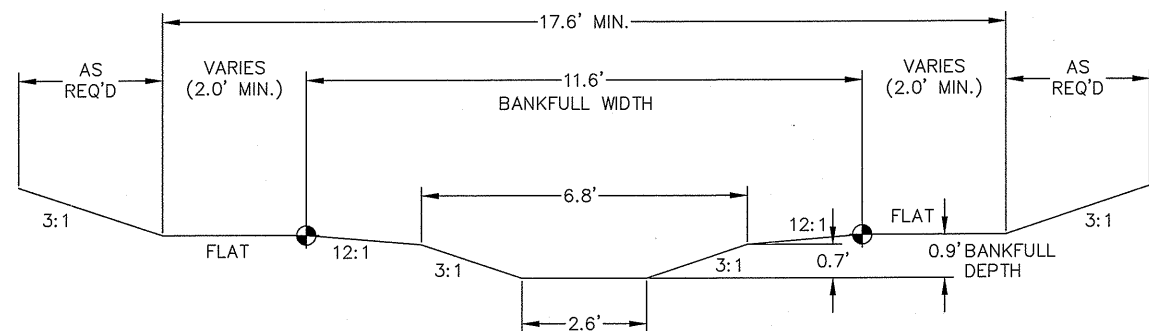
NOTES:

TYPICAL SECTIONS ARE PROVIDED TO GIVE THE GENERAL DIMENSIONS OF THE CHANNEL. FINAL GRADING WILL GIVE THE CHANNEL A MORE "NATURAL" APPEARANCE AND ALLOW A SMOOTH TRANSITION FROM EXISTING CHANNEL TO NEW CHANNEL.

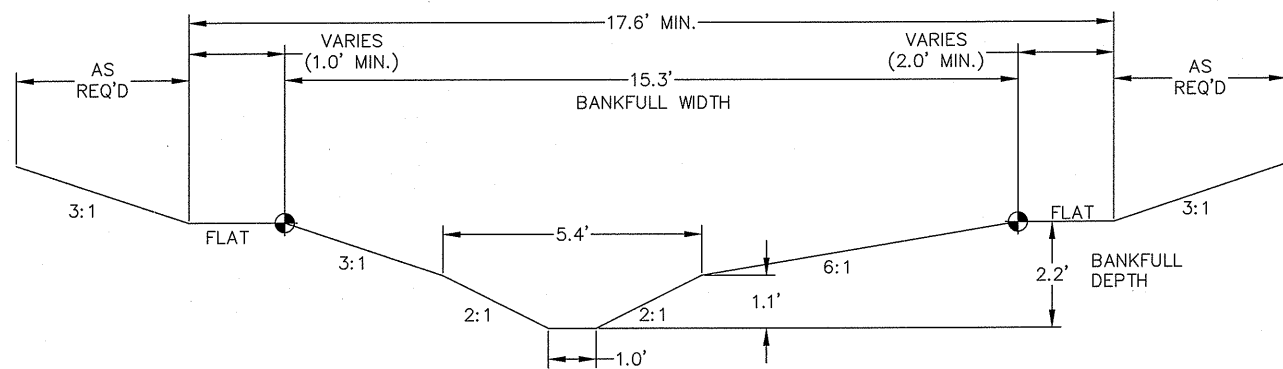
ALL POOLS SHALL BE OVERDUG 1' TO ACCOUNT FOR SEDIMENTATION.

LEGEND:

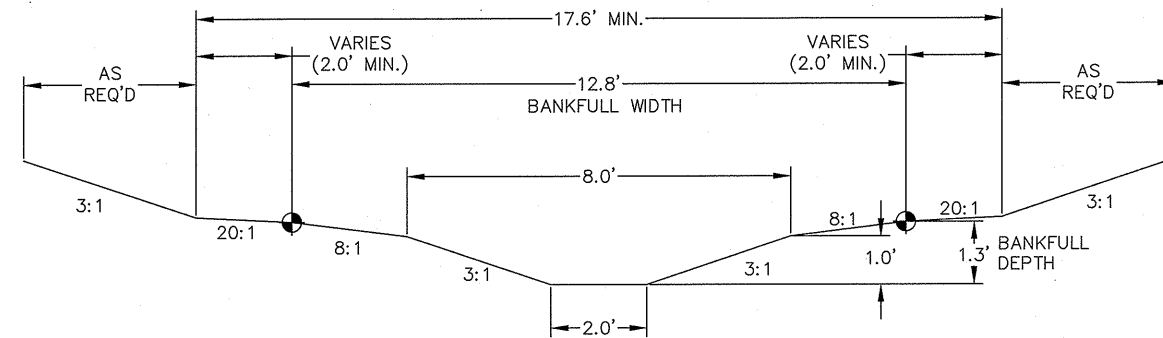
⊙ BANKFULL ELEVATION TO ACT AS VERTICAL CONTROL POINT. POINT SHOULD BE VERIFIED BY DESIGNER BEFORE EARTHWORK BEGINS.



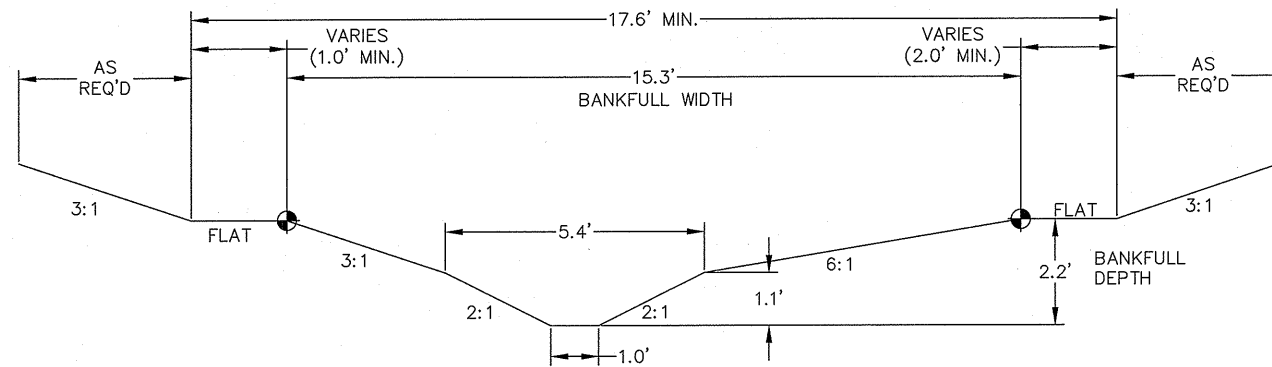
UT3-B LOWER RIFFLE
STA 315+50 TO 319+72



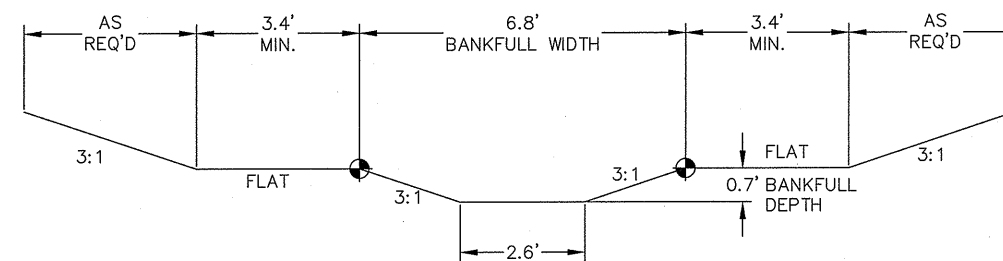
UT3-B LOWER POOL
STA 315+50 TO 319+72



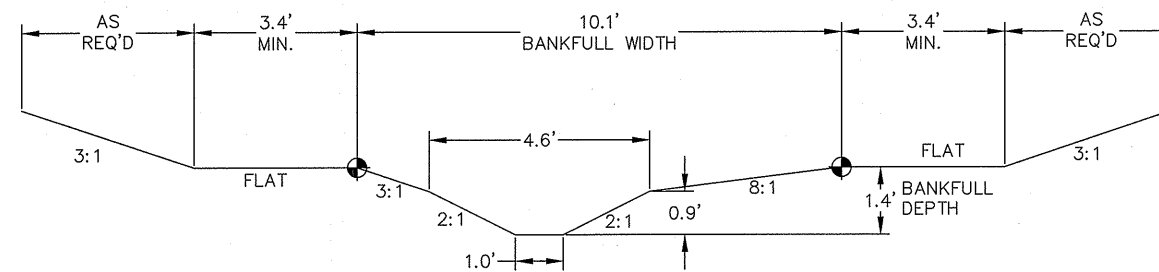
UT3-A RIFFLE
STA 320+41 TO 336+27



UT3-A POOL
STA 320+41 TO 336+27



UT3-B UPPER RIFFLE
STA 300+00 TO 315+50



UT3-B UPPER POOL
STA 300+00 TO 315+50

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TITLE: TYPICAL CROSS SECTIONS

DATE: 02/25/08
PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

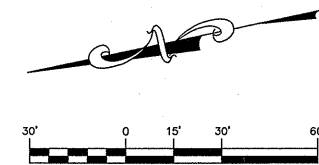
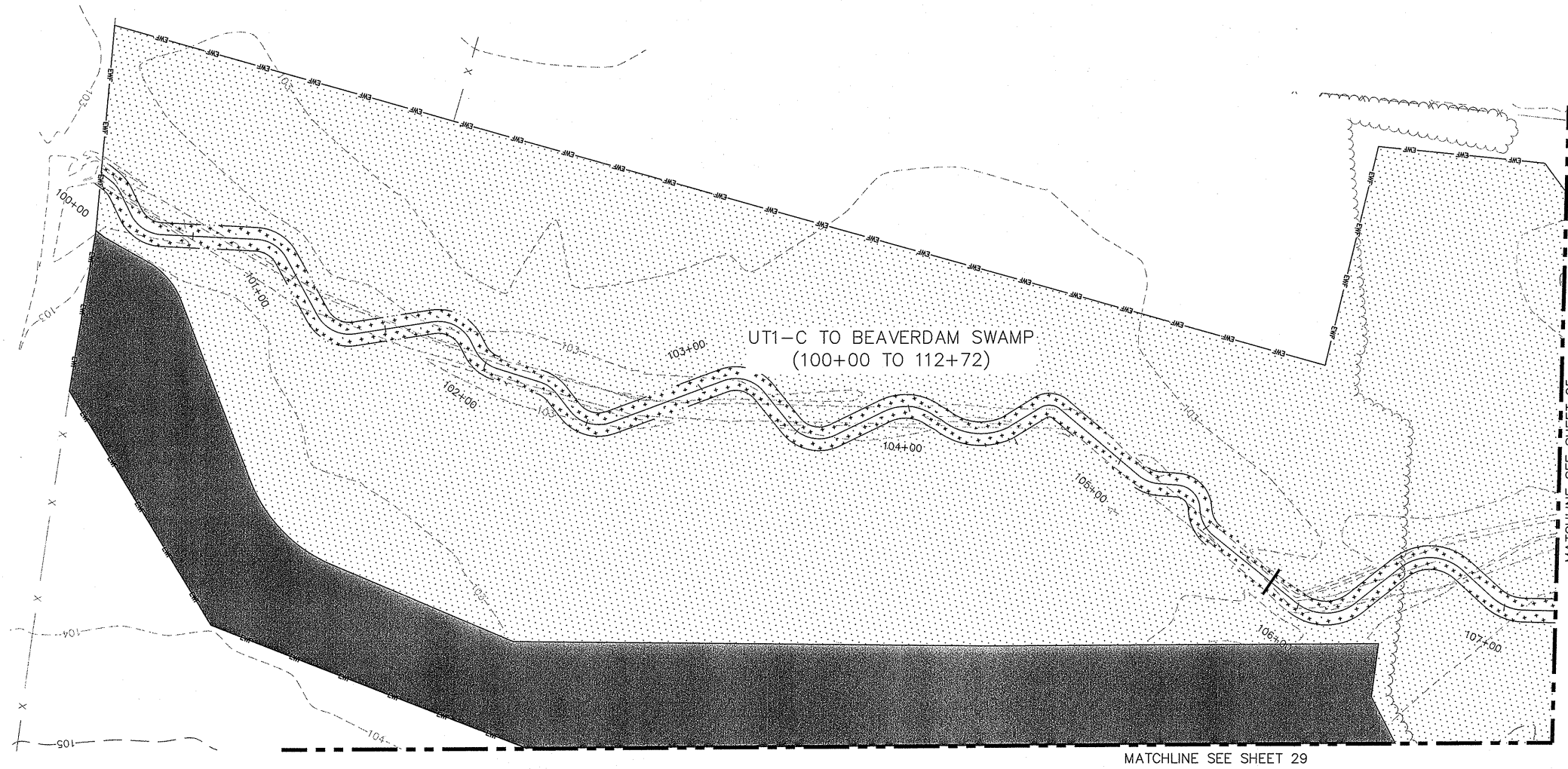
DESIGNED BY: JIK
CHECKED BY: RTL
TSJ

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 23

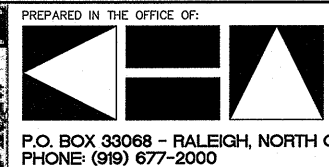
- | | | | |
|--|--|--|--|
| <p>10+00</p> PROPOSED BANK FULL
PROPOSED CREEK
PERMANENT CONSERVATION EASEMENT
PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING | <p>LEGEND</p> ROCK CROSS VANE
ROCK A-VANE
ROCK VANE
LOG CROSS VANE | <p>SURVEY LEGEND</p> PROPERTY LINE
MAJOR CONTOURS
MINOR CONTOURS
STREAM CENTERLINE
TREELINE
EXISTING WETLAND | <p>PLANTING LEGEND</p> <p>ZONE 1 STREAM BANKS
 ZONE 2 RIPARIAN
 ZONE 3 UPLAND
 ZONE 4 TO REMAIN</p> |
|--|--|--|--|

NOTE:
 UT1-C DOWN TO STA 106+50 TO RECEIVE INVASIVE REMOVAL TREATMENT AND SUPPLEMENTAL PLANTING ONLY WITHIN THE FORESTED AREA. FORESTED AREA SHALL NOT BE RIPPED.



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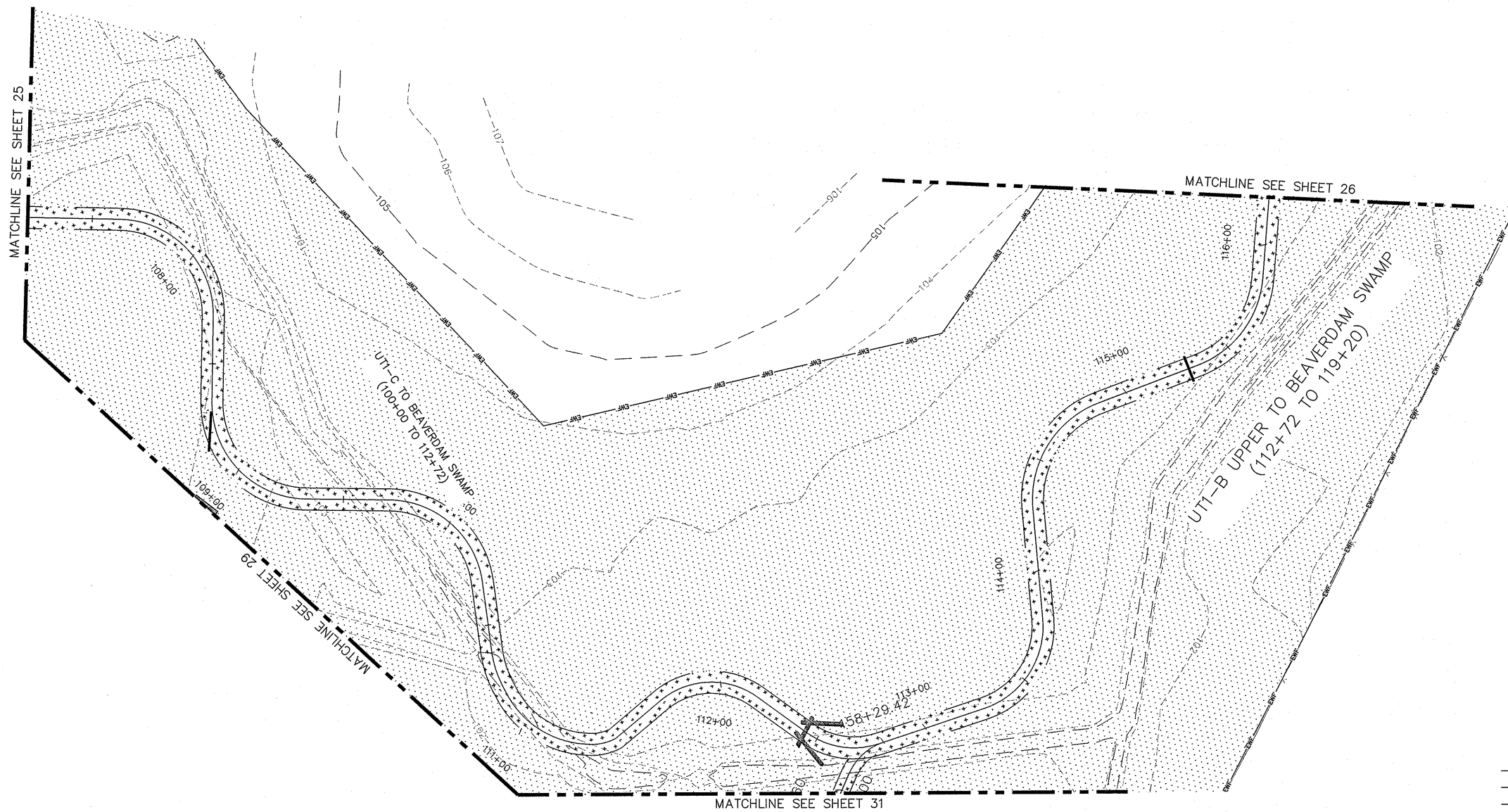
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CLIENT: STATE OF NORTH CAROLINA
 ECOSYSTEM ENHANCEMENT PROGRAM
 TITLE: PLANTING PLAN



DATE:	02/25/08	PROJECT:	BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC
DRAWN BY:	JK	DESIGNED BY:	RTL
CHECKED BY:	TSJ	JOB NUMBER:	012620010
			SHEET NUMBER: 24

The record drawings represent the construction plans with adjustments made to represent constructed conditions.



PLANTING LEGEND

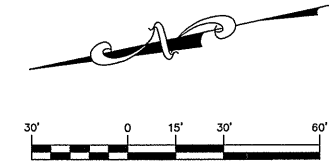
- ZONE 1 STREAM BANKS
- ZONE 2 RIPARIAN
- ZONE 3 UPLAND
- ZONE 4 TO REMAIN

LEGEND

- PROPOSED BANK FULL
- PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND



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 ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: **PLANTING PLAN**

DATE: 02/25/08
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 CHECKED BY: TSJ

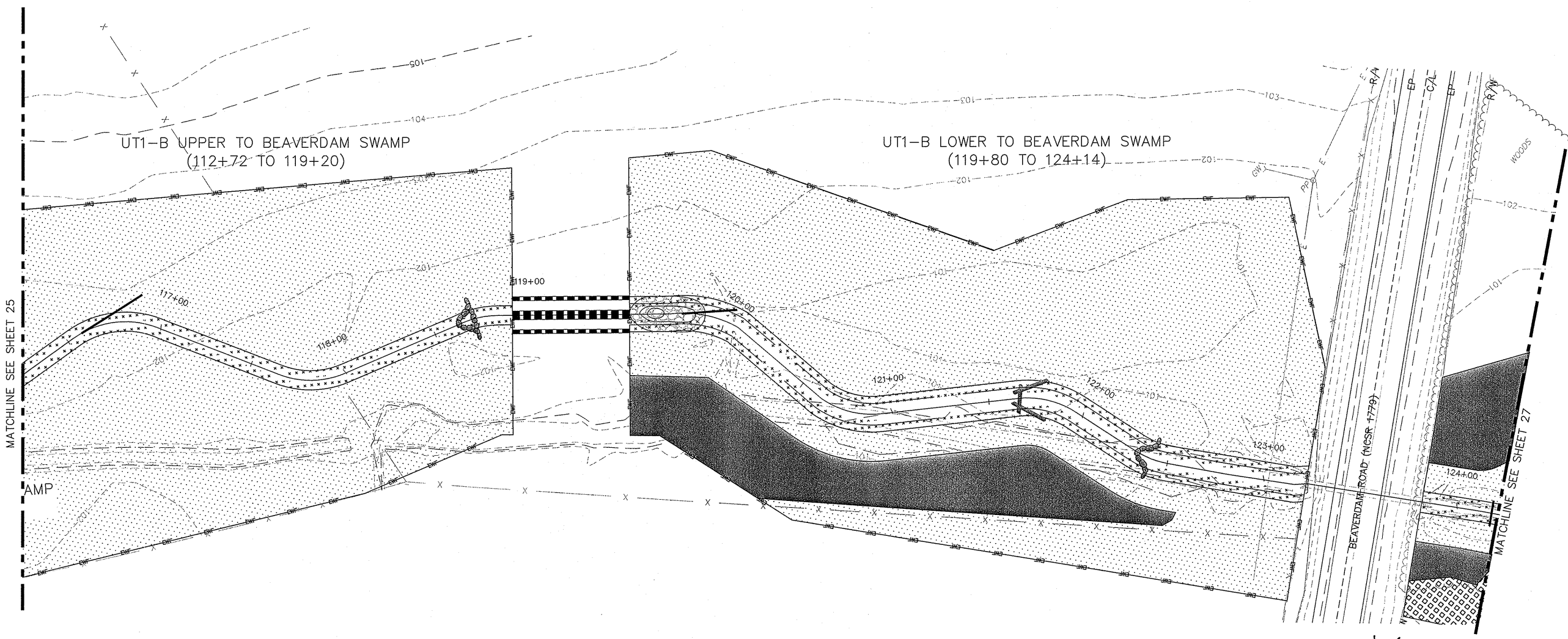
PROJECT: **BEAVERDAM SWAMP
 STREAM AND WETLAND RESTORATION
 EBX NEUSE I, LLC**

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 25

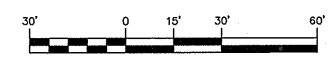
April 28, 2008 - 3:51pm By: jmkimble

- | | | | | |
|---|--|---------------------------------|--|---|
| <p>10+00</p> <p>PROPOSED BANK FULL</p> <p>PROPOSED CREEK</p> <p>PERMANENT CONSERVATION EASEMENT</p> <p>PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING</p> | <p>LEGEND</p> <p>ROCK CROSS VANE</p> <p>ROCK A-VANE</p> <p>ROCK VANE</p> <p>LOG CROSS VANE</p> | <p>LOG SILL</p> <p>LOG VANE</p> | <p>SURVEY LEGEND</p> <p>PROPERTY LINE</p> <p>MAJOR CONTOURS</p> <p>MINOR CONTOURS</p> <p>STREAM CENTERLINE</p> <p>TREELINE</p> <p>EXISTING WETLAND</p> | <p>PLANTING LEGEND</p> <p>ZONE 1 STREAM BANKS</p> <p>ZONE 2 RIPARIAN</p> <p>ZONE 3 UPLAND</p> <p>ZONE 4 TO REMAIN</p> |
|---|--|---------------------------------|--|---|



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LEGEND

- 10+00
- PROPOSED BANK FULL
- PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- LOG CROSS VANE
- LOG SILL
- LOG VANE

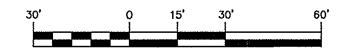
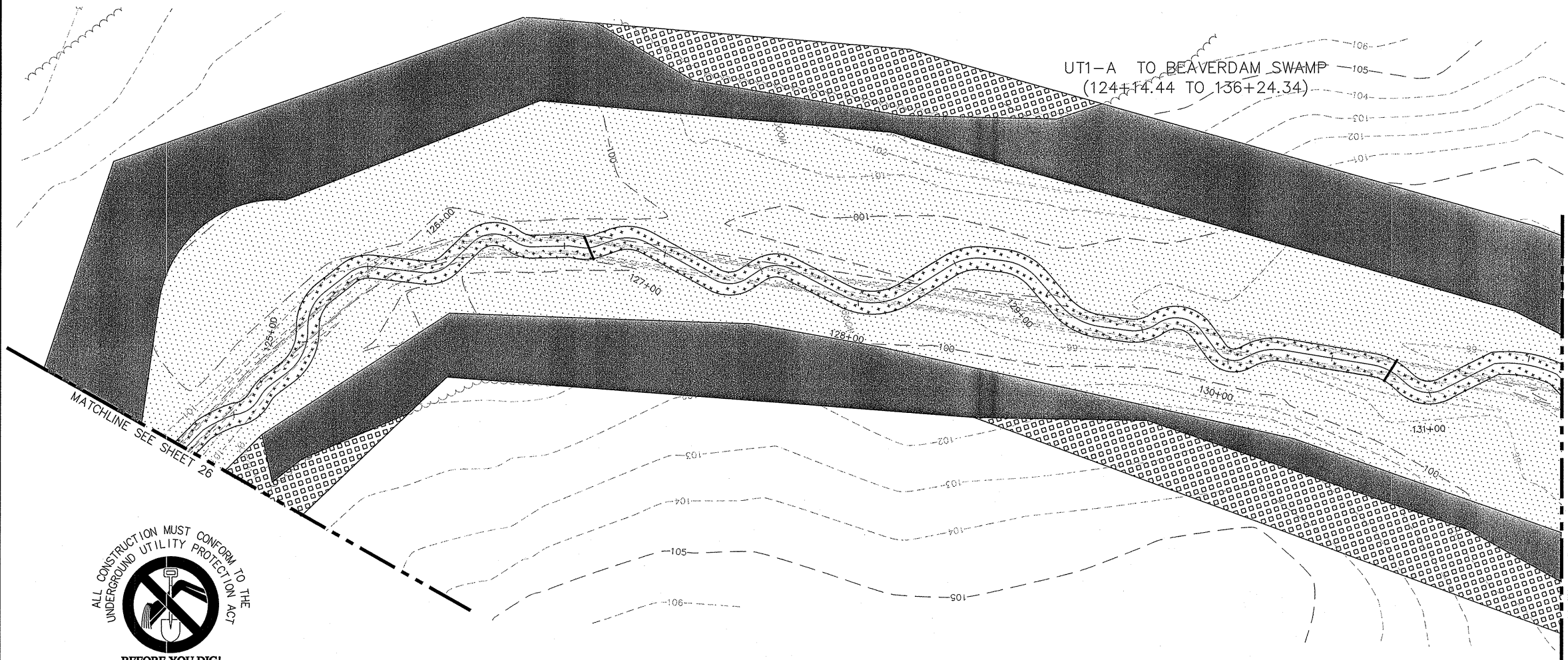
SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE
- EXISTING WETLAND

PLANTING LEGEND

- ZONE 1: STREAM BANKS
- ZONE 2: RIPARIAN
- ZONE 3: UPLAND
- ZONE 4: TO REMAIN

NOTE:
 UT1-A BELOW BEAVERDAM ROAD TO RECEIVE
 INVASIVE REMOVAL TREATMENT AND SUPPLEMENTAL
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
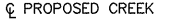
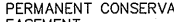






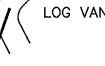
				PREPARED IN THE OFFICE OF: 		CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM		PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC	
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1 REVISED PER EROSION CONTROL REVIEW				08/23/07 JIK TWS		JOB NUMBER: 012620010		SHEET NUMBER: 27	

T:\van\012620010 Beaverdam Swamp Restoration\0101_LDD.dwg (RECORD SET 04-10-08) 08-16G PLANS.dwg

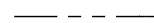





PLANTING LEGEND

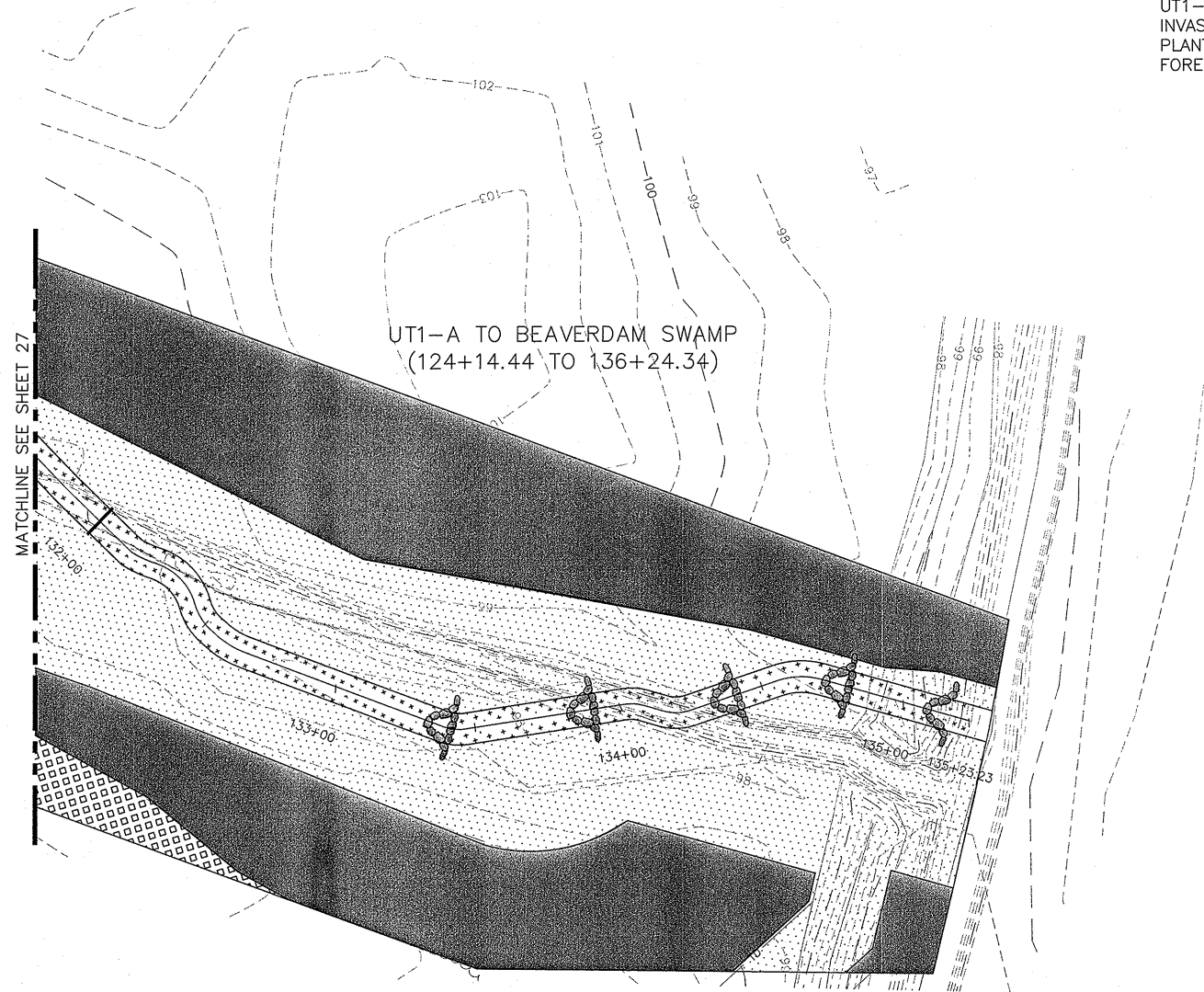
- ZONE 1  STREAM BANKS
- ZONE 2  RIPARIAN
- ZONE 3  UPLAND
- ZONE 4  TO REMAIN

LEGEND

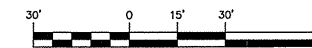
-  10+00
-  PROPOSED CREEK
-  PERMANENT CONSERVATION EASEMENT
-  PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
-  ROCK CROSS VANE
-  ROCK A-VANE
-  ROCK VANE
-  LOG CROSS VANE
-  LOG SILL
-  LOG VANE

SURVEY LEGEND

-  PROPERTY LINE
-  MAJOR CONTOURS
-  MINOR CONTOURS
-  STREAM CENTERLINE
-  TREELINE
-  EXISTING WETLAND



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 UT1-A BELOW BEAVERDAM ROAD TO RECEIVE
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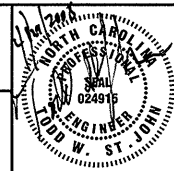
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CLIENT: STATE OF NORTH CAROLINA
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TITLE: **PLANTING PLAN**







DATE: 02/25/08
 DRAWN BY: JJK
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 CHECKED BY: TSJ

PROJECT: **BEAVERDAM SWAMP
 STREAM AND WETLAND RESTORATION
 EBX NEUSE I, LLC**











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JOB NUMBER: 012620010 SHEET NUMBER: 28

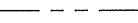
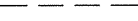
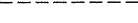

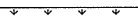

PLANTING LEGEND

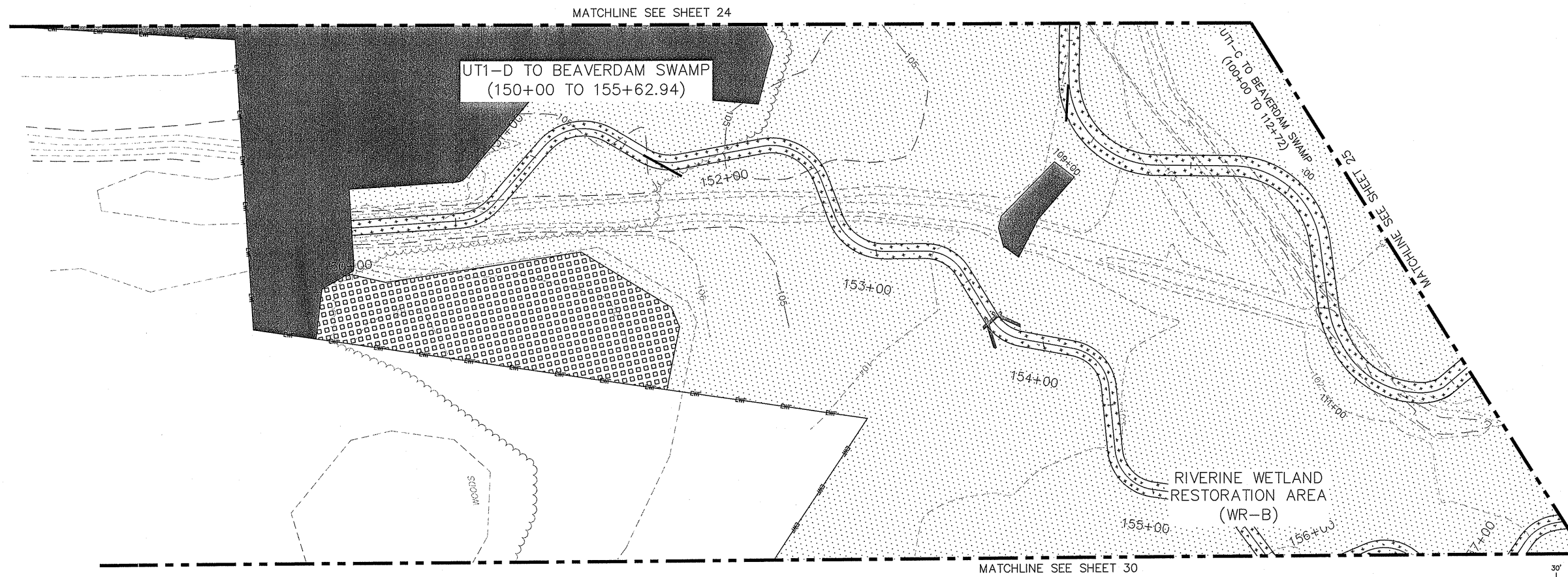
- ZONE 1  STREAM BANKS
- ZONE 2  RIPARIAN
- ZONE 3  UPLAND
- ZONE 4  TO REMAIN

LEGEND

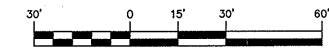
-  10+00
-  PROPOSED CREEK
-  PERMANENT CONSERVATION EASEMENT
-  PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
-  ROCK CROSS VANE
-  ROCK A-VANE
-  ROCK VANE
-  LOG CROSS VANE
-  LOG SILL
-  LOG VANE

SURVEY LEGEND

-  PROPERTY LINE
-  MAJOR CONTOURS
-  MINOR CONTOURS
-  STREAM CENTERLINE
-  TREELINE
-  EXISTING WETLAND



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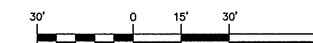
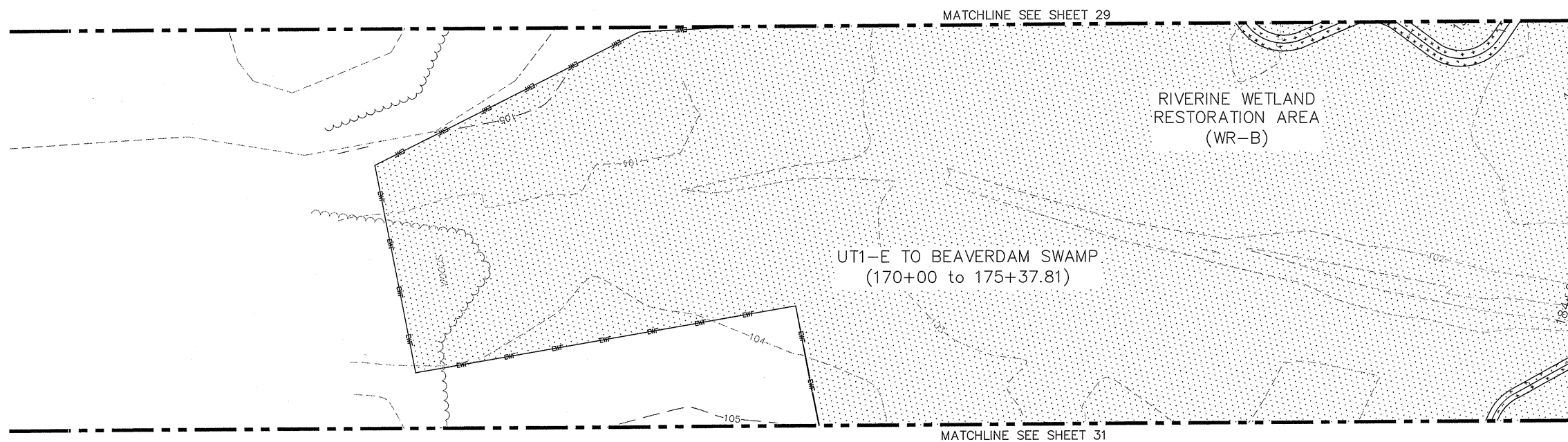
DATE: 02/25/08
 DRAWN BY: JIK
 DESIGNED BY: RTL
 CHECKED BY: TSJ

PROJECT: **BEAVERDAM SWAMP
 STREAM AND WETLAND RESTORATION
 EBX NEUSE I, LLC**

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 29

LEGEND		SURVEY LEGEND		PLANTING LEGEND	
10+00	PROPOSED BANK FULL	ROCK CROSS VANE	PROPERTY LINE	ZONE 1	STREAM BANKS
⊕	PROPOSED CREEK	ROCK A-VANE	MAJOR CONTOURS	ZONE 2	RIPARIAN
---	PERMANENT CONSERVATION EASEMENT	ROCK VANE	MINOR CONTOURS	ZONE 3	UPLAND
---	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING	LOG CROSS VANE	STREAM CENTERLINE	ZONE 4	TO REMAIN
		LOG SILL	TREELINE		
		LOG VANE	EXISTING WETLAND		



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CLIENT: STATE OF NORTH CAROLINA
 ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

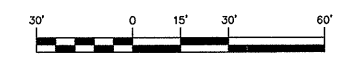
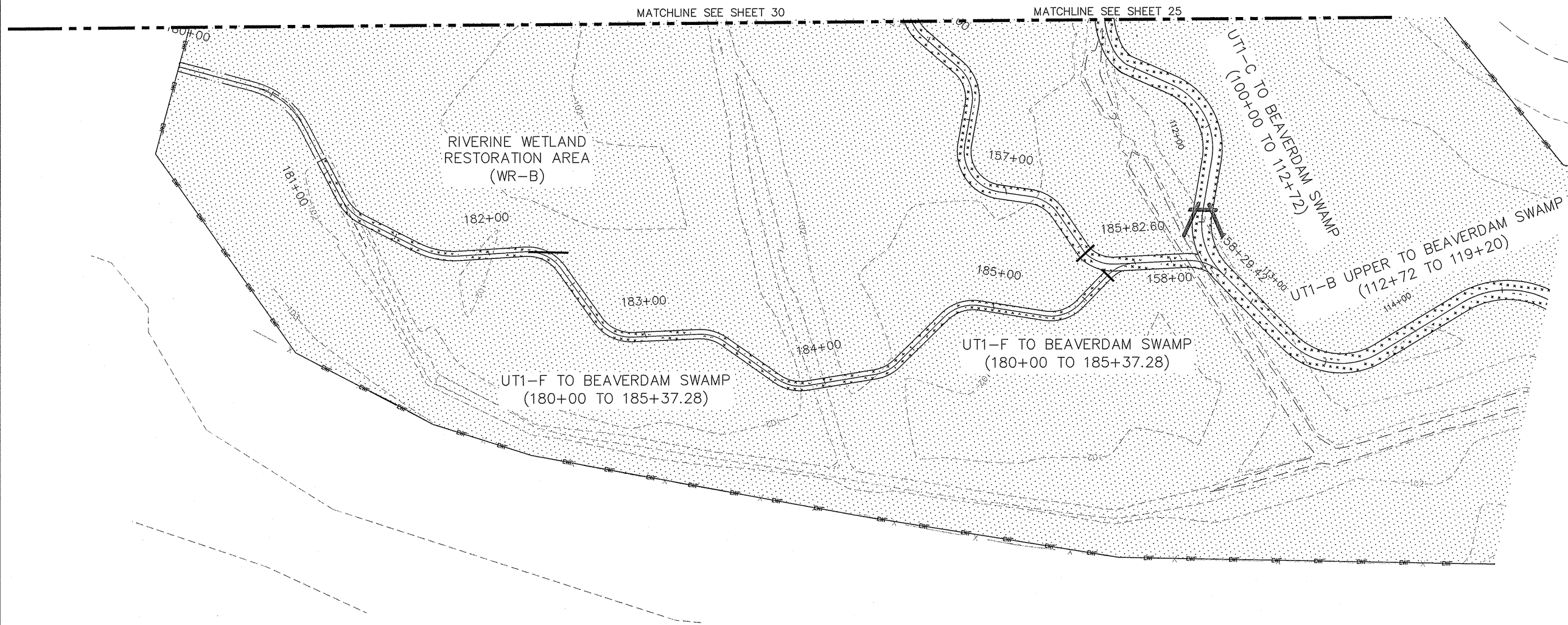
DATE: 02/25/08 PROJECT: BEAVERDAM SWAMP
 STREAM AND WETLAND RESTORATION
 EBX NEUSE I, LLC

DESIGNED BY: JIK
 CHECKED BY: RTL
 TJSJ

The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 30

LEGEND		SURVEY LEGEND		PLANTING LEGEND	
10+00	PROPOSED BANK FULL		ROCK CROSS VANE		PROPERTY LINE
	PROPOSED CREEK		LOG SILL		MAJOR CONTOURS
	PERMANENT CONSERVATION EASEMENT		ROCK A-VANE		MINOR CONTOURS
	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING		ROCK VANE		STREAM CENTERLINE
			LOG CROSS VANE		TREELINE
					EXISTING WETLAND
				ZONE 1	STREAM BANKS
				ZONE 2	RIPARIAN
				ZONE 3	UPLAND
				ZONE 4	TO REMAIN



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REV. No.: 1 REVISION: REVISED PER EROSION CONTROL REVIEW DATE: 08/23/07 DRAWN BY: JIK CHECKED BY: TWS		P.O. BOX 33068 - RALEIGH, NORTH CAROLINA 27636-3068 PHONE: (919) 677-2000 FAX: (919) 677-2050		TITLE: PLANTING PLAN		The record drawings represent the construction plans with adjustments made to represent constructed conditions.		JOB NUMBER: 012620010 SHEET NUMBER: 31	

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April 28, 2008 - 3:53pm By: Jm.Kimble

T:\n\012620010 Beaverdam Swamp Restoration\0101_LDD.dwg\RECORD SET_04-10-08\08-REG PLANS.dwg

LEGEND

10+00	PROPOSED BANK FULL		ROCK CROSS VANE
	PROPOSED CREEK		ROCK A-VANE
	PERMANENT CONSERVATION EASEMENT		ROCK VANE
	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING		LOG CROSS VANE
			LOG SILL
			LOG VANE

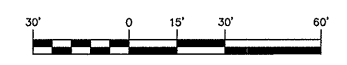
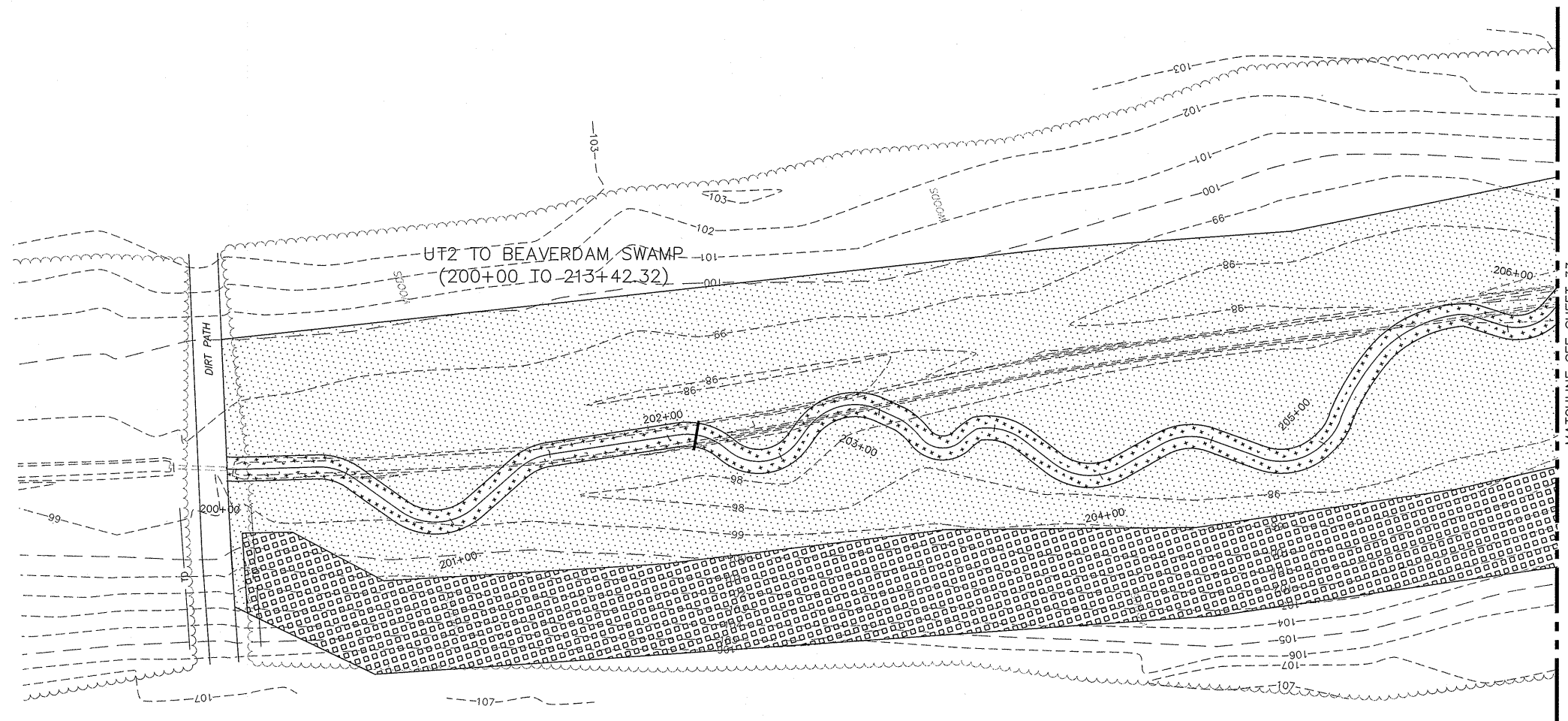
SURVEY LEGEND

	PROPERTY LINE
	MAJOR CONTOURS
	MINOR CONTOURS
	STREAM CENTERLINE
	TREELINE
	EXISTING WETLAND

PLANTING LEGEND

ZONE 1		STREAM BANKS
ZONE 2		RIPARIAN
ZONE 3		UPLAND
ZONE 4		TO REMAIN

NOTE:
 FORESTED AREA TO RECEIVE INVASIVE REMOVAL TREATMENT AND SUPPLEMENTAL PLANTING ONLY.
 FORESTED AREA SHALL NOT BE RIPPED.



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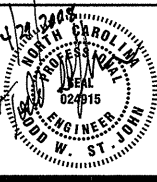
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TITLE: PLANTING PLAN



DATE: 02/25/08
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PROJECT: BEAVERDAM SWAMP
 STREAM AND WETLAND RESTORATION
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The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 32

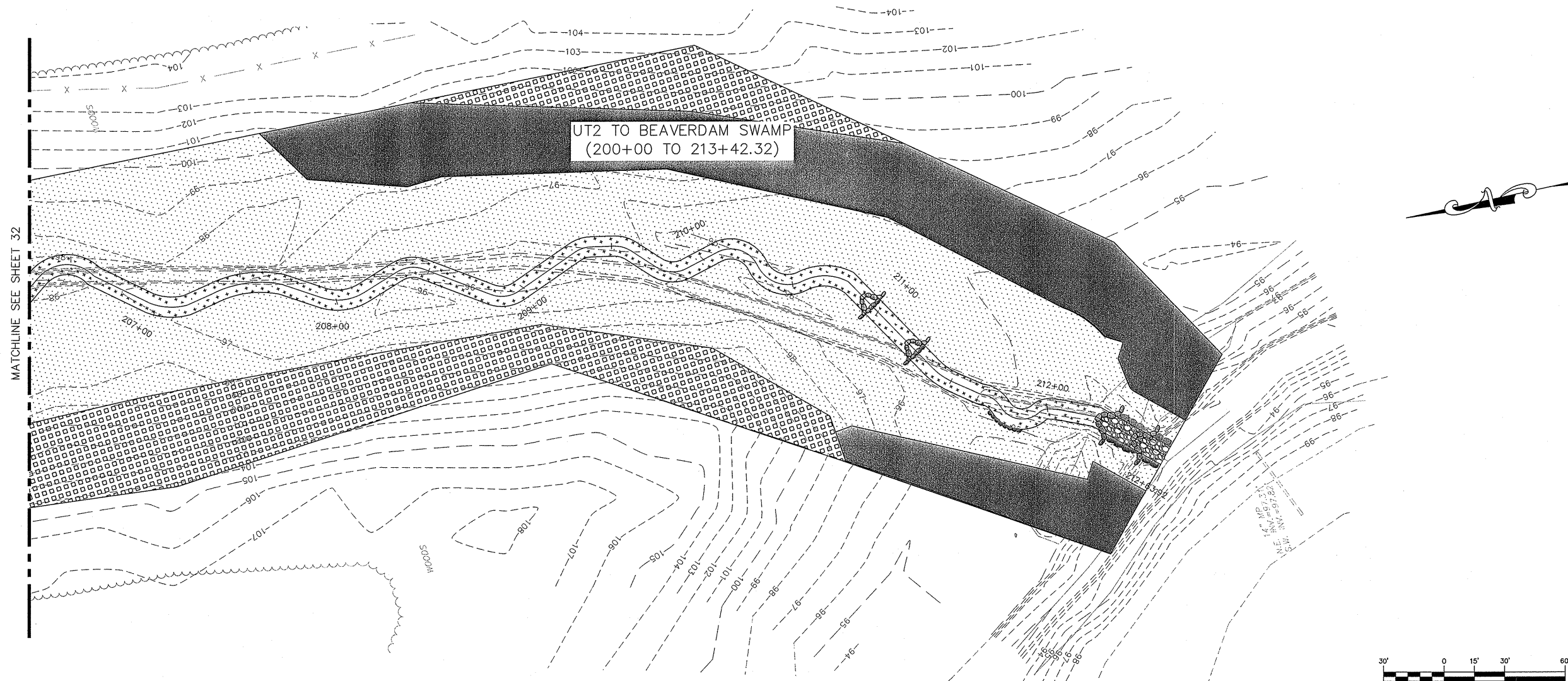
LEGEND	
	PROPOSED BANK FULL
	PROPOSED CREEK
	PERMANENT CONSERVATION EASEMENT
	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
	ROCK CROSS VANE
	ROCK A-VANE
	ROCK VANE
	LOG CROSS VANE
	LOG SILL
	LOG VANE

SURVEY LEGEND	
	PROPERTY LINE
	MAJOR CONTOURS
	MINOR CONTOURS
	STREAM CENTERLINE
	TREELINE
	EXISTING WETLAND

PLANTING LEGEND	
ZONE 1	STREAM BANKS
ZONE 2	RIPARIAN
ZONE 3	UPLAND
ZONE 4	TO REMAIN



NOTE:
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TITLE: PLANTING PLAN

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 DESIGNED BY: RTL
 CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
 STREAM AND WETLAND RESTORATION
 EBX NEUSE I, LLC

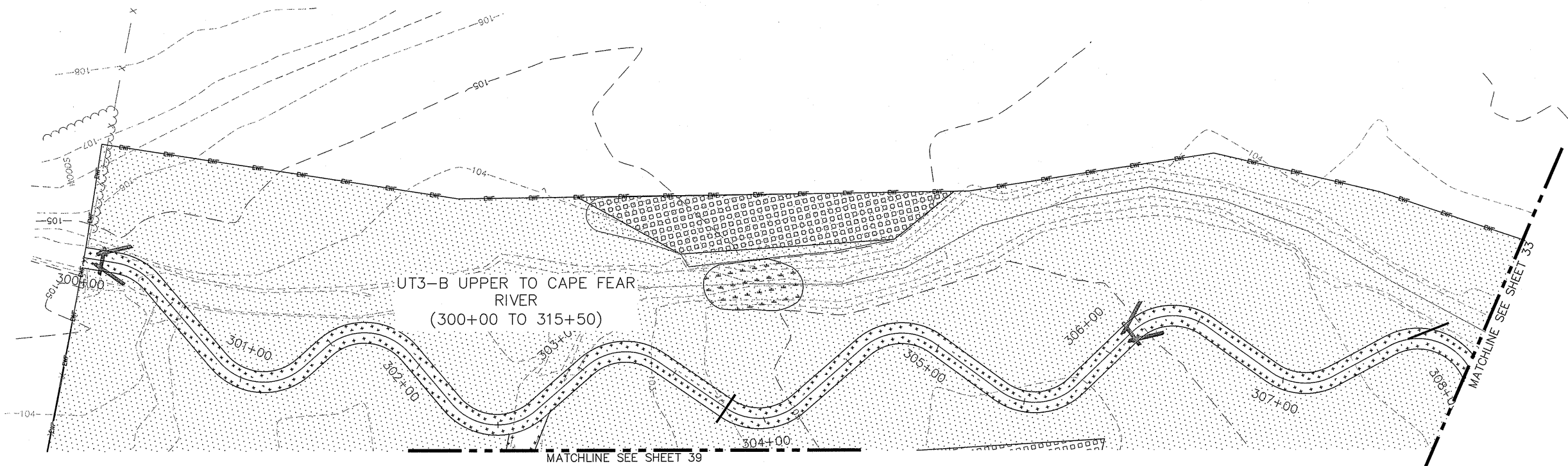
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JOB NUMBER: 012620010 SHEET NUMBER: 33

LEGEND	
	PROPOSED BANK FULL
	PROPOSED CREEK
	PERMANENT CONSERVATION EASEMENT
	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
	ROCK CROSS VANE
	ROCK A-VANE
	ROCK VANE
	LOG CROSS VANE
	LOG SILL
	LOG VANE

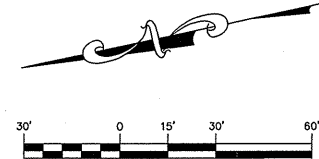
SURVEY LEGEND	
	PROPERTY LINE
	MAJOR CONTOURS
	MINOR CONTOURS
	STREAM CENTERLINE
	TREELINE
	EXISTING WETLAND

PLANTING LEGEND	
ZONE 1	STREAM BANKS
ZONE 2	RIPARIAN
ZONE 3	UPLAND
ZONE 4	TO REMAIN



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TITLE: PLANTING PLAN

DATE: 02/25/08
DRAWN BY: JIK
DESIGNED BY: RTL
CHECKED BY: TSJ

PROJECT: BEAVERDAM SWAMP
STREAM AND WETLAND RESTORATION
EBX NEUSE I, LLC

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JOB NUMBER: 012620010 SHEET NUMBER: 34

LEGEND

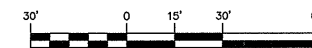
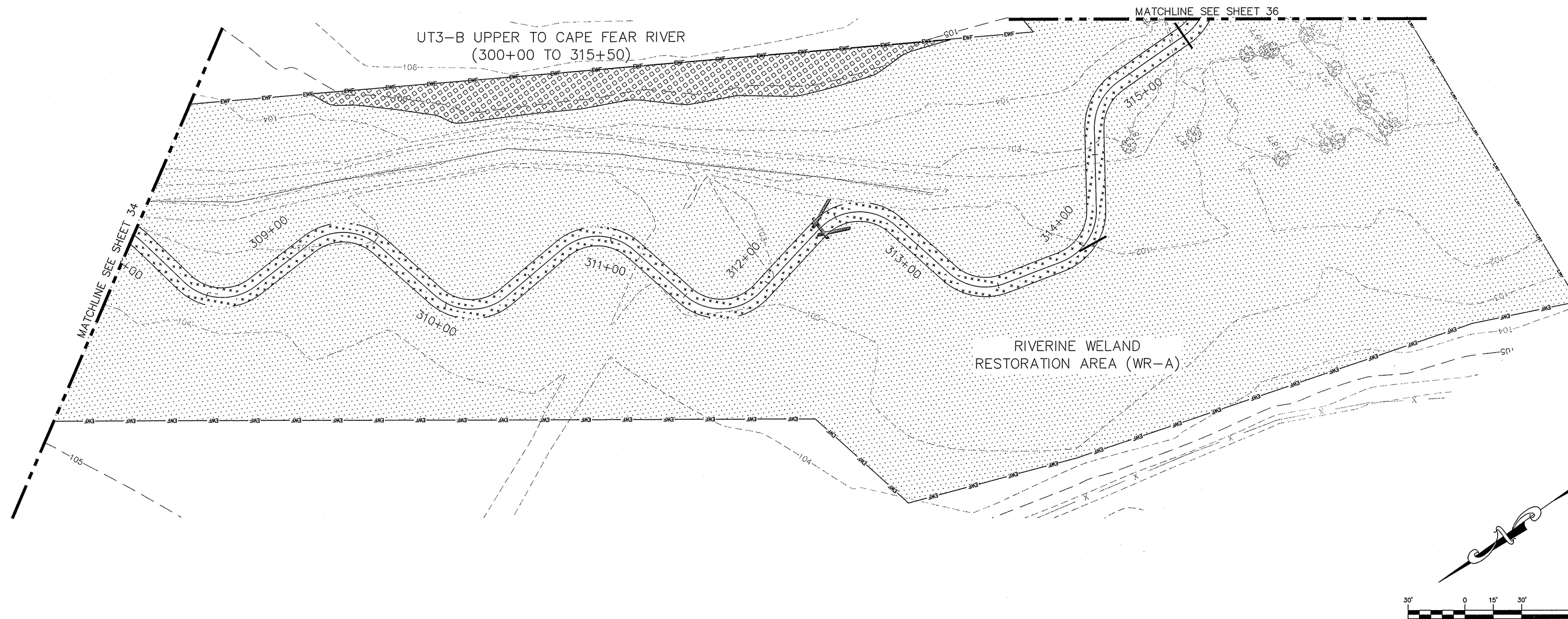
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	PROPOSED CREEK		ROCK A-VANE		LOG VANE
	PERMANENT CONSERVATION EASEMENT		ROCK VANE		
	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING		LOG CROSS VANE		

SURVEY LEGEND

	PROPERTY LINE
	MAJOR CONTOURS
	MINOR CONTOURS
	STREAM CENTERLINE
	TREELINE
	EXISTING WETLAND

PLANTING LEGEND

ZONE 1		STREAM BANKS
ZONE 2		RIPARIAN
ZONE 3		UPLAND
ZONE 4		TO REMAIN



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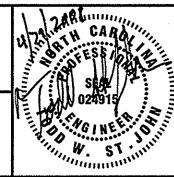
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PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

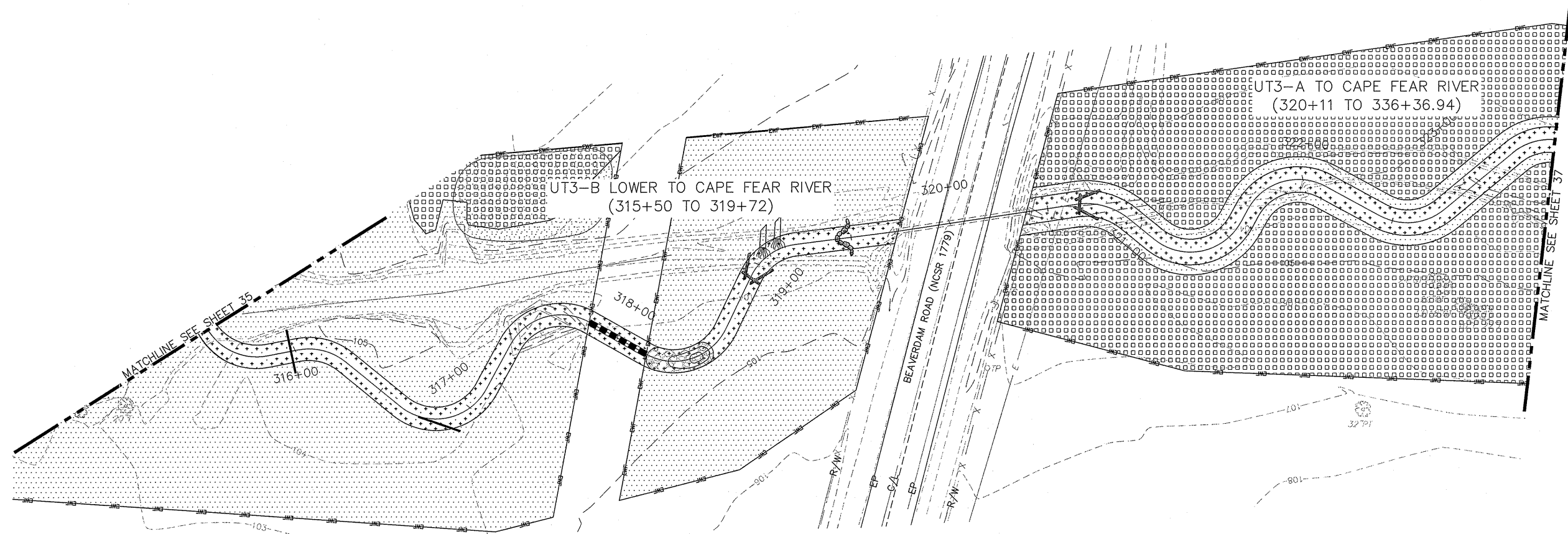
The record drawings represent the construction plans with adjustments made to represent constructed conditions.

JOB NUMBER: 012620010 SHEET NUMBER: 35

LEGEND	
	PROPOSED BANK FULL
	PROPOSED CREEK
	PERMANENT CONSERVATION EASEMENT
	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING
	ROCK CROSS VANE
	ROCK A-VANE
	ROCK VANE
	LOG CROSS VANE
	LOG SILL
	LOG VANE

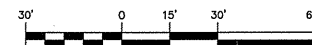
SURVEY LEGEND	
	PROPERTY LINE
	MAJOR CONTOURS
	MINOR CONTOURS
	STREAM CENTERLINE
	TREELINE
	EXISTING WETLAND

PLANTING LEGEND	
	ZONE 1 STREAM BANKS
	ZONE 2 RIPARIAN
	ZONE 3 UPLAND
	ZONE 4 TO REMAIN



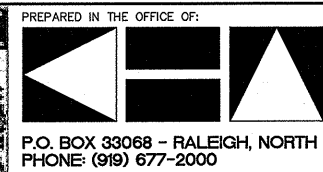
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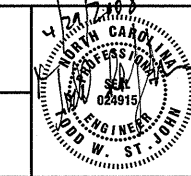
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

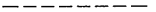










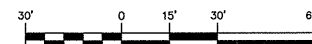
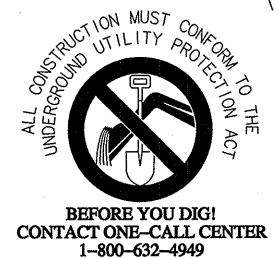
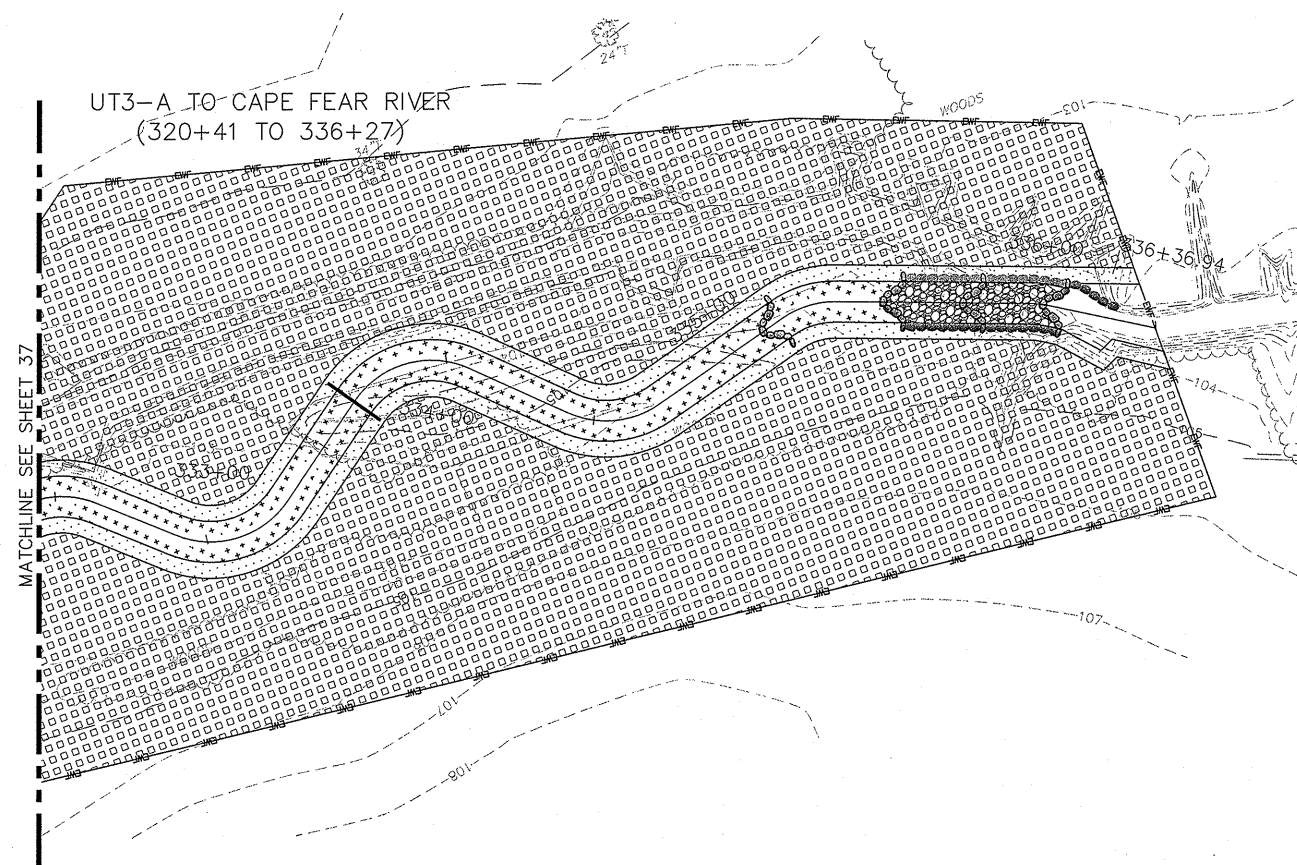
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CLIENT:	STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM
TITLE:	PLANTING PLAN



DATE:	02/25/08	PROJECT:	BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC
DRAWN BY:	JK	CHECKED BY:	TSJ
DESIGNED BY:	RTL	JOB NUMBER:	012620010
SHEET NUMBER:	36	The record drawings represent the construction plans with adjustments made to represent constructed conditions.	

		LEGEND		SURVEY LEGEND		PLANTING LEGEND	
10+00 -----	PROPOSED BANK FULL		ROCK CROSS VANE		PROPERTY LINE		ZONE 1 STREAM BANKS
-----	PROPOSED CREEK		ROCK A-VANE		MAJOR CONTOURS		ZONE 2 RIPARIAN
-----	PERMANENT CONSERVATION EASEMENT		ROCK VANE		MINOR CONTOURS		ZONE 3 UPLAND
-----	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING		LOG CROSS VANE		STREAM CENTERLINE		ZONE 4 TO REMAIN
			LOG SILL		TREELINE		
			LOG VANE		EXISTING WETLAND		



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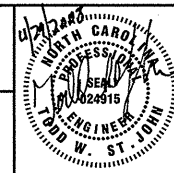
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 ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: **PLANTING PLAN**



DATE: 02/25/08
 DRAWN BY: JIK
 DESIGNED BY: RTL
 CHECKED BY: TSJ

PROJECT: **BEAVERDAM SWAMP
 STREAM AND WETLAND RESTORATION
 EBX NEUSE I, LLC**

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JOB NUMBER: 012620010 SHEET NUMBER: **38**

April 28, 2008 - 3:55pm By: jmk/mbt

T:\env\02282010\Beaverdam_Swamp_Restoration\0210_LDD.dwg\RECORD_SET_04-10-08\03-LEG_PLANS.dwg

LEGEND

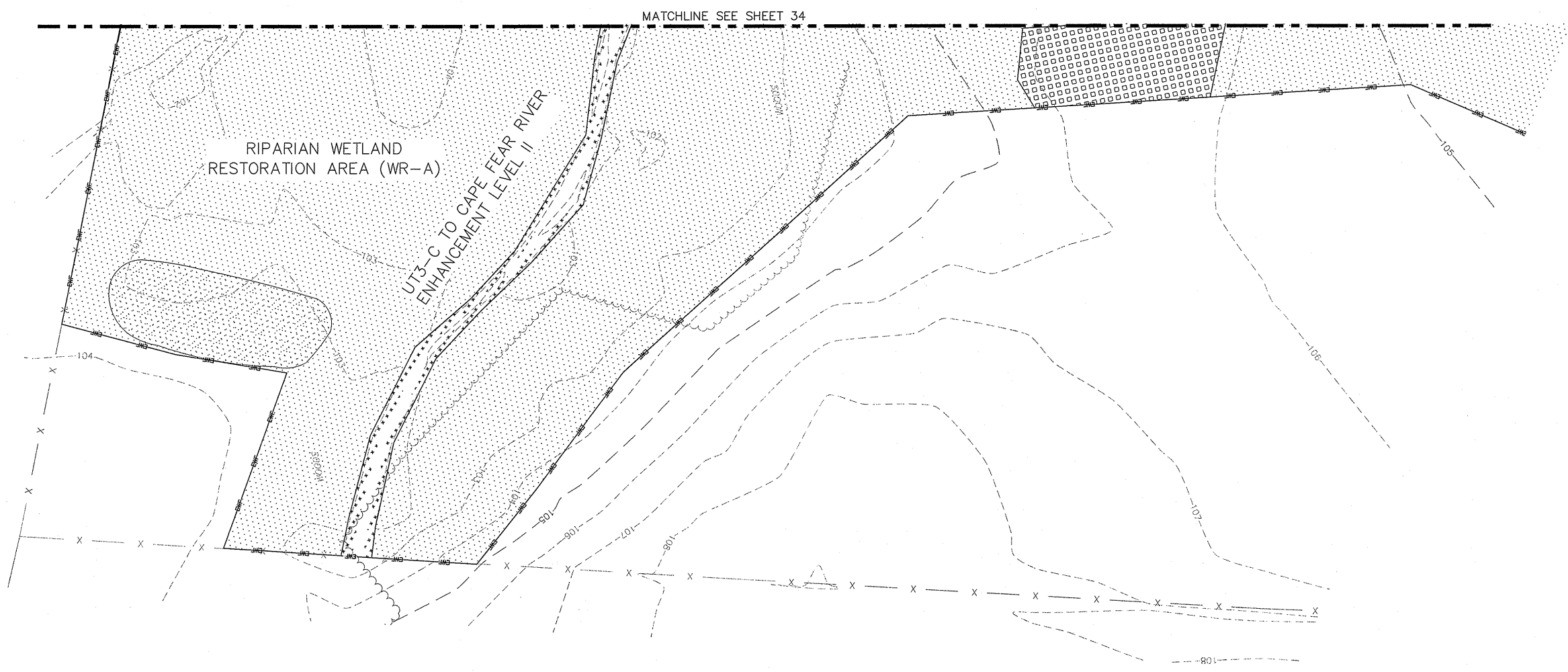
10+00	PROPOSED BANK FULL	ROCK CROSS VANE	LOG SILL
⊕	PROPOSED CREEK	ROCK A-VANE	LOG VANE
—	PERMANENT CONSERVATION EASEMENT	ROCK VANE	
—	PERMANENT CONSERVATION EASEMENT WITH LIVESTOCK FENCING	LOG CROSS VANE	

SURVEY LEGEND

---	PROPERTY LINE
---	MAJOR CONTOURS
---	MINOR CONTOURS
---	STREAM CENTERLINE
---	TREELINE
---	EXISTING WETLAND

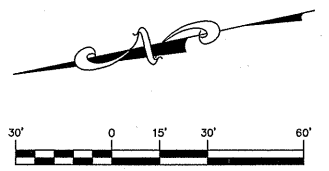
PLANTING LEGEND

ZONE 1	STREAM BANKS
ZONE 2	RIPARIAN
ZONE 3	UPLAND
ZONE 4	TO REMAIN



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DATE: 02/25/08

DRAWN BY: JIK

DESIGNED BY: RTL

CHECKED BY: TSJ

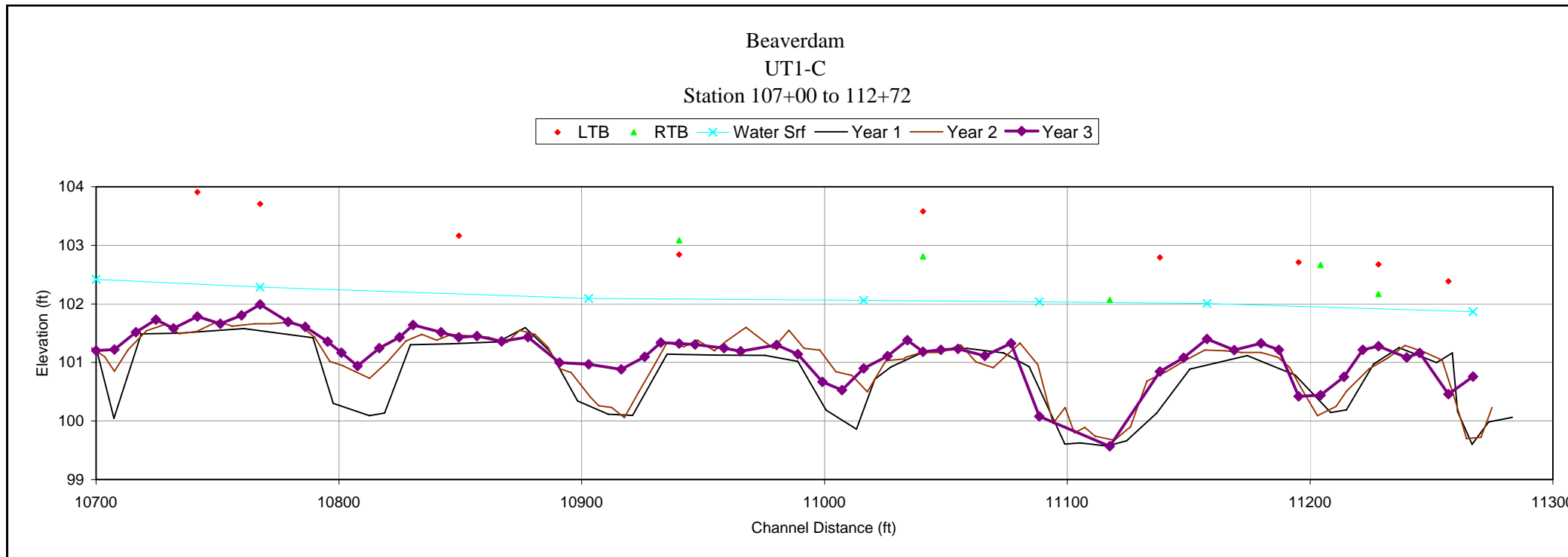
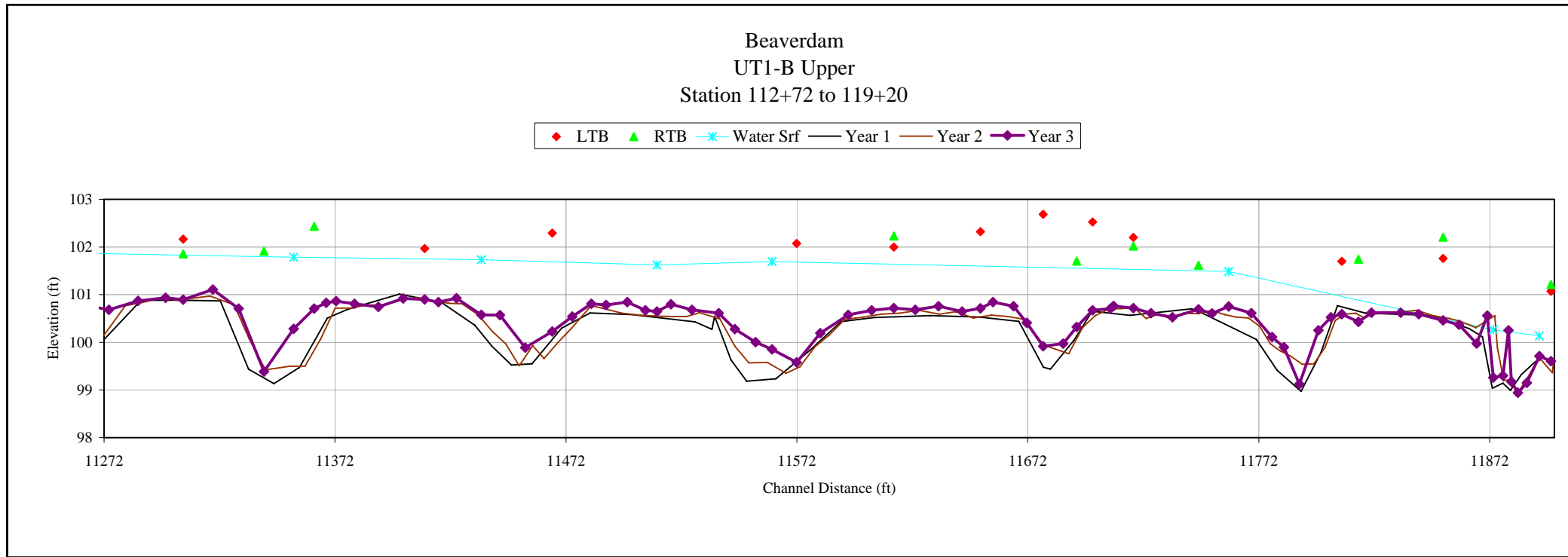
PROJECT: BEAVERDAM SWAMP STREAM AND WETLAND RESTORATION EBX NEUSE I, LLC

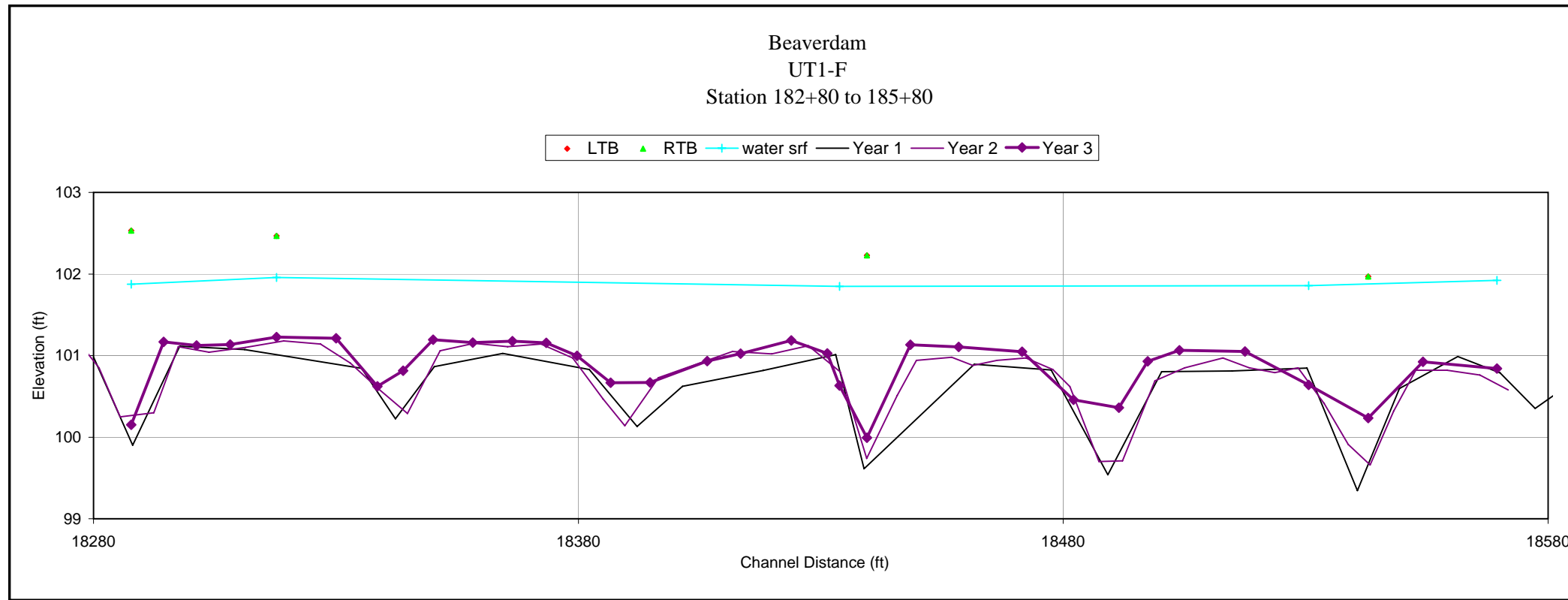
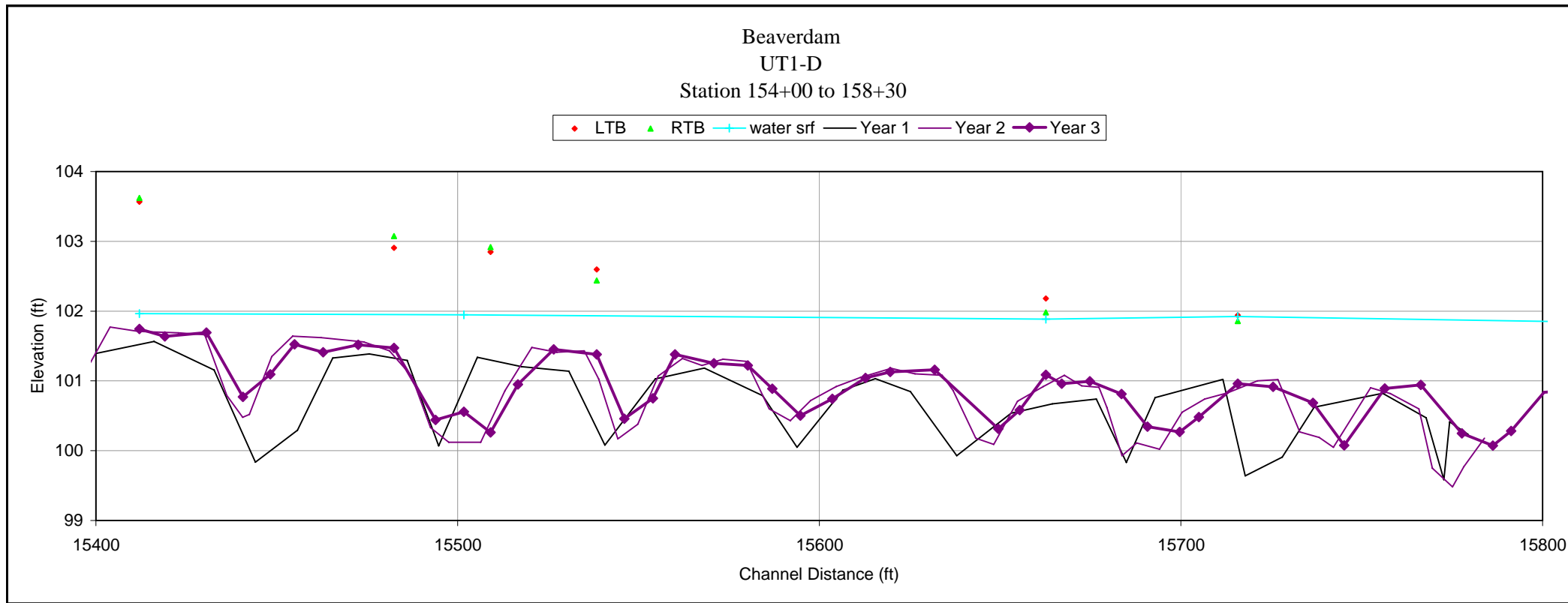
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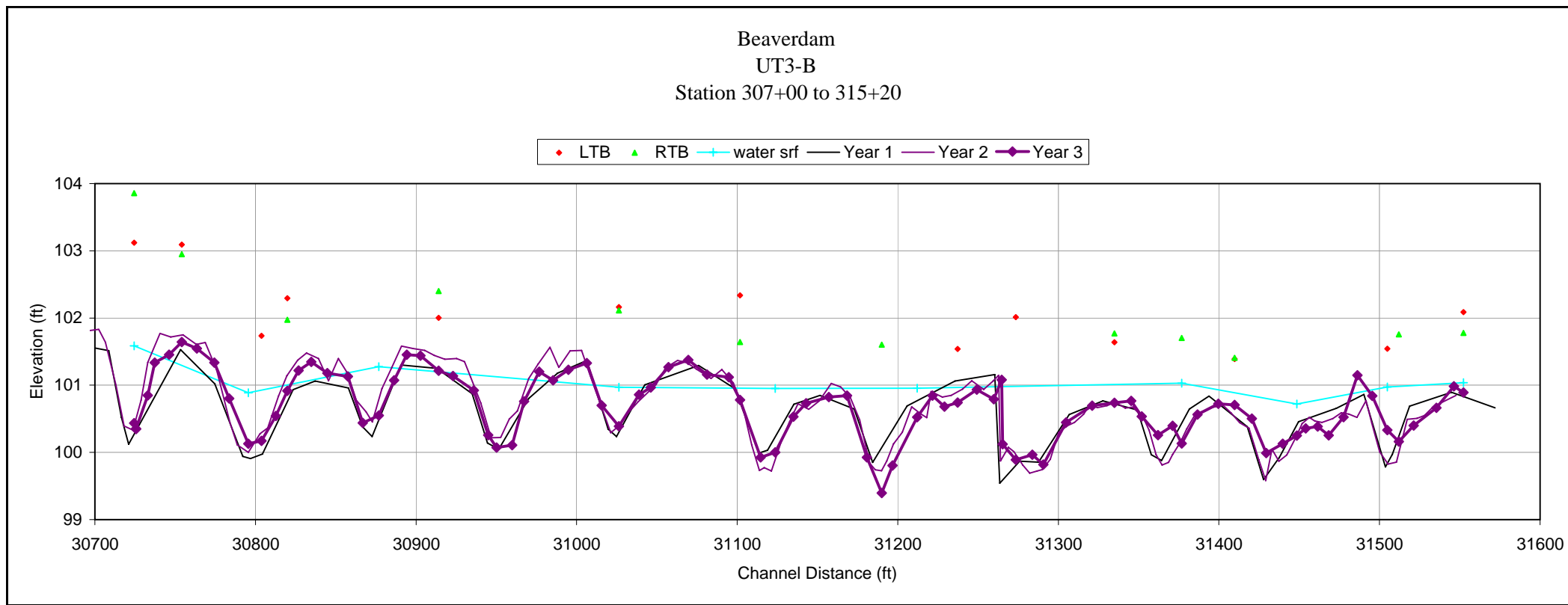
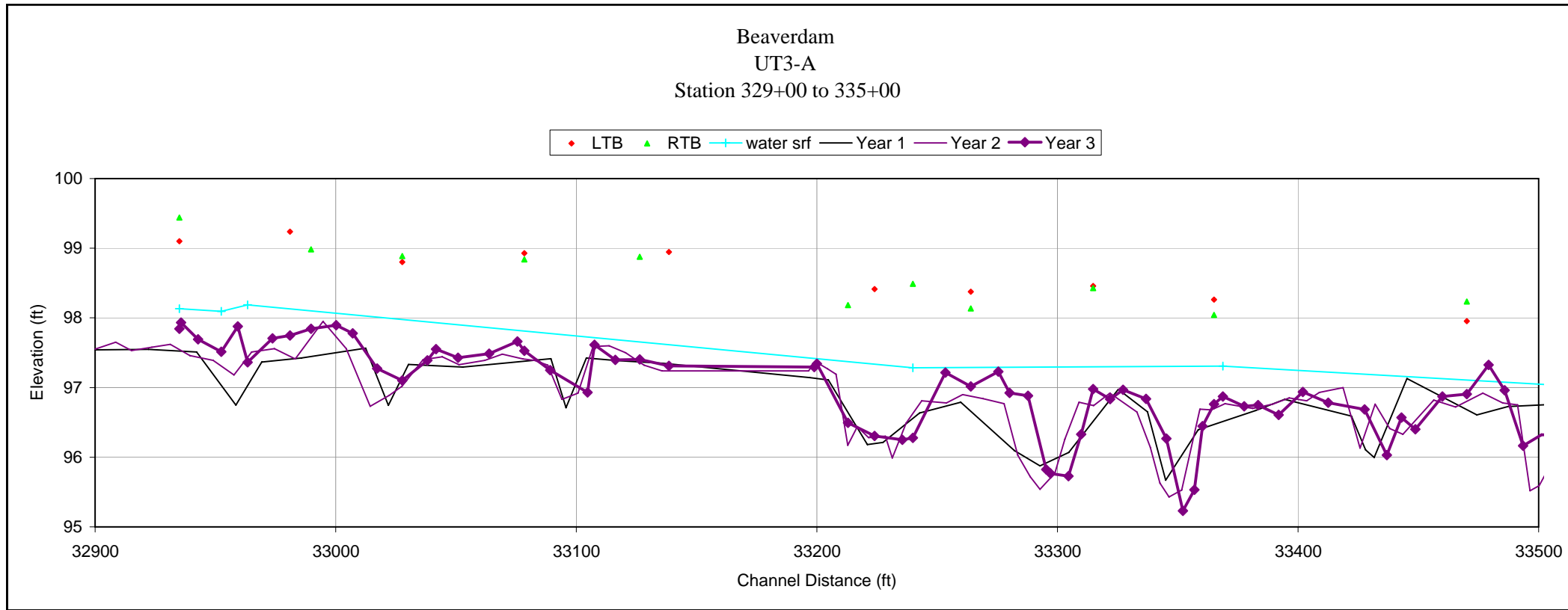
JOB NUMBER: 012620010 SHEET NUMBER: 39

APPENDIX B

2010 Profile and Cross Section Data







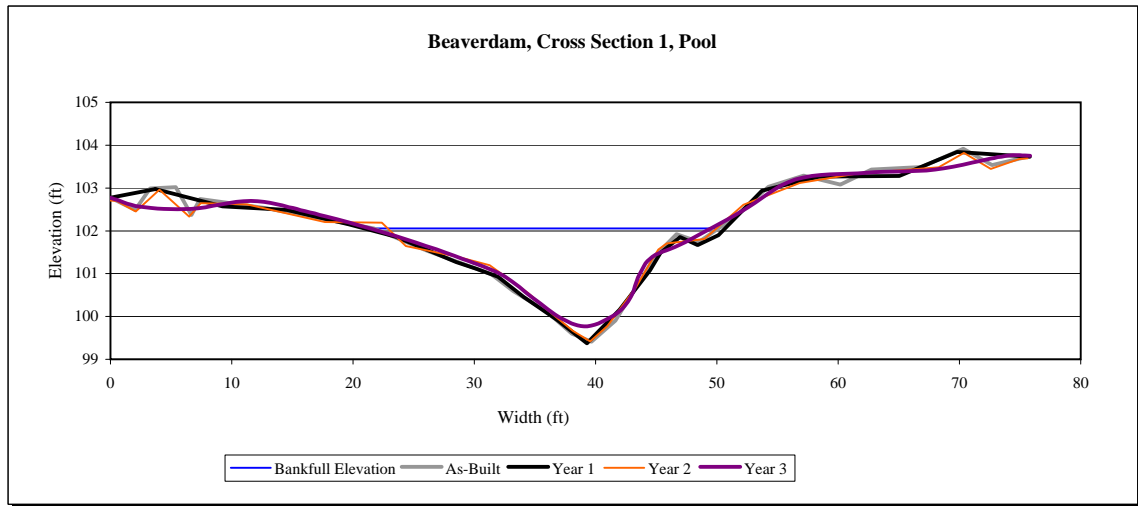
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



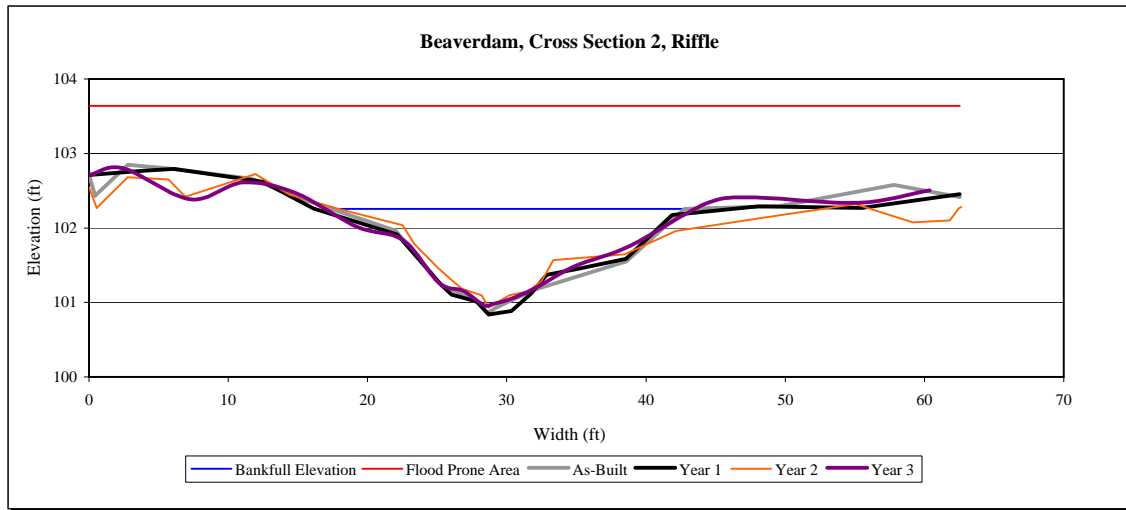
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



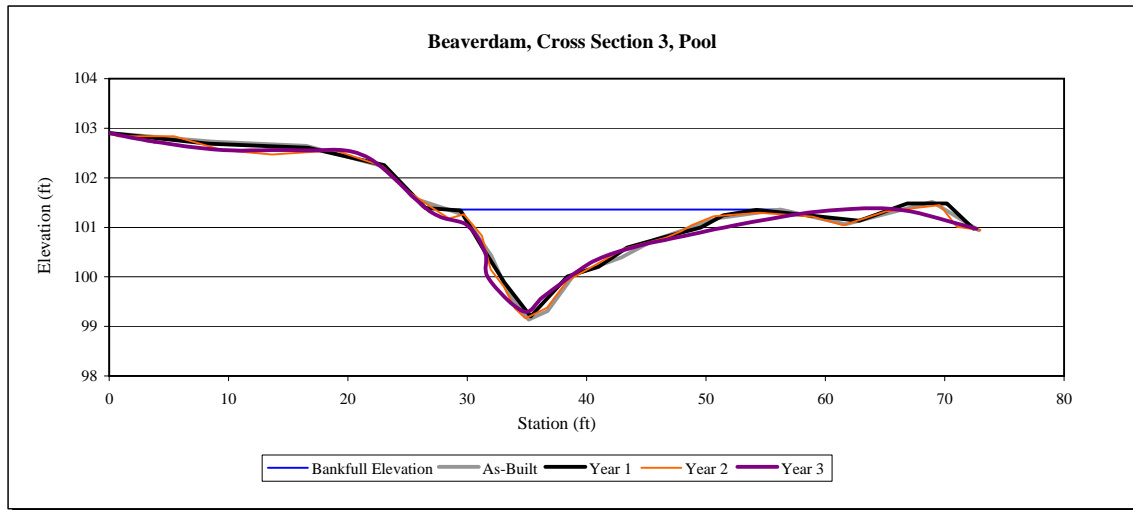
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



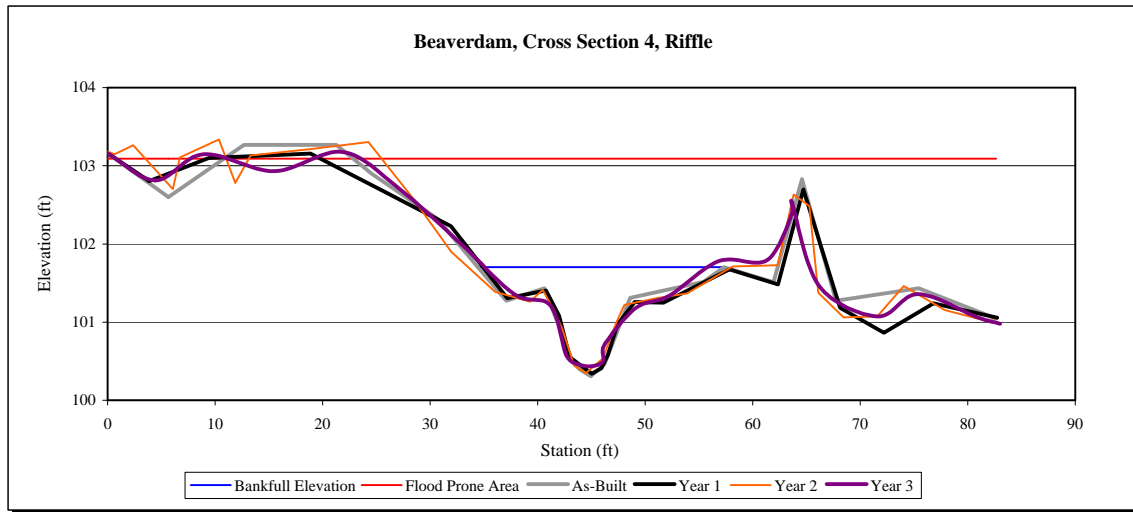
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



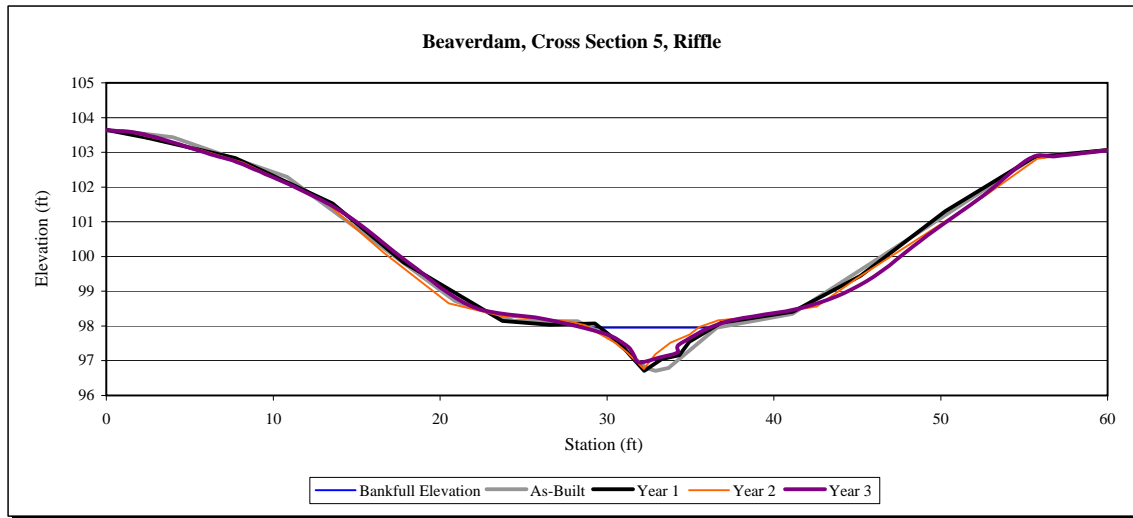
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



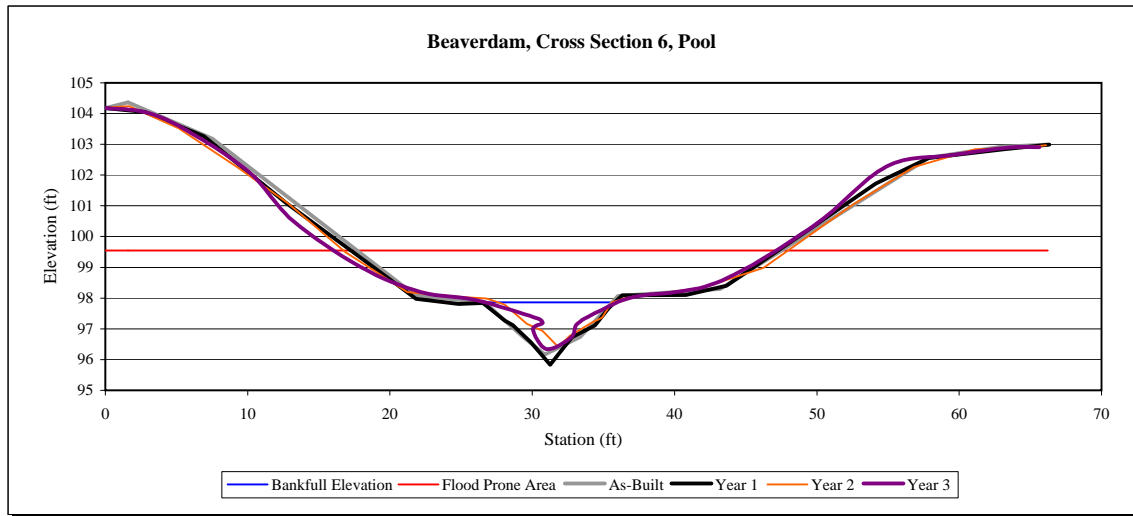
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



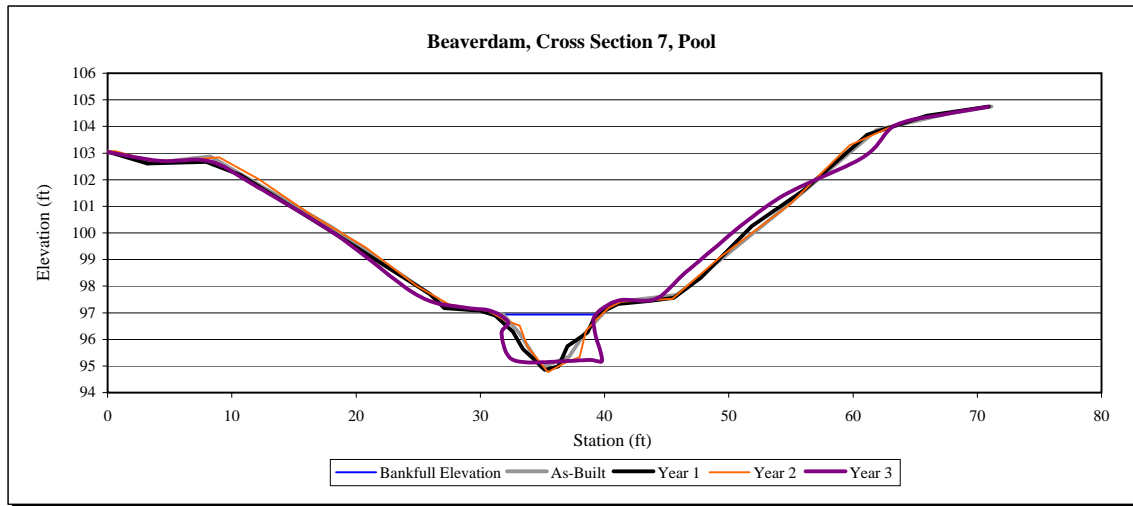
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



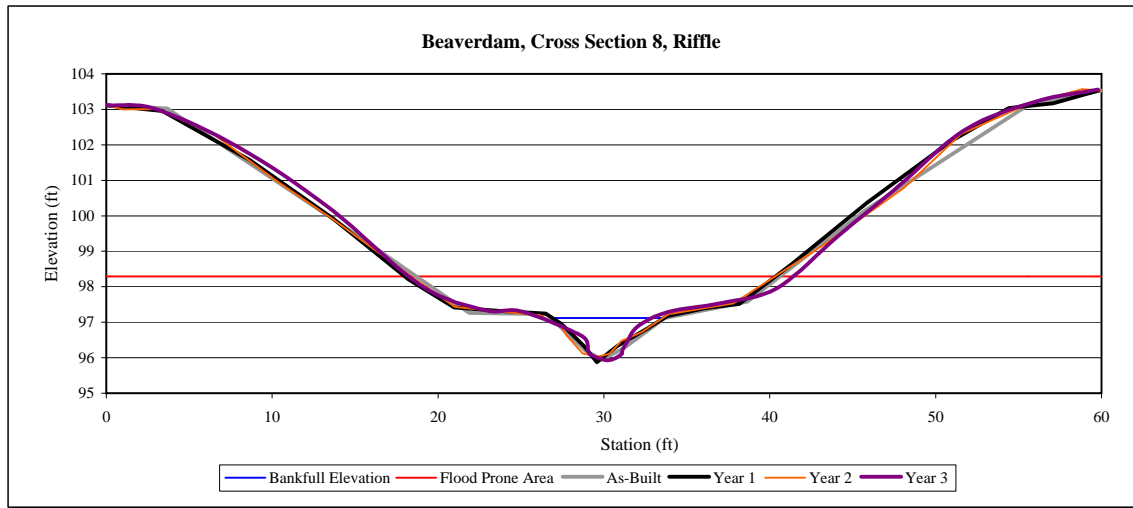
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



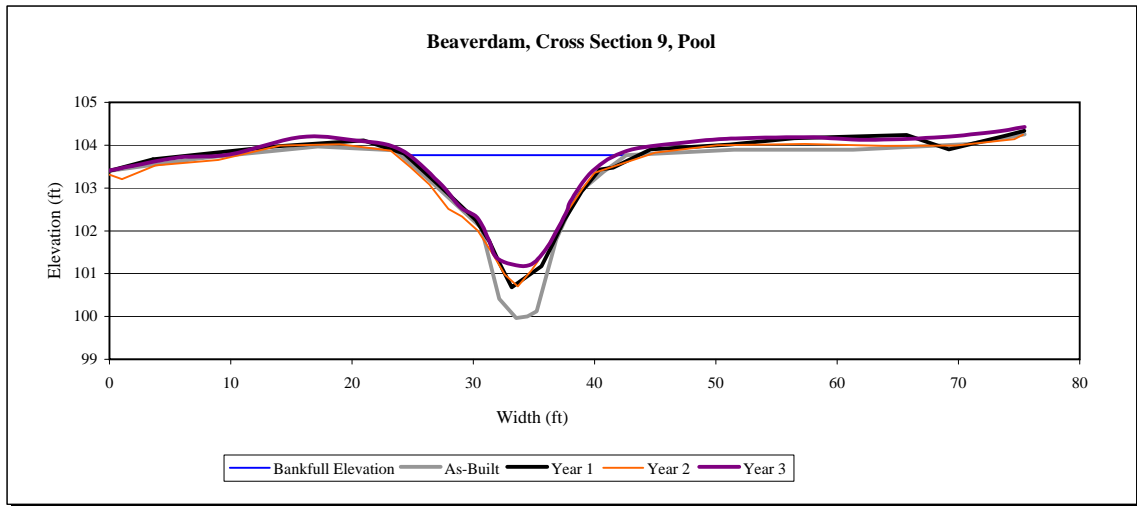
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



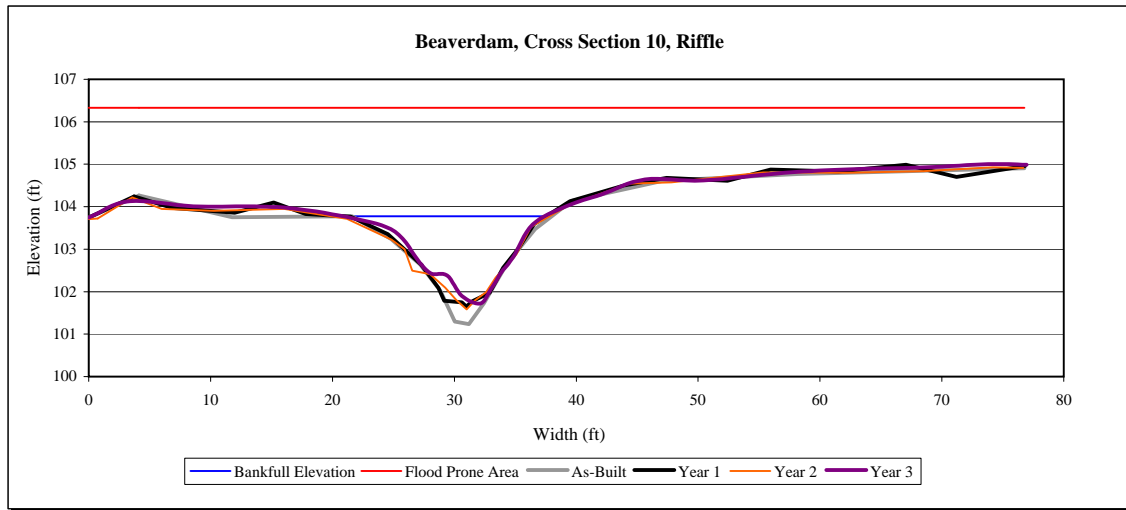
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



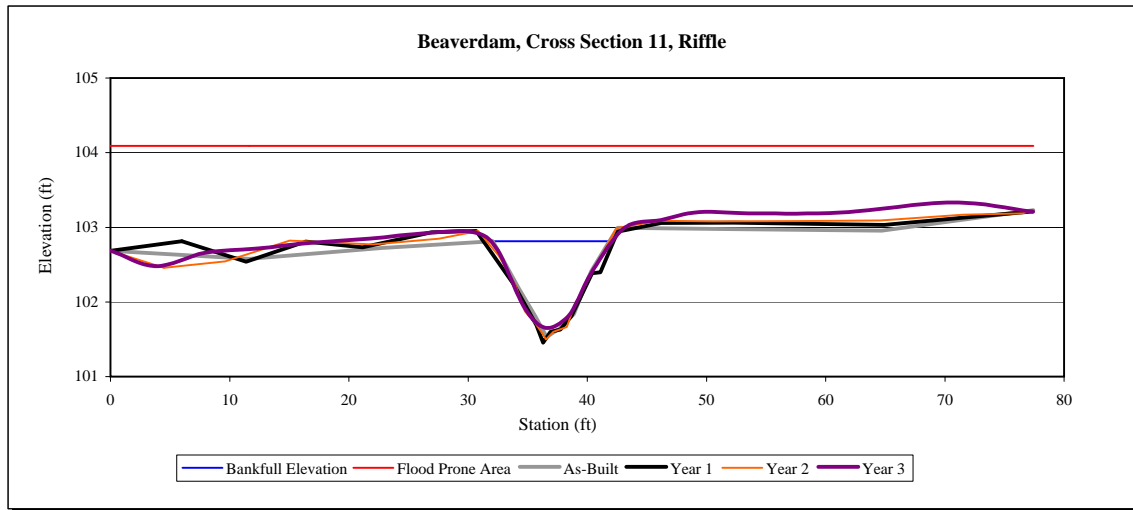
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



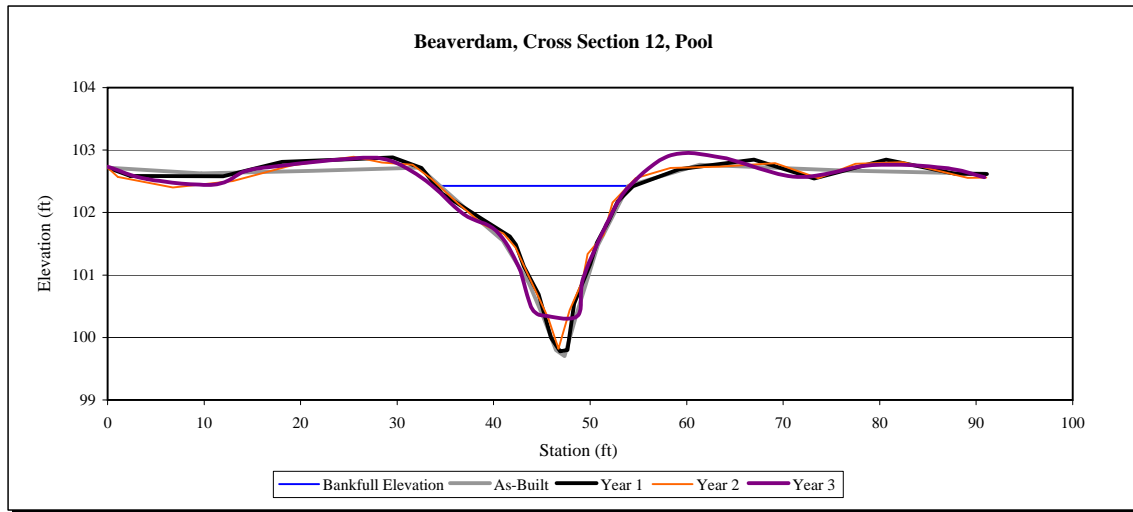
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



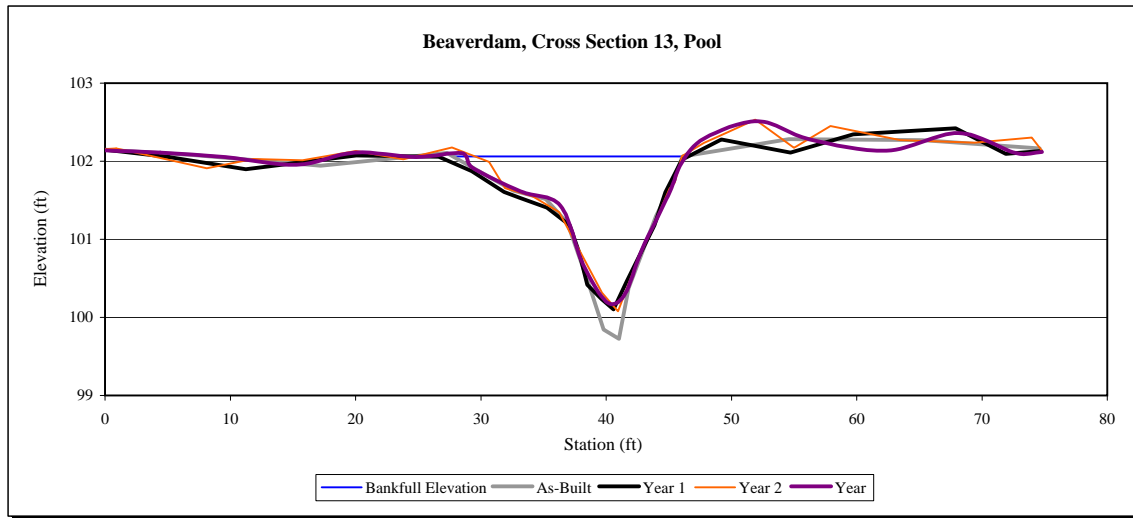
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



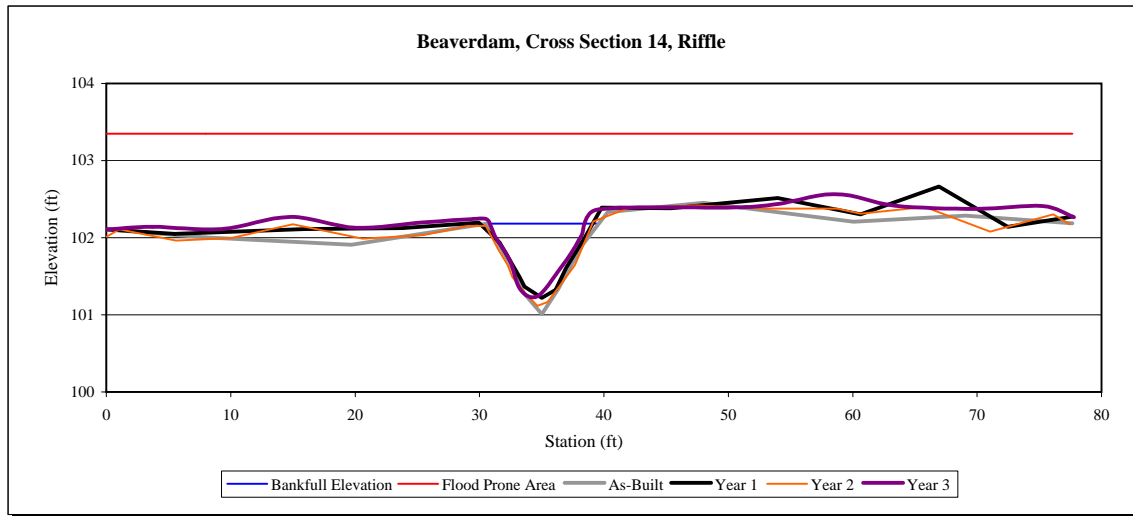
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



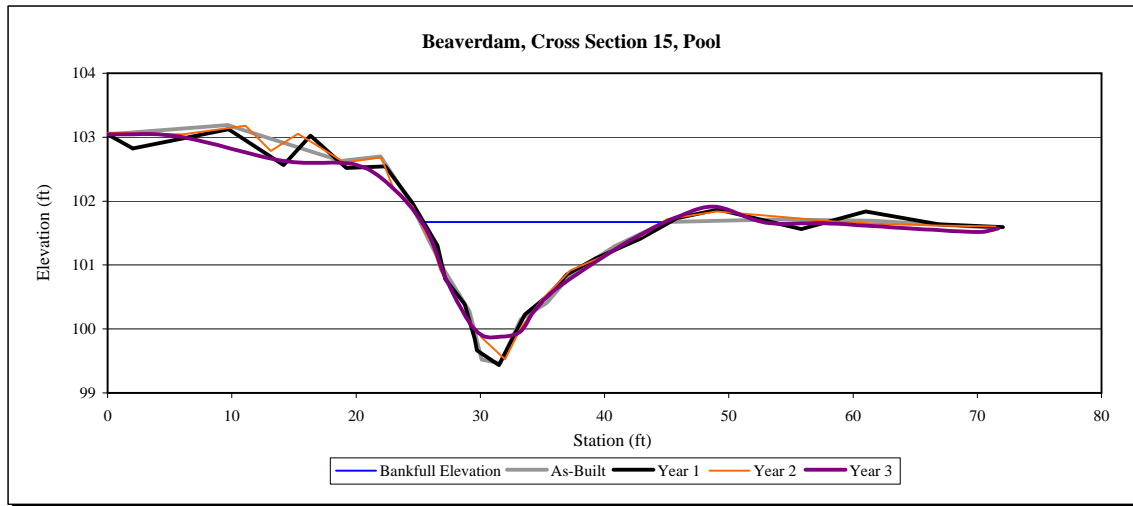
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



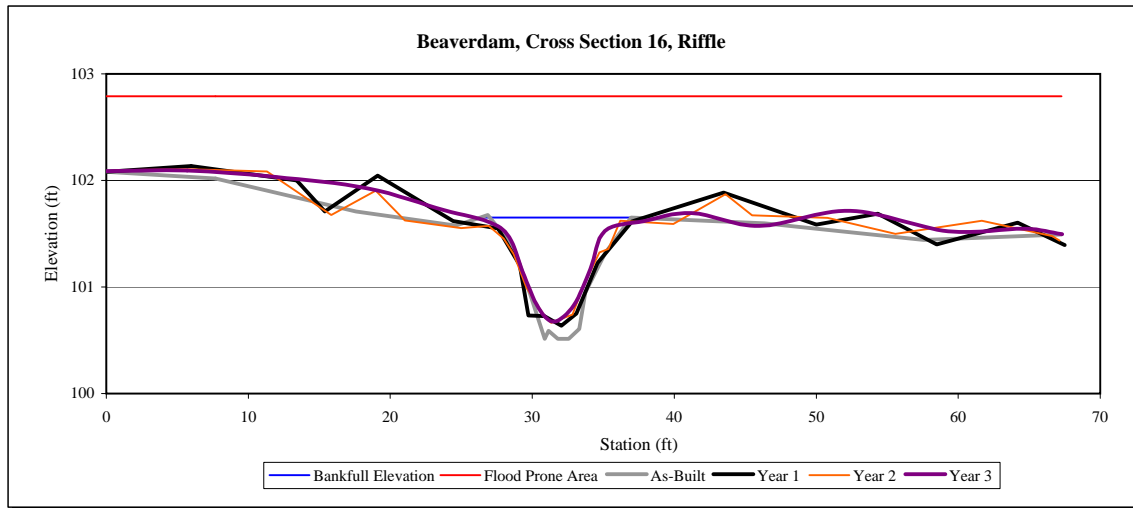
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



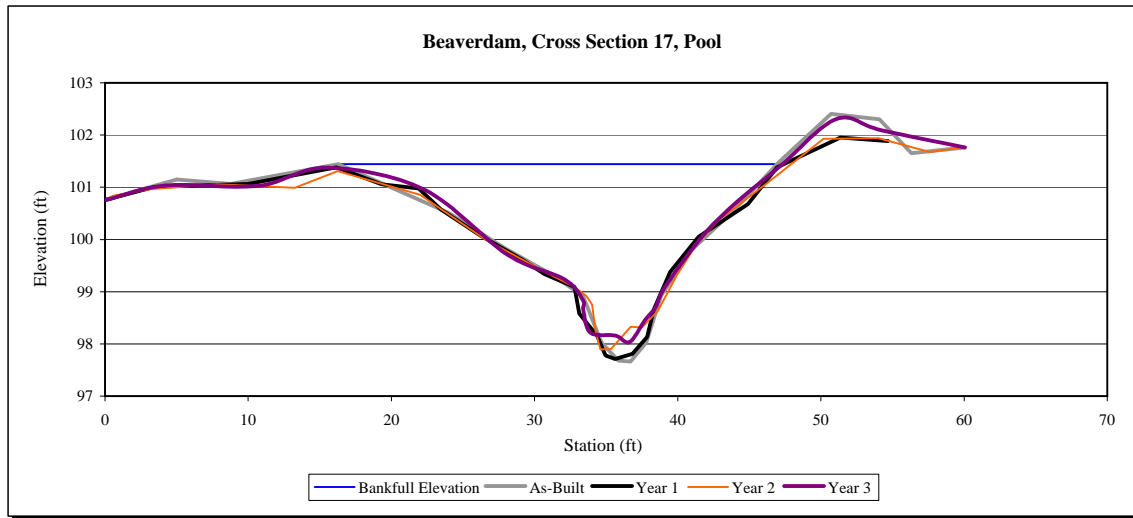
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



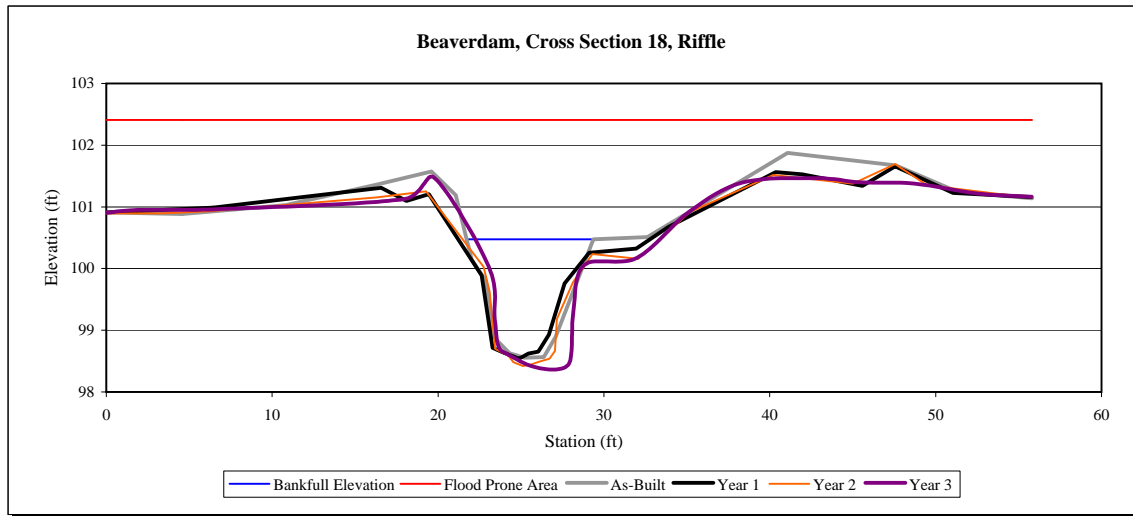
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



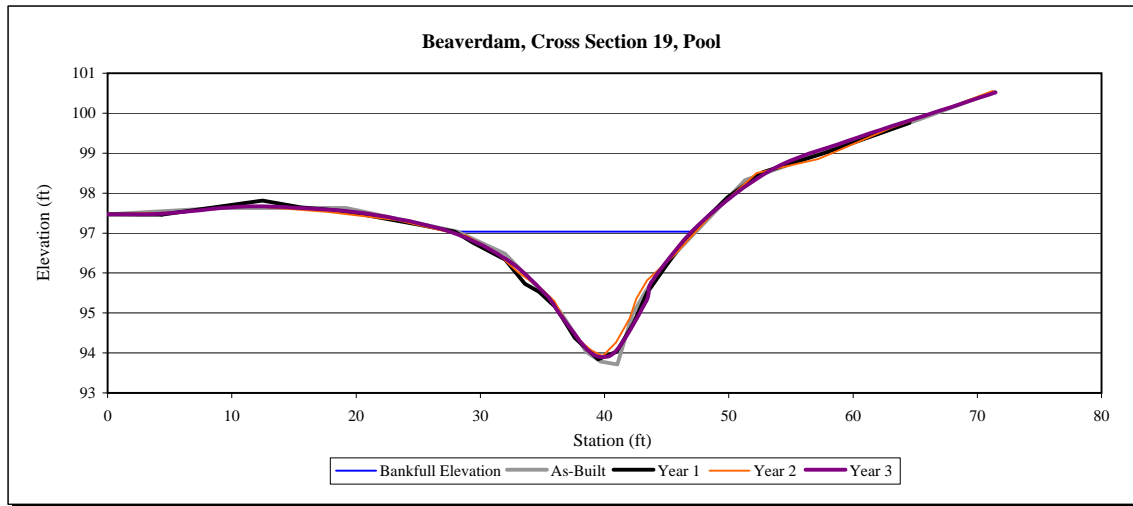
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



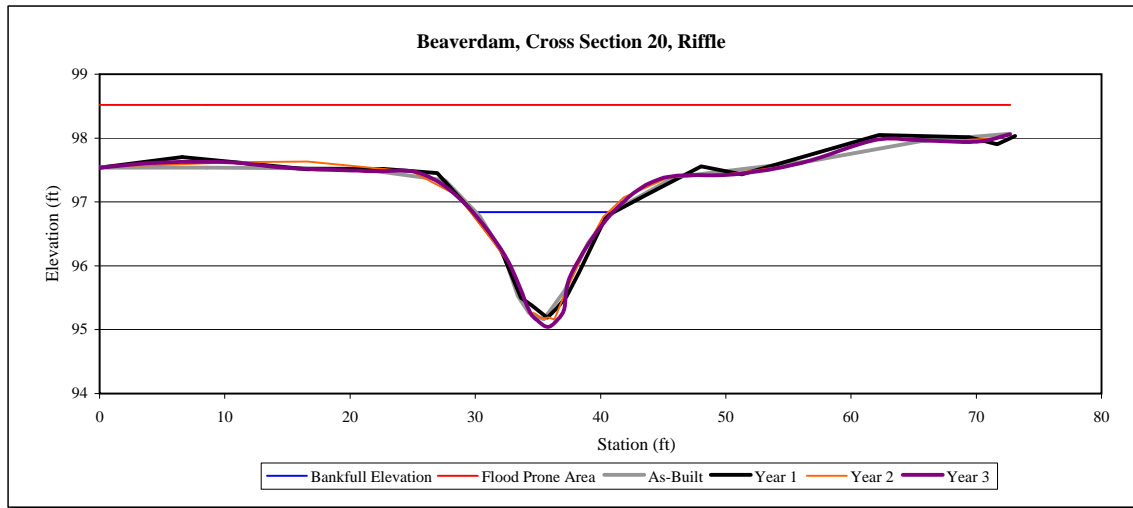
Beaverdam Mitigation Site
Annual Monitoring Report for 2010 (Year 3)



Left bank



Right bank



APPENDIX C

2010 Gauge Data

Date	Time	Water Level (inches)										CG1	CG2	CG3	On-site Manual Raingauge	On-site Auto Raingauge	Weather Station Rainfall Data			
		BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	Ambient	BD RAW1						BD RAW2	BD RAW3	On-site Auto RG Monthly Totals	Dunn Daily Rainfall
5-Feb-2010	06:00:00	-1.40	-0.95	6.89	-13.79	3.83	-5.29	2.98	6.54		2.94	-1.75	-2.27				1.65		1.36	
5-Feb-2010	12:00:00	-1.59	-1.30	6.64	-14.06	3.45	-5.55	2.28	6.06		2.67	-1.97	-2.40							
5-Feb-2010	18:00:00	-0.06	-0.28	6.28	-7.84	3.97	-4.84	2.66	6.67		3.35	-1.18	-2.08							
5-Feb-2010	24:00:00	4.42	1.52	6.23	0.84	9.13	0.07	7.17	13.28		9.05	3.04	3.96							
6-Feb-2010	06:00:00	4.80	3.12	6.41	0.36	12.07	4.01	11.58	16.26		9.39	4.48	7.41				0.01			
6-Feb-2010	12:00:00	2.62	1.22	6.33	-3.49	10.47	2.06	11.00	13.70		7.35	2.58	4.88							
6-Feb-2010	18:00:00	1.69	0.45	6.61	-8.24	9.25	0.56	9.34	12.01		6.33	1.58	3.30							
6-Feb-2010	24:00:00	1.32	0.32	6.91	-10.57	8.25	-0.55	7.48	11.63		5.79	0.75	2.17							
7-Feb-2010	06:00:00	0.34	-0.18	6.69	-12.17	6.97	-1.72	6.54	10.86		4.98	-0.33	0.85							
7-Feb-2010	12:00:00	-0.78	-0.98	6.14	-13.27	5.78	-3.14	4.98	9.31		3.81	-1.58	-0.81							
7-Feb-2010	18:00:00	1.32	1.16	8.59	-11.36	7.55	-1.40	6.75	11.05		5.78	0.41	0.85							
7-Feb-2010	24:00:00	-0.04	-0.05	7.64	-12.61	6.27	-2.80	5.30	9.60		4.57	-0.89	-0.69							
8-Feb-2010	06:00:00	-1.57	-1.85	6.26	-14.16	4.44	-4.48	3.94	7.45		3.06	-2.39	-2.51							
8-Feb-2010	12:00:00	-1.90	-2.10	6.26	-14.38	3.98	-5.09	3.25	6.60		2.77	-2.60	-2.85							
8-Feb-2010	18:00:00	0.38	0.08	8.38	-12.20	5.88	-3.13	4.88	8.29		4.89	-0.26	-0.71							
8-Feb-2010	24:00:00	-0.35	-0.66	7.90	-12.77	5.10	-3.93	3.93	7.73		4.17	-0.87	-1.42							
9-Feb-2010	06:00:00	-2.15	-2.69	6.17	-14.45	3.42	-5.71	2.71	5.71		2.36	-2.53	-3.05				0.56		0.29	
9-Feb-2010	12:00:00	-1.96	-2.56	6.33	-14.35	3.29	-5.69	2.23	5.25		2.49	-2.41	-3.01							
9-Feb-2010	18:00:00	-1.12	-1.89	7.17	-13.61	3.73	-5.02	2.67	5.49		3.37	-1.67	-2.15							
9-Feb-2010	24:00:00	0.18	-0.23	6.17	-9.38	4.25	-4.41	2.89	7.51		4.64	-0.87	-1.91							
10-Feb-2010	06:00:00	-0.06	-0.46	6.22	-11.80	4.86	-4.07	3.99	8.57		4.39	-1.25	-1.87				0.03		0.02	
10-Feb-2010	12:00:00	0.76	0.69	7.30	-11.32	6.01	-3.04	4.34	9.37		5.29	-0.46	-1.12							
10-Feb-2010	18:00:00	2.89	3.00	9.79	-9.62	8.17	-0.88	7.24	11.25		7.34	1.66	1.05							
10-Feb-2010	24:00:00	1.72	1.71	9.02	-10.82	6.99	-1.94	5.92	9.77		6.21	0.50	-0.06							
11-Feb-2010	06:00:00	-0.52	-0.42	7.06	-13.12	4.68	-4.29	4.04	7.16		4.17	-1.53	-2.19							
11-Feb-2010	12:00:00	-1.37	-1.42	6.47	-13.96	3.73	-5.14	2.74	6.13		3.27	-2.23	-2.82							
11-Feb-2010	18:00:00	1.64	1.44	9.44	-11.10	6.65	-2.29	5.36	9.12		6.32	0.82	0.21							
11-Feb-2010	24:00:00	0.64	0.20	8.56	-11.99	5.58	-3.34	4.41	8.00		5.28	-0.28	-0.87							
12-Feb-2010	06:00:00	-1.64	-2.07	6.41	-14.17	3.31	-5.59	2.60	5.63		3.14	-2.33	-3.07						0.07	
12-Feb-2010	12:00:00	-1.72	-2.38	6.39	-14.28	3.26	-5.68	2.02	5.30		3.07	-2.41	-3.07							
12-Feb-2010	18:00:00	0.82	-0.08	8.79	-12.05	5.52	-3.41	4.52	7.45		5.34	-0.10	-0.73							
12-Feb-2010	24:00:00	-0.81	-1.88	7.24	-13.57	3.73	-5.08	2.98	5.72		3.72	-1.66	-2.33							
13-Feb-2010	06:00:00	-1.84	-2.66	6.28	-14.46	2.77	-6.01	1.76	4.66		2.71	-2.55	-3.23				0.19		0.03	
13-Feb-2010	12:00:00	-1.60	-2.60	6.32	-14.39	2.93	-5.89	1.60	4.91		3.06	-2.24	-3.10							
13-Feb-2010	18:00:00	-1.04	-2.08	6.71	-14.11	3.37	-5.29	2.40	5.18		3.47	-1.88	-2.57							
13-Feb-2010	24:00:00	1.32	1.13	8.41	-11.74	5.23	-3.64	3.44	6.92		5.30	-0.06	-0.49							
14-Feb-2010	06:00:00	-0.90	-0.93	6.75	-13.81	3.37	-5.42	2.79	5.16		3.68	-1.90	-2.19							
14-Feb-2010	12:00:00	-1.73	-2.04	6.19	-14.63	2.76	-6.37	1.51	4.15		3.12	-2.73	-3.03							
14-Feb-2010	18:00:00	2.61	2.15	10.19	-10.74	6.67	-2.02	5.14	7.91		6.91	1.51	1.25							
14-Feb-2010	24:00:00	1.90	1.44	9.76	-11.18	6.02	-2.91	4.65	7.22		6.53	0.94	0.62							
15-Feb-2010	06:00:00	-1.79	-2.30	6.23	-14.76	2.37	-6.53	1.90	3.54		2.99	-2.61	-3.12							
15-Feb-2010	12:00:00	-1.73	-2.43	6.26	-14.77	2.24	-6.56	0.99	3.35		2.89	-2.63	-3.19							
15-Feb-2010	18:00:00	0.40	-0.44	8.29	-12.68	4.31	-4.52	3.00	5.27		4.98	-0.59	-1.03							
15-Feb-2010	24:00:00	-1.19	-2.16	6.67	-14.27	2.65	-6.19	1.44	3.57		3.41	-2.12	-2.65							
16-Feb-2010	06:00:00	-1.81	-2.76	6.35	-14.66	2.12	-6.63	0.99	2.97		3.00	-2.53	-3.12							
16-Feb-2010	12:00:00	-0.46	-1.60	7.60	-13.45	3.36	-5.51	1.71	4.08		4.25	-1.23	-1.86							
16-Feb-2010	18:00:00	1.98	0.67	10.06	-10.94	5.65	-3.47	4.52	6.33		6.60	1.11	0.45							
16-Feb-2010	24:00:00	1.21	-0.44	9.31	-11.66	4.82	-4.64	3.07	5.46		5.84	0.23	-0.40							
17-Feb-2010	06:00:00	-1.83	-3.68	6.32	-14.60	1.89	-7.64	1.14	2.48		2.89	-2.68	-3.33							
17-Feb-2010	12:00:00	-2.09	-4.08	6.14	-14.96	1.52	-8.08	0.19	2.19		2.57	-2.98	-3.60							
17-Feb-2010	18:00:00	2.35	0.42	10.30	-10.72	5.64	-3.28	4.09	6.29		6.77	1.28	0.73							
17-Feb-2010	24:00:00	0.24	-1.95	8.50	-12.56	3.80	-5.87	2.34	4.41		5.01	-0.53	-1.26							
18-Feb-2010	06:00:00	-1.54	-3.96	6.65	-14.36	1.85	-7.70	1.11	2.45		3.11	-2.49	-3.09							
18-Feb-2010	12:00:00	-2.00	-4.48	6.28	-14.81	1.51	-8.27	0.10	1.99		2.76	-2.83	-3.52							
18-Feb-2010	18:00:00	1.04	-1.58	9.26	-11.83	4.32	-5.21	2.90	4.91		5.71	0.13	-0.57							
18-Feb-2010	24:00:00	0.63	-2.02	8.91	-12.23	4.01	-5.95	2.48	4.64		5.42	-0.16	-0.99							
19-Feb-2010	06:00:00	-2.27	-5.31	5.65	-15.14	1.07	-8.90	0.38	1.50		2.43	-3.14	-3.90							
19-Feb-2010	12:00:00	-2.39	-5.46	5.69	-15.14	0.97	-9.16	-0.38	1.39		2.43	-3.20	-4.07							
19-Feb-2010	18:00:00	1.82	-1.13	9.67	-11.20	5.01	-4.55	3.36	5.43		6.45	0.93	0.11							
19-Feb-2010	24:00:00	1.64	-1.61	9.33	-11.29	4.76	-5.44	3.07	5.17		6.25	0.70	-0.25							
20-Feb-2010	06:00:00	-2.45	-5.64	5.29	-15.19	0.90	-9.44	0.28	1.26		2.25	-3.22	-4.15							
20-Feb-2010	12:00:00	-2.50	-5.96	5.14	-15.38	0.75	-9.85	-0.86	1.11		2.30	-3.35	-4.29							
20-Feb-2010	18:00:00	2.43	-0.80	9.91	-10.52	5.37	-4.10	3.72	5.82		6.99	1.44	0.54							
20-Feb-2010	24:00:00	2.25	-1.26	10.11	-10.51	5.36	-4.96	3.70	5.82		6.97	1.45	0.48							
21-Feb-2010	06:00:00	-2.46	-6.12	5.07	-15.25	0.55	-9.83	0.15	1.07		2.21	-3.37	-4.29							
21-Feb-2010	12:00:00	-2.72	-6.38	4.90	-15.52	0.44	-10.04	-0.88	0.92		2.15	-3.56	-4.54							
21-Feb-2010	18:00:00	1.89	-1.53	9.58	-10.99	4.79	-5.02	3.18	5.47		6.55	1.02	0.05							
21-Feb-2010	24:00:00	0.55	-3.28	8.30	-12.24	3.48	-6.80	2.14	4.13		5.17	-0.32	-1.41							
22-Feb-2010	06:00:00	-2.54	-6.30	5.02	-15.36	0.42	-9.82	-0.20	1.11		2.12	-3.45	-4.44				0.38		0.37	
22-Feb-2010	12:00:00	-2.59	-6.35	5.14	-15.34	0.31	-9.88	-1.04	1.15		1.97	-3.52	-4.54							

Date	Time	Water Level (inches)										Ambient	BD RAW1	BD RAW2	BD RAW3	CG1	CG2	CG3	On-site Manual Raingauge	On-site Auto Rainauge	Weather Station Rainfall Data	
		BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	On-site Auto RG Monthly Totals	Dunn Daily Rainfall										Dunn Monthly Rainfall	
3-May-2010	18:00:00	-13.21	-21.36	-3.55	-22.66	-29.34	-29.47	-31.20	-13.97													
3-May-2010	24:00:00	-12.88	-21.69	-3.26	-22.52	-29.33	-29.32	-30.80	-13.37													
4-May-2010	06:00:00	-12.02	-21.22	-2.91	-21.80	-29.27	-29.21	-30.89	-12.93													
4-May-2010	12:00:00	-11.77	-20.68	-2.89	-21.62	-29.26	-29.19	-31.04	-12.36													
4-May-2010	18:00:00	-12.86	-20.73	-3.25	-22.24	-29.59	-29.33	-31.48	-13.13													
4-May-2010	24:00:00	-12.92	-21.23	-3.38	-22.84	-29.68	-29.42	-30.84	-13.52													
5-May-2010	06:00:00	-12.44	-20.86	-3.04	-22.02	-29.32	-29.08	-31.16	-13.10										0.01			
5-May-2010	12:00:00	-12.31	-20.57	-3.08	-21.95	-29.47	-29.32	-30.78	-12.83													
5-May-2010	18:00:00	-13.33	-20.62	-3.33	-22.34	-29.52	-29.29	-31.12	-13.58													
5-May-2010	24:00:00	-14.05	-21.77	-3.76	-23.42	-29.41	-29.37	-30.81	-15.24													
6-May-2010	06:00:00	-13.16	-21.53	-3.32	-22.42	-29.31	-29.18	-31.12	-14.42													
6-May-2010	12:00:00	-12.94	-21.03	-3.17	-22.26	-29.37	-29.15	-30.75	-13.54													
6-May-2010	18:00:00	-14.43	-21.53	-3.80	-23.26	-29.51	-29.32	-31.29	-14.87													
6-May-2010	24:00:00	-15.37	-22.24	-4.18	-23.89	-29.52	-29.32	-30.70	-16.40													
7-May-2010	06:00:00	-14.61	-21.82	-3.73	-22.91	-29.29	-29.07	-31.01	-15.95												0.01	
7-May-2010	12:00:00	-14.44	-21.41	-3.69	-22.73	-29.39	-29.20	-30.78	-15.47													
7-May-2010	18:00:00	-15.95	-22.11	-4.49	-24.10	-29.58	-29.29	-31.16	-17.49													
7-May-2010	24:00:00	-16.53	-22.40	-4.43	-24.35	-29.45	-29.23	-30.82	-18.04													
8-May-2010	06:00:00	-15.85	-21.92	-3.80	-23.23	-29.28	-29.05	-31.14	-16.78													
8-May-2010	12:00:00	-15.34	-21.26	-3.46	-22.69	-29.27	-29.01	-30.87	-15.21													
8-May-2010	18:00:00	-17.01	-21.84	-4.49	-24.12	-29.52	-29.15	-31.34	-17.12													
8-May-2010	24:00:00	-18.04	-22.54	-4.79	-25.06	-29.43	-29.15	-30.82	-19.32													
9-May-2010	06:00:00	-18.34	-22.67	-4.46	-24.22	-29.27	-28.97	-31.07	-19.90													
9-May-2010	12:00:00	-18.51	-22.65	-4.58	-24.01	-29.37	-29.00	-30.64	-20.19													
9-May-2010	18:00:00	-19.10	-23.02	-4.78	-24.83	-29.45	-29.00	-31.23	-21.16													
9-May-2010	24:00:00	-19.78	-23.18	-5.05	-25.13	-29.43	-29.05	-30.76	-21.60													
10-May-2010	06:00:00	-19.75	-22.78	-4.36	-24.07	-29.15	-28.82	-31.08	-20.96													
10-May-2010	12:00:00	-20.23	-22.38	-4.45	-23.98	-29.38	-29.05	-30.88	-20.69													
10-May-2010	18:00:00	-20.65	-22.53	-4.97	-24.94	-29.40	-29.14	-31.07	-21.81													
10-May-2010	24:00:00	-21.09	-22.76	-4.96	-24.97	-29.35	-28.94	-30.71	-22.25													
11-May-2010	06:00:00	-21.03	-22.55	-4.55	-24.04	-29.27	-29.03	-30.90	-21.23													
11-May-2010	12:00:00	-21.05	-22.05	-4.41	-23.81	-29.35	-28.94	-30.34	-20.38													
11-May-2010	18:00:00	-21.25	-22.05	-4.63	-24.07	-29.29	-28.81	-30.69	-20.87													
11-May-2010	24:00:00	-21.58	-22.19	-4.47	-23.96	-29.22	-28.87	-30.75	-20.67													
12-May-2010	06:00:00	-21.56	-22.07	-4.25	-23.54	-29.26	-28.93	-30.99	-19.53													
12-May-2010	12:00:00	-21.47	-21.33	-4.09	-23.28	-29.27	-28.88	-30.96	-18.81													
12-May-2010	18:00:00	-22.12	-21.72	-4.84	-24.18	-29.55	-29.13	-30.92	-20.01													
12-May-2010	24:00:00	-22.48	-22.29	-4.89	-24.88	-29.34	-29.00	-30.76	-21.38													
13-May-2010	06:00:00	-22.70	-22.20	-4.52	-23.99	-29.26	-28.93	-30.94	-20.76													
13-May-2010	12:00:00	-22.84	-21.82	-4.42	-23.76	-29.17	-28.87	-30.78	-20.26													
13-May-2010	18:00:00	-23.44	-22.42	-5.27	-25.16	-29.45	-29.00	-31.19	-22.32													
13-May-2010	24:00:00	-24.08	-22.98	-5.41	-25.64	-29.39	-28.88	-30.63	-23.74													
14-May-2010	06:00:00	-24.23	-23.07	-4.89	-24.43	-29.32	-28.95	-30.86	-22.59													
14-May-2010	12:00:00	-24.29	-22.53	-4.67	-24.08	-29.28	-28.89	-30.69	-21.52													
14-May-2010	18:00:00	-24.88	-23.16	-5.54	-25.61	-29.41	-29.08	-30.87	-23.43													
14-May-2010	24:00:00	-25.48	-23.43	-5.54	-25.87	-29.22	-28.83	-30.56	-24.41													
15-May-2010	06:00:00	-25.55	-23.36	-4.99	-24.79	-29.11	-28.78	-30.92	-23.50													
15-May-2010	12:00:00	-25.72	-22.80	-4.70	-24.32	-29.15	-28.78	-30.78	-22.07													
15-May-2010	18:00:00	-26.27	-23.37	-5.89	-25.91	-29.38	-29.03	-31.11	-24.20													
15-May-2010	24:00:00	-26.61	-23.69	-5.81	-26.20	-29.25	-28.93	-30.65	-25.22													
16-May-2010	06:00:00	-26.97	-23.50	-5.30	-25.20	-29.23	-28.90	-30.81	-24.32													
16-May-2010	12:00:00	-26.98	-22.95	-4.94	-24.67	-29.03	-28.79	-30.83	-23.06											0.60		0.30
16-May-2010	18:00:00	-27.58	-23.56	-6.13	-26.33	-29.40	-29.09	-30.95	-25.22													
16-May-2010	24:00:00	-27.53	-23.58	-5.51	-25.43	-29.13	-28.82	-30.82	-24.42													
17-May-2010	06:00:00	-21.19	-22.36	-4.65	-24.67	-26.39	-28.72	-30.96	-23.37												0.84	0.79
17-May-2010	12:00:00	-17.01	-21.69	-4.46	-24.26	-26.31	-28.85	-30.70	-21.86													
17-May-2010	18:00:00	-15.28	-20.78	-4.58	-24.13	-26.79	-28.99	-30.98	-21.00													
17-May-2010	24:00:00	-13.33	-19.71	-4.19	-23.83	-24.39	-28.94	-30.71	-20.04													
18-May-2010	06:00:00	-2.79	-17.57	-3.65	-23.11	-16.27	-28.82	-23.36	-17.81												0.46	0.30
18-May-2010	12:00:00	-1.30	-13.77	-3.71	-22.87	-15.09	-28.83	-21.44	-16.64													
18-May-2010	18:00:00	-5.44	-14.74	-4.04	-22.98	-16.30	-28.90	-22.04	-17.39													
18-May-2010	24:00:00	-7.52	-16.32	-4.23	-23.14	-17.51	-28.89	-22.43	-17.50													
19-May-2010	06:00:00	-8.39	-17.43	-4.22	-23.12	-18.40	-28.88	-23.01	-17.60													
19-May-2010	12:00:00	-8.81	-18.05	-4.41	-23.22	-18.83	-29.03	-23.66	-17.70													
19-May-2010	18:00:00	-9.79	-18.72	-4.71	-23.74	-19.12	-29.08	-24.75	-18.23													
19-May-2010	24:00:00	-10.61	-19.26	-4.90	-23.96	-19.67	-28.93	-25.13	-18.69													
20-May-2010	06:00:00	-10.45	-19.68	-4.53	-23.59	-20.10	-28.81	-26.04	-18.82													
20-May-2010	12:00:00	-10.63	-19.95	-4.76	-23.65	-20.74	-28.88	-26.82	-19.02													
20-May-2010	18:00:00	-11.41	-20.46	-5.20	-24.43	-21.41	-29.02	-28.01	-20.20													
20-May-2010	24:00:00	-12.27	-21.14	-5.37	-24.78	-22.06	-28.94	-28.44	-21.11													

Date	Time	Water Level (inches)										CG1	CG2	CG3	On-site Manual Raingauge	On-site Auto Raingauge	Weather Station Rainfall Data			
		BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	Ambient	BD RAW1						BD RAW2	BD RAW3	On-site Auto RG Monthly Totals	Dunn Daily Rainfall
25-Jun-2010	06:00:00	-30.20	-31.06	-9.59	-29.27	-24.41	-28.99	-31.43	-38.33		-29.97	-34.17	-35.20							
25-Jun-2010	12:00:00	-30.34	-31.05	-9.47	-29.06	-25.03	-29.05	-30.59	-37.76		-30.16	-34.28	-35.28							
25-Jun-2010	18:00:00	-30.45	-31.59	-10.39	-30.46	-25.91	-29.27	-31.38	-39.14		-30.54	-34.21	-35.37							
25-Jun-2010	24:00:00	-30.31	-31.98	-10.54	-30.83	-26.58	-29.21	-30.92	-40.13		-30.85	-34.19	-35.44							
26-Jun-2010	06:00:00	-30.35	-32.07	-9.87	-29.68	-27.00	-29.18	-31.12	-39.65		-30.70	-34.18	-35.34							
26-Jun-2010	12:00:00	-30.17	-31.60	-9.50	-29.21	-27.23	-29.01	-31.05	-38.18		-30.52	-34.29	-35.14							
26-Jun-2010	18:00:00	-30.37	-32.00	-10.42	-30.49	-27.91	-29.26	-31.00	-39.16		-31.11	-34.27	-35.40							
26-Jun-2010	24:00:00	-30.35	-32.22	-10.31	-30.25	-28.25	-29.17	-31.06	-39.82		-31.07	-34.13	-35.41							
27-Jun-2010	06:00:00	-30.17	-32.16	-9.83	-29.56	-28.49	-29.11	-31.31	-39.35		-30.93	-34.17	-35.31							
27-Jun-2010	12:00:00	-30.13	-31.79	-9.56	-29.06	-28.73	-29.08	-30.95	-38.31		-30.78	-34.42	-35.25							
27-Jun-2010	18:00:00	-30.44	-32.36	-10.78	-30.73	-29.39	-29.33	-31.07	-39.78		-31.41	-34.17	-35.41							
27-Jun-2010	24:00:00	-30.22	-32.70	-10.76	-30.97	-29.73	-29.23	-31.13	-41.33		-31.62	-34.16	-35.38							
28-Jun-2010	06:00:00	-30.10	-32.74	-10.16	-29.93	-29.81	-29.00	-31.44	-40.49		-31.45	-34.10	-35.10							
28-Jun-2010	12:00:00	-30.11	-32.58	-9.76	-29.39	-29.73	-29.02	-30.87	-39.52		-31.26	-34.39	-35.04							
28-Jun-2010	18:00:00	-30.37	-33.21	-10.88	-30.96	-29.95	-29.17	-30.96	-40.79		-32.13	-34.30	-35.40							
28-Jun-2010	24:00:00	-30.34	-33.54	-11.09	-31.39	-29.93	-29.21	-31.19	-41.99		-32.29	-34.09	-35.26							
29-Jun-2010	06:00:00	-30.11	-33.71	-10.61	-30.29	-29.79	-29.07	-31.94	-41.80		-32.25	-34.09	-35.16							0.09
29-Jun-2010	12:00:00	-30.15	-33.72	-10.30	-29.63	-16.93	-28.97	-30.60	-40.70		-32.10	-34.31	-35.22							
29-Jun-2010	18:00:00	-30.40	-34.26	-11.35	-31.07	-17.03	-29.25	-31.14	-41.96		-32.87	-34.24	-35.44							
29-Jun-2010	24:00:00	-30.25	-34.31	-10.90	-30.61	-15.65	-29.14	-31.07	-41.97		-32.51	-34.12	-35.10							
30-Jun-2010	06:00:00	-30.13	-33.94	-10.37	-29.52	-14.50	-29.08	-31.00	-40.98		-32.11	-34.18	-35.17							0.02
30-Jun-2010	12:00:00	-30.33	-33.51	-10.15	-29.41	-13.99	-29.24	-30.78	-40.19		-32.02	-34.29	-35.22							
30-Jun-2010	18:00:00	-30.23	-33.30	-10.35	-29.90	-13.56	-29.18	-31.14	-40.53		-31.86	-34.12	-35.35							
30-Jun-2010	24:00:00	-30.11	-32.80	-10.11	-29.40	-13.11	-29.12	-30.90	-39.92		-31.45	-34.06	-35.16							
1-Jul-2010	06:00:00	-30.21	-32.51	-9.88	-29.17	-12.87	-29.11	-31.20	-39.62		-31.26	-34.12	-35.21							0.05
1-Jul-2010	12:00:00	-30.19	-32.24	-9.75	-29.02	-12.91	-29.09	-30.86	-39.08		-31.08	-34.23	-35.15							
1-Jul-2010	18:00:00	-30.39	-32.62	-10.73	-30.46	-13.83	-29.24	-30.93	-40.22		-31.56	-34.21	-35.37							
1-Jul-2010	24:00:00	-30.27	-33.06	-11.15	-30.96	-13.96	-29.19	-30.94	-41.93		-32.15	-34.10	-35.33							
2-Jul-2010	06:00:00	-30.14	-33.22	-10.59	-29.88	-13.49	-29.00	-31.44	-41.44		-31.81	-34.03	-35.13							
2-Jul-2010	12:00:00	-30.11	-33.28	-10.37	-29.57	-13.51	-29.05	-31.06	-40.85		-31.90	-34.45	-35.10							
2-Jul-2010	18:00:00	-30.43	-33.99	-11.45	-31.08	-14.89	-29.36	-30.99	-42.21		-32.89	-34.29	-35.41							
2-Jul-2010	24:00:00	-30.35	-34.65	-11.60	-31.67	-15.16	-29.30	-30.99	-43.31		-32.87	-34.10	-35.41							
3-Jul-2010	06:00:00	-30.10	-34.78	-10.97	-30.55	-14.45	-29.14	-31.38	-42.62		-32.67	-34.13	-35.20							
3-Jul-2010	12:00:00	-30.05	-34.83	-10.75	-30.06	-14.43	-29.12	-31.02	-41.81		-32.58	-34.33	-35.21							
3-Jul-2010	18:00:00	-30.37	-35.30	-11.66	-31.33	-15.42	-29.31	-31.05	-42.76		-32.75	-34.29	-35.40							
3-Jul-2010	24:00:00	-30.32	-35.78	-11.74	-31.73	-15.37	-29.37	-31.14	-43.61		-32.77	-34.13	-35.50							
4-Jul-2010	06:00:00	-30.20	-35.80	-11.23	-30.78	-14.77	-29.24	-31.38	-43.11		-32.57	-34.13	-35.17							
4-Jul-2010	12:00:00	-30.09	-35.70	-10.83	-30.19	-14.79	-29.13	-30.99	-42.18		-32.59	-34.30	-35.28							
4-Jul-2010	18:00:00	-30.34	-36.12	-11.87	-31.48	-15.70	-29.33	-31.00	-43.16		-32.75	-34.30	-35.40							
4-Jul-2010	24:00:00	-30.37	-36.52	-12.02	-32.05	-16.00	-29.23	-31.14	-44.40		-32.74	-34.15	-35.45							
5-Jul-2010	06:00:00	-30.21	-36.71	-11.45	-31.22	-15.09	-29.21	-31.37	-44.18		-32.53	-34.01	-35.25							
5-Jul-2010	12:00:00	-30.11	-36.35	-11.06	-30.49	-14.80	-29.00	-30.80	-43.11		-32.49	-34.40	-35.15							
5-Jul-2010	18:00:00	-30.45	-37.11	-12.13	-31.91	-16.55	-29.42	-31.00	-44.14		-32.87	-34.27	-35.55							
5-Jul-2010	24:00:00	-30.34	-37.26	-12.27	-32.53	-17.17	-29.23	-31.01	-45.28		-32.64	-33.97	-35.40							
6-Jul-2010	06:00:00	-30.14	-37.23	-11.61	-31.48	-15.51	-29.08	-31.31	-45.09		-32.33	-34.00	-35.10							
6-Jul-2010	12:00:00	-30.10	-37.06	-11.19	-30.88	-15.35	-29.03	-30.77	-44.04		-32.39	-34.23	-35.15							
6-Jul-2010	18:00:00	-30.31	-37.61	-12.25	-32.29	-18.15	-29.27	-31.07	-45.12		-32.55	-34.23	-35.35							
6-Jul-2010	24:00:00	-30.33	-37.92	-12.47	-32.78	-21.06	-29.30	-31.05	-45.72		-32.57	-34.13	-35.45							
7-Jul-2010	06:00:00	-30.03	-37.91	-11.87	-31.75	-22.21	-29.08	-31.31	-45.46		-32.26	-34.01	-35.17							0.04
7-Jul-2010	12:00:00	-30.10	-37.72	-11.51	-31.26	-23.22	-28.97	-30.92	-44.79		-32.28	-34.28	-35.20							
7-Jul-2010	18:00:00	-30.37	-38.31	-12.58	-32.72	-24.75	-29.24	-31.10	-45.59		-32.55	-34.21	-35.39							
7-Jul-2010	24:00:00	-30.29	-38.70	-12.73	-33.05	-26.22	-29.17	-31.00	-45.58		-32.39	-34.01	-35.40							
8-Jul-2010	06:00:00	-30.16	-38.52	-12.08	-32.15	-26.88	-29.07	-31.56	-45.48		-32.34	-34.09	-35.27							0.08
8-Jul-2010	12:00:00	-30.16	-38.45	-11.80	-31.73	-27.58	-29.08	-31.20	-45.56		-32.37	-34.23	-35.27							
8-Jul-2010	18:00:00	-30.29	-38.76	-12.97	-32.99	-28.54	-29.23	-31.06	-45.70		-32.55	-34.09	-35.43							
8-Jul-2010	24:00:00	-30.31	-39.15	-12.89	-33.22	-29.26	-29.15	-30.82	-45.58		-32.39	-34.10	-35.28							
9-Jul-2010	06:00:00	-30.28	-39.14	-12.26	-32.52	-29.73	-29.15	-31.30	-45.62		-32.35	-34.10	-35.32							0.07
9-Jul-2010	12:00:00	-30.25	-38.82	-11.95	-31.67	-29.73	-29.06	-30.77	-45.63		-32.38	-34.17	-35.27							
9-Jul-2010	18:00:00	-30.38	-39.05	-12.67	-32.65	-29.88	-29.23	-31.11	-45.70		-32.41	-34.09	-35.40							
9-Jul-2010	24:00:00	-30.33	-39.45	-12.89	-33.19	-29.83	-29.15	-31.06	-45.58		-32.33	-34.01	-35.25							0.02
10-Jul-2010	06:00:00	-30.16	-39.32	-12.35	-32.26	-29.71	-29.00	-31.04	-45.52		-32.31	-34.06	-35.25							
10-Jul-2010	12:00:00	-30.13	-39.08	-12.01	-31.81	-29.76	-29.11	-30.84	-45.48		-32.34	-34.23	-35.22							
10-Jul-2010	18:00:00	-30.27	-39.45	-12.77	-32.68	-29.88	-29.25	-31.05	-45.58		-32.41	-34.01	-35.37							
10-Jul-2010	24:00:00	-30.03	-39.84	-12.98	-33.23	-29.75	-29.07	-30.99	-45.46		-32.35	-34.12	-35.25							
11-Jul-2010	06:00:00	-30.13	-40.13	-12.57	-32.56	-29.93	-29.13	-31.26	-45.51		-32.34	-34.05	-35.23							
11-Jul-2010	12:00:00	-30.08	-39.87	-12.28	-31.99	-29.70	-29.03	-30.95	-45.47		-32.32	-34.30	-35.19							
11-Jul-2010	18:00:00	-30.31	-40.35	-13.22	-33.24	-29.88	-29.30	-31.11	-45.59		-32.50	-34.10	-35.35							
11-Jul-2010	24:00:00	-30.21	-40.72	-13.30	-33.72	-29.91	-29.18	-30.82	-45.52		-32.38	-34.11	-35.34							
12-Jul-2010	06:00:00	-30.02	-40.74	-12.88	-32.94	-29.82	-29.08	-31.20	-45.50		-32.32	-33.93	-35.19							0.37
12-Jul-201																				

Date	Time	Water Level (inches)										CG1	CG2	CG3	On-site Manual Raingauge	On-site Auto Rainauge	Weather Station Rainfall Data		
		BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	Ambient	BD RAW1						BD RAW2	BD RAW3	On-site Auto RG Monthly Totals
3-Sep-2010	06:00:00	-30.92	-40.90	-16.78	-36.24	-21.37	-29.66	-31.67	-45.82		-31.18	-26.26	-35.57						
3-Sep-2010	12:00:00	-30.88	-40.91	-16.53	-36.17	-22.18	-29.57	-31.26	-45.83		-31.37	-26.73	-35.67						
3-Sep-2010	18:00:00	-31.10	-41.18	-17.30	-36.94	-22.79	-29.92	-31.78	-45.99		-32.29	-26.93	-35.81						
3-Sep-2010	24:00:00	-30.94	-40.94	-17.30	-37.16	-23.07	-29.71	-31.30	-45.87		-33.11	-27.10	-35.70						
4-Sep-2010	06:00:00	-30.86	-40.82	-17.06	-36.88	-23.47	-29.60	-31.34	-45.74		-32.70	-27.40	-35.52						
4-Sep-2010	12:00:00	-30.92	-40.79	-17.06	-36.78	-24.21	-29.65	-31.25	-45.81		-32.75	-27.75	-35.63						
4-Sep-2010	18:00:00	-31.01	-41.00	-17.50	-37.31	-24.87	-29.73	-31.70	-45.87		-32.93	-28.16	-35.70						
4-Sep-2010	24:00:00	-30.86	-40.88	-17.66	-37.60	-25.11	-29.73	-31.31	-45.82		-32.88	-28.23	-35.67						
5-Sep-2010	06:00:00	-30.82	-40.79	-17.36	-37.20	-25.53	-29.55	-31.67	-45.68		-32.71	-28.49	-35.50						
5-Sep-2010	12:00:00	-30.88	-40.73	-17.24	-37.07	-26.21	-29.51	-31.40	-45.64		-32.68	-28.84	-35.56						
5-Sep-2010	18:00:00	-31.00	-41.01	-17.74	-37.62	-26.69	-29.73	-31.70	-45.89		-32.93	-29.17	-35.75						
5-Sep-2010	24:00:00	-30.87	-40.96	-17.89	-37.60	-26.98	-29.75	-31.26	-45.72		-32.82	-29.31	-35.65						
6-Sep-2010	06:00:00	-30.68	-40.83	-17.53	-37.19	-27.46	-29.48	-31.79	-45.66		-32.77	-29.59	-35.52						
6-Sep-2010	12:00:00	-30.92	-40.88	-17.51	-37.21	-28.14	-29.67	-31.29	-45.72		-32.80	-30.09	-35.64						
6-Sep-2010	18:00:00	-31.06	-41.16	-18.20	-37.68	-28.47	-29.85	-31.70	-45.94		-33.04	-30.35	-35.81						
6-Sep-2010	24:00:00	-30.97	-41.01	-18.07	-37.68	-28.77	-29.73	-31.37	-45.78		-32.82	-30.44	-35.64						
7-Sep-2010	06:00:00	-30.81	-40.85	-17.81	-37.37	-29.10	-29.65	-31.49	-45.71		-32.75	-30.81	-35.57						
7-Sep-2010	12:00:00	-30.86	-40.88	-17.72	-37.32	-29.64	-29.68	-31.36	-45.70		-32.83	-31.00	-35.59						
7-Sep-2010	18:00:00	-31.06	-41.01	-18.22	-37.57	-30.03	-29.84	-31.59	-45.90		-32.94	-31.39	-35.76						
7-Sep-2010	24:00:00	-31.05	-40.96	-18.32	-37.85	-30.04	-29.77	-31.41	-45.83		-32.93	-31.40	-35.73						
8-Sep-2010	06:00:00	-30.94	-40.86	-17.91	-37.54	-29.98	-29.57	-31.56	-45.70		-32.74	-31.72	-35.57						
8-Sep-2010	12:00:00	-30.93	-40.84	-17.69	-37.24	-30.45	-29.57	-31.28	-45.74		-32.79	-32.23	-35.61						
8-Sep-2010	18:00:00	-31.16	-41.30	-18.51	-37.93	-30.16	-29.91	-31.78	-46.04		-33.10	-32.29	-35.83						
8-Sep-2010	24:00:00	-31.10	-41.02	-18.29	-37.94	-30.01	-29.74	-31.42	-45.93		-32.88	-32.42	-35.70						
9-Sep-2010	06:00:00	-30.88	-40.88	-18.03	-37.55	-30.10	-29.56	-31.54	-45.71		-32.79	-32.60	-35.51						
9-Sep-2010	12:00:00	-30.88	-40.90	-17.85	-37.45	-30.19	-29.55	-31.31	-45.72		-32.87	-32.99	-35.55						
9-Sep-2010	18:00:00	-31.00	-41.04	-18.53	-37.93	-30.07	-29.72	-31.74	-45.84		-32.94	-33.08	-35.59						
9-Sep-2010	24:00:00	-30.97	-40.88	-18.46	-38.12	-30.01	-29.66	-31.24	-45.71		-32.88	-33.34	-35.61						
10-Sep-2010	06:00:00	-30.93	-40.88	-18.34	-37.97	-30.11	-29.67	-31.49	-45.78		-32.73	-33.55	-35.56						
10-Sep-2010	12:00:00	-30.87	-40.91	-18.35	-37.97	-30.19	-29.63	-31.43	-45.70		-32.86	-33.85	-35.58						
10-Sep-2010	18:00:00	-31.03	-41.02	-18.68	-38.29	-30.07	-29.84	-31.83	-45.86		-32.98	-34.03	-35.74						
10-Sep-2010	24:00:00	-30.95	-40.90	-18.85	-38.56	-30.06	-29.75	-31.28	-45.80		-32.91	-34.17	-35.68						
11-Sep-2010	06:00:00	-30.89	-40.97	-18.59	-38.16	-30.10	-29.67	-31.59	-45.81		-32.86	-34.29	-35.56						
11-Sep-2010	12:00:00	-30.94	-40.83	-18.47	-38.16	-30.25	-29.68	-31.36	-45.76		-32.79	-34.70	-35.55						
11-Sep-2010	18:00:00	-31.12	-41.19	-18.95	-38.65	-30.11	-29.95	-31.72	-45.95		-33.07	-34.79	-35.86						
11-Sep-2010	24:00:00	-31.03	-40.98	-18.89	-38.52	-30.04	-29.81	-31.20	-45.92		-32.88	-34.82	-35.75						
12-Sep-2010	06:00:00	-30.86	-40.77	-18.39	-38.05	-29.98	-29.60	-31.52	-45.69		-32.76	-34.75	-35.53						
12-Sep-2010	12:00:00	-30.93	-40.82	-18.28	-37.82	-30.25	-29.67	-31.23	-45.70		-32.85	-34.96	-35.57						
12-Sep-2010	18:00:00	-31.07	-41.12	-18.86	-38.53	-29.97	-29.78	-31.72	-45.87		-33.07	-34.78	-35.79						
12-Sep-2010	24:00:00	-30.95	-40.80	-18.93	-38.81	-29.97	-29.62	-31.25	-45.70		-32.80	-34.73	-35.57						
13-Sep-2010	06:00:00	-30.80	-40.80	-18.74	-38.57	-29.92	-29.60	-31.53	-45.63		-32.74	-34.67	-35.46						
13-Sep-2010	12:00:00	-30.83	-40.74	-18.62	-38.32	-30.05	-29.56	-31.31	-45.60		-32.67	-34.82	-35.50						
13-Sep-2010	18:00:00	-30.98	-40.95	-19.12	-38.82	-30.07	-29.68	-31.80	-45.84		-32.87	-34.73	-35.65						
13-Sep-2010	24:00:00	-31.06	-40.83	-19.28	-39.11	-29.95	-29.72	-31.32	-45.82		-32.89	-34.65	-35.62						
14-Sep-2010	06:00:00	-30.88	-40.82	-19.03	-38.72	-29.88	-29.55	-31.49	-45.66		-32.81	-34.71	-35.52						
14-Sep-2010	12:00:00	-30.85	-40.76	-18.92	-38.63	-30.18	-29.62	-31.38	-45.64		-32.83	-34.87	-35.55						
14-Sep-2010	18:00:00	-31.15	-41.07	-19.58	-39.32	-30.11	-29.85	-31.71	-45.84		-33.03	-34.82	-35.74						
14-Sep-2010	24:00:00	-31.00	-41.02	-19.58	-39.55	-29.98	-29.78	-31.19	-45.89		-32.92	-34.64	-35.77						
15-Sep-2010	06:00:00	-30.89	-40.91	-19.19	-39.12	-29.92	-29.65	-31.35	-45.69		-32.83	-34.63	-35.52						
15-Sep-2010	12:00:00	-30.82	-40.79	-19.19	-38.93	-30.24	-29.68	-31.35	-45.68		-32.71	-34.94	-35.45						
15-Sep-2010	18:00:00	-31.16	-41.13	-19.88	-39.59	-30.07	-29.86	-31.65	-45.93		-33.03	-34.70	-35.79						
15-Sep-2010	24:00:00	-30.92	-40.92	-19.78	-39.71	-29.91	-29.72	-31.22	-45.74		-32.75	-34.66	-35.63						
16-Sep-2010	06:00:00	-30.80	-40.80	-19.64	-39.35	-30.01	-29.57	-31.62	-45.63		-32.74	-34.72	-35.45						
16-Sep-2010	12:00:00	-30.85	-40.94	-19.33	-39.20	-30.24	-29.61	-31.36	-45.65		-32.74	-34.90	-35.55						
16-Sep-2010	18:00:00	-31.15	-41.19	-19.99	-39.88	-29.95	-29.81	-31.72	-45.94		-33.03	-34.81	-35.75						
16-Sep-2010	24:00:00	-31.00	-41.06	-20.00	-40.12	-29.92	-29.69	-31.30	-45.80		-32.86	-34.69	-35.58						
17-Sep-2010	06:00:00	-30.85	-40.90	-19.64	-39.66	-29.94	-29.59	-31.49	-45.66		-32.80	-34.71	-35.50						
17-Sep-2010	12:00:00	-30.86	-40.91	-19.60	-39.72	-30.03	-29.72	-31.22	-45.71		-32.81	-34.79	-35.61						
17-Sep-2010	18:00:00	-30.98	-40.92	-19.96	-40.13	-29.99	-29.66	-31.55	-45.77		-32.91	-34.70	-35.63						
17-Sep-2010	24:00:00	-31.00	-41.02	-20.21	-40.28	-29.93	-29.73	-31.28	-45.72		-32.86	-34.76	-35.76						
18-Sep-2010	06:00:00	-30.92	-40.92	-19.89	-39.91	-29.81	-29.67	-31.64	-45.69		-32.83	-34.58	-35.62						
18-Sep-2010	12:00:00	-30.77	-40.96	-19.70	-39.62	-30.11	-29.60	-31.37	-45.60		-32.77	-34.91	-35.47						
18-Sep-2010	18:00:00	-31.22	-41.12	-20.35	-40.31	-30.04	-29.86	-31.70	-45.92		-33.04	-34.78	-35.76						
18-Sep-2010	24:00:00	-31.11	-40.96	-20.30	-40.49	-29.92	-29.73	-31.37	-45.83		-32.89	-34.61	-35.65						
19-Sep-2010	06:00:00	-30.86	-40.84	-20.01	-39.98	-30.04	-29.61	-31.67	-45.60		-32.65	-34.71	-35.44						
19-Sep-2010	12:00:00	-30.98	-40.94	-19.99	-39.96	-30.15	-29.62	-31.38	-45.72		-32.76	-34.90	-35.58						
19-Sep-2010	18:00:00	-31.07	-41.09	-20.38	-40.36	-29.97	-29.73	-31.76	-45.82		-32.91	-34.82	-35.74						
19-Sep-2010	24:00:00	-31.13	-40.95	-20.62	-40.62	-29.95	-29.77	-31.46	-45.82		-32.89	-34.71	-35.69						
20-Sep-2010	06:00:00	-31.07	-40.90	-20.14	-40.18	-29.91	-29.61	-31.30	-45.65		-32.83	-34.69	-35.59						
20-Sep-2010	12:00:00	-30.95	-40.97	-20.00	-39.86	-30.27	-29.60	-31.31	-45.68		-32.82	-35.07	-35.55						

Date	Time	Water Level (inches)										CG1	CG2	CG3	On-site Manual Raingauge	On-site Auto Raingauge	Weather Station Rainfall Data			
		BD AW1	BD AW2	BD AW3	BD AW4	BD AW5	BD AW6	BD AW7	BD AW8	Ambient	BD RAW1						BD RAW2	BD RAW3	On-site Auto RG Monthly Totals	Dunn Daily Rainfall
20-Sep-2010	18:00:00	-31.29	-41.12	-20.72	-40.75	-29.94	-30.07	-31.72	-46.05		-33.15	-34.72	-35.91							
20-Sep-2010	24:00:00	-30.98	-41.06	-20.72	-40.80	-29.99	-29.63	-31.31	-45.75		-32.81	-34.82	-35.62							
21-Sep-2010	06:00:00	-31.07	-40.95	-20.49	-40.68	-29.80	-29.79	-31.52	-45.82		-32.87	-34.64	-35.69							
21-Sep-2010	12:00:00	-30.89	-40.89	-20.24	-40.38	-30.07	-29.54	-31.50	-45.69		-32.63	-34.89	-35.45							
21-Sep-2010	18:00:00	-31.16	-41.13	-20.87	-41.02	-29.95	-29.75	-31.85	-45.88		-33.01	-34.75	-35.77							
21-Sep-2010	24:00:00	-30.97	-41.10	-20.95	-41.28	-29.83	-29.61	-31.29	-45.87		-32.83	-34.64	-35.75							
22-Sep-2010	06:00:00	-30.87	-40.91	-20.61	-40.75	-29.89	-29.69	-31.72	-45.72		-32.74	-34.75	-35.64							
22-Sep-2010	12:00:00	-31.00	-40.95	-20.45	-40.68	-30.24	-29.67	-31.34	-45.83		-32.80	-34.93	-35.64							
22-Sep-2010	18:00:00	-31.16	-41.20	-20.98	-41.26	-29.93	-29.99	-31.80	-46.05		-32.99	-34.70	-35.89							
22-Sep-2010	24:00:00	-30.91	-40.95	-21.13	-41.45	-29.94	-29.71	-31.25	-45.80		-32.95	-34.67	-35.64							
23-Sep-2010	06:00:00	-30.83	-40.89	-20.89	-41.11	-29.94	-29.67	-31.55	-45.75		-32.85	-34.67	-35.57							
23-Sep-2010	12:00:00	-31.01	-41.01	-20.59	-40.93	-30.00	-29.75	-31.50	-45.75		-32.89	-34.91	-35.64							
23-Sep-2010	18:00:00	-31.11	-41.18	-21.22	-41.62	-29.99	-29.84	-31.70	-45.94		-33.10	-34.69	-35.77							
23-Sep-2010	24:00:00	-31.05	-40.97	-21.28	-41.62	-29.94	-29.69	-31.26	-45.90		-32.95	-34.72	-35.67							
24-Sep-2010	06:00:00	-30.97	-41.09	-21.01	-41.33	-29.99	-29.75	-31.56	-45.88		-32.85	-34.69	-35.64							
24-Sep-2010	12:00:00	-31.00	-40.96	-20.85	-41.16	-30.24	-29.72	-31.37	-45.84		-32.86	-34.90	-35.61							
24-Sep-2010	18:00:00	-31.21	-41.22	-21.52	-41.83	-29.92	-29.84	-31.82	-46.05		-33.06	-34.70	-35.92							
24-Sep-2010	24:00:00	-30.88	-41.00	-21.50	-41.88	-29.91	-29.60	-31.34	-45.82		-32.93	-34.67	-35.64							
25-Sep-2010	06:00:00	-30.89	-40.85	-21.11	-41.53	-30.03	-29.60	-31.61	-45.77		-32.85	-34.73	-35.59							
25-Sep-2010	12:00:00	-31.03	-40.97	-20.95	-41.16	-30.22	-29.74	-31.47	-45.81		-32.86	-34.87	-35.67							
25-Sep-2010	18:00:00	-31.22	-41.15	-21.53	-41.80	-30.00	-29.85	-31.48	-45.99		-33.06	-34.64	-35.81							
25-Sep-2010	24:00:00	-30.95	-40.98	-21.67	-41.95	-29.95	-29.66	-26.28	-45.82		-32.77	-34.64	-35.52							
26-Sep-2010	06:00:00	-30.97	-40.95	-21.40	-41.63	-29.95	-29.55	-25.01	-45.68		-32.75	-34.66	-35.62							
26-Sep-2010	12:00:00	-30.89	-40.97	-21.15	-41.46	-30.03	-29.69	-5.48	-45.75		-32.81	-34.82	-35.55							
26-Sep-2010	18:00:00	-31.10	-41.12	-21.35	-41.83	-29.89	-29.85	-0.84	-45.90		-32.92	-34.63	-35.65							
26-Sep-2010	24:00:00	-30.88	-40.95	-19.55	-41.05	-4.73	-29.62	-1.30	-45.72		-32.74	-29.85	-35.53							
27-Sep-2010	06:00:00	-31.04	-41.00	-15.79	-39.42	-2.63	-27.15	-1.60	-41.08		-32.89	-20.61	-7.68			0.81				
27-Sep-2010	12:00:00	-30.16	-40.89	-14.17	-15.76	0.69	-7.34	0.00	-31.85		-25.90	-2.68	-4.09							
27-Sep-2010	18:00:00	-31.06	-25.52	-13.71	-15.80	2.35	-7.10	0.00	-39.28		-6.83	-2.53	-3.70							
27-Sep-2010	24:00:00	-31.00	-3.76	-12.03	-15.36	0.84	-7.36	0.00	-4.86		-4.80	-3.75	-3.83				3.11			
28-Sep-2010	06:00:00	-31.06	-4.64	-12.92	-31.88	0.68	-8.66	0.00	-5.28		-4.98	-3.81	-4.57							
28-Sep-2010	12:00:00	-31.04	-4.30	-12.46	-28.84		-8.29	0.00	-4.69		-4.73		-4.23	0.00	0.00	0.00	4.90			
28-Sep-2010	18:00:00																			
28-Sep-2010	24:00:00																	0.25		
29-Sep-2010	06:00:00																			
29-Sep-2010	12:00:00																			
29-Sep-2010	18:00:00																			
29-Sep-2010	24:00:00																			
30-Sep-2010	06:00:00																			
30-Sep-2010	12:00:00																			
30-Sep-2010	18:00:00																			
30-Sep-2010	24:00:00																		4.45	0.00

APPENDIX D

2010 Site Photos



SOA1 – Piping around header rock on Rock A-vane at Sta. 133+30 (UT1-A)



SOA2 – Piping around header rock on Rock A-vane at Sta. 134+50 (UT1-A)



SOA3 – Easement fencing is down at Sta. 118+70 (UT1-B)



SOA4 – Piping around header rock on rock A-vane at Sta. 119+50 (UT1-B2)



SOA5 – Minor rills and left bank erosion at Sta. 329+50 – 331+00 (UT3)



Log Cross Vane (typical)



Pool (typical)



Riffle (typical)



Log weir (typical)



Root wad (typical)



Rock cross vane (typical)



Vegetation Plot #1



Vegetation Plot #2



Vegetation Plot #3



Vegetation Plot #4



Vegetation Plot #5



Vegetation Plot #6



Vegetation Plot #7



Vegetation Plot #8



Vegetation Plot #9



Vegetation Plot #10



Vegetation Plot #11



Vegetation Plot #12



Vegetation Plot #13



Vegetation Plot #14

APPENDIX E

Morphologic Monitoring Parameters

Parameter	Cross Section 1 Pool						Cross Section 2 Riffle						Cross Section 3 Pool						Cross Section 4 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	28.4	26.4	25.0	22.3			25.3	24.4	22.8	26.2			26.6	21.8	20.8	27.5			22.8	22.8	24.8	22.1		
Floodprone Width (ft)	75.6	75.8	75.6	75.8			62.5	62.5	62.7	62.4			72.9	72.4	73.0	72.7			70.0	68.4	62.8	78.1		
BF Cross Sectional Area (ft ²)	31.7	26.4	23.4	20.7			18.1	16.2	11.4	16.8			22.8	19.2	19.0	19.2			11.7	11.6	12.9	13.2		
BF Mean Depth (ft)	1.1	1.0	0.9	1.2			0.7	0.7	0.5	0.6			0.9	0.9	0.9	0.7			0.5	0.5	0.5	0.6		
BF Max Depth (ft)	2.6	2.5	2.4	2.9			1.4	1.3	1.1	1.3			2.2	2.0	2.1	1.9			1.4	1.3	1.4	1.3		
Width/Depth Ratio	25.5	26.2	26.8	324.0			35.2	36.6	45.9	40.8			31.0	24.7	22.7	39.3			44.4	44.8	47.7	37.1		
Entrenchment Ratio	2.7	2.9	3.0	1.8			2.5	2.6	2.7	2.4			2.7	3.3	3.5	2.6			3.1	3.0	2.5	3.5		
Wetted Perimeter(ft)	29.1	26.9	25.7	22.8			25.5	24.6	23.0	26.3			27.2	22.3	21.4	28.1			23.2	23.1	25.2	22.5		
Hydraulic radius (ft)	1.1	1.0	0.9	1.2			0.7	0.7	0.5	0.6			0.8	0.9	0.9	0.7			0.5	0.5	0.5	0.6		
Parameter	Cross Section 5 Riffle						Cross Section 6 Pool						Cross Section 7 Pool						Cross Section 8 Riffle					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	7.6	7.5	8.7	10.0			9.0	9.2	9.7	11.2			7.9	9.8	9.4	10.7			6.9	7.3	7.7	8.7		
Floodprone Width (ft)	24.4	26.0	27.1	25.7			29.9	31.9	31.3	31.9			27.0	29.3	29.0	28.3			21.9	24.0	22.4	24.8		
BF Cross Sectional Area (ft ²)	5.0	5.0	4.7	5.1			8.4	8.7	6.9	7.4			8.7	10.7	10.6	15.4			4.4	4.7	4.8	5.2		
BF Mean Depth (ft)	0.7	0.7	0.5	0.5			0.9	0.9	0.7	0.7			1.1	1.1	1.1	1.4			0.6	0.6	0.6	0.6		
BF Max Depth (ft)	1.2	1.4	1.4	1.2			1.7	2.0	1.6	1.7			2.0	2.2	2.3	2.1			1.2	1.4	1.2	1.4		
Width/Depth Ratio	11.4	11.1	16.3	19.6			9.5	9.8	13.6	16.9			7.2	9.0	8.3	7.5			10.7	11.3	12.4	14.7		
Entrenchment Ratio	3.2	3.5	27.1	2.6			3.3	3.5	3.2	2.9			3.4	3.0	3.1	2.6			3.2	3.3	2.9	2.8		
Wetted Perimeter(ft)	8.0	8.0	9.2	10.5			9.6	10.1	10.3	13.2			9.0	11.0	10.9	14.8			7.3	7.8	8.1	9.4		
Hydraulic radius (ft)	0.6	0.6	0.5	0.5			0.9	0.9	0.7	0.6			1.0	1.0	1.0	1.0			0.6	0.6	0.6	0.6		
Parameter	Cross Section 9 Pool						Cross Section 10 Riffle						Cross Section 11 Riffle						Cross Section 12 Pool					
Dimension	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	18.5	19.7	19.9	18.4			16.4	15.1	16.1	16.9			9.8	11.8	11.5	12.4			19.5	19.8	18.8	20.5		
Floodprone Width (ft)	75.5	75.4	75.3	75.5			76.8	76.8	76.7	77.0			77.4	77.4	77.4	77.4			90.9	91.1	91.1	90.8		
BF Cross Sectional Area (ft ²)	29.3	25.9	25.0	24.0			18.4	16.5	15.8	15.1			6.8	9.0	8.7	8.3			22.2	20.4	18.5	21.2		
BF Mean Depth (ft)	1.6	1.3	1.3	1.0			1.1	1.1	1.0	0.8			0.7	0.8	0.8	0.7			1.1	1.0	1.0	1.1		
BF Max Depth (ft)	3.8	3.1	3.0	3.0			2.5	2.1	2.1	2.3			1.3	1.5	1.5	1.3			2.7	2.6	2.5	2.5		
Width/Depth Ratio	11.8	14.9	15.8	14.1			14.6	13.7	16.3	18.8			14.0	15.4	15.1	18.4			17.2	19.2	19.7	19.7		
Entrenchment Ratio	4.1	3.8	3.8	2.4			4.7	5.1	4.8	3.0			7.9	6.6	6.7	6.3			4.7	4.6	4.8	3.2		
Wetted Perimeter(ft)	20.7	20.9	20.9	19.3			17.3	15.8	16.8	17.6			10.1	12.2	11.9	12.7			20.4	20.8	19.1	21.2		
Hydraulic radius (ft)	1.4	1.2	1.2	0.9			1.1	1.0	0.9	0.8			0.7	0.7	0.7	0.7			1.1	1.0	0.9	1.1		

Parameter	Cross Section 13 Pool						Cross Section 14 Riffle						Cross Section 15 Pool						Cross Section 16 Riffle					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	18.3	19.4	19.5	18.2			9.0	9.2	9.9	8.9			19.7	24.2	24.3	24.6			9.9	9.0	9.1	11.2		
Floodprone Width (ft)	74.6	74.7	74.8	74.8			77.7	77.7	77.5	77.8			71.7	72.1	71.5	71.7			67.3	67.5	67.1	67.3		
BF Cross Sectional Area (ft ²)	15.8	15.3	16.3	15.2			5.4	4.8	5.2	4.8			18.8	23.0	22.2	23.7			5.8	4.6	4.4	4.5		
BF Mean Depth (ft)	0.9	0.8	0.8	0.8			0.6	0.5	0.5	0.5			1.0	1.0	0.9	1.0			0.6	0.5	0.5	0.4		
BF Max Depth (ft)	2.3	2.0	2.1	1.9			1.2	1.0	1.0	1.0			2.2	2.4	2.3	2.0			1.1	0.9	0.9	0.9		
Width/Depth Ratio	21.3	24.6	23.2	21.8			15.1	17.4	18.7	16.5			20.7	25.4	26.5	25.6			16.9	17.5	18.8	28.1		
Entrenchment Ratio	4.1	3.9	3.8	4.1			8.6	8.5	7.8	8.8			3.6	3.0	2.9	2.9			6.8	7.5	7.4	6.0		
Wetted Perimeter(ft)	19.2	20.0	20.1	18.8			9.3	9.4	10.2	9.1			20.5	25.0	24.9	25.1			10.3	9.3	9.4	11.4		
Hydraulic radius (ft)	0.8	0.8	0.8	0.8			0.6	0.5	0.5	0.5			0.9	0.9	0.9	0.9			0.6	0.5	0.5	0.4		
Parameter	Cross Section 17 Pool						Cross Section 18 Riffle						Cross Section 19 Pool						Cross Section 20 Riffle					
	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5	Base	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	30.6	30.7	31.3	31.4			7.6	7.4	7.1	9.1			19.2	18.5	20.5	19.5			10.5	10.4	10.4	10.7		
Floodprone Width (ft)	60.1	54.7	60.1	60.0			55.8	55.7	55.7	55.8			69.9	64.6	71.3	67.9			72.7	73.1	72.6	72.7		
BF Cross Sectional Area (ft ²)	46.3	45.8	44.6	43.5			9.6	7.5	7.9	8.5			28.2	28.9	27.4	28.2			9.5	9.1	8.9	9.2		
BF Mean Depth (ft)	1.5	1.5	1.4	1.4			1.3	1.0	1.1	0.9			1.5	1.6	1.3	1.4			0.9	0.9	0.9	0.9		
BF Max Depth (ft)	3.7	3.7	3.5	3.3			1.9	1.7	1.8	1.8			3.3	3.2	3.1	3.1			1.7	1.6	1.6	1.7		
Width/Depth Ratio	19.7	20.6	22.0	22.6			6.1	7.3	6.5	9.8			13.1	11.8	15.3	13.5			11.6	11.9	12.1	12.4		
Entrenchment Ratio	2.0	1.8	1.9	1.9			7.3	7.6	7.8	6.1			3.6	3.5	3.5	3.5			6.9	7.0	7.0	6.8		
Wetted Perimeter(ft)	31.5	32.2	32.6	32.5			9.0	8.6	8.7	11.0			20.7	19.7	21.7	20.8			11.1	11.0	11.0	11.3		
Hydraulic radius (ft)	1.5	1.4	1.4	1.3			1.1	0.9	0.9	0.8			1.4	1.5	1.3	1.4			0.9	0.8	0.8	0.8		

Reach UT1-A

Parameter	Baseline			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	30.6	44.7	37.7															
Radius of Curvature (ft)	35.5	45.3	39.7															
Meander Wavelength (ft)	138.7	167.3	153.0															
Meander Width ratio	1.7	2.5	2.1															
Profile																		
Riffle length (ft)																		
Riffle slope (ft/ft)	0.0033	0.0044	0.0039															
Pool length (ft)																		
Pool spacing (ft)	71.0	106.5	85.0															
Additional Reach Parameters																		
Valley Length (ft)		1043																
Channel Length (ft)		1210																
Sinuosity		1.16																
Water Surface Slope (ft/ft)																		
BF slope (ft/ft)																		
Rosgen Classification		C			C													

Reach UT1-B Upper

Parameter	Baseline¹			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	40.0	65.0	52.5	90.9	99.7	96.5	38.6	55.0	49.0	37.0	60.2	53.4						
Radius of Curvature (ft)	35.5	45.3	39.7	29.0	59.3	38.1	42.4	51.4	47.4	36.6	70.5	50.6						
Meander Wavelength (ft)	157.0	203.7	180.4	311.7	429.5	367.6	180.5	210.3	198.5	150.7	188.8	166.6						
Meander Width ratio	8.7	11.3	10.0	3.5	3.9	2.1	2.3	4.2	2.9	2.2	4.1	2.5						
Profile																		
Riffle length (ft)				34.3	62.6	50.6	31.8	62.5	49.1	50.7	61.4	52.1						
Riffle slope (ft/ft)	0.0014	0.0019	0.0016	0.0002	0.0084	0.0034	0.0009	0.0113	0.0035	0.001	0.0045	0.0012						
Pool length (ft)				31.7	59.8	46.1	50.1	86.9	61.8	39.2	66.3	52.1						
Pool spacing (ft)	61.4	106.5	97.8	78.2	131.8	106.0	95.7	117.7	106.3	89.9	127.7	107.9						
Additional Reach Parameters																		
Valley Length (ft)		558			548.4			565.56			556.1							
Channel Length (ft)		648			619.8			630.62			632.5							
Sinuosity		1.16			1.1			1.12			1.1							
Water Surface Slope (ft/ft)					0.0028			0.00092			0.0027							
BF slope (ft/ft)					0.0005			0.00055			0.0021							
Rosgen Classification		C			C			C			C							

Reach UT1-B Lower

Parameter	Baseline¹			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	40.0	65.0	52.5															
Radius of Curvature (ft)	35.5	45.3	39.7															
Meander Wavelength (ft)	157.0	203.7	180.4															
Meander Width ratio	8.7	11.3	10.0															
Profile																		
Riffle length (ft)																		
Riffle slope (ft/ft)	0.0014	0.0019	0.0016															
Pool length (ft)																		
Pool spacing (ft)	61.4	106.5	97.8															
Additional Reach Parameters																		
Valley Length (ft)		374																
Channel Length (ft)		434																
Sinuosity		1.16																
Water Surface Slope (ft/ft)																		
BF slope (ft/ft)																		
Rosgen Classification		C																

Reach UT1-C

Parameter	Baseline			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	39.9	73.9	56.9	61.8	117.7	91.9	61.6	72.5	67.1	50.6	82.1	71.4						
Radius of Curvature (ft)	35.5	51.0	43.3	17.3	46.8	34.8	22.5	50.6	39.5	36.8	59.8	49.9						
Meander Wavelength (ft)	127.0	201.4	164.2	235.3	331.6	283.7	118.8	174.9	156.5	133.4	180.2	152.3						
Meander Width ratio	2.3	4.3	3.3	2.4	4.6	3.6	3.6	3.8	3.7	2.0	3.2	2.8						
Profile																		
Riffle length (ft)				21.9	70.7	48.5	21.8	71.2	37.5	17.1	47.7	37.9						
Riffle slope (ft/ft)	0.0016	0.0021	0.0019	0.0010	0.0057	0.0029	0.0021	0.0119	0.0054	0.001	0.066	0.022						
Pool length (ft)				18.6	66.1	39.5	24.8	89.2	48.9	41.0	80.7	58.7						
Pool spacing (ft)	68.0	115.0	91.5	89.3	109.6	98.8	56.9	102.2	82.3	58.1	110.3	95.5						
Additional Reach Parameters																		
Valley Length (ft)		1042			469.2			498.5			455.6							
Channel Length (ft)		1272			583.3			589.2			567.1							
Sinuosity		1.22			1.2			1.18			1.2							
Water Surface Slope (ft/ft)					0.0008			0.0014			0.0009							
BF slope (ft/ft)					0.0017			0.0019			0.0033							
Rosgen Classification		C			C			C			C							

Reach UT3-A

Parameter	Baseline			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	42.2	54.8	48.5	54.3	104.8	77.6	40.3	50.7	42.9	37.6	50.1	43.2						
Radius of Curvature (ft)	29.0	34.0	31.5	18.8	31.6	24.4	14.0	30.0	20.7	13.6	19.5	17.1						
Meander Wavelength (ft)	105.6	139.0	122.3	204.2	337.3	263.8	99.0	131.3	117.5	104.8	121.2	112.3						
Meander Width ratio	3.3	4.3	3.8	3.4	6.6	4.9	4.8	5.3	5.1	3.2	5.2	4.8						
Profile																		
Riffle length (ft)				12.1	100.6	50.3	32.9	68.1	44.5	18.8	61.5	35.4						
Riffle slope (ft/ft)	0.0007	0.0010	0.0009	0.0007	0.0264	0.0088	0.0016	0.0208	0.0069	0.0001	0.011	0.0014						
Pool length (ft)				14.8	65.5	28.3	17.9	33.4	25.5	8.4	53.5	27.1						
Pool spacing (ft)	58.0	80.0	69.0	55.0	115.4	81.7	56.4	85.5	68.2	47.8	84.5	72.1						
Additional Reach Parameters																		
Valley Length (ft)		1403			564.6			503.6			505.2							
Channel Length (ft)		1586			698.3			630.0			609.7							
Sinuosity		1.13			1.2			1.25			1.2							
Water Surface Slope (ft/ft)					0.0016			0.0019			0.0119							
BF slope (ft/ft)					0.0012			0.0014			0.0017							
Rosgen Classification		C			C			C			C							

Reach UT3-B Upper

Parameter	Baseline³			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	49.6	55.6	52.6	76.3	151.8	94.5	56.8	90.2	80.0	54.0	64.3	57.4						
Radius of Curvature (ft)	29.0	34.0	31.5	23.1	51.2	29.7	19.2	32.0	25.1	20.1	44.8	29.2						
Meander Wavelength (ft)	116.8	124.4	120.6	249.4	333.4	279.6	128.6	140.0	135.4	125.7	152.2	132.4						
Meander Width ratio	10.1	10.7	10.4	2.4	4.7	2.9	2.6	3.6	3.1	2.0	2.4	2.1						
Profile																		
Riffle length (ft)				20.7	56.1	38.6	32.9	55.4	43.1	20.3	43.1	30.4						
Riffle slope (ft/ft)	0.0035	0.0046	0.0040	0.0006	0.0283	0.0079	0.0009	0.0082	0.0042	0.0006	0.015	0.007						
Pool length (ft)				28.4	48.7	37.0	25.8	44.6	34.2	36.7	60.4	48.8						
Pool spacing (ft)	60.4	79.0	69.7	66.1	92.3	78.2	62.3	82.0	70.4	65.8	96.3	79.1						
Additional Reach Parameters																		
Valley Length (ft)		1302			679.5			712.5			632.7							
Channel Length (ft)		1550			871.9			856.9			827.9							
Sinuosity		1.19			1.3			1.20			1.3							
Water Surface Slope (ft/ft)					0.0008			0.0009			0.0006							
BF slope (ft/ft)					0.00155			0.0010			0.001							
Rosgen Classification		C			C			C			C							

Reach UT3-B Lower

Parameter	Baseline³			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	49.6	55.6	52.6															
Radius of Curvature (ft)	29.0	34.0	31.5															
Meander Wavelength (ft)	116.8	124.4	120.6															
Meander Width ratio	10.1	10.7	10.4															
Profile																		
Riffle length (ft)																		
Riffle slope (ft/ft)	0.0035	0.0046	0.0040															
Pool length (ft)																		
Pool spacing (ft)	60.4	79.0	69.7															
Additional Reach Parameters																		
Valley Length (ft)		354																
Channel Length (ft)		422																
Sinuosity		1.19																
Water Surface Slope (ft/ft)																		
BF slope (ft/ft)																		
Rosgen Classification		C																

Reach UT3-C

Parameter	Baseline			MY1			MY2			MY3			MY4			MY5		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)																		
Radius of Curvature (ft)																		
Meander Wavelength (ft)																		
Meander Width ratio																		
Profile																		
Riffle length (ft)																		
Riffle slope (ft/ft)																		
Pool length (ft)																		
Pool spacing (ft)																		
Additional Reach Parameters																		
Valley Length (ft)																		
Channel Length (ft)																		
Sinuosity																		
Water Surface Slope (ft/ft)																		
BF slope (ft/ft)																		
Rosgen Classification																		

1 – All values except Channel Length include both UT1-B Upper and UT1-B Lower

2 – All values except Channel Length include both UT1-E and UT1-F

3 – All values except Channel Length include both UT3-B Upper and UT3-B Lower

4 – Baseline Profile data derived from **Stream and Wetland Restoration Plan for Beaverdam Swamp Site** report provided by Kimley-Horn and Associates, Inc. (March 28, 2007)