Wolf Pond Stream Restoration Project
Annual Monitoring Report
Monitoring Year: 2009
Monitoring Year: 2
As-built Date: 2008
NCEEP Project Number: D 06054-B

Submitted to:
NCDENR-Ecosystem Enhancement Program
1619 Mail Service Center
Raleigh, NC 27699-1619

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1.0 Executive Summary

This Annual Monitoring Report documents the results of monitoring activities during the 2009 growing season on the Wolf Pond Stream Restoration Project. Construction of the site, including planting of trees, was completed in March 2008. The 2009 data documents results from the second year of geomorphic and vegetation monitoring at the site.

The design for the Wolf Pond Stream Restoration Project involved stream restoration. After construction, it was determined that the project generated 4,513 feet of stream restoration. The As-Built Survey is included as Appendix B.

This Annual Monitoring Report presents data from five vegetation monitoring plots, one crest gauge, one rain gauge, eight cross sections, approximately 4,000 linear feet of profile survey and photographic reference locations, as specified in the approved Restoration Plan for the site.

A manual rain gauge was used in conjunction with the onsite automatic rain gauge to validate precipitation data. Drought conditions that prevailed in the 2008 growing season were not an issue during this monitoring period.

The vegetation monitoring documented surviving planted stem densities between 404 and 607 stems per acre with an average of 463 stems per acre. This represents a survival rate of approximately 67% based on a baseline density of 691 stems per acre. The initial vegetative success criteria will be 360 stems per acre at the end of three years of monitoring, and the final vegetative success criteria will be the survival of 260 five-year-old planted stems per acre at the end of five years of monitoring.

Two bankfull events were recorded in March and June. The restored stream channel has remained stable and is providing the intended habitat and hydrologic functions. All monitored cross sections and the longitudinal profile for 2009 document minor adjustment in stream dimension.

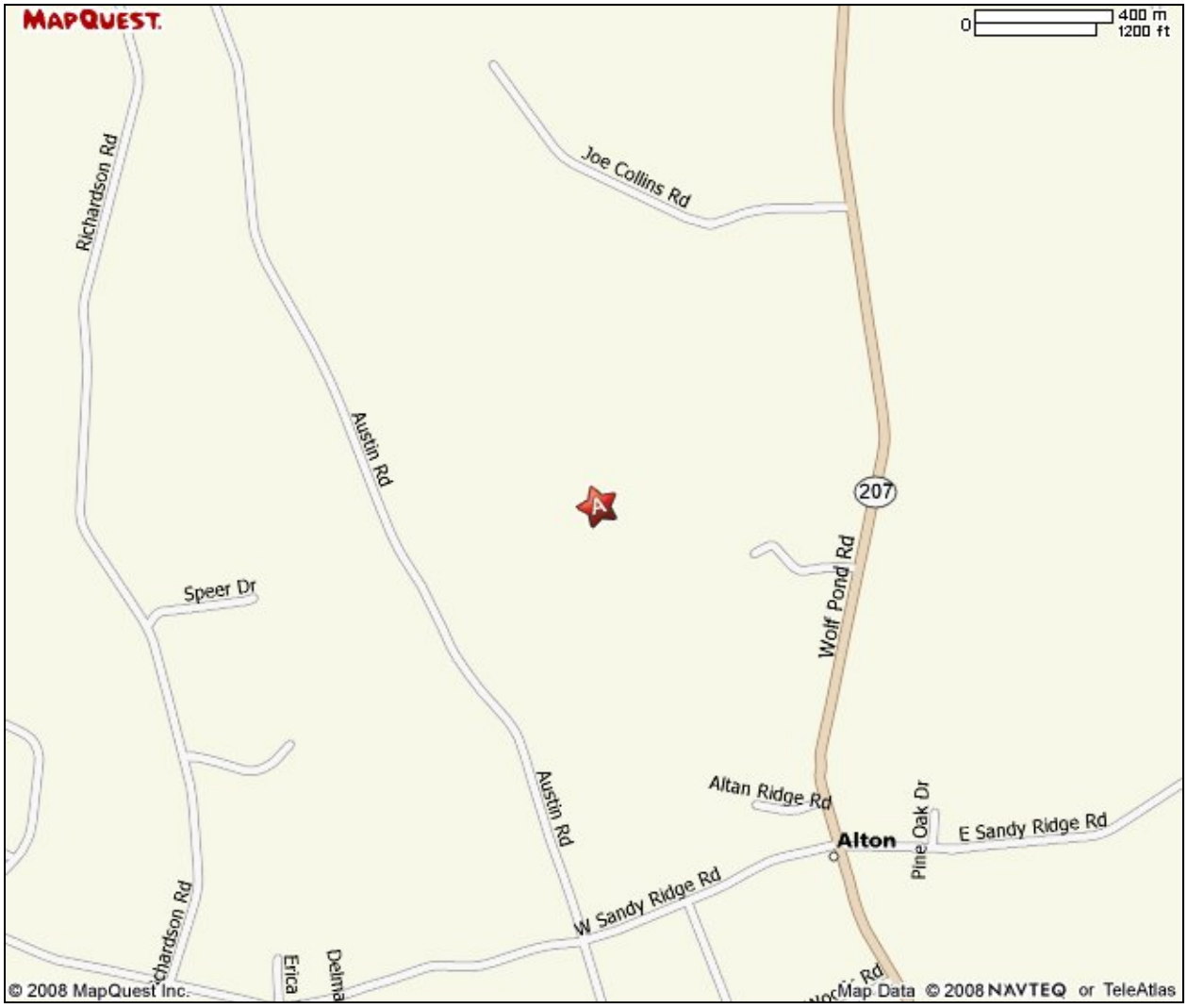
The bed material in some riffles has become finer since MY1.

2.0 Introduction

2.1 Project Description

The Wolf Pond site is located approximately 8 miles south of Monroe in Union County (see Figure 1). The property is located west of Wolf Pond Road, SR 207, and south of Joe Collins Road. The site is accessed by a farm path that runs adjacent to the main power transmission lines that bisect the property.

Figure 1 - Wolf Pond Location Map



The project is a restoration of approximately 4,500 linear feet of unnamed tributaries to Adams Branch in the Yadkin Pee-Dee River Basin. The project is made up of an upper and lower section of UT2, referred to as Reach 3 and Reach 1, respectively for monitoring and UT1, referred to as Reach 2 for monitoring. Reach 1, 2, and 3 stationing is summarized in Table 1. The Wolf Pond site has a drainage area of 0.95 mi^2. The dominant historic land use was originally timber production followed by intensive agricultural production of crops including corn, soybeans, and winter wheat. The channel was straightened and channelized for agricultural purposes. This led to an incised condition with little to no floodplain access.

Table 1 - Wolf Pond Monitoring Reaches

Reach Name	As-Built Length (ft)	Monitoring Stations	Restoration Approach
UT2/Reach 1/Reach 3	2,972	202+03 – 215+45 219+13 – 229+63	Restoration (Priority I)
UT1/Reach 2	1,541	100+45 – 116+26	Restoration (Priority I/II)
Total	4,513	3,975	

2.2 Project Objectives

The Wolf Pond site was identified by EBX to support the NC EEP full delivery mitigation process. The objective of the project was to produce a minimum of 4,500 stream mitigation units (SMU) to NC EEP through the full delivery process in the Yadkin Pee-Dee River 03040105 hydrologic unit.

Due to the incised condition of the channel and lack of access to the floodplain, the existing channel was abandoned and a Priority I Natural Channel Design approach was selected for the majority of the project. Reach 2 existed at a higher elevation than Reaches 1 and 3, so a Priority II approach was used to create a floodplain at a lower elevation to reach appropriate elevations before the confluence with UT2 (Reach 1 and 3). Given the valley type VIII drainage, a C4 channel was chosen as the design channel. The design channel relies heavily on structures for grade control and bank protection.

Monitoring of the Wolf Pond site is required to demonstrate successful mitigation based on success criteria specified in the Restoration Plan. Stream and vegetation monitoring are conducted on an annual basis. This Annual Monitoring Report documents the results of the monitoring for 2009 (Year 2).

The as-built data documented 4,513 linear feet of stream restoration. The stream restoration will provide multiple ecological and water quality benefits within the Yadkin Pee-Dee River Basin. Those benefits are as follows:

Hydrology:

- Re-establishing floodplain connection by raising bed elevations
- Increase flood storage by re-establishing floodplain

Water Quality:

- Reducing turbidity by reducing sediment inputs
- Reducing water temperatures by providing shading
- Increasing/ stabilizing oxygen levels by reducing BOD/COD and increasing re-oxygenating turbulence

Habitat:

- Improve bed habitat by increasing riffle-pool diversity, reducing sediment deposition, and improving low flow water depths
- Improve bank habitat by increasing stability and woody biomass
- Improve floodplain habitat by establishing micro-topography and hydrology, removing invasive vegetation, and increasing habitat diversity
- Improve food web dynamics by adding biomass (such as detritus, wood debris, and leaf matter) and re-establishing floodplain connection

2.3 Project History

This project was identified by EBX in the winter of 2006.

Table 2 - Wolf Pond Site History

Project Activity and Reporting History		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan	February 2007	April 2007
Final Design - 90%	N/A	July 2007
Construction	N/A	February 2008
Temporary S&E mix applied to entire project area	N/A	February 2008
Permanent seed mix applied to reach	N/A	February 2008
Bare roots and live stakes	N/A	March 2008
Mitigation Plan / As-built (Monitoring Baseline)	March 2008	June 2008
Year 1 Monitoring	March 2009	March 2009
Year 2 Monitoring	October 2009	December 2009
Year 3 Monitoring	September 2010	-
Year 4 Monitoring	September 2011	-
Year 5 Monitoring	September 2012	-

3.0 Project Condition and Monitoring Results

3.1 Vegetation Assessment

3.1.1 Vegetation Success Criteria

Successful establishment of vegetation in riparian areas will be the survival of 260 planted stems following Year 5 monitoring. The interim vegetative success criteria will be the survival of at least 320 planted stems per acre at the end of Year 3 monitoring. Up to 20% of the site species composition may be comprised of volunteers. Remedial action may be required should volunteers present a problem or exceed 20% 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 species.

3.1.2 Description of Vegetation Monitoring

Five semi-permanent vegetation plots were established within the planted restoration areas to monitor the success of planted vegetation. The vegetation plots are 0.01 hectares in size. The vegetation plots are distributed across the site, but the precise location and orientation of the plots was random (see location on as-built drawings.) The plots cover approximately two percent of the site. Seven species were planted on site (see Table 3).

Table 3 - Wolf Pond Planted Species

Common Name	Scientific Name	Abbreviations
Paw Paw	Asimina triloba	AT
River Birch	Betula nigra	BN
Shag Bark Hickory	Carya ovate	CO
Green Ash	Fraxinus pennsylvanica	FP
Swamp Chestnut Oak	Quercus michauxii	QM
Water Oak	Quercus nigra	QN
Willow Oak	Quercus phellos	QP

Each of the planted stems inside the plots was flagged to help in locating them in the future.

The taxonomic standard for vegetation used in this report was based on “Manual of the Vascular of the Carolinas”, by Albert E Radford et al. The vegetation monitoring protocol used for collecting vegetation data was established for this project in 2000 by the Wetland Restoration Program (WRP) and Karen Hall of NCSU.

3.1.3 Results of Vegetation Monitoring

Wolf Pond is almost totally dominated by Goldenrod. Plots 1, 4, and 5 were very dense with growth 6 to 7 feet in height. All but one plot had browsed trees and 3 plots had trees that had been gnawed at the base. The stream had a slight flow at the time of the visit with tadpoles, fish, and algae in the pools except the reach adjacent to WP-4 and WP-5. WP-4 again showed impacts from water off of the field creating drifts. No impacts by animals or any vandalism was observed during this visit.

Original planting density, based on the five 0.01 hectare plots, (100 square meters) was 691 stems per acre. The current density is currently 463 stems per acre which represents a survival rate of approximately 67%. The planted stems in the monitoring plots ranged from 404 to 607 stems per acre. This site is on track to meet the interim success criteria of 360 stems per acre after three years and 260 stems per acre after five years.

Table 4 - Baseline Stem Counts

Baseline Data									
May 2008									
Plot	PLANTED SPECIES								
	AT	BN	CO	FP	QM	QN	QP	Q	PLANTED STEMS
WP1	1	4	1	5		1	4	1	17
WP2	2		3	2	5	3		1	16
WP3	2	4	2	2	3	2	2	1	18
WP4	1	5	1	2	3	2	2	3	19
WP5	3	4	3	2			2	1	15
TOTALS	9	17	10	13	11	8	10	7	85
Percents	0.106	0.200	0.118	0.153	0.129	0.094	0.118	0.082	1.000

Table 5 – MY2 (2009) Stem Counts

October 2009 (MY2)									
Plot	PLANTED SPECIES								LIVE
	AT	BN	CO	FP	QM	QN	QP	Q	PLANTED STEMS
WP1		3		5			2		10
WP2	1		2	2	3	1	1		10
WP3		4	2	2	3	2	2		15
WP4		5		2	3		2		12
WP5	2	3	2	2			1		10
TOTALS	3	15	6	13	9	3	8	0	57
Percents	0.053	0.263	0.105	0.228	0.158	0.053	0.140	0.000	1.000

Table 6 - Baseline Stems per Acre

Monitoring Plots Baseline Data					
May 2008					
Plot	**Trees**	**Plot size**	**Plot size**	**Plot size**	**Stems**
	n_i	m^2	ft^2	ac	**per acre**
WP1	17	100	1076	0.0247	688
WP2	16	100	1076	0.0247	647
WP3	18	100	1076	0.0247	728
WP4	19	100	1076	0.0247	769
WP5	15	100	1076	0.0247	607
Totals:	85	500	5380	0.123	
Stems/plot	17			Average=	691

Table 7 – MY2 (2009) Stems per Acre

Fall Monitoring Data					
October 2009					
Plot	**Trees**	**Plot size**	**Trees**	**Percent**	**Stems**
	n_i	m^2	**Loss**	**Loss**	**per acre**
WP1	10	100	3	0.300	404
WP2	10	100	0	0.000	404
WP3	15	100	0	0.000	607
WP4	12	100	0	0.000	485
WP5	10	100	-1	-0.100	404
Totals:	57	500	2	0.035	
Stems/plot	11.4			Average=	463

Table 8 – MY2 (2009) Vegetation Problem Areas

Feature/Issue	Plot/Station Range	Probable Cause	Photo Number
Drift Wood	WP-4	Upstream debris	Photo D 6

3.2 Stream Assessment

3.2.1 Stream Success Criteria

As stated in the approved Mitigation Plan, the stream restoration 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 C type channel.

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 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.

3.2.2 Stream Morphology Monitoring Plan

Stream monitoring will document the stability of the restored channel. Monitoring will occur for 5 years or until the final success criteria have been achieved, whichever is longer. Monitoring methods used are based on US Army Corps of Engineering guidance documents and NC Division of Water Quality guidance documents.

Cross Sections

Two permanent cross sections, one at a riffle and one at a pool were installed for every 1,000 linear feet of restored stream. Each cross section was marked with permanent pins on both banks. Each cross section is tied to a benchmark to allow for comparison for data each year. The cross section survey takes into account water surface and all breaks in slope including thalweg, top of bank, and bankfull if present.

Longitudinal Profile

Longitudinal profile is surveyed once every year for five years or until the final success criteria are met. The longitudinal survey will include thalweg, water surface, bankfull and top of bank. Each survey point will occur at the head, midpoint, and end of each feature and the invert of each structure. The survey will be tied to a permanent benchmark.

Hydrology

Bankfull events will be monitored for the length of the monitoring period. One crest gauge is installed on site to capture bankfull events. Photographs of high water marks, wrack lines and sediment deposition will also be used to document these events.

Photo Reference Stations

Photographs will be taken at the same locations each year for the length of the monitoring period. These photos will document the progression of the site from year to year.

3.2.3 Stream Morphology Monitoring Results

Stream conditions are stable. Banks are stabilized with woven coir matting. Base flow was low. There are 30 structures within the monitoring reaches. All structures appear to be stable. The channel has experienced some minor adjustment but is expected to stabilize as the bed material coarsens, and the riparian vegetation completely establishes itself. This adjustment will be closely monitored.

Cross Sections

The survey data was collected in October 2009, and the results are presented in Appendix C. Cross sections appear to be stable.

Longitudinal Profile

The longitudinal profile survey was conducted in October 2009, and the results are presented in Appendix C . The profile survey showed minor adjustment in channel dimensions and profile.

Hydrology

Two bankfull events were documented during this year of monitoring by a crest gauge. The bankfull events were recorded in March and June at stages of 0.58 ft and 0.4 ft above bankfull, respectively.

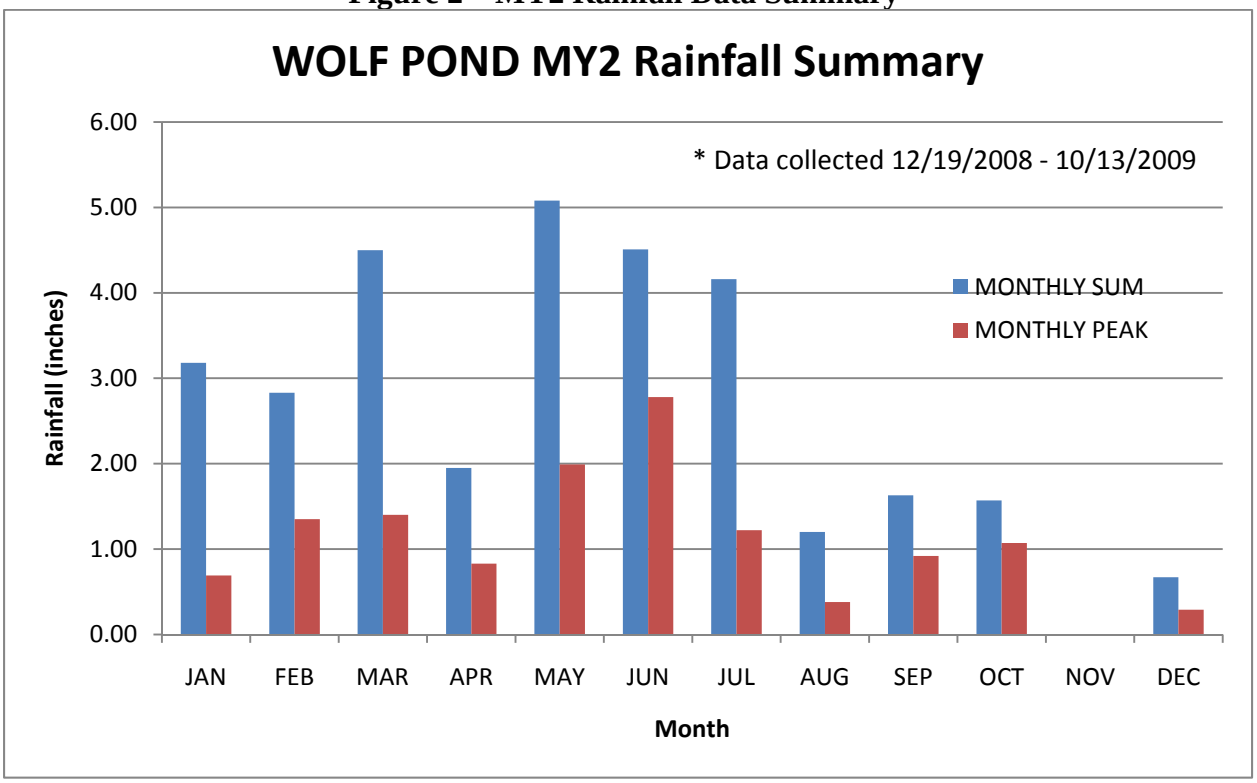
3.2.4 Problem Areas

At the time of data collection in October, 2009, repairs had recently taken place to correct erosion on Reach 2. The effectiveness of these measures cannot be fully documented until MY3; however, seed growth in the area appears vibrant and is documented in the Appendix: Problem Area Photos. No other problem areas were observed.

3.3 Rainfall Data

Rainfall data is collected by an automated rain gauge and confirmed with a manual rain gauge. Rainfall data shows drought conditions experienced in the 2008 growing season have abated. The average monthly peak for the 2009 growing season was 1.17 inches with a maximum of 2.78 inches occurring in June. The average monthly sum was 2.84 inches with a maximum of 5.08 inches occurring in May. Complete rainfall data is shown in Appendix F.

Figure 2 – MY2 Rainfall Data Summary



4.0 Conclusions

Overall stream dimension, pattern, and profile are stable. Drought conditions that threatened vegetation in 2008 have eased, and riparian vegetation is flourishing. The baseflow channel in Reach 1 and Reach 3 was dry during data collection; however, Reach 2 was maintaining normal baseflow. All stream structures look stable; however, it is difficult to assess their performance under the dry conditions observed at the site. Overall, the site is on track to achieve the stream stability and vegetative success criteria specified in the Restoration Plan. Monitoring will continue through 2012.

Appendix A – As Built Survey

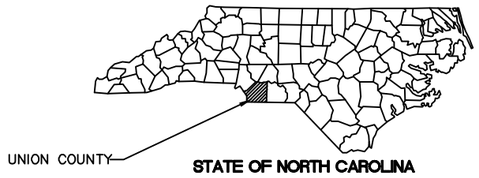
January 05, 2009 - 7:27am By: jim.kimble

RECORD SET DRAWINGS FOR

WOLF POND

STREAM RESTORATION PROJECT

ENVIRONMENTAL BANC & EXCHANGE, LLC



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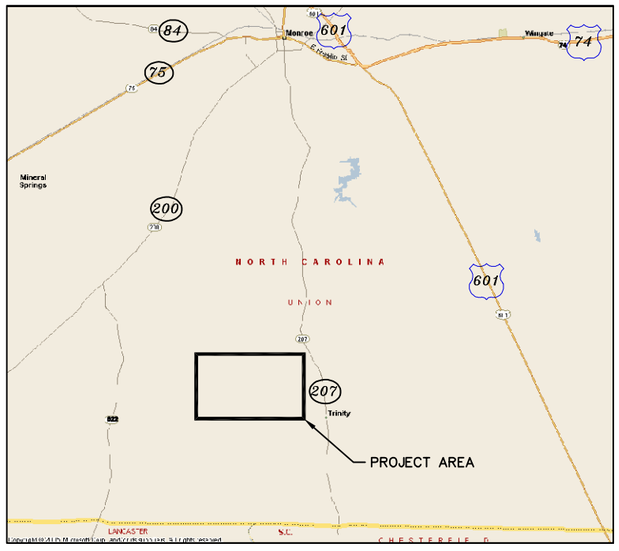
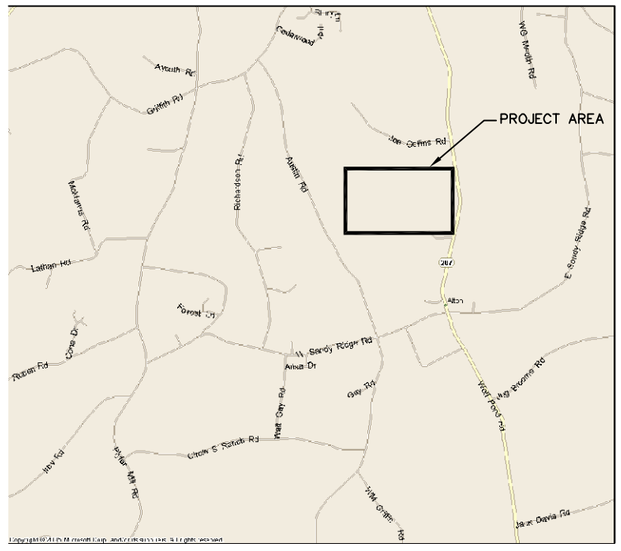
STATE PROJECT NO.: D 06054-B



VICINITY MAP



LOCATION MAP

INDEX OF SHEETS

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

SURVEY PREPARED BY:

R.B. PHARR & ASSOCIATES, P.A.
SURVEYING & MAPPING
241 POST OFFICE DR., UNIT A-2
INDIAN TRAIL, N.C. 28079 TEL. (704) 821-4029

NC-EEP CONTACT: GUY PEARCE (919) 715-1656
KIMLEY-HORN AND ASSOCIATES CONTACT: DAREN PAIT, P.E. (919) 678-4155
ENVIRONMENTAL BANC & EXCHANGE CONTACT: NORTON WEBSTER (919) 829-9909
DISTURBED AREA: 13.2 ACRES
CENTERLINE STA 10+00 = LAT 34.891980 LONG -80.551304

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

EBX

PREPARED IN THE OFFICE OF:
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CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: TITLE SHEET

SEAL: NORTH CAROLINA PROFESSIONAL ENGINEER SEAL 030000 DAREN M. PAIT

DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 1 OF 15

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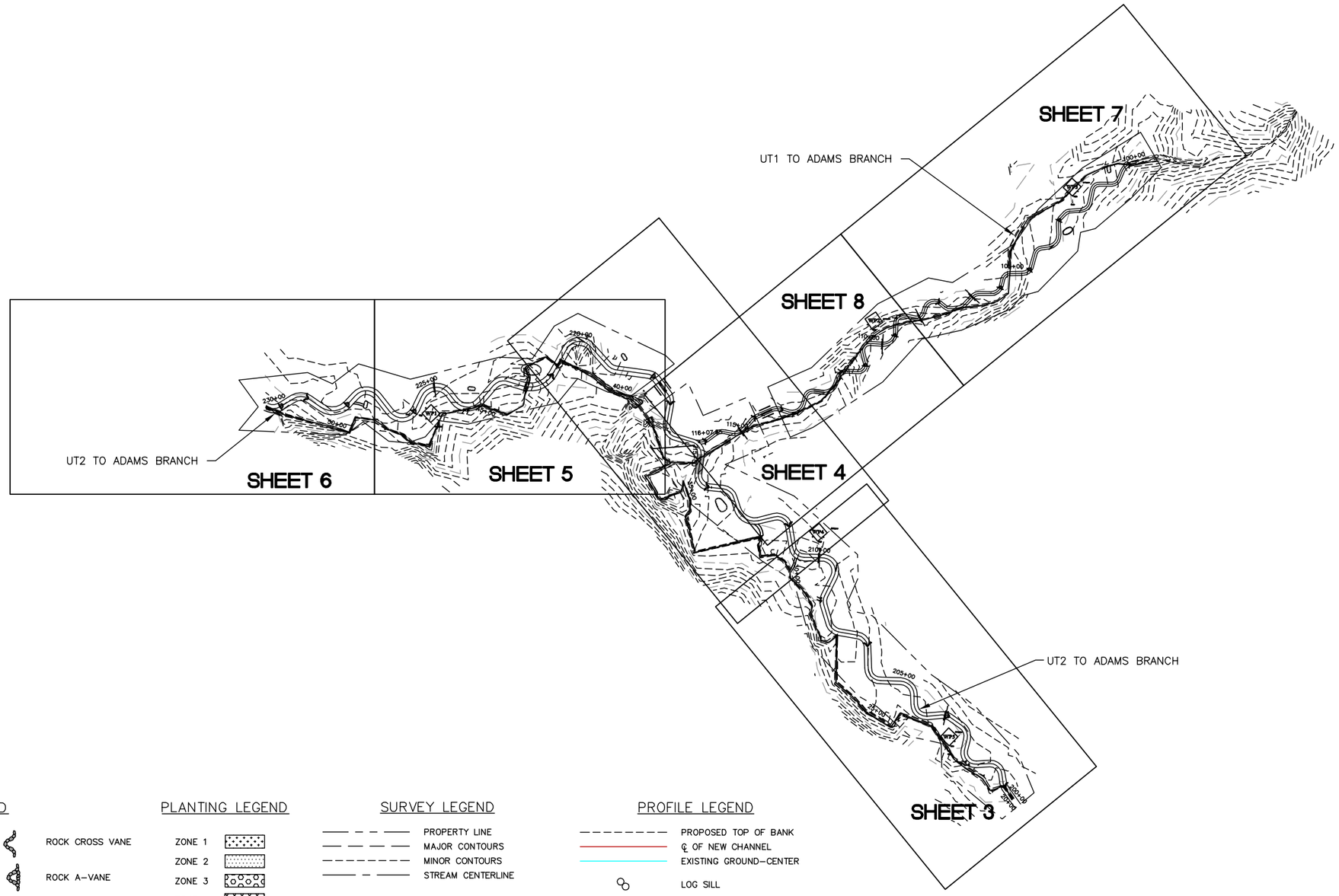


LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PROPOSED FENCE
- PERMANENT CONSERVATION EASEMENT
- CHANNEL BLOCK
- CHANNEL BACKFILL
- LOG VANE
- ROCK CROSS VANE
- ROCK A–VANE
- ROCK VANE
- ROOT WAD
- LOG SILL
- VERNAL POOL

PLANTING LEGEND

- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- ZONE 5

SURVEY LEGEND

- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE

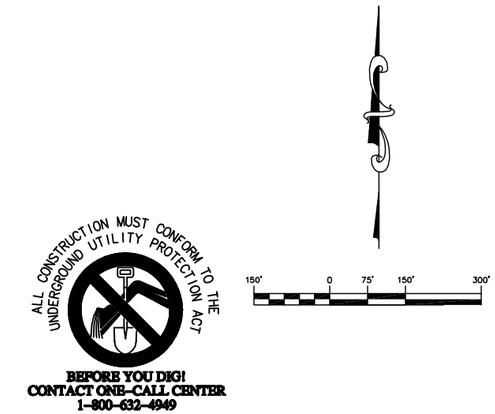
CROSS SECTION LEGEND

- EXISTING GROUND
- PROPOSED CHANNEL

PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG SILL
- ROCK X–VANE
- A–VANE

NOTE: BOTTOM OF POOL ELEVATION PROVIDED IS DEEPEST POINT IN POOL AT STATION, NOT ACTUAL ELEVATION AT THE CENTERLINE. REFER TO PLAN AND CROSS SECTIONS SHEETS FOR OFFSETS. POOLS SHOULD BE "OVER DUG" BY 1'–1.5' TO ACCOUNT FOR SEDIMENTATION.



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CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: LEGENDS AND SYMBOLS

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DATE: 05/02/08
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PROJECT: WOLF POND STREAM RESTORATION

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SHEET NUMBER: 2 OF 15

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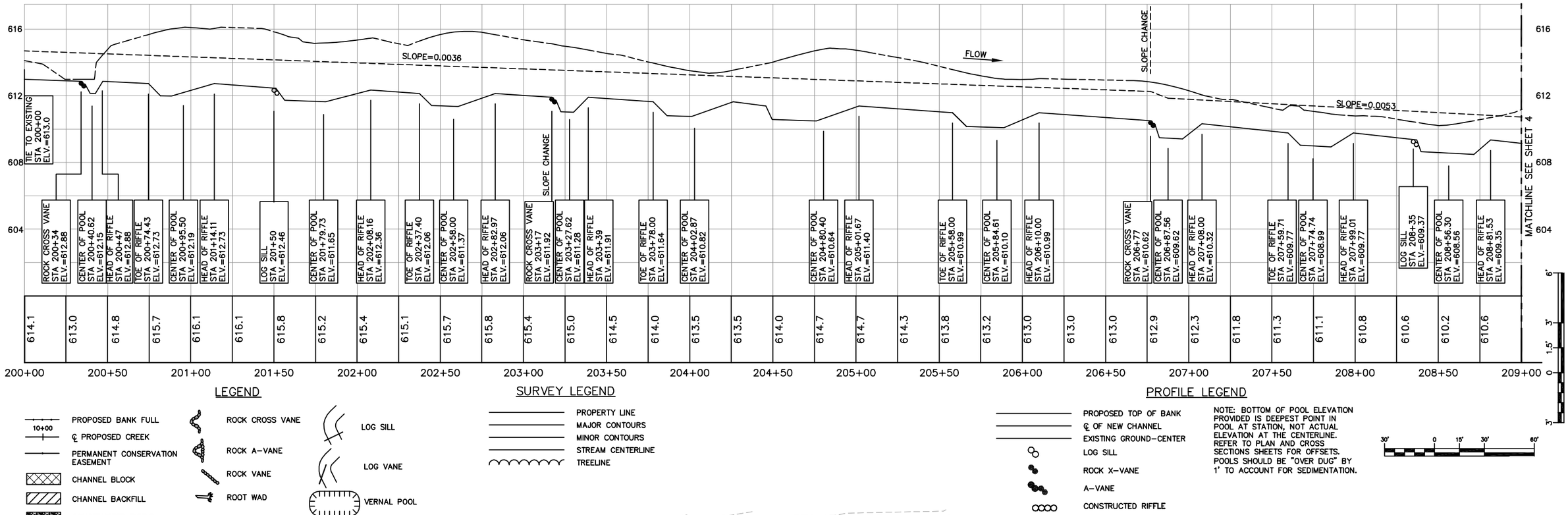

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- CHANNEL BACKFILL
- CONSTRUCTED RIFFLE
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SURVEY LEGEND

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

PROFILE LEGEND

- PROPOSED TOP OF BANK
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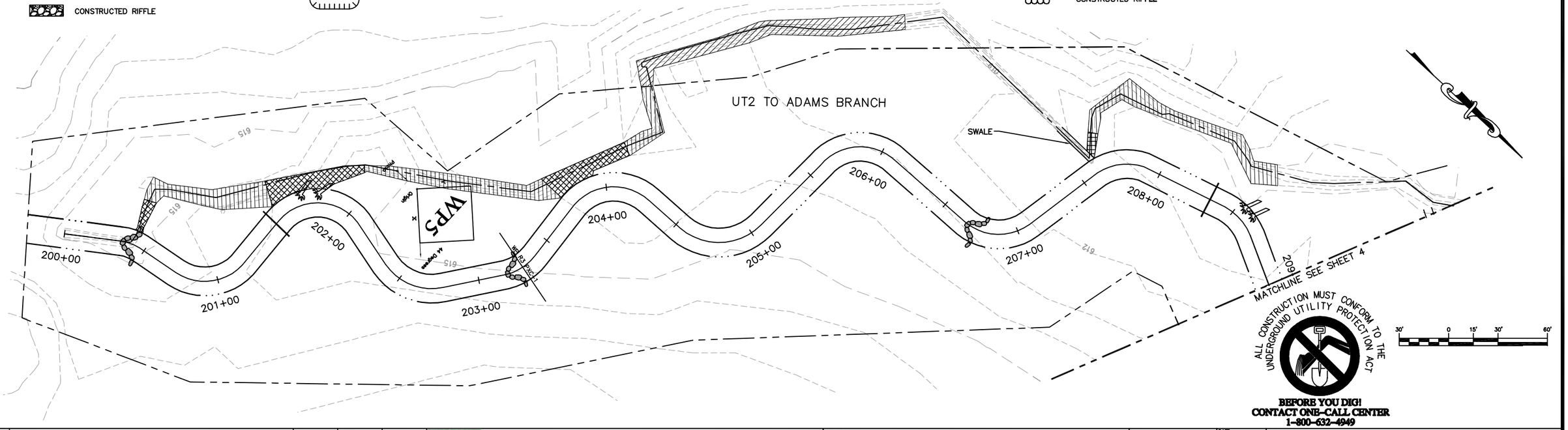

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CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER WARREN M. PAIT

SEAL:

DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

PROJECT: WOLF POND STREAM RESTORATION

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SHEET NUMBER: 3 OF 15

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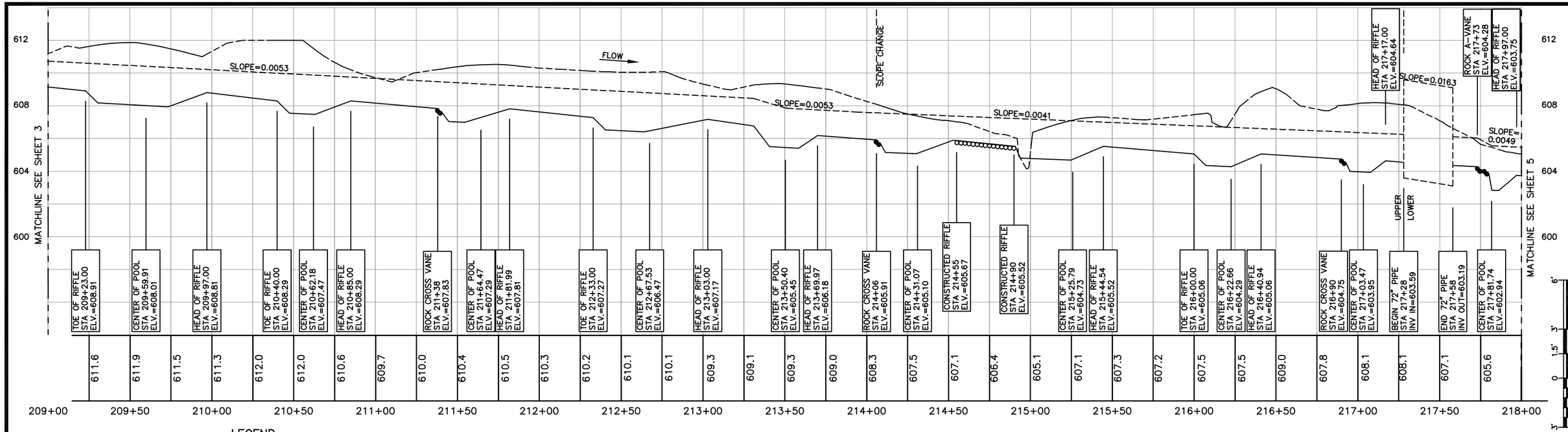
January 05, 2009 - 7:27am By: jmclamb



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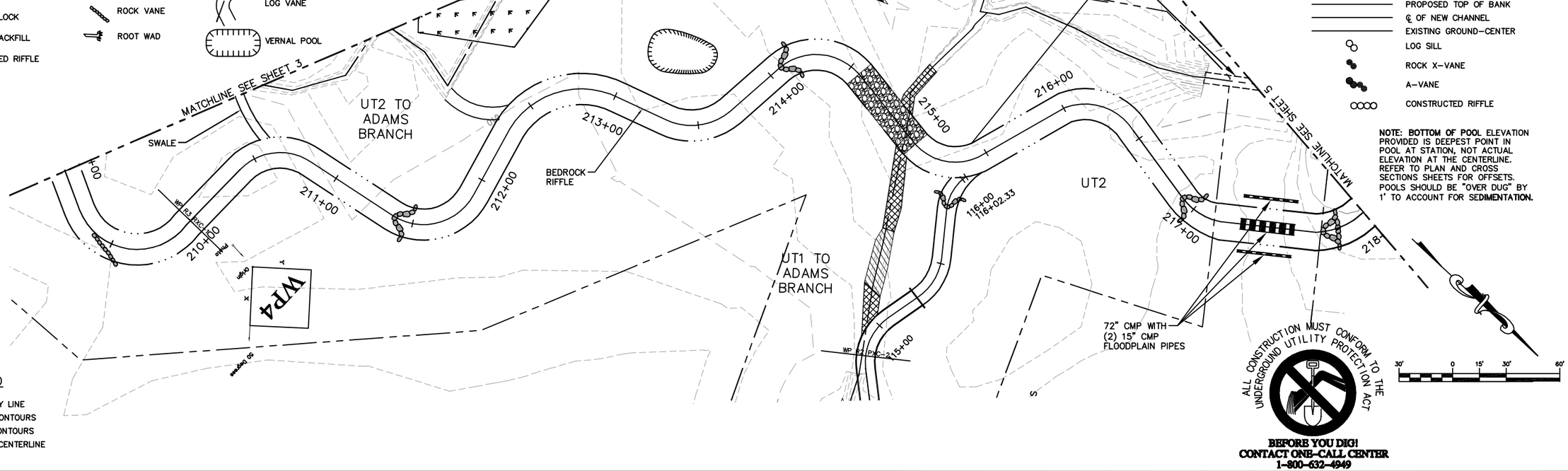

PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG SILL
- ROCK X-VANE
- A-VANE
- CONSTRUCTED RIFFLE

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SEAL: NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT

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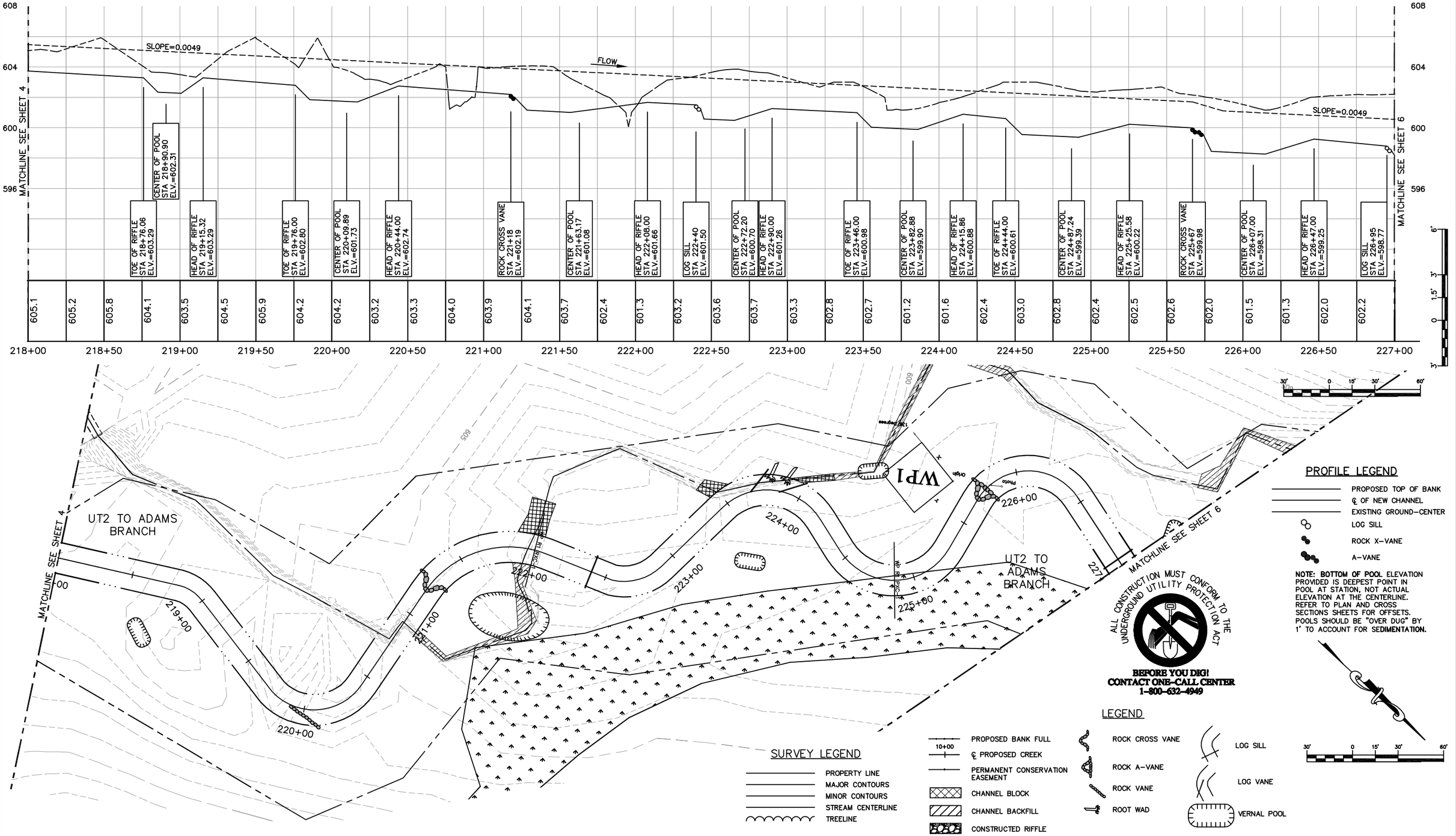
SHEET NUMBER: 4 OF 15

K:\RAL_Environmental\012620006 Wolf Pond Restoration\JD0_0008\dwg\Record Set\03-GRADING PLAN.dwg

January 05, 2009 - 7:28am By: jimkimble



PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND–CENTER
- LOG SILL
- ROCK X–VANE
- A–VANE

NOTE: BOTTOM OF POOL ELEVATION PROVIDED IS DEEPEST POINT IN POOL AT STATION, NOT ACTUAL ELEVATION AT THE CENTERLINE. REFER TO PLAN AND CROSS SECTIONS SHEETS FOR OFFSETS. POOLS SHOULD BE "OVER DUG" BY 1' TO ACCOUNT FOR **SEDIMENTATION.**

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

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SURVEY LEGEND

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

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- CHANNEL BLOCK
- CHANNEL BACKFILL
- CONSTRUCTED RIFFLE
- ROCK CROSS VANE
- ROCK A–VANE
- ROCK VANE
- ROOT WAD
- LOG SILL
- LOG VANE
- VERNAL POOL

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

EBX

PREPARED IN THE OFFICE OF:
Kimley-Horn and Associates, Inc.
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: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT
SEAL:

DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 5 OF 15

K:\RAL_Environmental\012620006 Wolf Pond Restoration\DD_0008\dwg\Record Set\03-GRADING PLAN.dwg

January 05, 2009 - 7:28am By: jim.kimble

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- CHANNEL BLOCK
- CHANNEL BACKFILL
- CONSTRUCTED RIFFLE
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- ROOT WAD
- LOG SILL
- LOG VANE
- VERNAL POOL

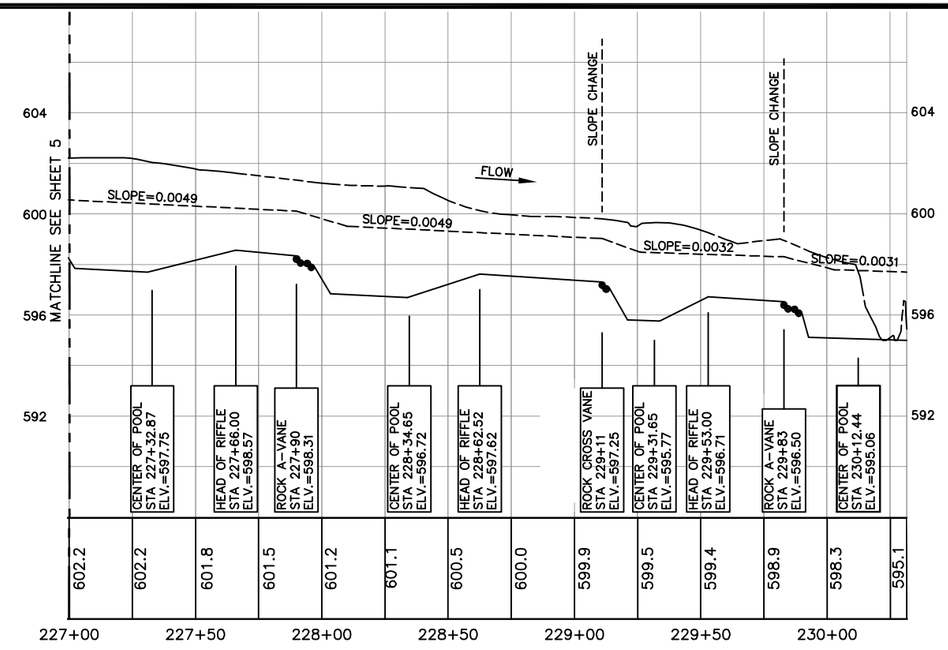
SURVEY LEGEND

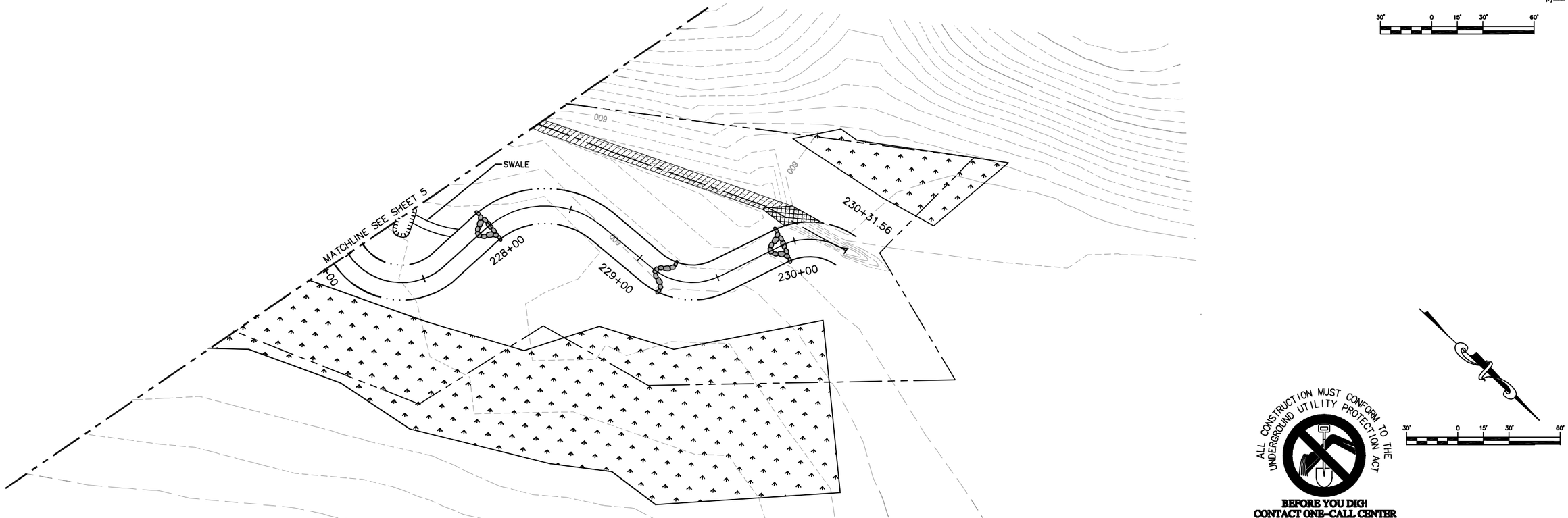
- PROPERTY LINE
- MAJOR CONTOURS
- MINOR CONTOURS
- STREAM CENTERLINE
- TREELINE

PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG SILL
- ROCK X-VANE
- A-VANE

NOTE: BOTTOM OF POOL ELEVATION PROVIDED IS DEEPEST POINT IN POOL AT STATION, NOT ACTUAL ELEVATION AT THE CENTERLINE. REFER TO PLAN AND CROSS SECTIONS SHEETS FOR OFFSETS. POOLS SHOULD BE "OVER DUG" BY 1' TO ACCOUNT FOR SEDIMENTATION.





30' 0 15' 30' 60'

3' 1.5' 0 3' 6'

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

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1-800-632-4949

30' 0 15' 30' 60'

REV. No.	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

EBX

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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: GRADING PLAN AND PROFILE

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT
SEAL:

DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

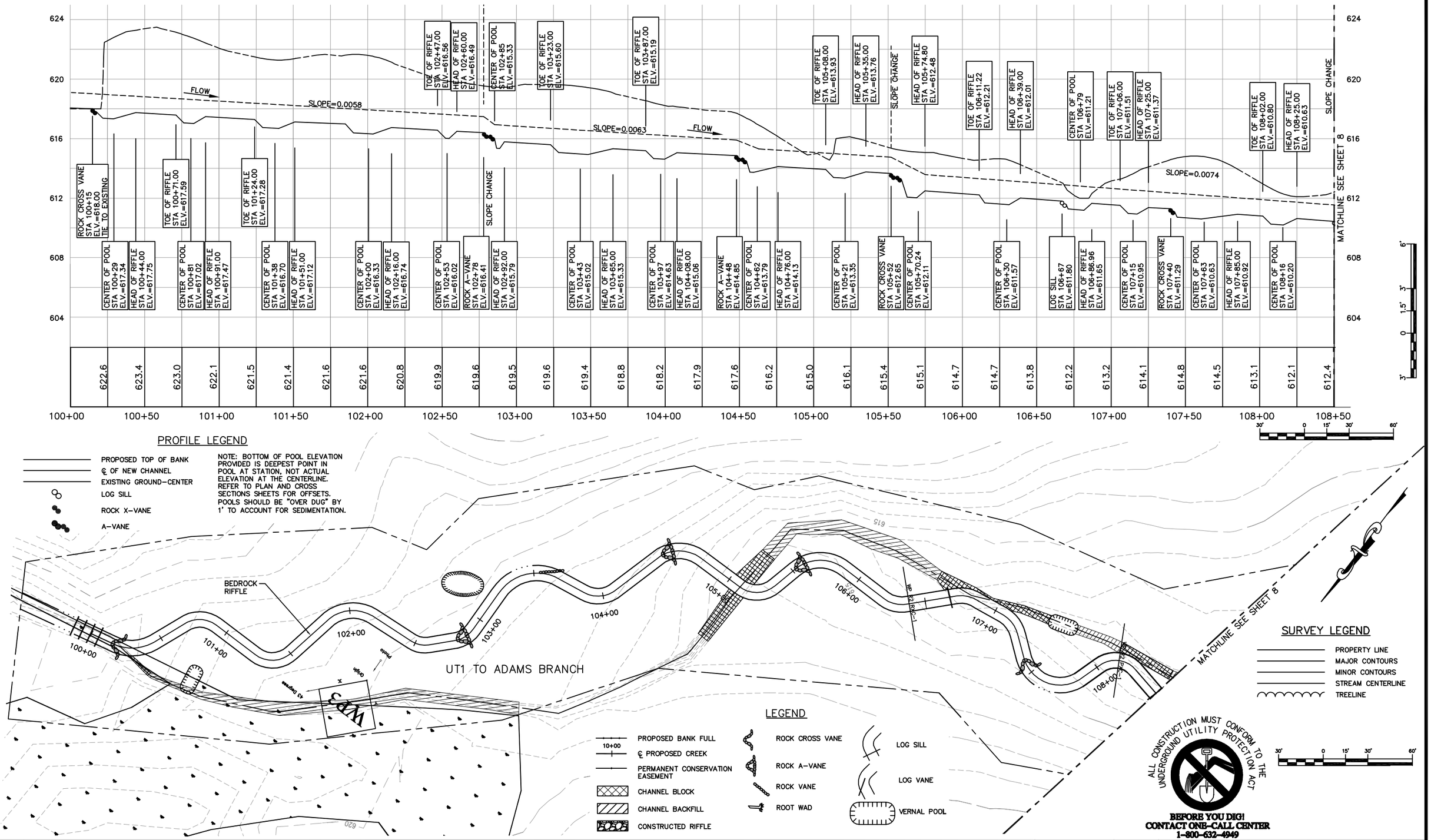
PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 6 OF 15

K:\RAL_Environmental\012620006 Wolf Pond Restoration\DD_0008\dwg\Record Set\03-GRADING PLAN.dwg

January 05, 2009 - 7:28am By: jimkimble



PROFILE LEGEND

- PROPOSED TOP OF BANK
- ℄ OF NEW CHANNEL
- EXISTING GROUND-CENTER
- LOG SILL
- ROCK X-VANE
- A-VANE

NOTE: BOTTOM OF POOL ELEVATION PROVIDED IS DEEPEST POINT IN POOL AT STATION, NOT ACTUAL ELEVATION AT THE CENTERLINE. REFER TO PLAN AND CROSS SECTIONS SHEETS FOR OFFSETS. POOLS SHOULD BE "OVER DUG" BY 1' TO ACCOUNT FOR SEDIMENTATION.

SURVEY LEGEND

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

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- CHANNEL BLOCK
- CHANNEL BACKFILL
- CONSTRUCTED RIFFLE
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- ROOT WAD
- LOG SILL
- LOG VANE
- VERNAL POOL

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30' 0 15' 30' 60'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

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CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

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NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT

SEAL:

DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

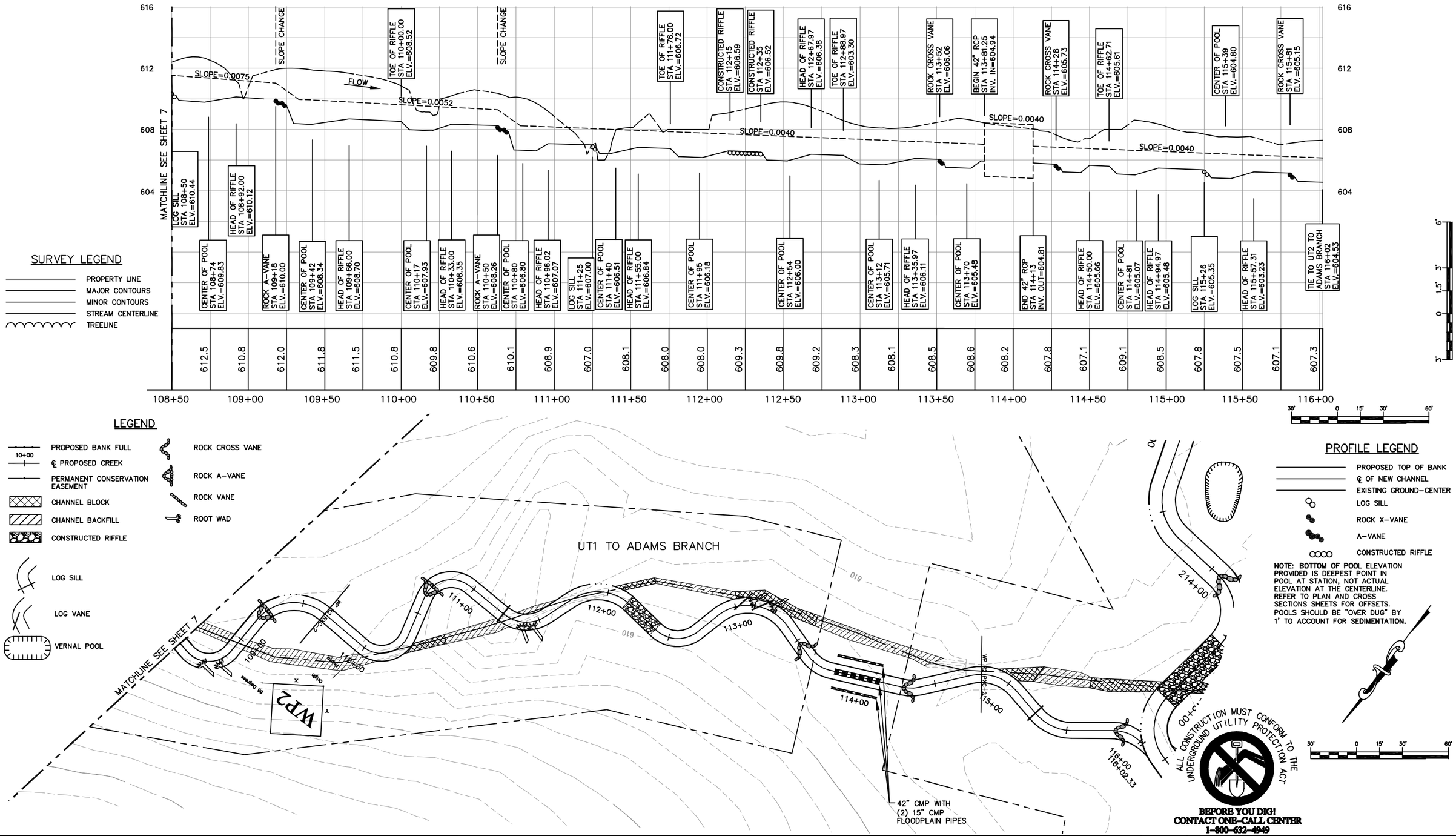
PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 7 OF 15

K:\RAL_Environmental\012620006 Wolf Pond Restoration\DD_0008\dwg\Record Set\03-GRADING PLAN.dwg

January 05, 2009 - 7:29am By: jimkimble



REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

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DATE: 05/02/08
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PROJECT: WOLF POND STREAM RESTORATION

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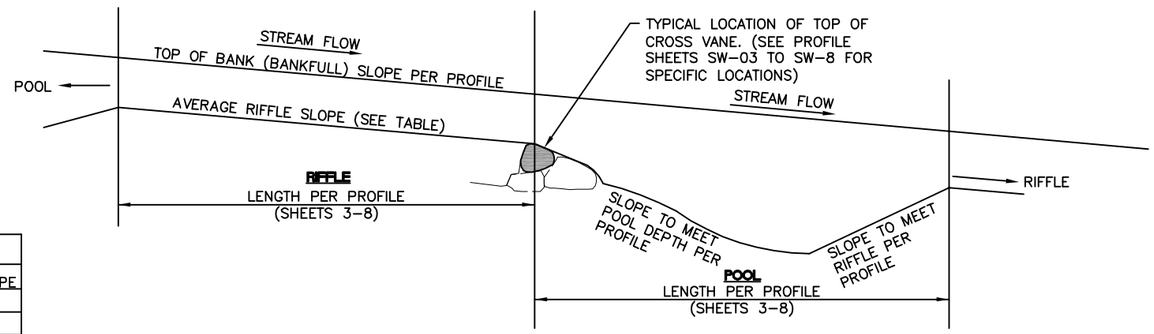
SHEET NUMBER: 8 OF 15

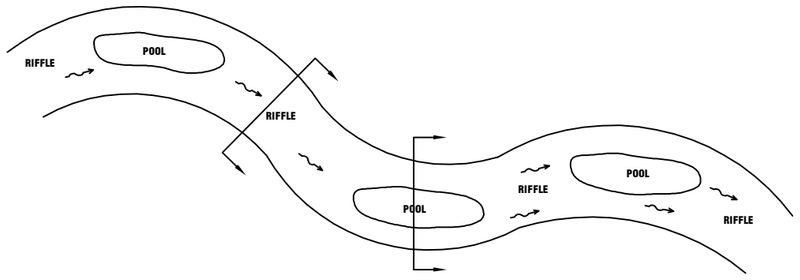
K:\RAL_Environmental\012620006 Wolf Pond Restoration\DD_0008\dwg\Record Set\03-GRADING PLAN.dwg

RIFFLE SLOPES		
BEGIN STA	END STA	AVERAGE RIFFLE SLOPE
100+00	116+08	0.0151
200+00	217+28	0.0123
217+28	230+32	0.0151



TYPICAL PROFILE OF RIFFLE/POOL SEQUENCE

N.T.S.



TYPICAL PLAN VIEW SCHEMATIC

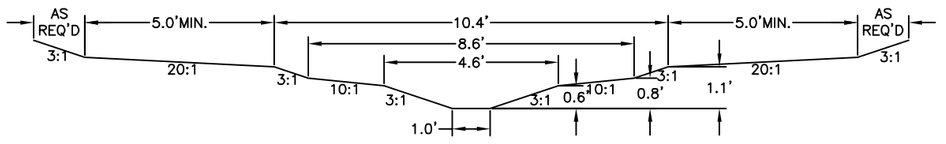
NTS

NOTES:

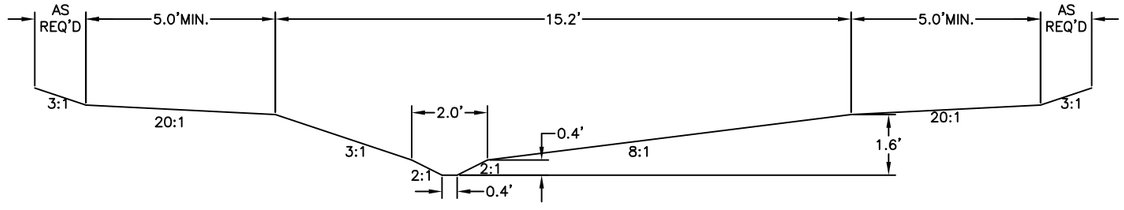
TYPICAL SECTIONS ARE PROVIDED TO GIVE THE GENERAL DIMENSIONS OF THE CHANNEL. FINAL GRADING WILL GIVE THE CHANNEL A MORE "NATURAL" APPEARANCE AND ALLOW A SMOOTH TRANSITION FROM EXISTING CHANNEL TO NEW CHANNEL.

ALL EXISTING GROUND REPRESENTATIONS ARE APPROXIMATE.

*NOTE:
ALL POOL DEPTHS SHOULD BE OVER DUG BY 1' TO ACCOUNT FOR SEDIMENT.



UT1 RIFFLE
STA 100+00 TO 116+08



UT1 POOL
STA 100+00 TO 116+08

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

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

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: TYPICAL CROSS SECTIONS

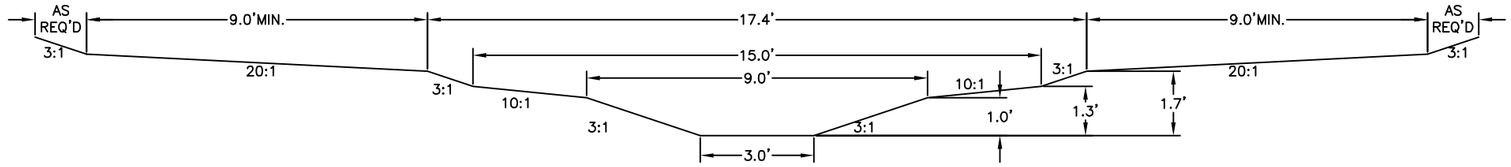
SEAL: NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT

DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

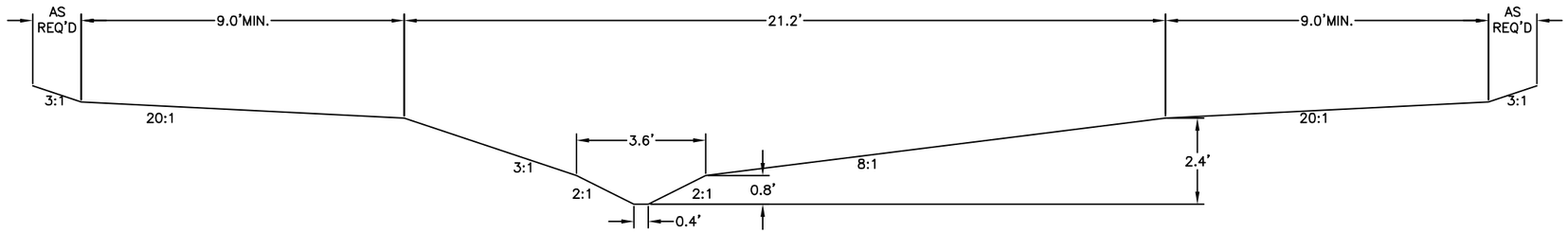
PROJECT: WOLF POND STREAM RESTORATION

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

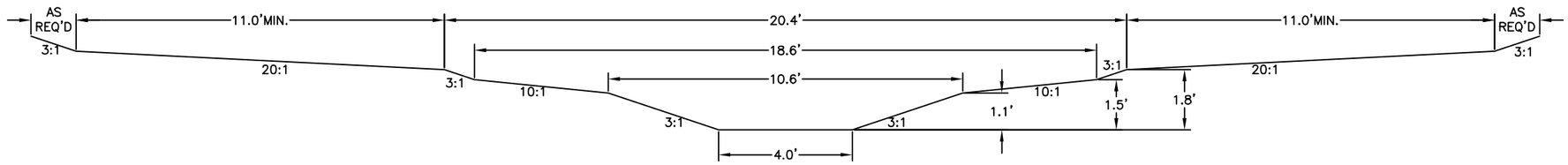
SHEET NUMBER: 9 OF 15



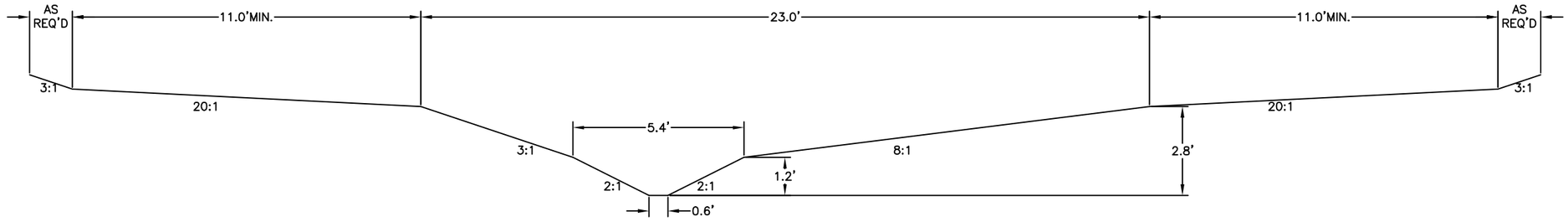
UPPER UT2 RIFFLE
STA 200+00 TO 217+28



UPPER UT2 POOL
STA 200+00 TO 217+28



LOWER UT2 RIFFLE
STA 217+28 TO 230+32



LOWER UT2 POOL
STA 217+28 TO 230+32

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

EBX

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

CLIENT: STATE OF NORTH CAROLINA
ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: TYPICAL CROSS SECTIONS

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT
SEAL:

DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 10 OF 15

MATCHLINE SEE SHEET 12

UT2 TO ADAMS BRANCH

206+00
205+00
204+00
203+00
202+00
201+00
200+00

615

WP5
44 Degrees
Origin
Phase

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- CHANNEL BLOCK
- CHANNEL BACKFILL
- CONSTRUCTED RIFFLE
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- ROOT WAD
- LOG SILL
- LOG VANE
- VERNAL POOL

PLANTING LEGEND

- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- ZONE 5

SURVEY LEGEND

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

ALL CONSTRUCTION MUST CONFORM TO THE UNDERGROUND UTILITY PROTECTION ACT

BEFORE YOU DIG!
CONTACT ONE-CALL CENTER
1-800-632-4949

60' 0 30' 60' 120'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

EBX

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Kimley-Horn and Associates, Inc.
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: PLANTING PLAN

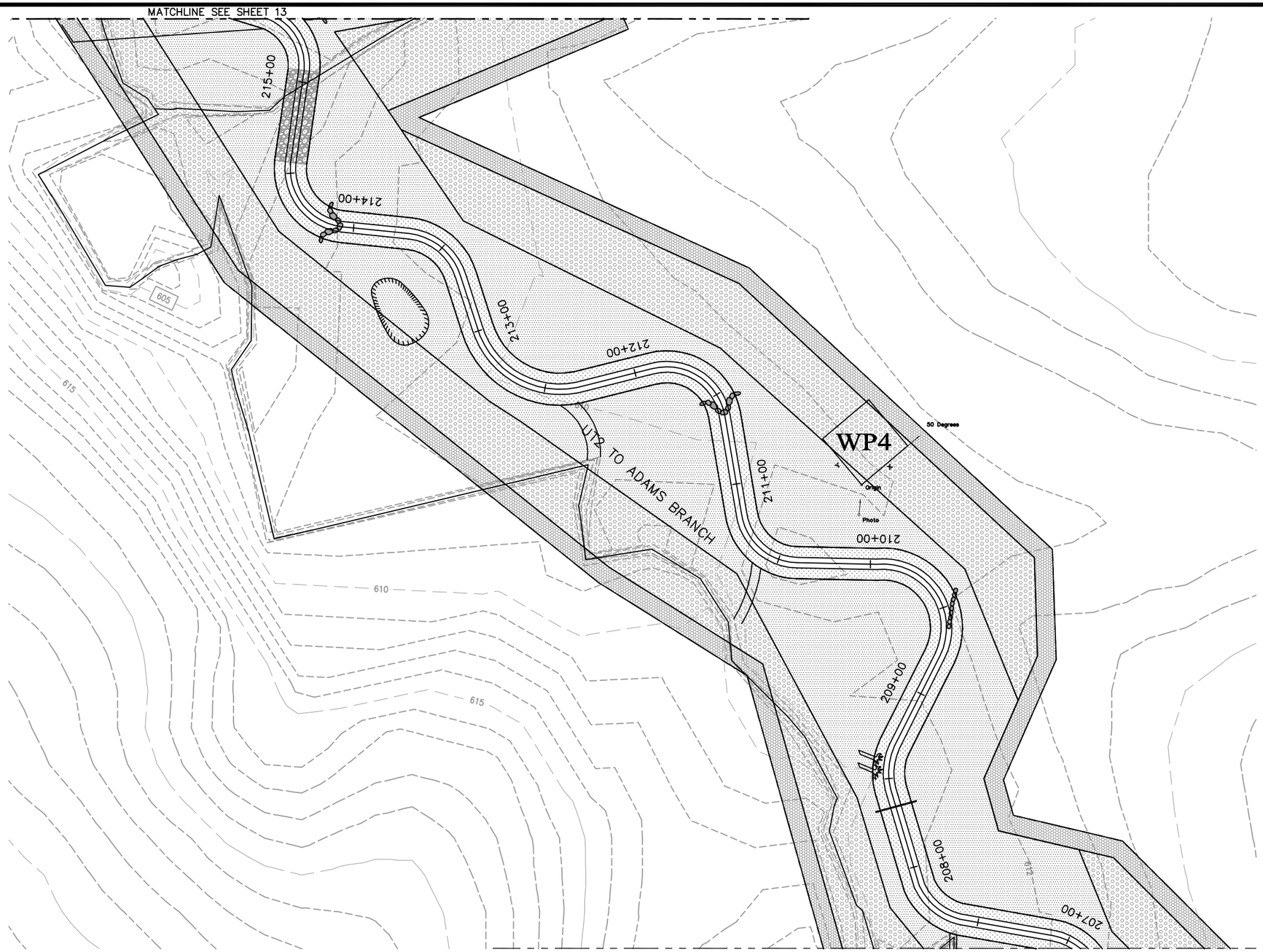
NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT
SEAL:

DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 11 OF 15



LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- CHANNEL BLOCK
- CHANNEL BACKFILL
- CONSTRUCTED RIFFLE
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- ROOT WAD
- LOG SILL
- LOG VANE
- VERNAL POOL

PLANTING LEGEND

- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- ZONE 5

SURVEY LEGEND

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

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60' 0 30' 60' 120'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

EBX

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

CLIENT: STATE OF NORTH CAROLINA ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DARREN M. PITT

SEAL:

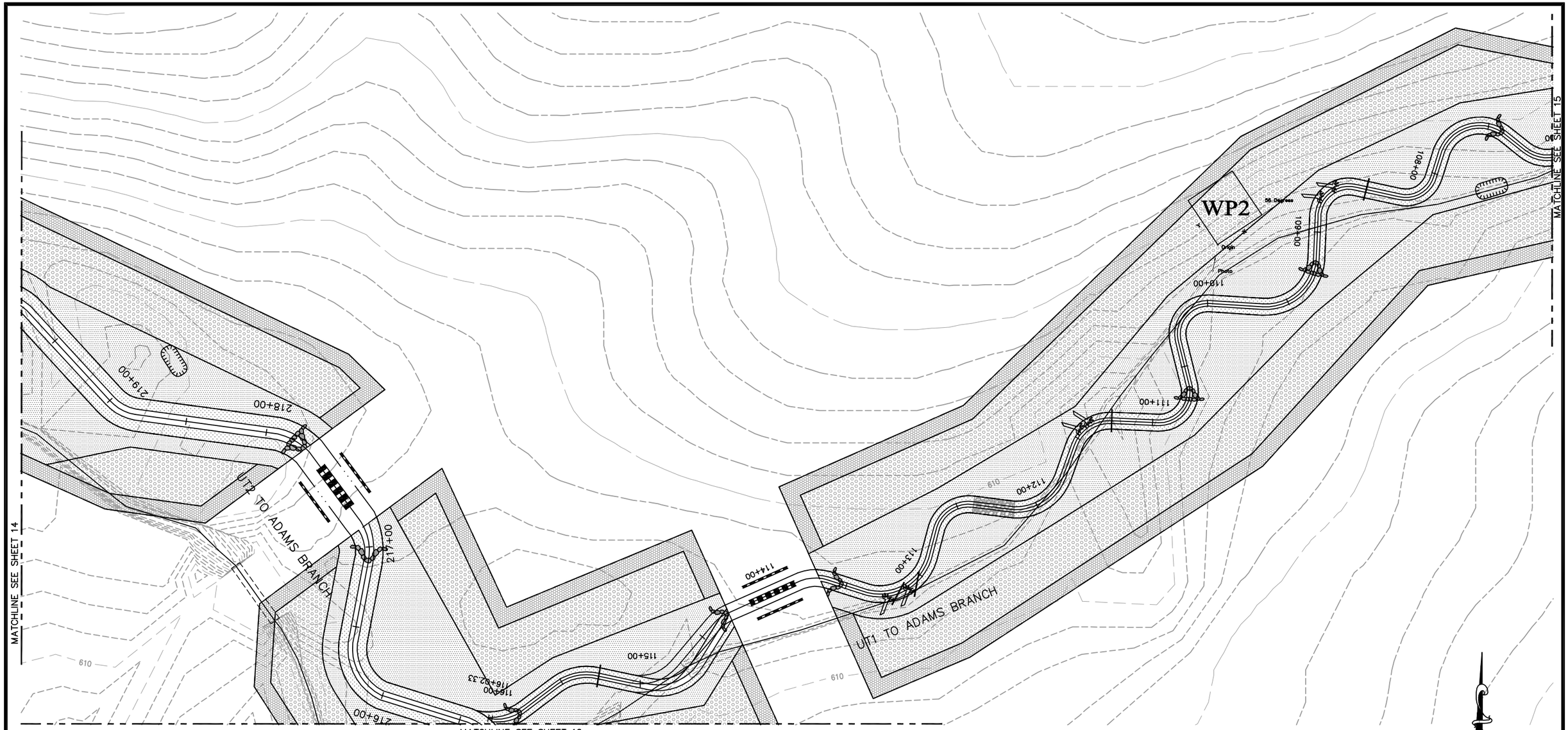
DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 12 OF 15

January 05, 2009 - 7:30am By: jimkimble



LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- CHANNEL BLOCK
- CHANNEL BACKFILL
- CONSTRUCTED RIFFLE
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- ROOT WAD
- LOG SILL
- LOG VANE
- VERNAL POOL

PLANTING LEGEND

- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- ZONE 5

SURVEY LEGEND

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

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60' 0 30' 60' 120'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

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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: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DAREN M. PAIT
SEAL:

DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 13 OF 15

K:\RAL_Environmental\012620006 Wolf Pond Restoration\LDD_0006\dwg\Record Set\05-PLANTING PLAN.dwg

January 05, 2009 - 7:30am By: jim.kimble

K:\RAL_Environmental\012620006 Wolf Pond Restoration\LDD_0006\dwg\Record Set\05-PLANTING PLAN.dwg

UT2 TO ADAMS BRANCH

220+00
221+00
222+00
223+00
224+00
225+00
226+00
227+00
228+00
229+00
230+00
230+31.56

WP1
Origin
Photo
135 Degrees

MATCHLINE SEE SHEET 13

605
600

LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- CHANNEL BLOCK
- CHANNEL BACKFILL
- CONSTRUCTED RIFFLE
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- ROOT WAD
- LOG SILL
- LOG VANE
- VERNAL POOL

PLANTING LEGEND

- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- ZONE 5

SURVEY LEGEND

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

60' 0 30' 60' 120'

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TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DARIN M. PAIT

SEAL:

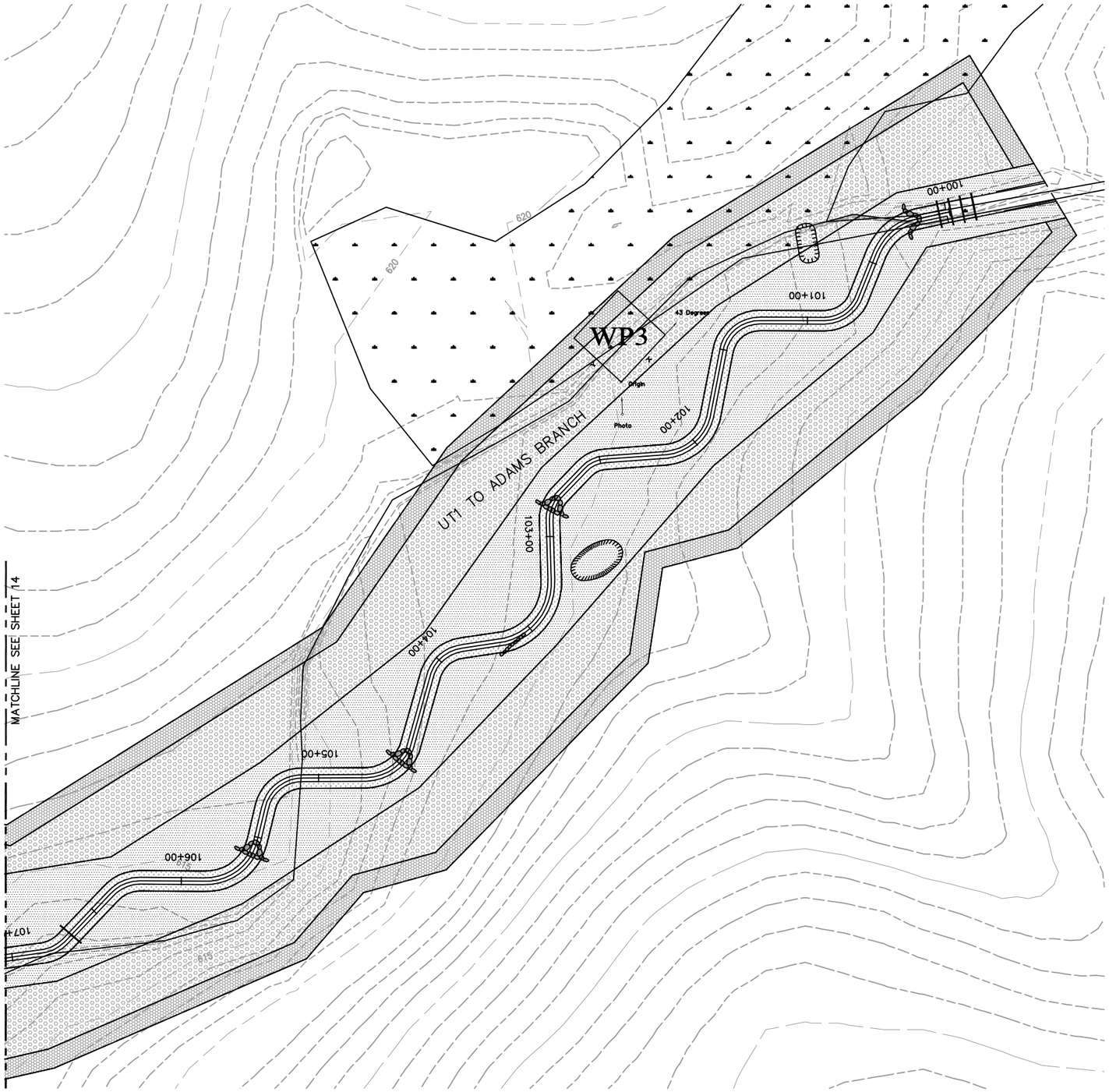
DATE: 05/02/08
JOB NUMBER: 012620006
DRAWN BY: JIK
DESIGNED BY: JCD
CHECKED BY: DMP

PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 14 OF 15

January 05, 2009 - 7:30am By: jim.kimble



LEGEND

- PROPOSED BANK FULL
- 10+00 ℄ PROPOSED CREEK
- PERMANENT CONSERVATION EASEMENT
- CHANNEL BLOCK
- CHANNEL BACKFILL
- CONSTRUCTED RIFFLE
- ROCK CROSS VANE
- ROCK A-VANE
- ROCK VANE
- ROOT WAD
- LOG SILL
- LOG VANE
- VERNAL POOL

PLANTING LEGEND

- ZONE 1
- ZONE 2
- ZONE 3
- ZONE 4
- ZONE 5

SURVEY LEGEND

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

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60' 0 30' 60' 120'

REV. No.:	REVISION:	DATE:	DRAWN BY:	CHECKED BY:

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ECOSYSTEM ENHANCEMENT PROGRAM

TITLE: PLANTING PLAN

NORTH CAROLINA PROFESSIONAL SEAL 030000 ENGINEER DARREN M. PAIT
SEAL:

DATE:	05/02/08
JOB NUMBER:	012620006
DRAWN BY:	JIK
DESIGNED BY:	JCD
CHECKED BY:	DMP

PROJECT: WOLF POND STREAM RESTORATION

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

SHEET NUMBER: 15 OF 15

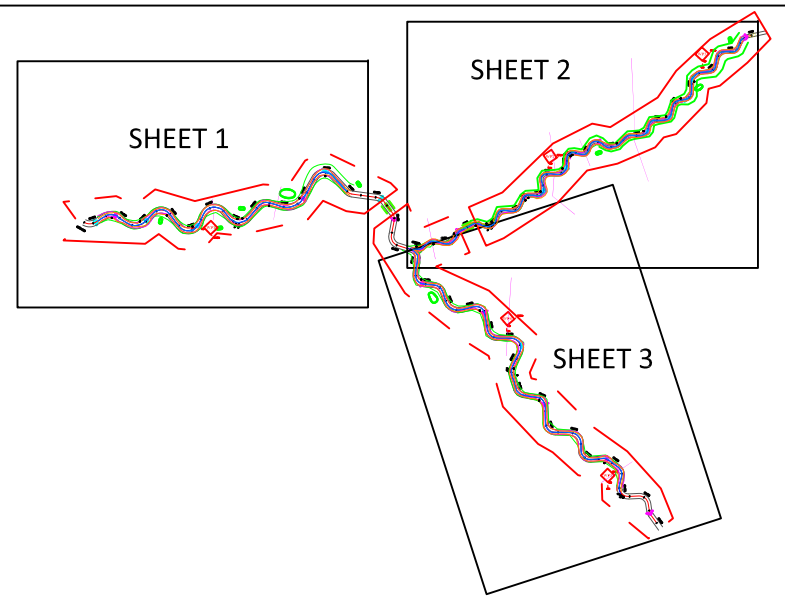
K:\RAL_Environmental\012620006 Wolf Pond Restoration\LDD_0006\dwg\Record Set\05-PLANTING PLAN.dwg

Appendix B – MY2 Survey

Figure B 1 - Wolf Pond Reach 1

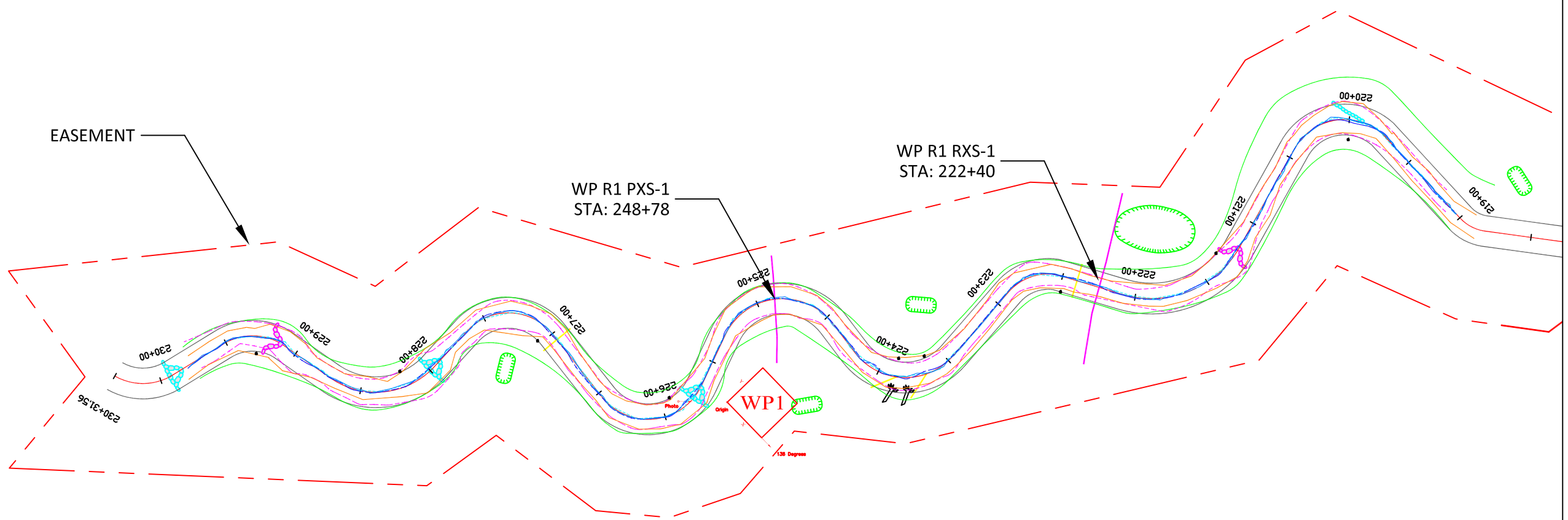
Figure B 2 - Wolf Pond Reach 2

Figure B 3 - Wolf Pond Reach 3



LEGEND

- DESIGN TOP OF BANK
- MONITORING ALIGNMENT (ALL YEARS)
- 2008 (MY0) THALWEG
- 2008 (MY0) TOP OF BANK
- 2009 (MY1) THALWEG
- 2009 (MY1) TOP OF BANK
- 2009 (MY2) THALWEG
- 2009 (MY2) TOP OF BANK
- PHOTO POINT



NORTH

1"=80'

0 40 80 160

NO.	NOTES:	DRN	CHK	DATE

NC STATE UNIVERSITY
BIOLOGICAL & AGRICULTURAL ENGINEERING
WEAVER LABS CAMPUS BOX 7625
NORTH CAROLINA STATE UNIVERSITY
RALEIGH NC 27695

NCDENR-EEP
RALEIGH, NC

WOLF POND - REACH 1

WOLF POND YEAR 02 (MY2)
MONITORING

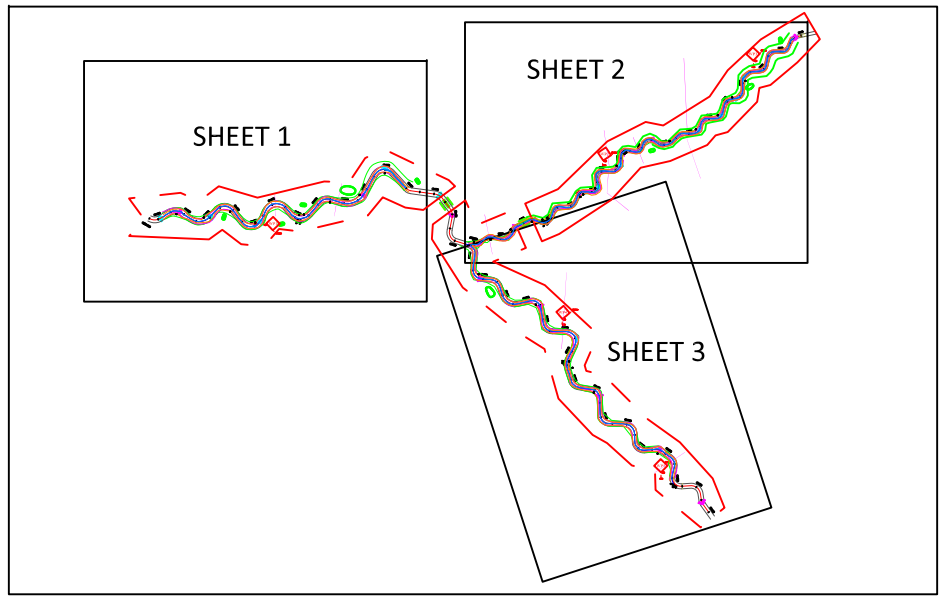
UNION COUNTY, NC

DATE
11/16/2009

PROJECT NO.
06054-B

FILENAME
WOLFPOND.DWG

SHEET NO.
1 OF 3



LEGEND

- DESIGN TOP OF BANK
- MONITORING ALIGNMENT (ALL YEARS)
- 2008 (MY0) THALWEG
- 2008 (MY0) TOP OF BANK
- 2009 (MY1) THALWEG
- 2009 (MY1) TOP OF BANK
- 2009 (MY2) THALWEG
- 2009 (MY2) TOP OF BANK
- PHOTO POINT

WP R2 RXS-1
STA: 106+01

WP R2 PXS-1
STA: 108+12

WP R2 RXS-2
STA: 109+74

WP R2 PXS-2
STA: 115+42

EASEMENT

WP3

WP2

NORTH

1"=80'

0 40 80 160

NO.	NOTES:	DRN	CHK	DATE

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NORTH CAROLINA STATE UNIVERSITY
RALEIGH NC 27695

NCDENR-EEP
RALEIGH, NC

WOLF POND - REACH 2

WOLF POND YEAR 02 (MY2)
MONITORING

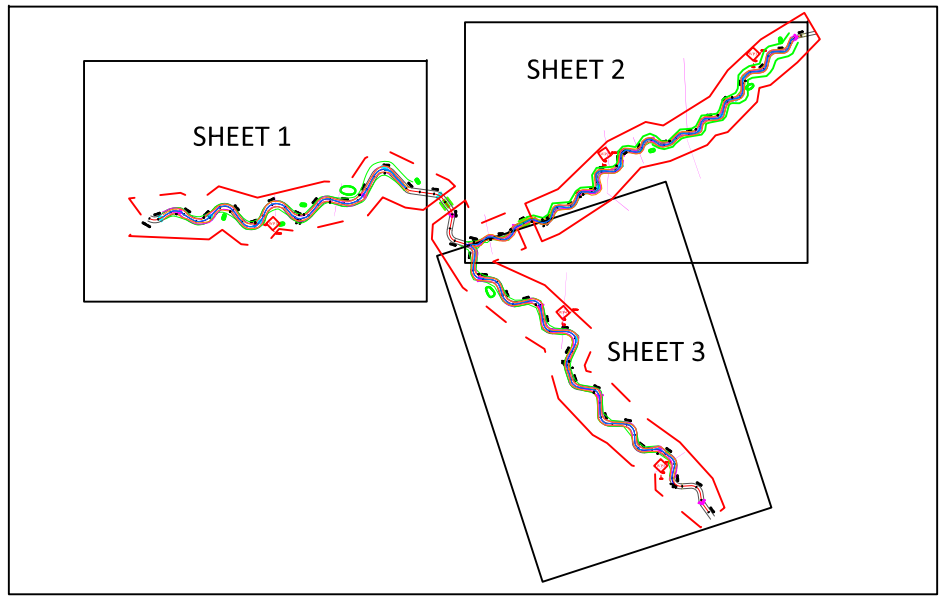
UNION COUNTY, NC

DATE
11/16/2009

PROJECT NO.
06054-B

FILENAME
WOLFPOND.DWG

SHEET NO.
2 OF 3



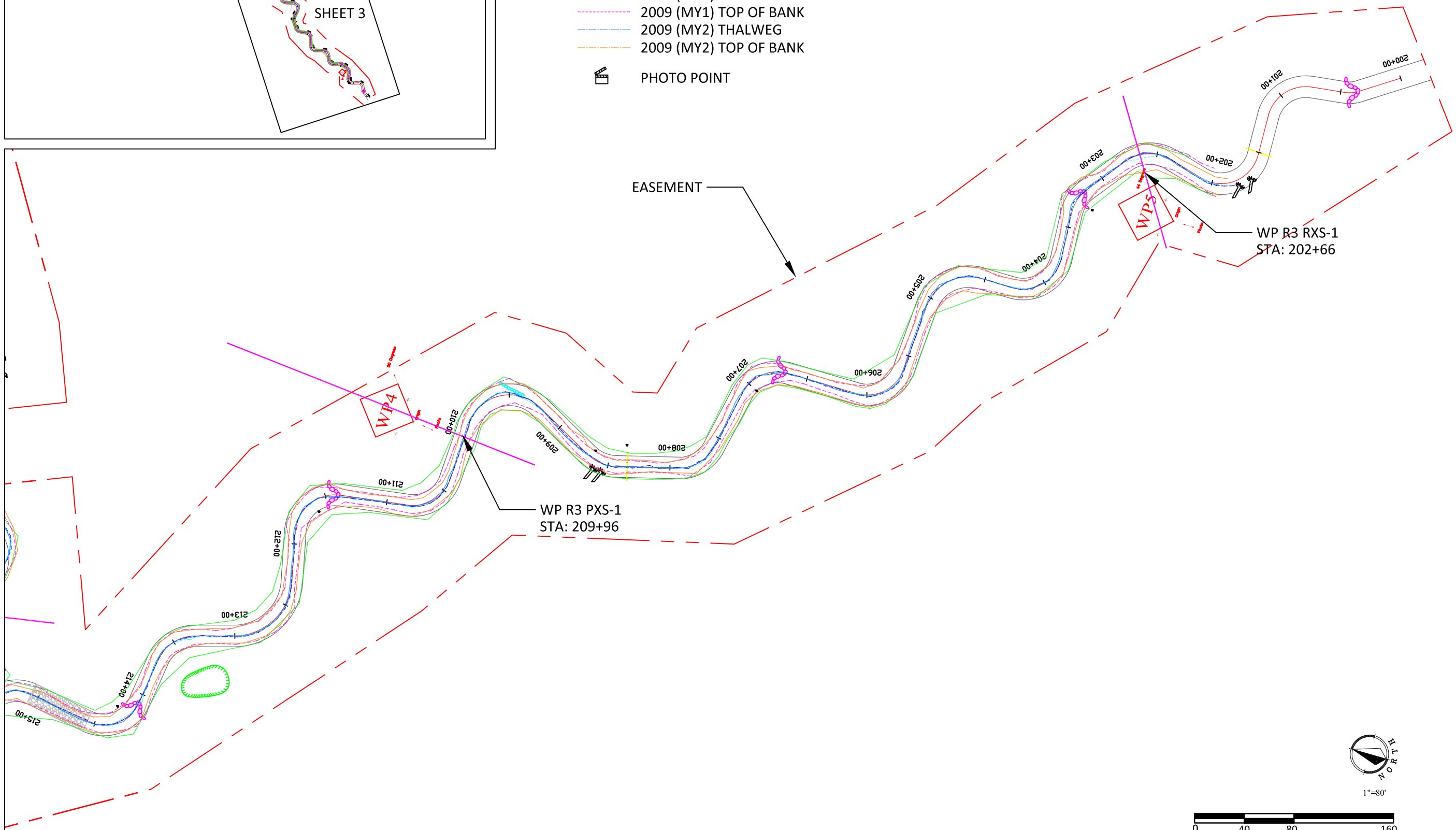
LEGEND

- DESIGN TOP OF BANK
- MONITORING ALIGNMENT (ALL YEARS)
- 2008 (MY0) THALWEG
- 2008 (MY0) TOP OF BANK
- 2009 (MY1) THALWEG
- 2009 (MY1) TOP OF BANK
- 2009 (MY2) THALWEG
- 2009 (MY2) TOP OF BANK
- PHOTO POINT

EASEMENT

WP R3 RXS-1
STA: 202+66

WP R3 PXS-1
STA: 209+96



NORTH

1"=80'

0 40 80 160

NO.	NOTES:	DRN	CHK	DATE

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RALEIGH, NC

WOLF POND - REACH 3

WOLF POND YEAR 02 (MY2)
MONITORING

UNION COUNTY, NC

DATE
11/16/2009

PROJECT NO.
06054-B

FILENAME
WOLFPOND.DWG

SHEET NO.
3 OF 3

Appendix C – Profile, Cross Sections, and Pebble Counts

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Wolf Pond R1 RXS-1

Photo C 1 – R1 RXS-1 Left Pin

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Photo C 3 – R1 RXS-1 Downstream

Figure C 1 – R1 RXS-1 Cross Section Plot

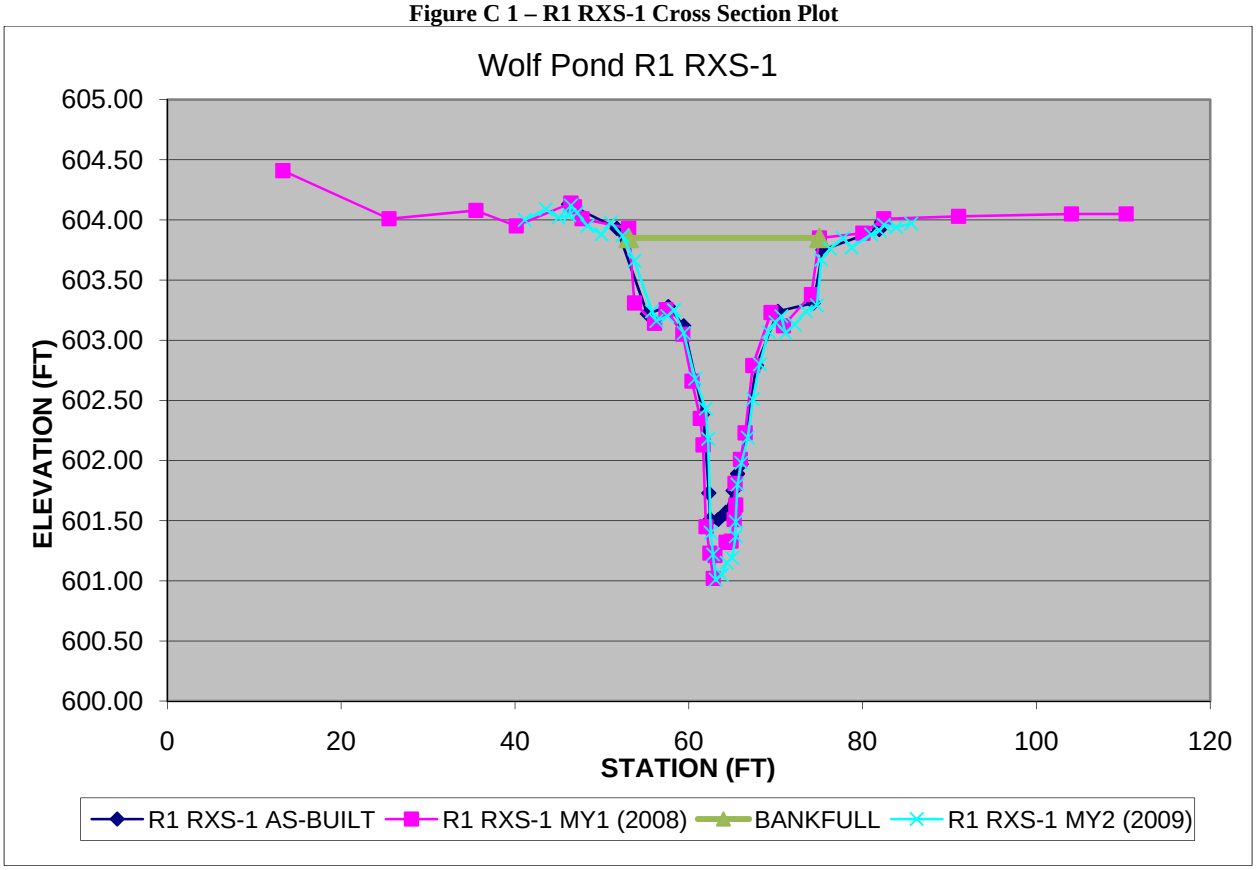


Table C 1 - R1 RXS-1 Dimension Data

AS-BUILT			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
46.17	604.13	r1rxs1r	13.29	604.41	R1RXS1	41.12	604	XS									
46.51	604.12	r1rxs1	25.51	604.01	R1RXS1	43.56	604.09	XS									
51.74	603.93	r1rxs1tob	35.5	604.079	R1RXS1	45.01	604.02	XS									
55.23	603.22	r1rxs1	40.14	603.95	R1RXS1	46.25	604.04	XS									
57.64	603.28	r1rxs1	46.43	604.14	R1RXS1PR	46.43	604.12	XSRP09									
59.41	603.12	r1rxs1	46.85	604.11	R1RXS1	47.16	604.06	XS									
61.66	602.39	r1rxs1	47.71	604.01	R1RXS1	48.33	603.95	XS									
62.3	601.73	r1rxs1w	53.08	603.93	R1RXS1	49.96	603.88	XS									
62.46	601.51	r1rxs1	53.75	603.31	R1RXS1	51.03	603.98	XS									
63.39	601.51	r1rxs1	56.06	603.14	R1RXS1	52.37	603.87	XS									
64.28	601.57	r1rxs1	57.38	603.254	R1RXS1	53.74	603.66	XS									
65.1	601.75	r1rxs1w	59.31	603.05	R1RXS1	55.77	603.24	XS									
65.11	601.57	r1rxs1	60.37	602.66	R1RXS1	56.27	603.16	XS									
65.61	601.89	r1rxs1	61.33	602.35	R1RXS1	57.54	603.2	XS									
66.03	601.97	r1rxs1	61.64	602.13	R1RXS1	58.28	603.25	XS									
67.78	602.79	r1rxs1	61.98	601.45	R1RXS1	58.29	603.25	XS									
70.25	603.24	r1rxs1	62.42	601.23	R1RXS1	59.42	603.06	XS									
74.35	603.31	r1rxs1	62.81	601.02	R1RXS1	60.74	602.68	XS									
75.43	603.75	r1rxs1tob	63.01	601.21	R1RXS1	61.94	602.43	XS									
81.91	603.92	r1rxs1	64.28	601.32	R1RXS1	62.23	602.18	XS									
82.17	603.98	r1rxs1l	64.87	601.33	R1RXS1	62.52	601.4	XS									
			65.22	601.51	R1RXS1	62.79	601.22	XS									
			65.4	601.63	R1RXS1	63.09	601.01	XS									
			65.32	601.81	R1RXS1WS	63.8	601.05	XS									
			65.94	602.01	R1RXS1	64.36	601.15	XS									
			66.48	602.23	R1RXS1	64.97	601.19	XS									
			67.36	602.79	R1RXS1	65.4	601.37	XS									
			69.46	603.23	R1RXS1	65.4	601.49	XSW									
			70.89	603.12	R1RXS1	65.6	601.8	XS									
			74.11	603.38	R1RXS1	66.05	601.98	XS									
			75.04	603.85	R1RXS1	66.79	602.19	XS									
			80.03	603.89	R1RXS1	67.36	602.51	XS									
			82.43	604.01	R1RXS1PL	68.18	602.8	XS									
			91.04	604.03	R1RXS1	69.17	603.07	XS									
			104.03	604.05	R1RXS1	69.97	603.15	XS									
			110.33	604.05	R1RXS1	70.65	603.2	XS									
						71.13	603.06	XS									
						72.18	603.13	XS									
						73.49	603.24	XS									
						74.75	603.29	XS									
						75.24	603.67	XS									
						76.25	603.76	XS									
						77.75	603.85	XS									
						78.73	603.77	XS									
						80.98	603.88	XS									
						81.95	603.91	XS									
						82.46	603.96	XSLP09									
						83.85	603.94	XS									
						85.6	603.97	XS									

Bankfull Width (ft)	23.7	Bankfull Width (ft)	22.0	Bankfull Width (ft)	26.4	Bankfull Width (ft)		Bankfull Width (ft)		Bankfull Width (ft)	
Bankfull Cross Sectional Area (sq ft)	20.4	Bankfull Cross Sectional Area (sq ft)	24.2	Bankfull Cross Sectional Area (sq ft)	24.7	Bankfull Cross Sectional Area (sq ft)		Bankfull Cross Sectional Area (sq ft)		Bankfull Cross Sectional Area (sq ft)	
Bankfull Mean Depth (ft)	0.86	Bankfull Mean Depth (ft)	1.10	Bankfull Mean Depth (ft)	0.94	Bankfull Mean Depth (ft)		Bankfull Mean Depth (ft)		Bankfull Mean Depth (ft)	
Bankfull Max Depth (ft)	2.24	Bankfull Max Depth (ft)	2.83	Bankfull Max Depth (ft)	2.84	Bankfull Max Depth (ft)		Bankfull Max Depth (ft)		Bankfull Max Depth (ft)	
Flood Prone Width (ft)	97	Flood Prone Width (ft)	97	Flood Prone Width (ft)	97	Flood Prone Width (ft)		Flood Prone Width (ft)		Flood Prone Width (ft)	
Entrenchment Ratio (ft/ft)	4.09	Entrenchment Ratio (ft/ft)	4.42	Entrenchment Ratio (ft/ft)	3.68	Entrenchment Ratio (ft/ft)		Entrenchment Ratio (ft/ft)		Entrenchment Ratio (ft/ft)	
Width/Depth Ratio (ft/ft)	27.50	Width/Depth Ratio (ft/ft)	19.95	Width/Depth Ratio (ft/ft)	28.15	Width/Depth Ratio (ft/ft)		Width/Depth Ratio (ft/ft)		Width/Depth Ratio (ft/ft)	
D50 (mm)	8.88	D50 (mm)	0.88	D50 (mm)	0.06	D50 (mm)		D50 (mm)		D50 (mm)	
D84 (mm)	18.75	D84 (mm)	8.0	D84 (mm)	0.06	D84 (mm)		D84 (mm)		D84 (mm)	

Wolf Pond R1 PXS-1

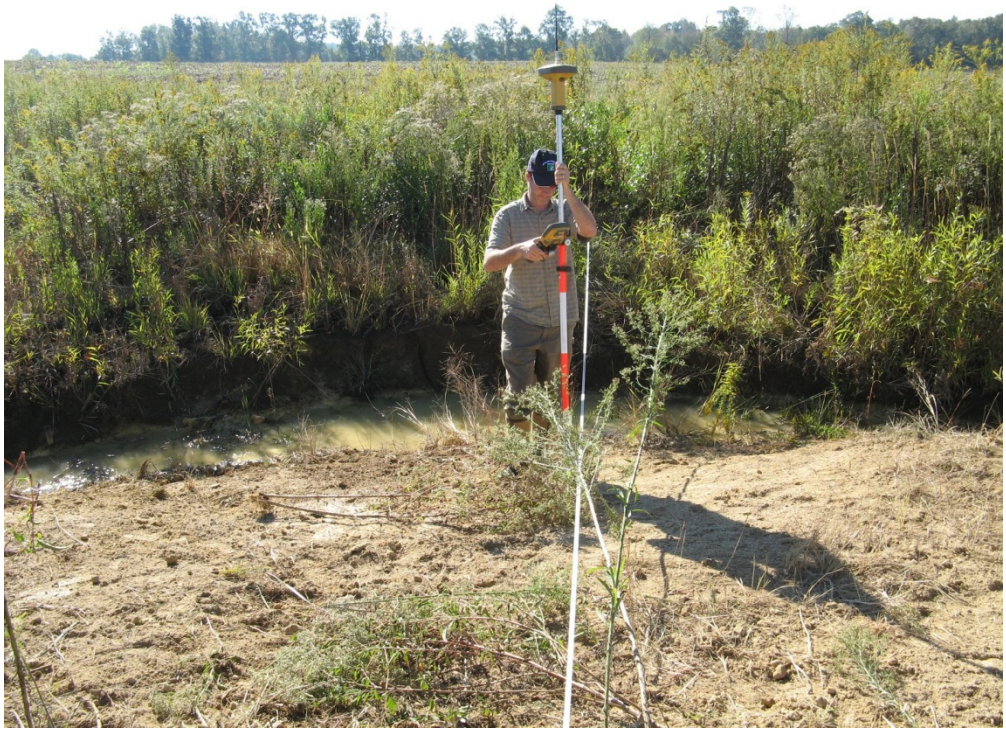


Photo C 4 - R1 PXS-1 Left Pin

Photo C 5 - R1 PXS-1 Right Pin

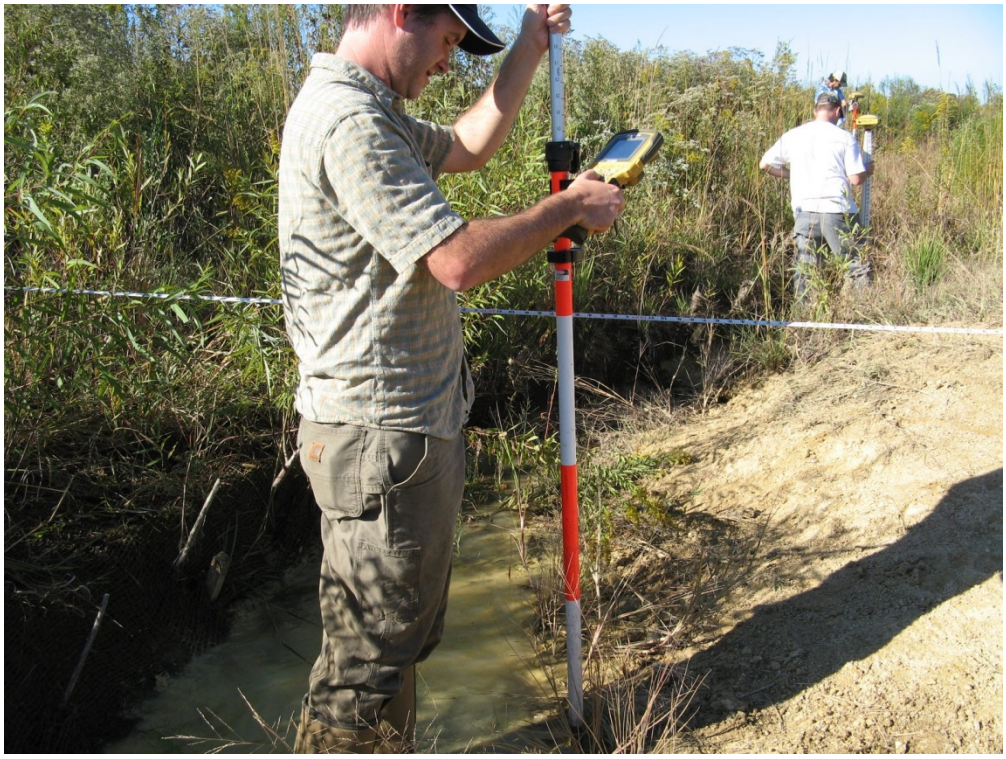


Photo C 6 - R1 PXS-1 Downstream

Figure C 2 - R1 PXS-1 Cross Section Plot

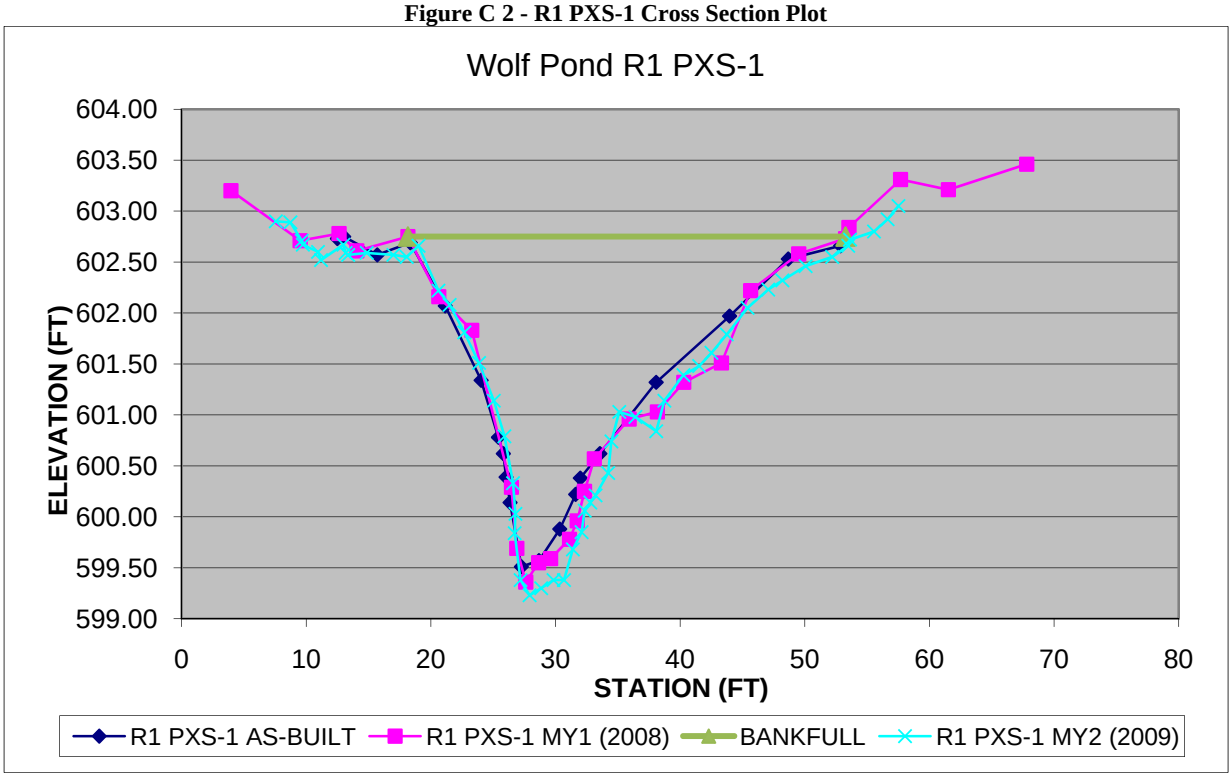


Table C 2 - R1 PXS-1 Dimension Data

AS-BUILT			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
12.5	602.73	r1rxs1r	3.96	603.2	R1PXS1	7.56	602.9	XS									
13.01	602.75	r1rxs1	9.51	602.71	R1PXS1	8.73	602.89	XS									
15.7	602.57	r1rxs1tob	12.63	602.78	R1PXS1PR	9.64	602.71	XS									
18.35	602.69	r1rxs1	14.06	602.61	R1PXS1	9.73	602.67	XS									
21.15	602.07	r1rxs1	18.16	602.75	R1PXS1	10.94	602.6	XS									
24.03	601.34	r1rxs1	20.63	602.16	R1PXS1	11.19	602.52	XS									
25.42	600.78	r1rxs1	23.28	601.83	R1PXS1	12.98	602.67	XSRP09									
25.81	600.62	r1rxs1w	26.46	600.29	R1PXS1	13.16	602.59	XS									
26.03	600.39	r1rxs1	26.89	599.69	R1PXS1	13.36	602.57	XS									
26.35	600.14	r1rxs1	27.61	599.36	R1PXS1	14.85	602.59	XS									
27.26	599.51	r1rxs1	28.64	599.55	R1PXS1	16.99	602.57	XS									
28.67	599.57	r1rxs1w	29.61	599.59	R1PXS1	18.06	602.55	XS									
30.34	599.88	r1rxs1	31.12	599.78	R1PXS1	19.01	602.66	XS									
31.61	600.22	r1rxs1	31.74	599.96	R1PXS1	20.61	602.22	XS									
31.99	600.38	r1rxs1	32.32	600.25	R1PXS1	21.5	602.08	XS									
33.56	600.62	r1rxs1	33.11	600.57	R1PXS1	22.68	601.81	XS									
38.07	601.32	r1rxs1	35.91	600.96	R1PXS1	23.86	601.51	XS									
43.96	601.97	r1rxs1	38.17	601.03	R1PXS1	25.05	601.14	XS									
48.67	602.53	r1rxs1tob	40.29	601.32	R1PXS1	25.9	600.79	XS									
52.87	602.66	r1rxs1	43.31	601.51	R1PXS1	26.59	600.33	XS									
53.39	602.78	r1rxs1l	45.65	602.22	R1PXS1	26.78	600.03	XS									
			49.51	602.58	R1PXS1	26.72	599.84	XS									
			53.27	602.73	R1PXS1	27.19	599.38	XS									
			53.54	602.84	RPRXS1PL	27.92	599.23	XS									
			57.68	603.31	R1PXS1	28.85	599.3	XS									
			61.52	603.21	R1PXS1	29.84	599.38	XS									
			67.8	603.46	R1PXS1	30.68	599.38	XS									
						31.39	599.68	XS									
						32.09	599.85	XS									
						32.34	600.06	XSW									
						32.79	600.14	XS									
						33.21	600.21	XS									
						34.22	600.43	XS									
						34.48	600.74	XS									
						35.11	601.03	XS									
						36.41	600.98	XS									
						38.08	600.84	XS									
						38.73	601.14	XS									
						40.26	601.39	XS									
						41.52	601.48	XS									
						42.51	601.61	XS									
						43.74	601.79	XS									
						45.4	602.05	XS									
						47.06	602.23	XS									
						48.2	602.32	XS									
						50.06	602.46	XS									
						52.19	602.55	XS									
						53.48	602.66	XS									
						53.63	602.72	XSLP09									
						55.55	602.8	XS									
						56.64	602.92	XS									
						57.51	603.05	XS									

Bankfull Width (ft)	33.0		Bankfull Width (ft)	35.1		Bankfull Width (ft)	43.8		Bankfull Width (ft)			Bankfull Width (ft)			Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)	40.0		Bankfull Cross Sectional Area (sq ft)	48.6		Bankfull Cross Sectional Area (sq ft)	52.2		Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)	1.21		Bankfull Mean Depth (ft)	1.38		Bankfull Mean Depth (ft)	1.19		Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)	3.06		Bankfull Max Depth (ft)	3.39		Bankfull Max Depth (ft)	3.52		Bankfull Max Depth (ft)			Bankfull Max Depth (ft)			Bankfull Max Depth (ft)		
Flood Prone Width (ft)	-		Flood Prone Width (ft)	-		Flood Prone Width (ft)	-		Flood Prone Width (ft)			Flood Prone Width (ft)			Flood Prone Width (ft)		
Entrenchment Ratio (ft/ft)	-		Entrenchment Ratio (ft/ft)	-		Entrenchment Ratio (ft/ft)	-		Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)		
Width/Depth Ratio (ft/ft)	-		Width/Depth Ratio (ft/ft)	-		Width/Depth Ratio (ft/ft)	-		Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)		
D50 (mm)	6.21		D50 (mm)	4.0		D50 (mm)	0.06		D50 (mm)			D50 (mm)			D50 (mm)		
D84 (mm)	14.21		D84 (mm)	11.3		D84 (mm)	0.06		D84 (mm)			D84 (mm)			D84 (mm)		

Wolf Pond R2 RXS-1

Photo C 7 - R2 RXS-1 Left Pin

Photo C 8 - R2 RXS-1 Right Pin

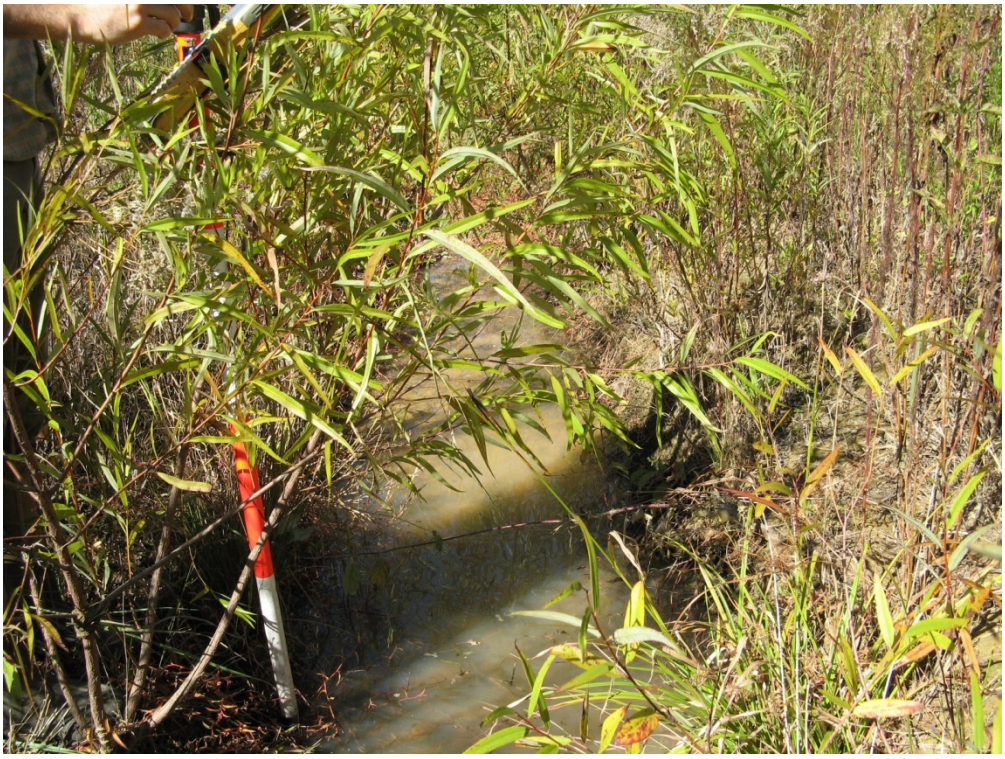


Photo C 9 - R2 RXS-1 Downstream

Figure C 3 - R2 RXS-1 Cross Section Plot

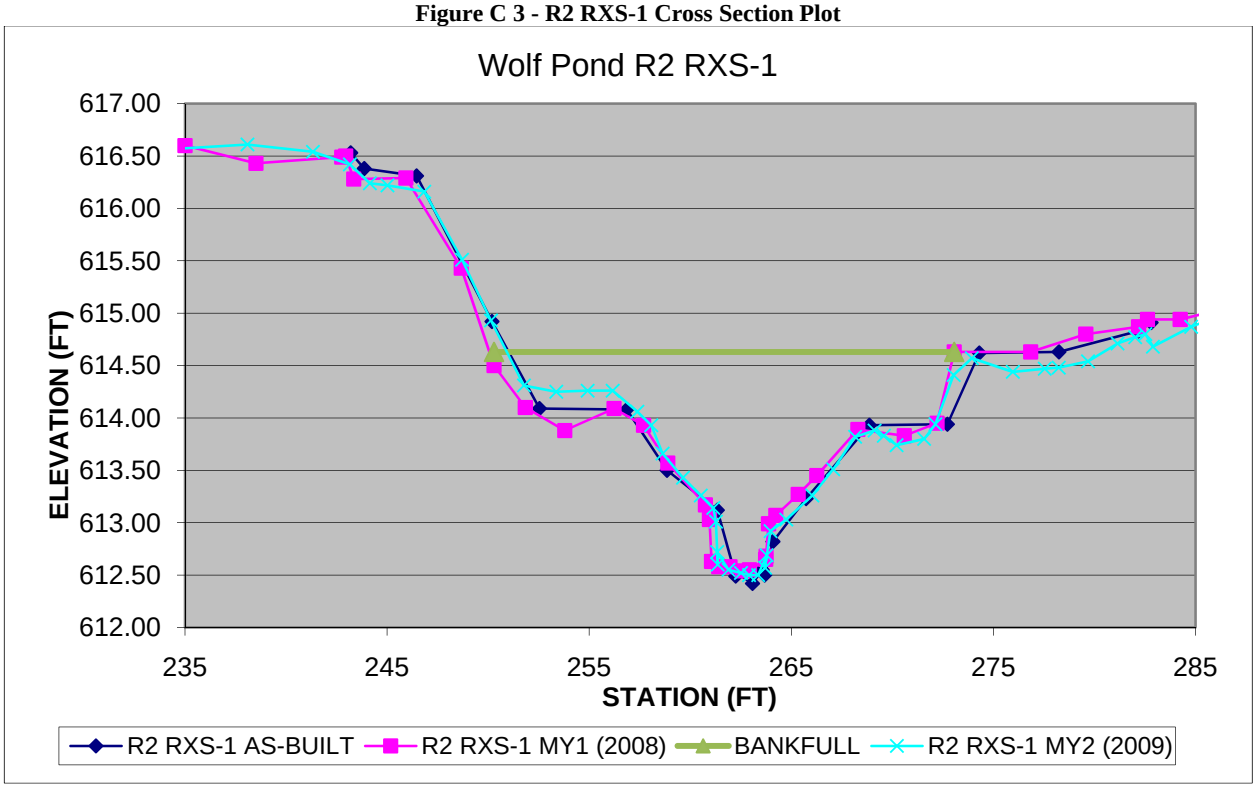


Table C 3 - R2 RXS-1 Dimension Data

AS-BUILT			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
243.2	616.53	r2rxs1r	20.35	624.87	R2RXS1	223.98	616.47	XS									
243.87	616.38	r2rxs1	40.29	624.21	R2RXS1	226.37	616.59	XS									
246.46	616.31	r2rxs1tob	67.31	623.02	R2RXS1	230.07	616.25	XS									
250.19	614.92	r2rxs1	92.19	621.76	R2RXS1	234.66	616.57	XS									
252.54	614.09	r2rxs1	121.49	619.8	R2RXS1	238.09	616.61	XS									
256.86	614.08	r2rxs1b	149.27	618.92	R2RXS1	241.33	616.54	XS									
258.85	613.5	r2rxs1	185.64	617.45	R2RXS1	243.16	616.42	XSRP09									
261.34	613.12	r2rxs1	201.14	617.05	R2RXS1	244.15	616.24	XS									
262.25	612.49	r2rxs1	210.6	617.16	R2RXS1	245.02	616.22	XS									
262.29	612.52	r2rxs1w	213.73	616.78	R2RXS1	246.84	616.16	XS									
263.08	612.42	r2rxs1	217.3	616.57	R2RXS1	248.71	615.51	XS									
263.56	612.55	r2rxs1w	222.11	616.61	R2RXS1	250.14	614.93	XS									
263.68	612.5	r2rxs1	227.97	616.52	R2RXS1	251.77	614.31	XS									
264.09	612.82	r2rxs1	235	616.6	R2RXS1	253.37	614.25	XS									
265.73	613.23	r2rxs1	238.51	616.43	R2RXS1	254.92	614.26	XS									
268.86	613.93	r2rxs1b	242.76	616.49	R2RXS1PR	256.16	614.26	XS									
272.72	613.94	r2rxs1	242.95	616.5	R2RXS1PR	257.38	614.06	XS									
274.3	614.62	r2rxs1tob	243.35	616.28	R2RXS1	258.07	613.93	XS									
278.24	614.63	r2rxs1	245.93	616.29	R2RXS1	258.63	613.66	XS									
282.18	614.83	r2rxs1	248.67	615.43	R2RXS1	259.64	613.43	XS									
282.8	614.91	r2rxs1l	250.29	614.5	R2RXS1	260.52	613.26	XS									
			251.84	614.1	R2RXS1	261.14	613.14	XS									
			253.79	613.88	R2RXS1	261.27	613.01	XS									
			256.23	614.09	R2RXS1	261.36	612.6	XS									
			257.69	613.93	R2RXS1	261.33	612.72	XSW									
			258.89	613.57	R2RXS1	261.89	612.55	XS									
			260.75	613.17	R2RXS1	262.51	612.52	XS									
			260.95	613.03	R2RXS1	262.91	612.5	XS									
			261.05	612.63	R2RXS1	263.36	612.5	XS									
			261.41	612.58	R2RXS1	263.78	612.69	XS									
			261.97	612.58	R2RXS1	263.7	612.57	XS									
			262.57	612.54	R2RXS1	263.97	612.92	XS									
			262.93	612.55	R2RXS1	264.75	613.03	XS									
			263.73	612.65	R2RXS1WS	266.04	613.26	XS									
			263.75	612.68	R2RXS1	267.07	613.51	XS									
			263.87	612.99	R2RXS1	268.16	613.82	XS									
			264.23	613.07	R2RXS1	269.12	613.88	XS									
			265.34	613.27	R2RXS1	269.58	613.83	XS									
			266.26	613.45	R2RXS1	270.21	613.74	XS									
			268.29	613.89	R2RXS1	271.57	613.8	XS									
			270.59	613.83	R2RXS1	272.13	613.94	XS									
			272.21	613.95	R2RXS1	273.03	614.41	XS									
			273.06	614.63	R2RXS1	273.93	614.57	XS									
			276.84	614.63	R2RXS1	275.96	614.44	XS									
			279.57	614.8	R2RXS1	277.54	614.47	XS									
			282.18	614.87	R2RXS1	278.23	614.48	XS									
			282.62	614.94	R2RXS1PL	279.68	614.54	XS									
			284.24	614.94	R2RXS1	281.14	614.71	XS									
			290.41	615.23	R2RXS1	282.01	614.77	XS									
			294.64	615.24	R2RXS1	282.52	614.8	XSLP09									
			299.06	615.71	R2RXS1	282.89	614.68	XS									
			307.87	616.9	R2RXS1	284.78	614.87	XS									
			324.46	617.21	R2RXS1	286.69	615.01	XS									
			412.44	624.2	R2RXS1	289.93	615.07	XS									
						293.76	615.23	XS									
						295.12	614.97	XS									
						296.94	614.99	XS									
						299.06	615.94	XS									
						299.78	616.07	XS									
						299.74	616.02	XS									
						300.6	615.71	XS									
						302.44	615.82	XS									
Bankfull Width (ft)		24.1	Bankfull Width (ft)		22.8	Bankfull Width (ft)		26.5	Bankfull Width (ft)			Bankfull Width (ft)			Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)		22.1	Bankfull Cross Sectional Area (sq ft)		22.4	Bankfull Cross Sectional Area (sq ft)		20.6	Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)		0.92	Bankfull Mean Depth (ft)		0.99	Bankfull Mean Depth (ft)		0.78	Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)		2.2	Bankfull Max Depth (ft)		2.09	Bankfull Max Depth (ft)		2.07	Bankfull Max Depth (ft)			Bankfull Max Depth (ft)			Bankfull Max Depth (ft)		
Flood Prone Width (ft)		94	Flood Prone Width (ft)		94	Flood Prone Width (ft)		94	Flood Prone Width (ft)			Flood Prone Width (ft)			Flood Prone Width (ft)		
Entrenchment Ratio (ft/ft)		3.90	Entrenchment Ratio (ft/ft)		4.13	Entrenchment Ratio (ft/ft)		3.55	Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)		
Width/Depth Ratio (ft/ft)		26.35	Width/Depth Ratio (ft/ft)		23.10	Width/Depth Ratio (ft/ft)		34.01	Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)		
D50 (mm)		19.87	D50 (mm)		13.49	D50 (mm)		13.65	D50 (mm)			D50 (mm)			D50 (mm)		
D84 (mm)		34.4	D84 (mm)		21.4	D84 (mm)		32.00	D84 (mm)			D84 (mm)			D84 (mm)		

Wolf Pond R2 RXS-2

Photo C 10 - R2 RXS-2 Left Pin

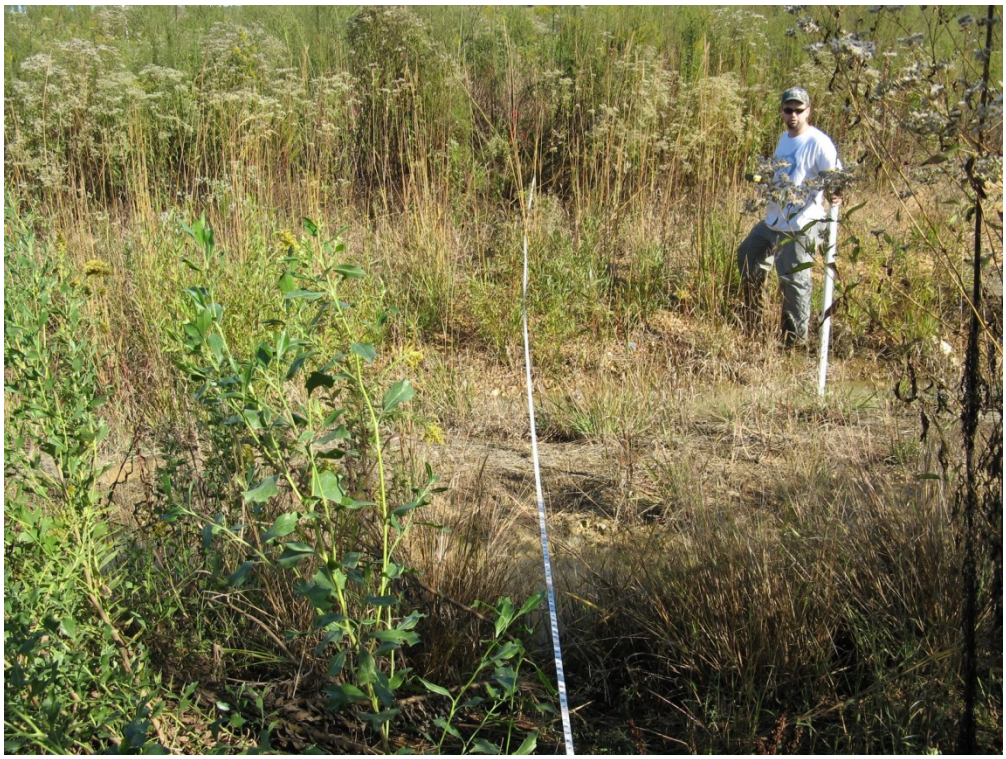


Photo C 11 - R2 RXS-2 Right Pin

Photo C 12 - R2 RXS-2 Downstream

Figure C 4 - R2 RXS-2 Cross Section Plot

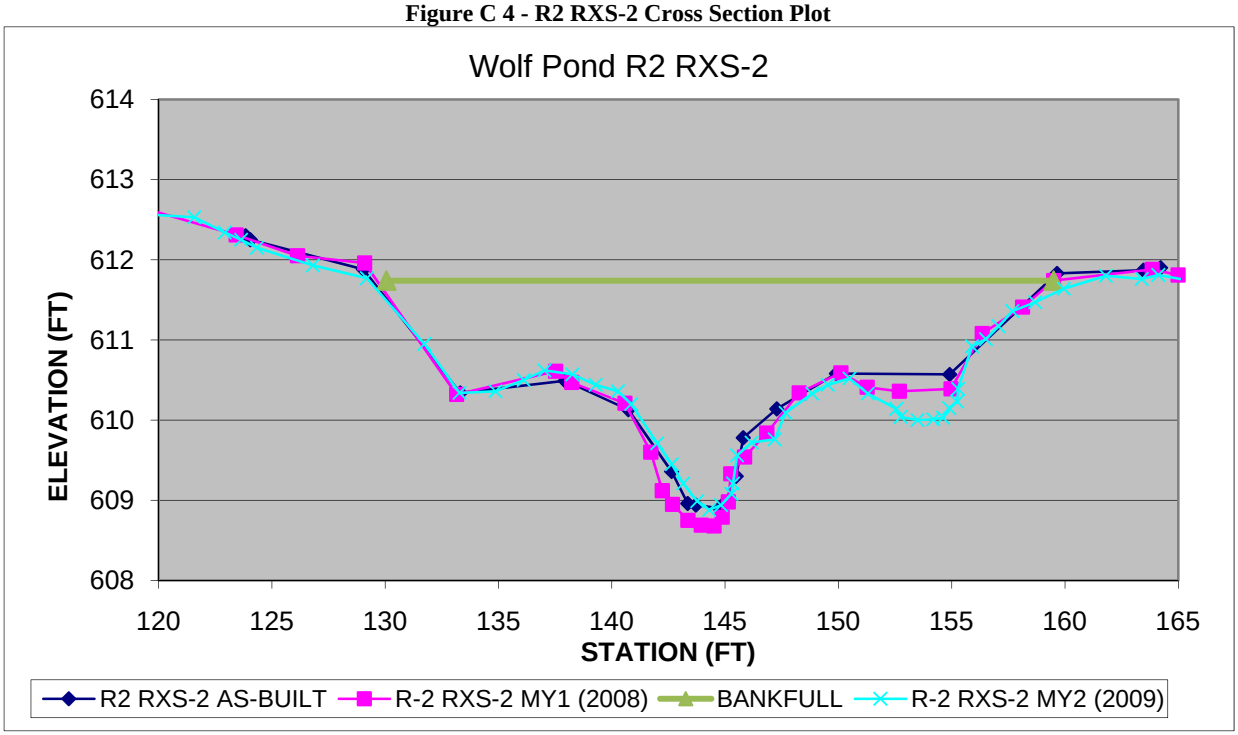


Table C 4 - R2 RXS-2 Dimension Data

AS-BUILT			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
123.84	612.3	r2rxs2r	9.49	619.56	R2RXS2	99.15	613.39	XS									
124.05	612.25	r2rxs2	28.99	618.8	R2RXS2	101.49	613.33	XS									
129.04	611.88	r2rxs2tob	72.93	615.94	R2RXS2	104.92	613.32	XS									
133.31	610.34	r2rxs2	92.74	613.88	R2RXS2	107.87	612.84	XS									
137.94	610.49	r2rxs2b	104.39	613.42	R2RXS2	112.77	612.88	XS									
140.73	610.13	r2rxs2	112.17	613.07	R2RXS2	118.57	612.58	XS									
142.64	609.36	r2rxs2	119.61	612.62	R2RXS2	121.57	612.53	XS									
143.35	608.96	r2rxs2w	123.42	612.31	R2RXS2PR	122.92	612.34	XS									
143.71	608.94	r2rxs2	126.13	612.34	R2RXS2	123.64	612.25	XSRP09									
144.75	608.9	r2rxs2	130.05	611.96	R2RXS2	124.34	612.15	XS									
144.99	608.97	r2rxs2w	134.72	610.16	R2RXS2	126.81	611.93	XS									
145.49	609.3	r2rxs2	137.52	610.61	R2RXS2	129.19	611.77	XS									
145.8	609.78	r2rxs2	138.23	610.47	R2RXS2	131.73	610.95	XS									
147.28	610.14	r2rxs2	140.58	610.21	R2RXS2	133.28	610.34	XS									
149.91	610.58	r2rxs2b	141.72	609.6	R2RXS2	134.87	610.36	XS									
154.91	610.57	r2rxs2	142.23	609.12	R2RXS2	136.11	610.5	XS									
159.65	611.83	r2rxs2tob	142.68	608.95	R2RXS2	137.03	610.62	XS									
163.46	611.87	r2rxs2	143.36	608.75	R2RXS2	138.26	610.57	XS									
164.22	611.9	r2rxs2l	143.95	608.69	R2RXS2	139.29	610.44	XS									
			144.51	608.68	R2RXS2	140.27	610.36	XS									
			144.87	608.79	R2RXS2	140.86	610.2	XS									
			145.14	608.98	R2RXS2	142	609.71	XS									
			145.25	609.33	R2RXS2WS	142.65	609.45	XS									
			145.86	609.54	R2RXS2	143.15	609.21	XS									
			146.84	609.84	R2RXS2	143.77	608.99	XS									
			148.27	610.34	R2RXS2	144.3	608.88	XS									
			150.11	610.59	R2RXS2	144.82	608.94	XS									
			151.27	610.41	R2RXS2	145.28	609.08	XS									
			152.69	610.36	R2RXS2	145.35	609.21	XSW									
			154.97	610.39	R2RXS2	145.53	609.56	XS									
			156.35	611.08	R2RXS2	146.17	609.72	XS									
			158.13	611.41	R2RXS2	147.19	609.76	XS									
			159.5	611.74	R2RXS2	147.67	610.09	XS									
			163.85	611.88	R2RXS2PL	148.84	610.33	XS									
			164.99	611.81	R2RXS2	149.53	610.44	XS									
			170.97	612.08	R2RXS2	150.49	610.52	XS									
			181.58	612.29	R2RXS2	151.3	610.33	XS									
			189.78	612.68	R2RXS2	152.56	610.14	XS									
			200.11	612.56	R2RXS2	152.75	610.04	XS									
			214.86	612.35	R2RXS2	153.49	610	XS									
			233.86	612.73	R2RXS2	154.19	610.01	XS									
			246.31	613.2	R2RXS2	154.62	610.03	XS									
			276.09	614.4	R2RXS2	154.89	610.15	XSW									
			299.38	616.07	R2RXS2	155.24	610.23	XS									
						155.28	610.39	XS									
						155.9	610.92	XS									
						156.51	611.01	XS									
						157.07	611.17	XS									
						157.68	611.36	XS									
						158.69	611.47	XS									
						159.95	611.64	XS									
						161.8	611.8	XS									
						163.39	611.76	XS									
						164.12	611.81	XSLP09									
						165.67	611.73	XS									
						167.44	611.95	XS									
						168.38	611.73	XS									
						171.75	612.06	XS									
						173.92	612.24	XS									
						177.4	612.2	XS									
						178.7	612.32	XS									
						181.94	612.35	XS									
Bankfull Width (ft)		30.6	Bankfull Width (ft)		30.4	Bankfull Width (ft)		30.8	Bankfull Width (ft)			Bankfull Width (ft)			Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)		42.5	Bankfull Cross Sectional Area (sq ft)		41.4	Bankfull Cross Sectional Area (sq ft)		41.7	Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)		1.39	Bankfull Mean Depth (ft)		1.36	Bankfull Mean Depth (ft)		1.35	Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)		2.93	Bankfull Max Depth (ft)		3.06	Bankfull Max Depth (ft)		2.86	Bankfull Max Depth (ft)			Bankfull Max Depth (ft)			Bankfull Max Depth (ft)		
Flood Prone Width (ft)		203	Flood Prone Width (ft)		203	Flood Prone Width (ft)		203	Flood Prone Width (ft)			Flood Prone Width (ft)			Flood Prone Width (ft)		
Entrenchment Ratio (ft/ft)		6.63	Entrenchment Ratio (ft/ft)		6.68	Entrenchment Ratio (ft/ft)		6.6	Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)		
Width/Depth Ratio (ft/ft)		22.07	Width/Depth Ratio (ft/ft)		22.36	Width/Depth Ratio (ft/ft)		22.71	Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)		
D50 (mm)		14.53	D50 (mm)		2.0	D50 (mm)		10.97	D50 (mm)			D50 (mm)			D50 (mm)		
D84 (mm)		27.85	D84 (mm)		11.3	D84 (mm)		22.60	D84 (mm)			D84 (mm)			D84 (mm)		

Wolf Pond R2 PXS-1

Photo C 13 - R2 PXS-1 Left Pin

Photo C 14 - R2 PXS-1 Right Pin

Photo C 15 - R2 PXS-1 Downstream

Figure C 5 - R2 PXS-1 Cross Section Plot

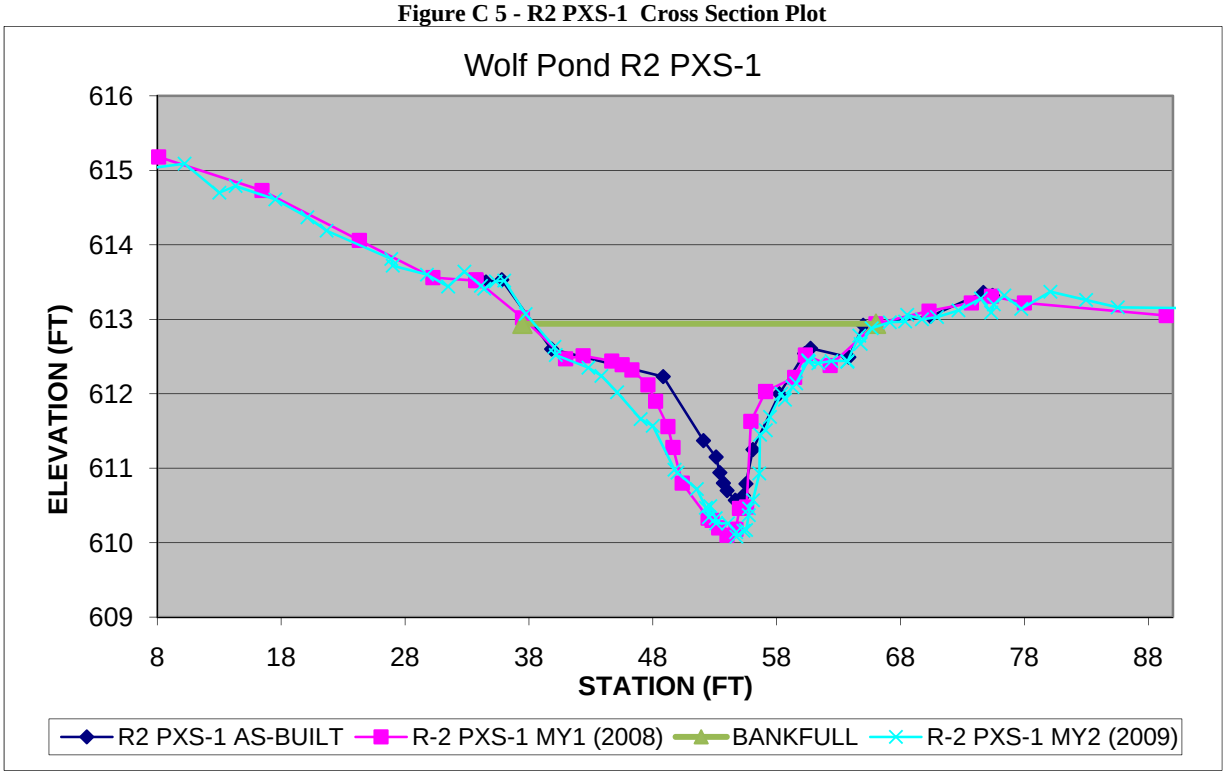


Table C 5 - R2 PXS-1 Dimension Data

AS-BUILT			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
34.12	613.52	r2pxs1r	8.11	615.18	R2PXS1	1.06	615.74	XSRP09									
34.53	613.5	r2pxs1	16.45	614.73	R2PXS1	1.37	615.8	XS									
35.81	613.53	r2pxs1tob	24.31	614.06	R2PXS1	4.14	614.82	XSRP09									
39.83	612.6	r2pxs1	30.25	613.56	R2PXS1	7.06	615.02	XS									
48.84	612.23	r2pxs1b	33.7	613.52	R2PXS1PR	10.2	615.09	XSRP09									
52.09	611.37	r2pxs1	33.72	613.52	R2PXS1	13.01	614.7	XS									
53.11	611.15	r2pxs1	33.72	613.53	R2PXS1PR	14.32	614.79	XSRP09									
53.41	610.94	r2pxs1	37.48	613.02	R2PXS1	17.53	614.61	XS									
53.7	610.8	r2pxs1w	40.96	612.47	R2PXS1	20.12	614.37	XSRP09									
54	610.7	r2pxs1	42.38	612.51	R2PXS1	21.67	614.19	XS									
54.66	610.57	r2pxs1	44.69	612.44	R2PXS1	26.89	613.81	XS									
55.31	610.63	r2pxs1	45.53	612.39	R2PXS1	27.01	613.72	XSRP09									
55.52	610.79	r2pxs1w	46.32	612.32	R2PXS1	29.77	613.6	XS									
56.08	611.25	r2pxs1	47.61	612.12	R2PXS1	31.48	613.44	XSRP09									
58.22	612	r2pxs1	48.23	611.9	R2PXS1	32.79	613.64	XS									
60.26	612.54	r2pxs1b	49.22	611.56	R2PXS1	34.13	613.45										
60.74	612.61	b/tob	49.63	611.28	R2PXS1	34.4	613.41	XS									
63.83	612.49	r2pxs1	50.38	610.8	R2PXS1	35.32	613.51	XSRP09									
64.99	612.92	r2pxs1tob	52.47	610.33	R2PXS1	36.01	613.52	XS									
70.42	613.04	r2pxs1	52.79	610.3	R2PXS1	37.74	613.07	XS									
74.69	613.36	r2pxs1	53.32	610.2	R2PXS1	40.06	612.63	XS									
75.43	613.32	r2pxs1l	53.99	610.1	R2PXS1	40.17	612.52	XSRP09									
			54.71	610.18	R2PXS1	42.8	612.35	XS									
			55	610.46	R2PXS1	43.85	612.24	XSRP09									
			55.57	610.48	R2PXS1WS	45.12	612.02	XS									
			55.92	611.63	R2PXS1	47.02	611.66	XSRP09									
			57.11	612.03	R2PXS1	48	611.57	XS									
			59.45	612.22	R2PXS1	49.76	610.98	XSRP09									
			60.32	612.52	R2PXS1	49.99	610.94	XS									
			62.32	612.38	R2PXS1	51.56	610.72	XS									
			66.01	612.94	R2PXS1	52.29	610.47	XSRP09									
			70.3	613.11	R2PXS1	52.53	610.34	XS									
			73.72	613.22	R2PXS1	52.64	610.49	XS									
			75.34	613.31	R2PXS1PL	53.08	610.33	XS									
			78	613.22	R2PXS1	53.11	610.26	XSRP09									
			89.45	613.05	R2PXS1	54.08	610.26	XS									
						54.73	610.14	XS									
						54.75	610.08	XSRP09									
						55.32	610.16	XSRP09									
						55.53	610.17	XS									
						55.75	610.37	XS									
						55.77	610.46	XSRP09									
						56.09	610.57	XSW									
						56.6	610.93	XS									
						56.66	611.45	XSRP09									
						57.12	611.51	XS									
						57.46	611.69	XS									
						58.38	612	XS									
						58.67	611.92	XSRP09									
						59.28	612.09	XS									
						59.58	612.14	XSRP09									
						60.54	612.45	XS									
						60.61	612.43	XSRP09									
						61.36	612.41	XS									
						62.42	612.44	XS									
						63.73	612.44	XS									
						63.7	612.43	XSRP09									
						64.67	612.78	XSRP09									
						64.78	612.67	XS									
						65.67	612.88	XS									
						67.14	612.96	XS									
						68.37	612.97	XSRP09									

Bankfull Width (ft)	25.2	Bankfull Width (ft)	28.5	Bankfull Width (ft)	27.9	Bankfull Width (ft)		Bankfull Width (ft)		Bankfull Width (ft)	
Bankfull Cross Sectional Area (sq ft)	21.9	Bankfull Cross Sectional Area (sq ft)	27.7	Bankfull Cross Sectional Area (sq ft)	32.4	Bankfull Cross Sectional Area (sq ft)		Bankfull Cross Sectional Area (sq ft)		Bankfull Cross Sectional Area (sq ft)	
Bankfull Mean Depth (ft)	0.87	Bankfull Mean Depth (ft)	0.97	Bankfull Mean Depth (ft)	1.16	Bankfull Mean Depth (ft)		Bankfull Mean Depth (ft)		Bankfull Mean Depth (ft)	
Bankfull Max Depth (ft)	2.35	Bankfull Max Depth (ft)	2.84	Bankfull Max Depth (ft)	2.86	Bankfull Max Depth (ft)		Bankfull Max Depth (ft)		Bankfull Max Depth (ft)	
Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)		Flood Prone Width (ft)		Flood Prone Width (ft)	
Entrenchment Ratio (ft/ft)	-	Entrenchment Ratio (ft/ft)	-	Entrenchment Ratio (ft/ft)	-	Entrenchment Ratio (ft/ft)		Entrenchment Ratio (ft/ft)		Entrenchment Ratio (ft/ft)	
Width/Depth Ratio (ft/ft)	-	Width/Depth Ratio (ft/ft)	-	Width/Depth Ratio (ft/ft)	-	Width/Depth Ratio (ft/ft)		Width/Depth Ratio (ft/ft)		Width/Depth Ratio (ft/ft)	
D50 (mm)	0.15	D50 (mm)	0.06	D50 (mm)	0.06	D50 (mm)		D50 (mm)		D50 (mm)	
D84 (mm)	0.40	D84 (mm)	8.00	D84 (mm)	13.65	D84 (mm)		D84 (mm)		D84 (mm)	

Wolf Pond R2 PXS-2

Photo C 16 - R2 PXS-2 Left Pin

Photo C 17 - R2 PXS-2 Right Pin

Photo C 18 - R2 PXS-2 Downstream

Figure C 6 - R2 PXS-2 Cross Section Plot

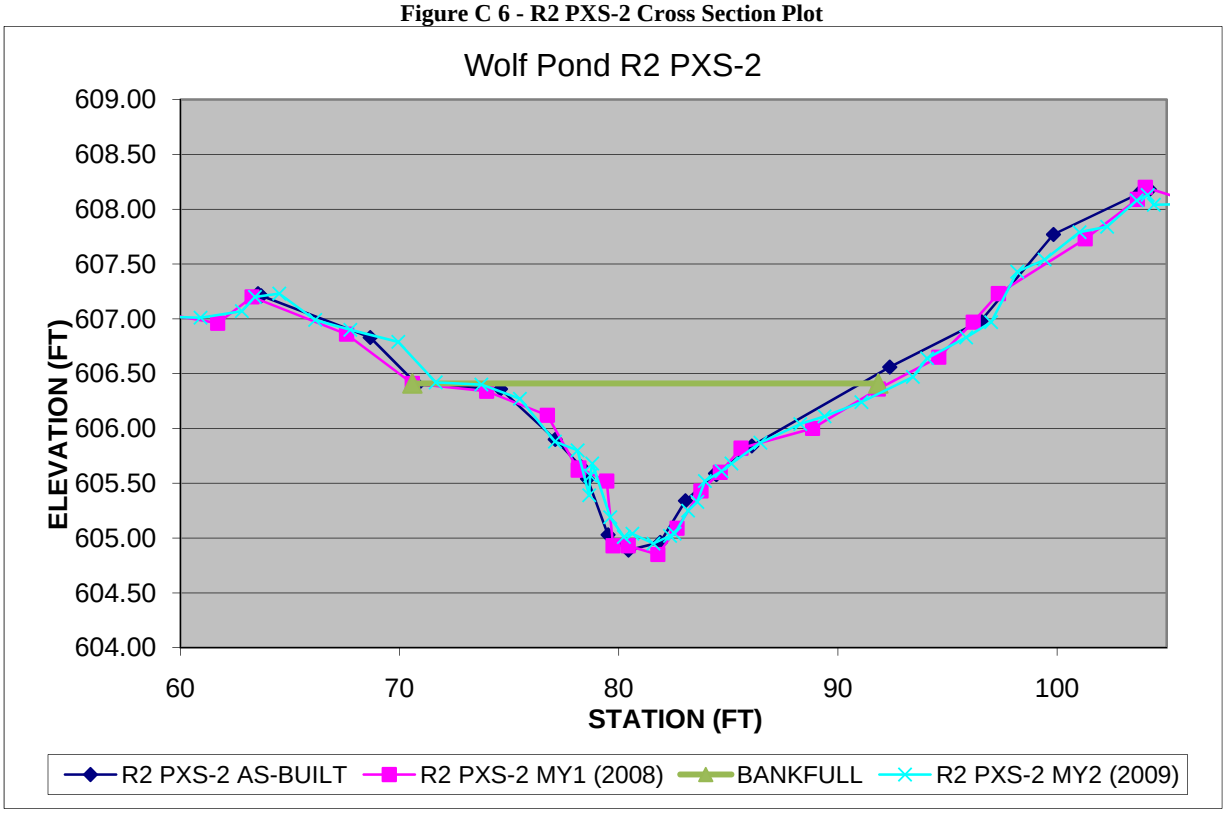


Table C 6 - R2 PXS-2 Dimension Data

AS-BUILT			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
63.54	607.23	r2pxs2r	5.09	607.75	R2PXS2	44.3	607.62	XS									
63.69	607.21	r2pxs2	37.18	607.68	R2PXS2	47.49	607.36	XS									
68.66	606.83	r2pxs2	51.18	607.33	R2PXS2	50.29	607.23	XS									
70.8	606.4	r2pxs2	61.7	606.96	R2PXS2	51.84	607.34	XS									
74.6	606.36	r2pxs2b	63.27	607.2	R2PXS2PR	54.93	607.32	XS									
77.1	605.9	r2pxs2	67.58	606.86	R2PXS2	57.5	607.03	XS									
78.28	605.65	r2pxs2w	70.58	606.41	R2PXS2	60.92	607.01	XS									
78.57	605.54	r2pxs2	73.97	606.34	R2PXS2	62.8	607.07	XS									
79.51	605.03	r2pxs2	76.74	606.12	R2PXS2	63.4	607.2	XSRP09									
80.44	604.89	r2pxs2	78.15	605.62	R2PXS2	64.51	607.23	XS									
81.89	604.96	r2pxs2	78.18	605.64	R2PXS2WS	66.15	606.99	XS									
83.04	605.34	r2pxs2	79.45	605.52	R2PXS2	67.75	606.9	XS									
84.41	605.59	r2pxs2w	79.74	604.93	R2PXS2	69.94	606.79	XS									
84.45	605.58	r2pxs2	80.43	604.93	R2PXS2	71.65	606.42	XS									
86.07	605.84	r2pxs2	81.78	604.85	R2PXS2	73.73	606.4	XS									
92.36	606.56	r2pxs2b	82.66	605.09	R2PXS2	75.49	606.27	XS									
96.52	606.98	r2pxs2	83.75	605.43	R2PXS2	77.09	605.88	XS									
99.83	607.77	r2pxs2tob	84.63	605.6	R2PXS2	78.12	605.8	XS									
103.7	608.14	r2pxs2	85.58	605.82	R2PXS2	78.65	605.39	XS									
104.21	608.18	r2pxs2l	88.84	606	R2PXS2	78.7	605.57	XS									
			91.84	606.36	R2PXS2	78.79	605.68	XSW									
			94.6	606.65	R2PXS2	79.61	605.19	XS									
			96.17	606.97	R2PXS2	80.23	605.01	XS									
			97.32	607.23	R2PXS2	80.62	605.04	XS									
			101.28	607.73	R2PXS2	81.58	604.95	XS									
			103.66	608.09	R2PXS2	82.34	605.02	XS									
			104.02	608.2	R2PXS2PL	82.55	605.04	XS									
			109.45	607.86	R2PXS2	83.16	605.25	XS									
			117.52	608.27	R2PXS2	83.58	605.33	XS									
			128.17	608.24	R2PXS2	83.93	605.52	XS									
						84.69	605.61	XS									
						85.14	605.68	XS									
						86.46	605.87	XS									
						88.28	606.04	XS									
						89.39	606.11	XS									
						91.07	606.24	XS									
						93.42	606.47	XS									
						94.07	606.64	XS									
						95.85	606.83	XS									
						96.99	606.97	XS									
						98.18	607.43	XS									
						99.43	607.54	XS									
						101.02	607.79	XS									
						102.28	607.84	XS									
						103.63	608.08	XS									
						104.13	608.13	XSLP09									
						104.41	608.04	XS									
						106.56	608.05	XS									
						108.16	608.08	XS									
						109.15	607.8	XS									
						110.23	607.98	XS									
						111.16	607.85	XS									
						112.73	608.13	XS									

Bankfull Width (ft)	21.6		Bankfull Width (ft)	21.3		Bankfull Width (ft)	17.3		Bankfull Width (ft)			Bankfull Width (ft)			Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)	11.4		Bankfull Cross Sectional Area (sq ft)	12.2		Bankfull Cross Sectional Area (sq ft)	11.8		Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)	0.53		Bankfull Mean Depth (ft)	0.57		Bankfull Mean Depth (ft)	0.68		Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)	1.5		Bankfull Max Depth (ft)	1.6		Bankfull Max Depth (ft)	1.46		Bankfull Max Depth (ft)			Bankfull Max Depth (ft)			Bankfull Max Depth (ft)		
Flood Prone Width (ft)	-		Flood Prone Width (ft)	-		Flood Prone Width (ft)	-		Flood Prone Width (ft)			Flood Prone Width (ft)			Flood Prone Width (ft)		
Entrenchment Ratio (ft/ft)	-		Entrenchment Ratio (ft/ft)	-		Entrenchment Ratio (ft/ft)	-		Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)		
Width/Depth Ratio (ft/ft)	-		Width/Depth Ratio (ft/ft)	-		Width/Depth Ratio (ft/ft)	-		Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)		
D50 (mm)	0.06		D50 (mm)	0.06		D50 (mm)	0.06		D50 (mm)			D50 (mm)			D50 (mm)		
D84 (mm)	4.85		D84 (mm)	0.06		D84 (mm)	0.06		D84 (mm)			D84 (mm)			D84 (mm)		

Wolf Pond R3 RXS-1

Photo C 19 - R3 RXS-1 Left Pin

Photo C 20 - R3 RXS-1 Right Pin

Photo C 21 - R3 RXS-1 Downstream

Figure C 7 - R3 RXS-1 Cross Section Plot

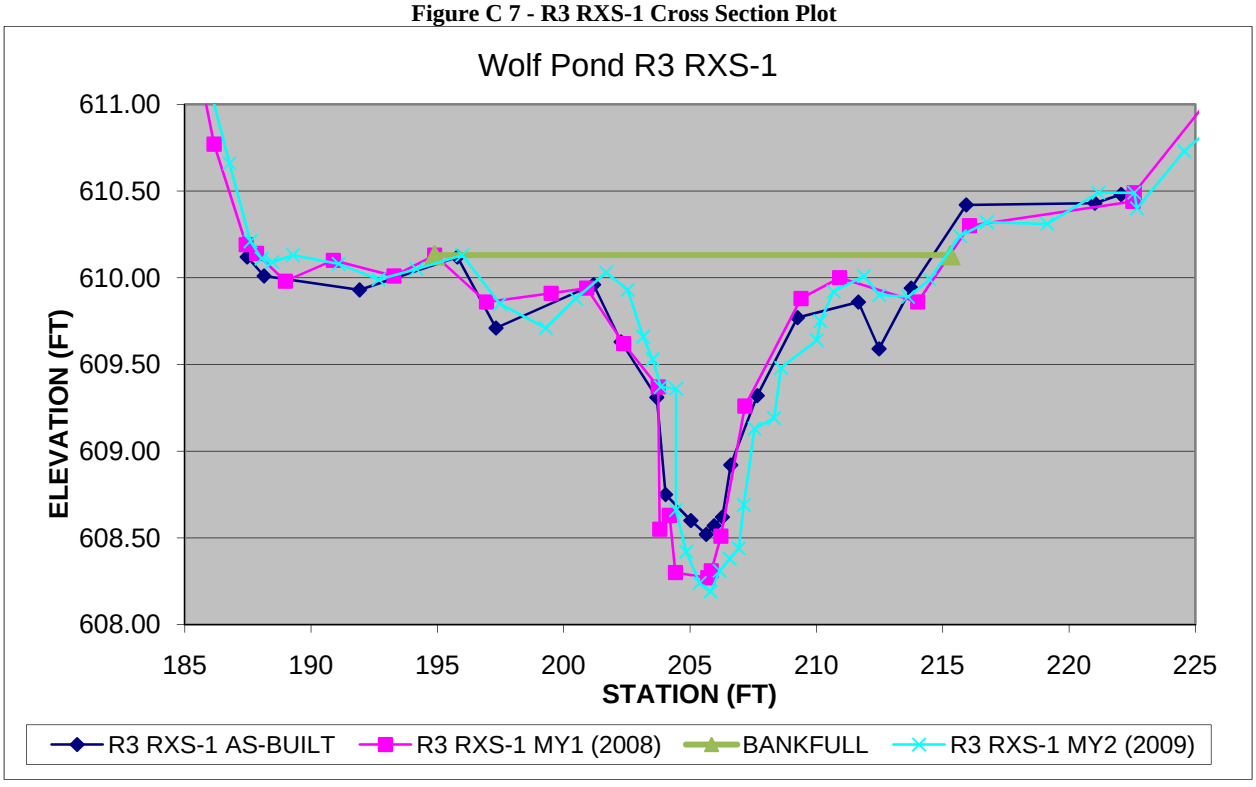


Table C 7 - R3 RXS-1 Dimension Data

AS-BUILT			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
187.47	610.12	r3rxs1r	65.43	612.57	R3PXS1	177.92	611.48	XS									
188.14	610.01	r3rxs1	101.5	611.9	R3PXS1	179.17	611.49	XS									
191.92	609.93	r3rxs1	112.14	611.87	R3PXS1	181.6	611.53	XS									
195.79	610.12	r3rxs1tob	128.94	611.43	R3PXS1	183.11	611.71	XS									
197.32	609.71	r3rxs1	140.25	611.49	R3PXS1	184.01	611.58	XS									
201.18	609.96	r3rxs1	156.99	611.21	R3PXS1	185.74	611.24	XS									
202.27	609.63	r3rxs1	161.71	611.04	R3PXS1	186.77	610.66	XS									
203.68	609.31	r3rxs1	169.33	611.1	R3PXS1	187.6	610.21	XS									
204.03	608.75	r3rxs1	173.28	611.47	R3PXS1	188.04	610.11	XSRP09									
205.03	608.6	r3rxs1w	178.57	611.24	R3PXS1	188.47	610.09	XS									
205.64	608.52	r3rxs1	181.37	611.5	R3PXS1	189.28	610.13	XS									
205.95	608.57	r3rxs1	183.75	611.54	R3PXS1	191.09	610.08	XS									
206.28	608.62	r3rxs1w	185.5	611.25	R3PXS1	192.67	609.99	XS									
206.61	608.92	r3rxs1	186.16	610.77	R3PXS1	194.17	610.05	XS									
207.66	609.32	r3rxs1	187.43	610.19	R3PXS1	195.98	610.13	XS									
209.25	609.77	r3rxs1	187.84	610.14	R3RXS1PR	197.47	609.85	XS									
211.66	609.86	r3rxs1	188.98	609.98	R3PXS1	199.29	609.71	XS									
212.48	609.59	r3rxs1	190.88	610.1	R3PXS1	200.48	609.88	XS									
213.75	609.94	r3rxs1	193.28	610.01	R3PXS1	201.68	610.03	XS									
215.93	610.42	r3rxs1tob	194.89	610.13	R3PXS1	202.53	609.93	XS									
221.02	610.43	r3rxs1	196.94	609.86	R3PXS1	203.14	609.66	XS									
222.06	610.48	r3rxs1l	199.5	609.91	R3PXS1	203.52	609.53	XS									
			200.91	609.94	R3PXS1	203.84	609.37	XS									
			202.37	609.62	R3PXS1	204.45	609.36	XS									
			203.74	609.37	R3PXS1	204.44	608.66	XS									
			203.8	608.55	R3RXS1WS	204.85	608.42	XS									
			204.19	608.63	R3PXS1	205.38	608.24	XS									
			204.42	608.3	R3PXS1	205.81	608.19	XS									
			205.7	608.27	R3PXS1	206.17	608.31	XS									
			205.84	608.31	R3PXS1	206.57	608.38	XS									
			206.22	608.51	R3PXS1	206.93	608.44	XS									
			207.17	609.26	R3PXS1	207.13	608.69	XS									
			209.39	609.88	R3PXS1	207.55	609.13	XS									
			210.92	610	R3PXS1	208.33	609.19	XS									
			214.01	609.86	R3PXS1	208.6	609.48	XS									
			216.06	610.3	R3PXS1	210.02	609.64	XS									
			222.53	610.44	R3PXS1	210.15	609.75	XS									
			222.58	610.49	R3RXS1PL	210.68	609.92	XS									
			225.54	611.03	R3PXS1	211.88	610.01	XS									
			247.02	611.86	R3PXS1	212.49	609.9	XS									
			259.18	612.28	R3PXS1	213.63	609.89	XS									
						214.48	609.99	XS									
						215.68	610.24	XS									
						216.75	610.32	XS									
						219.13	610.31	XS									
						221.16	610.49	XS									
						222.58	610.49	XSLP09									
						222.69	610.4	XS									
						224.56	610.73	XS									
						226.06	610.92	XS									

Bankfull Width (ft)	20.1		Bankfull Width (ft)	21.2		Bankfull Width (ft)	25.2		Bankfull Width (ft)			Bankfull Width (ft)			Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)	10.4		Bankfull Cross Sectional Area (sq ft)	10.3		Bankfull Cross Sectional Area (sq ft)	9.7		Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)			Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)	0.52		Bankfull Mean Depth (ft)	0.49		Bankfull Mean Depth (ft)	0.39		Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)			Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)	1.6		Bankfull Max Depth (ft)	1.86		Bankfull Max Depth (ft)	1.94		Bankfull Max Depth (ft)			Bankfull Max Depth (ft)			Bankfull Max Depth (ft)		
Flood Prone Width (ft)	121		Flood Prone Width (ft)	121		Flood Prone Width (ft)	121		Flood Prone Width (ft)			Flood Prone Width (ft)			Flood Prone Width (ft)		
Entrenchment Ratio (ft/ft)	6.01		Entrenchment Ratio (ft/ft)	5.72		Entrenchment Ratio (ft/ft)	4.80		Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)			Entrenchment Ratio (ft/ft)		
Width/Depth Ratio (ft/ft)	39.10		Width/Depth Ratio (ft/ft)	43.35		Width/Depth Ratio (ft/ft)	65.17		Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)			Width/Depth Ratio (ft/ft)		
D50 (mm)	13.47		D50 (mm)	6.47		D50 (mm)	0.06		D50 (mm)			D50 (mm)			D50 (mm)		
D84 (mm)	22.6		D84 (mm)	20.95		D84 (mm)	5.70		D84 (mm)			D84 (mm)			D84 (mm)		

Wolf Pond R3 PXS-1

Photo C 22 - R3 PXS-1 Left Pin

Photo C 23 - R3 PXS-1 Right Pin

Photo C 24 - R3 PXS-1 Downstream

Figure C 8 - R3 PXS-1 Cross Section Plot

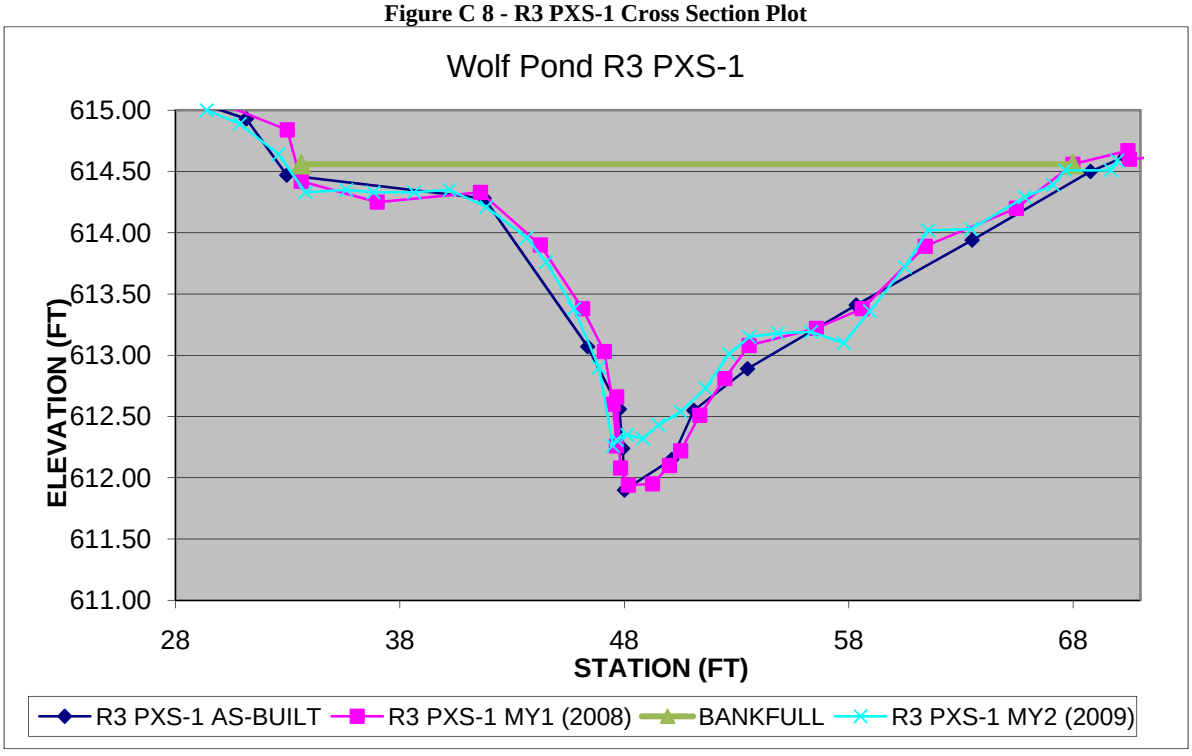


Table C 8 - R3 PXS-1 Dimension Data

AS-BUILT			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
29.1	615.08	r3pxs1r	1.04	618.09	R3PXS1	18.35	616.48	XS									
29.52	615.03	r3pxs1	15.85	616.47	R3PXS1	19.71	616.09	XS									
31.16	614.93	r3pxs1tob	25.02	615.67	R3PXS1	21.78	615.82	XS									
32.96	614.47	r3pxs1	29.09	615.12	R3PXS1PR	23.46	615.73	XS									
41.76	614.28	r3pxs1	29.26	615.11	R3PXS1PR	25.97	615.34	XS									
46.37	613.07	r3pxs1	32.98	614.84	R3PXS1	27.86	615.21	XS									
47.78	612.56	r3pxs1w	33.6	614.42	R3PXS1	28.77	615.05	XSRP09									
47.93	612.24	r3pxs1	36.99	614.25	R3PXS1	29.39	615	XS									
48.01	611.9	r3pxs1	41.59	614.33	R3PXS1	30.87	614.89	XS									
50.11	612.15	r3pxs1	44.26	613.9	R3PXS1	32.59	614.64	XS									
51.1	612.55	r3pxs1w	46.14	613.38	R3PXS1	33.79	614.33	XS									
53.49	612.89	r3pxs1	47.11	613.03	R3PXS1	35.61	614.35	XS									
58.33	613.41	r3pxs1	47.5	612.6	R3PXS1	36.82	614.33	XS									
63.5	613.94	r3pxs1	47.65	612.26	R3PXS1	38.63	614.33	XS									
68.77	614.5	r3pxs1tob	47.66	612.66	R3PXS1WS	40.21	614.35	XS									
70.31	614.62	r3pxs1l	47.83	612.08	R3PXS1	41.85	614.21	XS									
			48.18	611.94	R3PXS1	43.65	613.96	XS									
			49.26	611.95	R3PXS1	44.51	613.76	XS									
			50.01	612.1	R3PXS1	45.76	613.38	XS									
			50.51	612.22	R3PXS1	46.87	612.9	XS									
			51.36	612.51	R3PXS1	47.49	612.26	XS									
			52.48	612.81	R3PXS1	47.65	612.31	XS									
			53.56	613.08	R3PXS1	48.13	612.35	XS									
			56.56	613.22	R3PXS1	48.83	612.32	XS									
			58.6	613.38	R3PXS1	49.52	612.43	XS									
			61.41	613.89	R3PXS1	50.51	612.54	XS									
			65.47	614.2	R3PXS1	51.62	612.73	XS									
			67.99	614.56	R3PXS1	52.66	613.01	XS									
			70.44	614.67	R3PXS1PL	53.56	613.15	XS									
			70.51	614.6	R3PXS1	54.85	613.18	XS									
			73.83	614.66	R3PXS1	56.32	613.19	XS									
			76.59	615.09	R3PXS1	57.78	613.1	XS									
			84.08	615.12	R3PXS1	58.94	613.36	XS									
			88.6	615.79	R3PXS1	60.5	613.72	XS									
			98.31	615.86	R3PXS1	61.53	614.02	XS									
			105.57	615.55	R3PXS1	63.45	614.03	XS									
			115.46	615.07	R3PXS1	65.84	614.29	XS									
			127.21	615.1	R3PXS1	67.11	614.39	XS									
						67.64	614.51	XS									
						69.68	614.51	XS									
						69.96	614.59	XSLP09									

Bankfull Width (ft)	35.8	Bankfull Width (ft)	34.4	Bankfull Width (ft)	37.1	Bankfull Width (ft)		Bankfull Width (ft)		Bankfull Width (ft)	
Bankfull Cross Sectional Area (sq ft)	31.6	Bankfull Cross Sectional Area (sq ft)	32.1	Bankfull Cross Sectional Area (sq ft)	31.4	Bankfull Cross Sectional Area (sq ft)		Bankfull Cross Sectional Area (sq ft)		Bankfull Cross Sectional Area (sq ft)	
Bankfull Mean Depth (ft)	0.88	Bankfull Mean Depth (ft)	0.93	Bankfull Mean Depth (ft)	0.85	Bankfull Mean Depth (ft)		Bankfull Mean Depth (ft)		Bankfull Mean Depth (ft)	
Bankfull Max Depth (ft)	2.6	Bankfull Max Depth (ft)	2.62	Bankfull Max Depth (ft)	2.3	Bankfull Max Depth (ft)		Bankfull Max Depth (ft)		Bankfull Max Depth (ft)	
Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)		Flood Prone Width (ft)		Flood Prone Width (ft)	
Entrenchment Ratio (ft/ft)	-	Entrenchment Ratio (ft/ft)	-	Entrenchment Ratio (ft/ft)	-	Entrenchment Ratio (ft/ft)		Entrenchment Ratio (ft/ft)		Entrenchment Ratio (ft/ft)	
Width/Depth Ratio (ft/ft)	-	Width/Depth Ratio (ft/ft)	-	Width/Depth Ratio (ft/ft)	-	Width/Depth Ratio (ft/ft)		Width/Depth Ratio (ft/ft)		Width/Depth Ratio (ft/ft)	
D50 (mm)	5.96	D50 (mm)	2.63	D50 (mm)	0.96	D50 (mm)		D50 (mm)		D50 (mm)	
D84 (mm)	12.71	D84 (mm)	5.70	D84 (mm)	5.70	D84 (mm)		D84 (mm)		D84 (mm)	

Figure C 9 - Reach 1 Longitudinal Profile

Figure C 10 - Reach 2 Longitudinal Profile

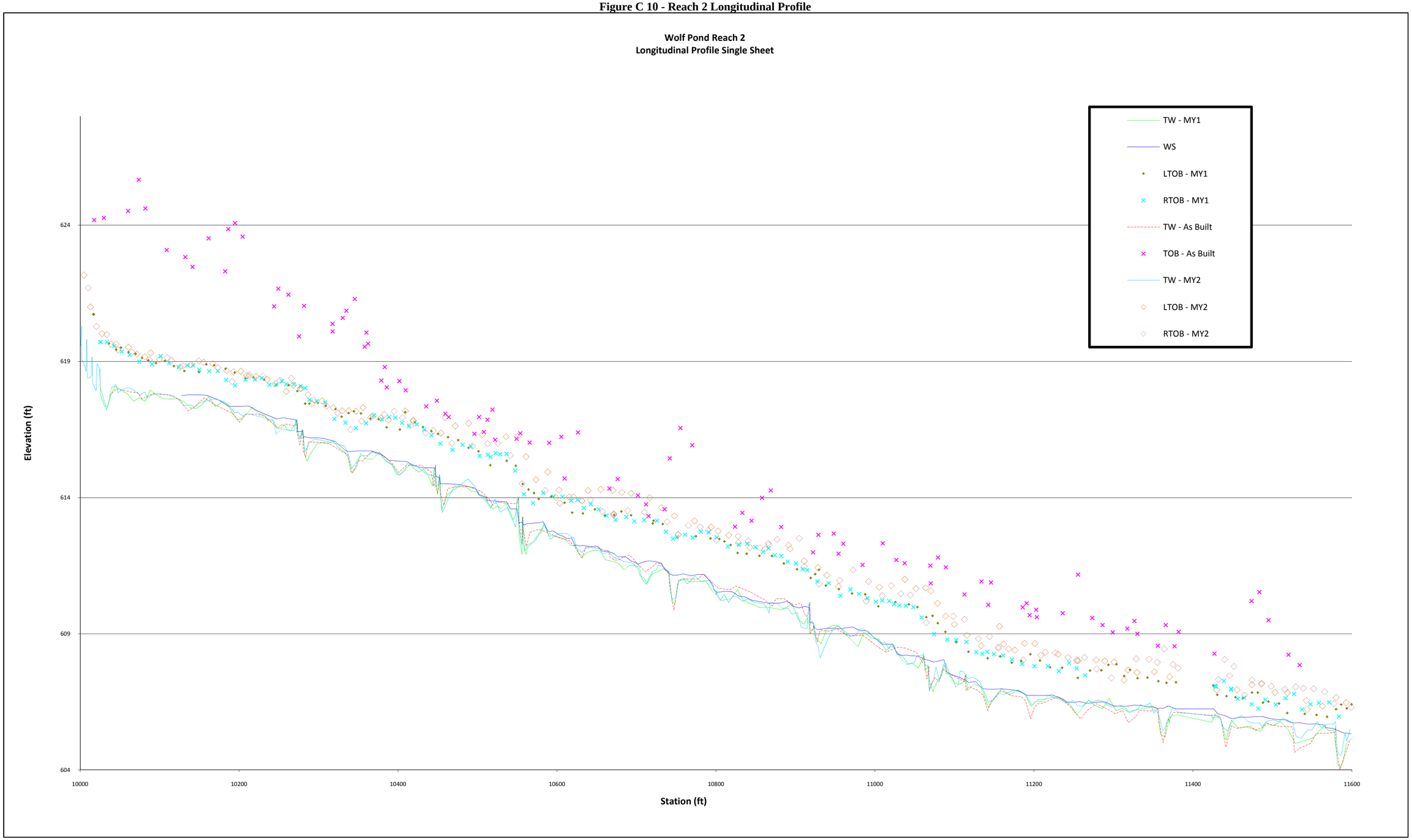


Figure C 11 - Reach 3 Longitudinal Profile

Figure C 12 - R1 RXS-1 Pebble Count

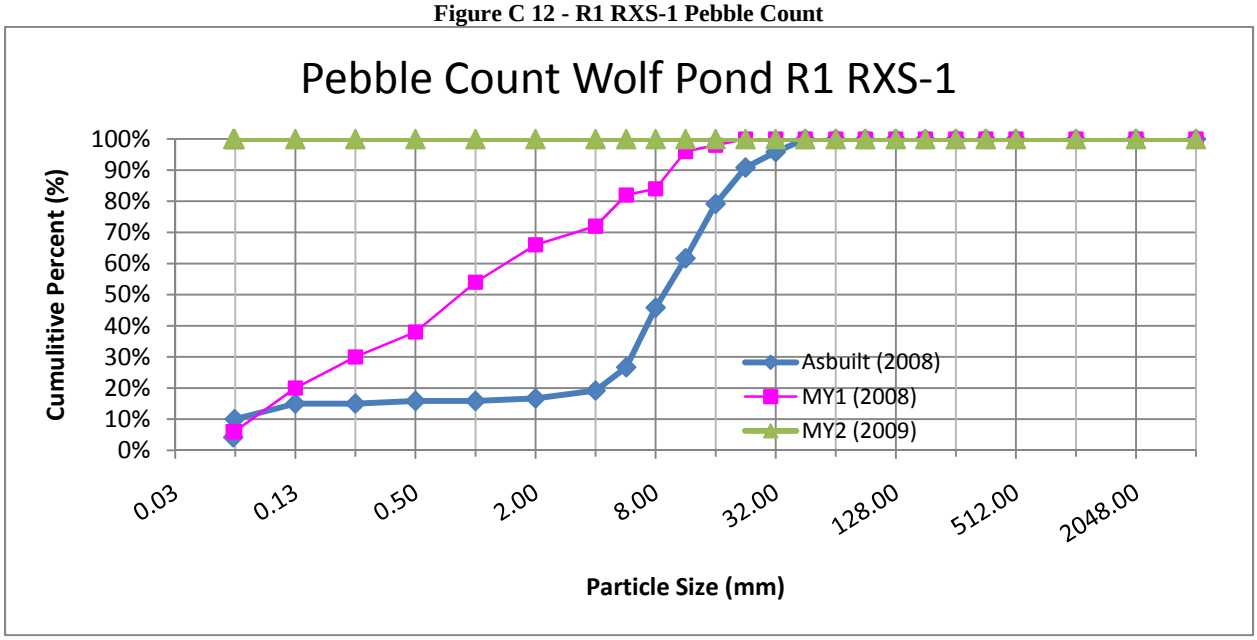


Figure C 13 - R1 PXS-1 Pebble Count

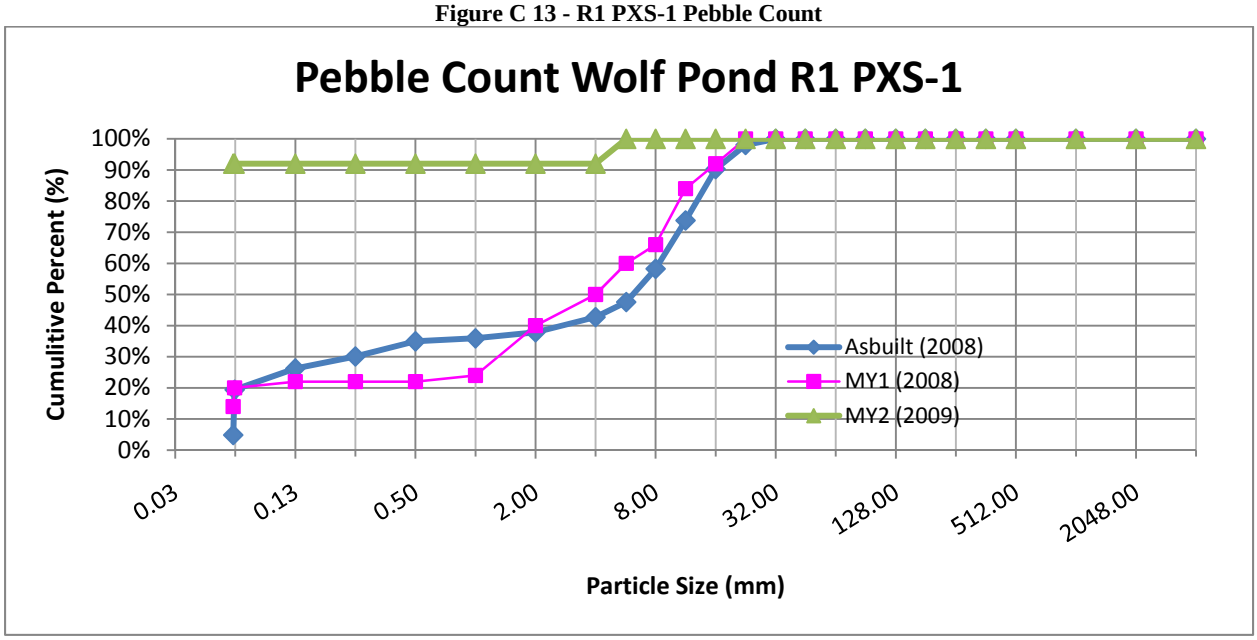


Figure C 14 - R2 RXS-1 Pebble Count

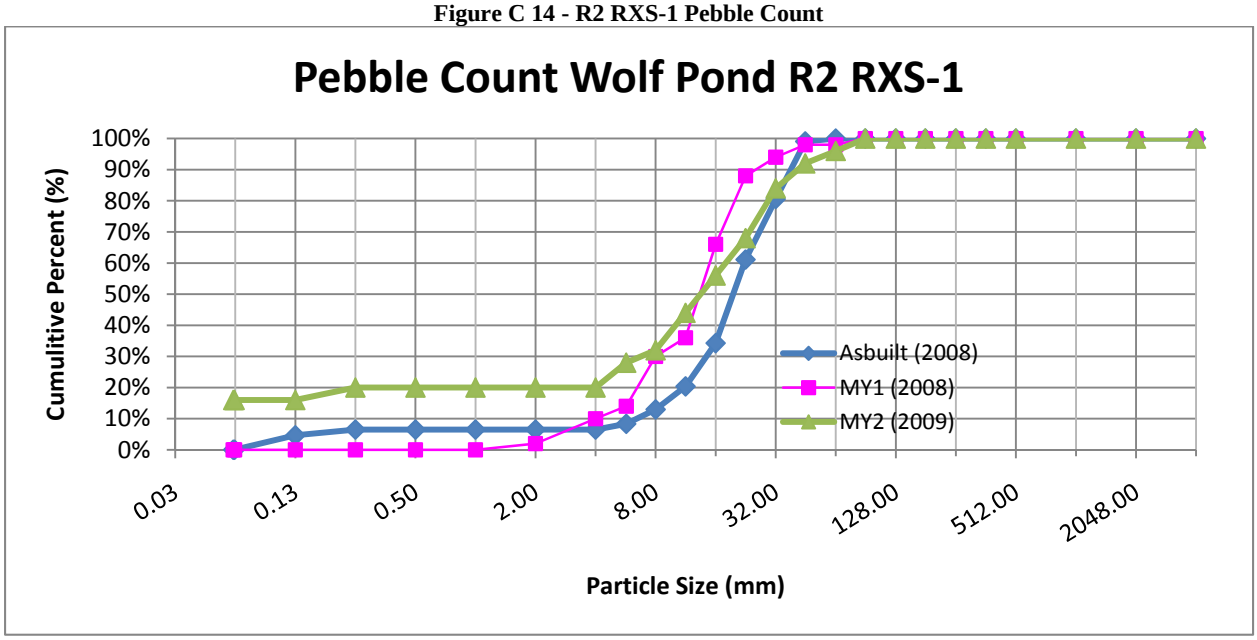


Figure C 15 - R2 RXS-2 Pebble Count

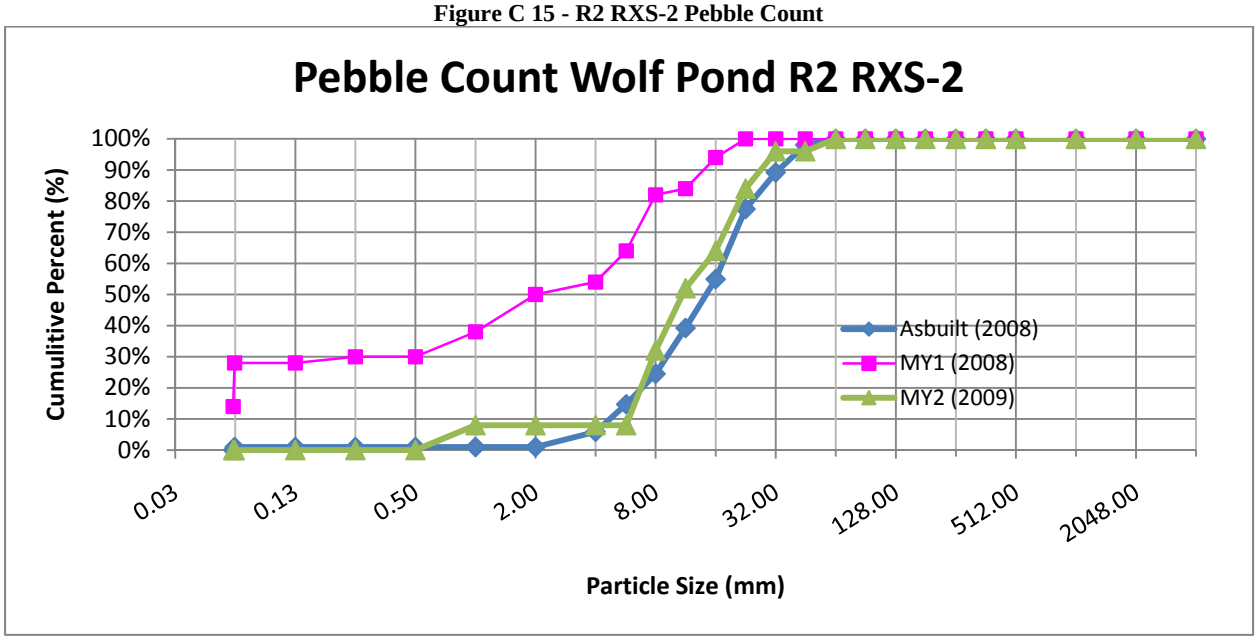


Figure C 16 - R2 PXS-1 Pebble Count

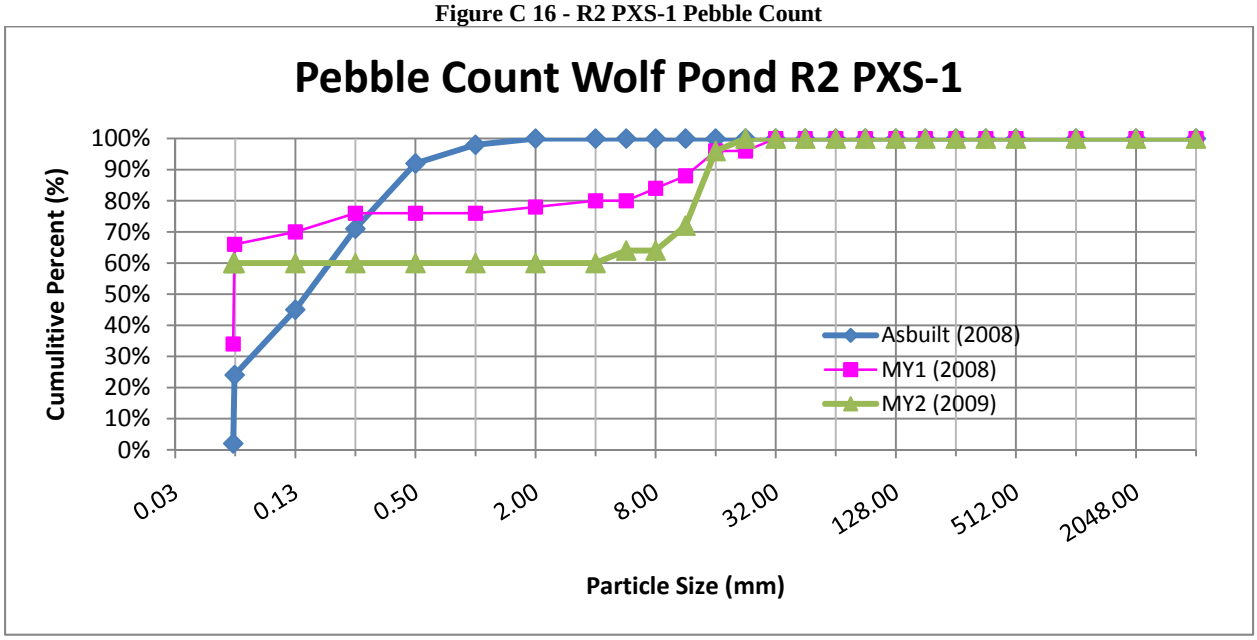


Figure C 17 - R2 PXS-2 Pebble Count

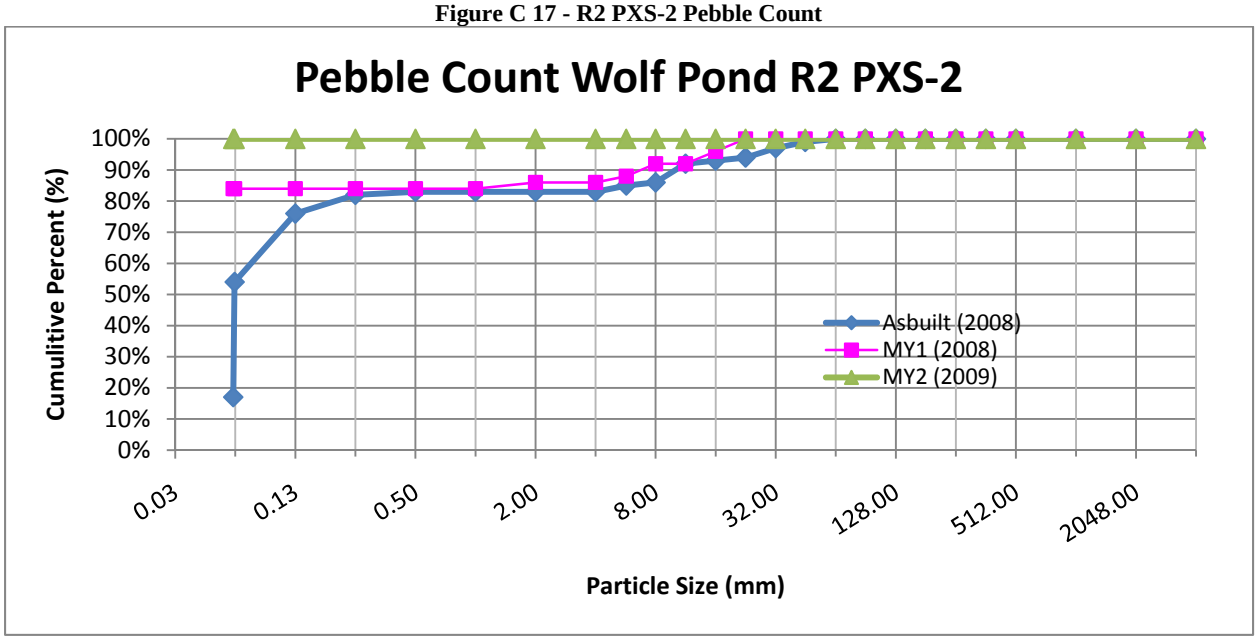


Figure C 18 - R3 RXS-1 Pebble Count

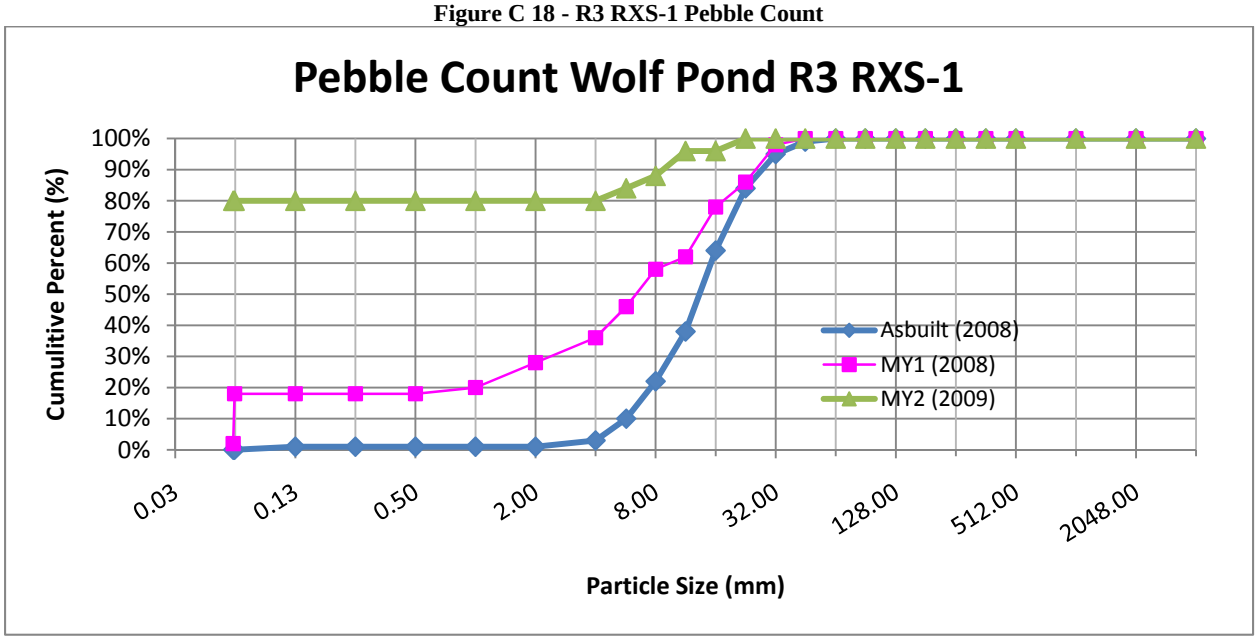
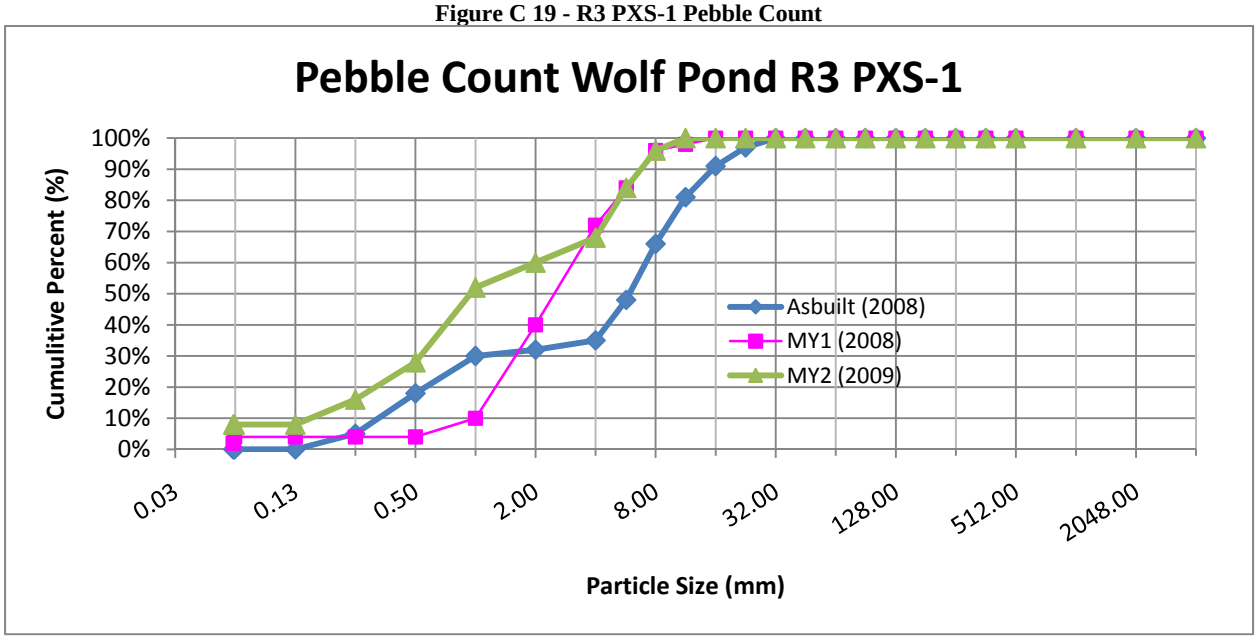


Figure C 19 - R3 PXS-1 Pebble Count



Appendix D – Site Photos

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Problem Area Photos

Problem Area Photo 1

Problem Area Photo 2

Problem Area Photo 3

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Vegetation Photos

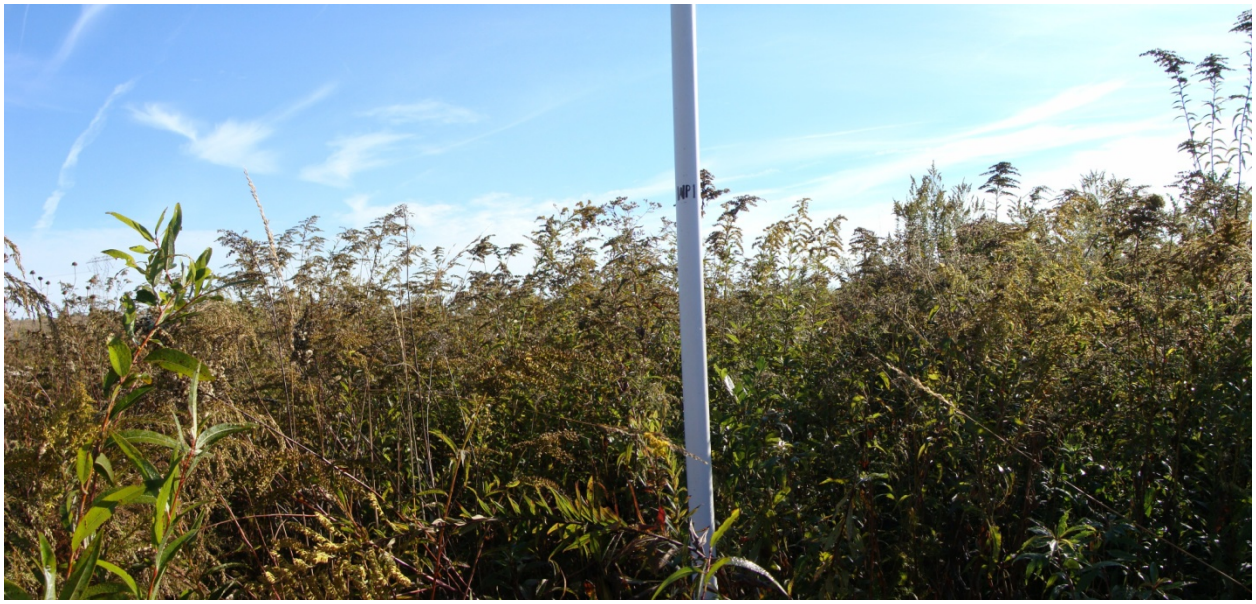

Photo D 1 - Vegetation Plot WP1

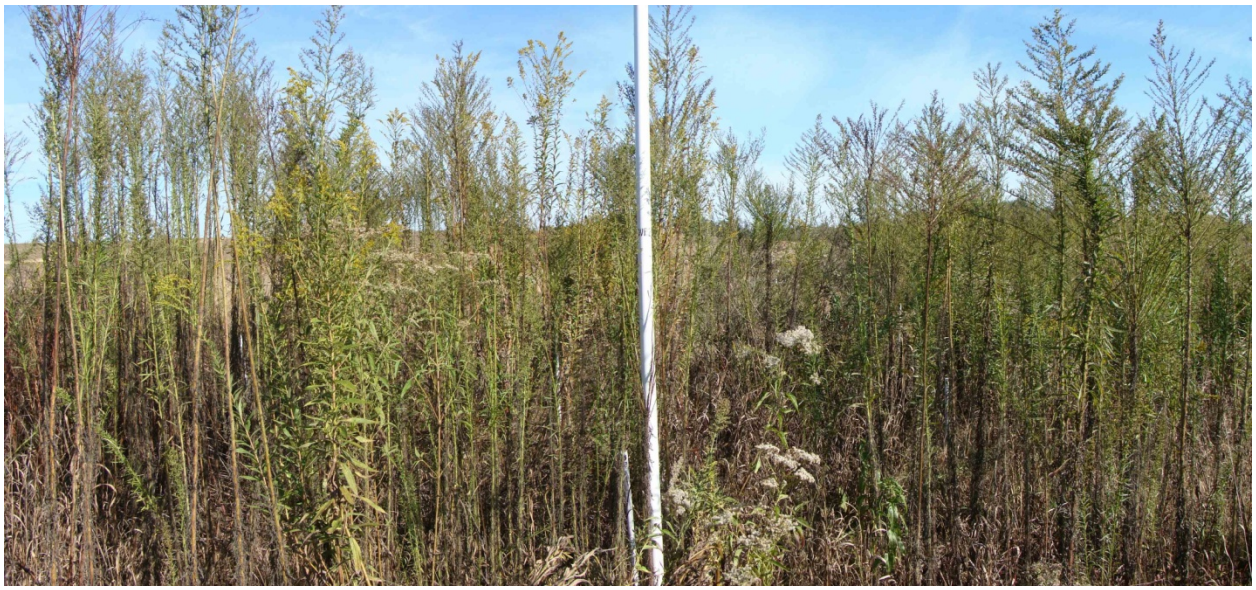

Photo D 2 - Vegetation Plot WP2

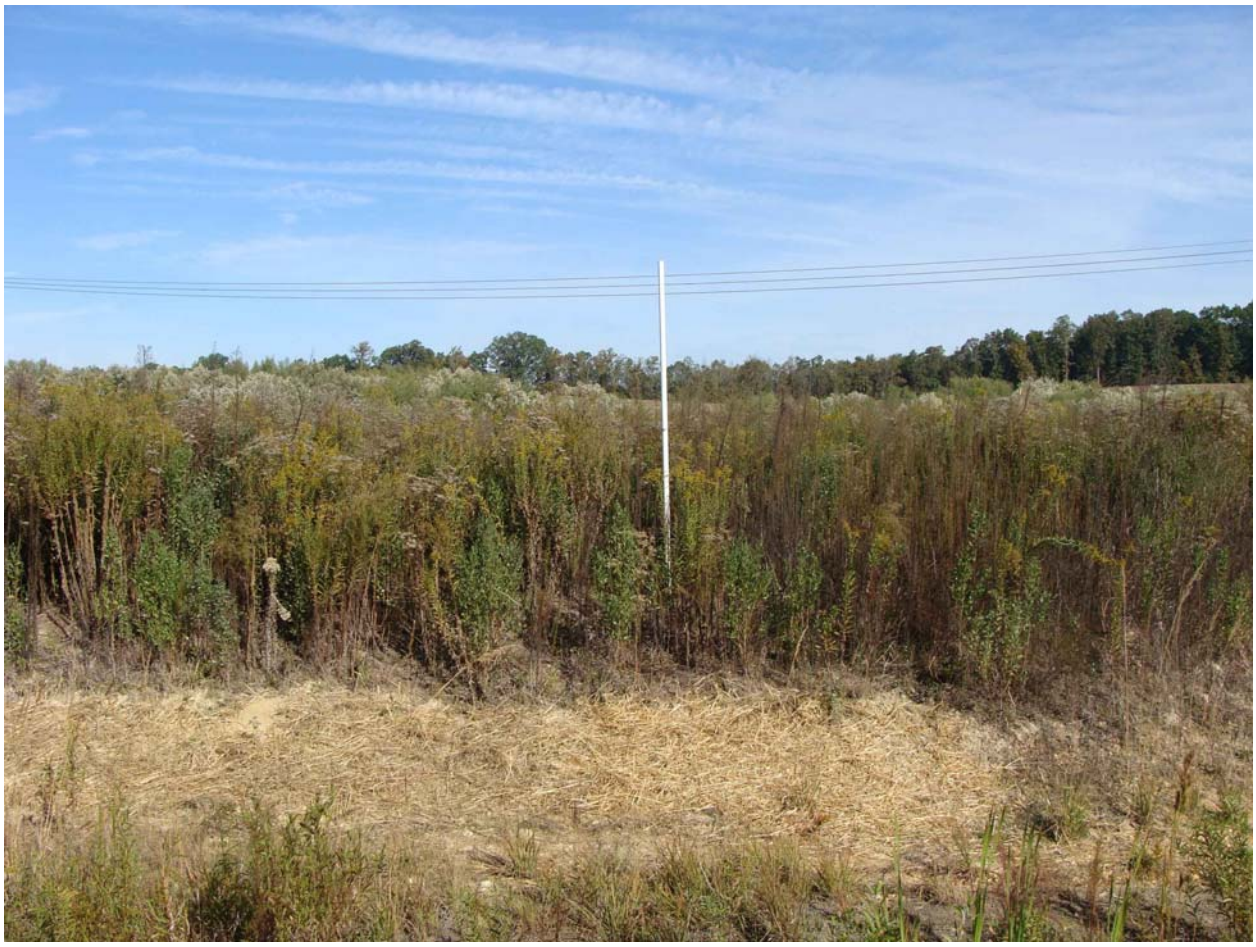

Photo D 3 - Vegetation Plot WP3

Photo D 4 - Vegetation Plot WP4

Photo D 5 - Vegetation Plot WP5

Photo D 6 – WP4 Problem Area (Drifts of Grasses)

Appendix E – Vegetation Data

Table of Contents

Table E 1 – MY2 (2009) Plot WP1 Data

				Spring Data				Fall Data				Notes
No	Species	Coordinates		ddh	Height	DBH	Vigor	ddh	Height	DBH	Vigor	
		X (m)	Y (m)	(mm)	(cm)	(cm)		(mm)	(cm)	(cm)		
1	FP	0.29	9.59	10	97		4	22	160	8	4	
2	FP	0.35	2.49	5	63		4	6	68		3	Browsed
3	FP	0.39	0.28	10	80		4	13	110		4	
4	AT	0.62	4.51	1	14		4				0	
5	FP	1.57	6.73	8	80		4	15	125		4	
6	FP	2.67	9.00	9	79		4	16	156	6	4	
7	CO	2.93	1.19				0				0	
8	Q	3.32	3.46				0				0	
9	QP	3.90	5.33				0				0	
10	BN	4.70	7.21	10	105		4	16	221	7	4	
11	BN	5.59	2.50	6	62		4	10	135		4	
12	QN	5.61	9.14				0				0	
13	BN	6.13	5.04	3	41		4	9	140	1	4	
14	BN	6.97	7.60				0				0	
15	QP	8.26	2.43				0				0	
16	QP	8.53	5.05	5	47		3	10	48		4	
17	QP	9.81	7.56	8	65		4	11	88		4	Extensively Browsed

Table E 2 – MY2 (2009) Plot WP2 Data

				Spring Data				Fall Data				Notes
No	Species	Coordinates		ddh	Height	DBH	Vigor	ddh	Height	DBH	Vigor	
		X (m)	Y (m)	(mm)	(cm)	(cm)		(mm)	(cm)	(cm)		
1	AT	0.22	5.02				0				0	
2	CO	0.26	7.97		5		2		7		3	
3	CO	0.35	0.41				0				0	
4	FP	1.97	2.76	5	56		4	11	101		4	
5	QM	2.48	5.21	5	38		3	6	39		4	
6	CO	3.01	0.37	6	15		3	6	15		4	
7	QM	3.25	8.07				0				0	
8	FP	4.44	2.83	6	48		4	10	82		4	
9	QM	5.03	5.14				0				0	
10	QN	5.55	0.56				0				0	
11	Q	6.18	8.00	1	12		4	1	17		3	Browsed with re-sprout
12	QM	7.01	2.96	6	58		4	8	70		4	
13	QM	7.73	5.52	5	52		4	11	52		4	
14	QN	8.20	0.84	5	50		4	10	89		4	Browsed & Base gnawed
15	AT	8.99	8.06	5	32		3	5	33		3	
16	QN	9.58	2.13				0				0	

Table E 3 – MY2 (2009) Plot WP3 Data

				Spring Data				Fall Data				Notes
No	Species	Coordinates		ddh	Height	DBH	Vigor	ddh	Height	DBH	Vigor	
		X (m)	Y (m)	(mm)	(cm)	(cm)		(mm)	(cm)	(cm)		
1	FP	0.15	7.12	5	49		4	8	72		4	
2	AT	0.29	1.45				0				0	
3	QM	0.30	9.80	4	34		4	4	34		4	
4	QP	0.37	4.29	4	32		4	4	33		4	
5	FP	2.31	7.16	10	92		4	12	98		4	
6	CO	2.86	9.91	5	28		4	6	29		4	
7	BN	2.87	1.65	8	65		4	9	81		3	
8	QM	3.13	4.21	9	54		3	4	53		3	
9	AT	4.58	7.21				0				0	
10	BN	5.29	1.81	7	64		4	8	90		3	
11	CO	5.65	9.85				0				0	
12	QN	5.82	4.47	3	26		4	4	30		4	Browsed
13	Q	6.65	7.28	4	14		4	4	14		4	
14	BN	7.46	1.68	6	70		4	8	85		3	
15	QP	8.48	4.42	4	21		2	4	43		4	
16	QM	8.62	9.86	8	61		4	9	59		4	Browsed
17	QN	8.82	7.25	5	39		4	6	43		4	
18	BN	9.90	1.68	8	85		4	11	129		4	

Table E 4 – MY2 (2009) Plot WP4 Data

				Spring Data				Fall Data				Notes
No	Species	Coordinates		ddh	Height	DBH	Vigor	ddh	Height	DBH	Vigor	
		X (m)	Y (m)	(mm)	(cm)	(cm)		(mm)	(cm)	(cm)		
1	CO	0.87	0.22				0				0	
2	QM	0.95	9.83	7	56		4	7	60		4	
3	QN	1.01	7.32				0				0	
4	FP	1.03	4.62	6	38		4	11	97		4	
5	Q	1.23	2.40				0				0	
6	Q	3.06	9.49				0				0	
7	Q	3.17	0.34				0				0	
8	QM	3.20	6.91	10	78		4	11	106		4	
9	QP	3.32	2.56	2	25		4	4	37		4	
10	QM	3.36	4.72	9	60		4	9	119		4	
11	BN	5.59	5.70	8	93		4	13	148	2	4	
12	BN	5.66	9.70	8	82		4	8	119		3	
13	BN	5.70	7.65	8	95		4	11	139	1	3	
14	BN	6.00	3.63	10	97		4	17	158	3	4	
15	BN	6.01	1.54	11	107		4	13	174	3	4	
16	FP	8.30	8.38	7	74		4	10	106		4	
17	AT	8.86	3.86				0				0	
18	QN	8.90	1.65				0				0	
19	QP	9.00	6.04	4	45		4	5	40		4	Browsed, gnawed, re-sprout

Table E 5 – MY2 (2009) Plot WP5 Data

				Spring Data				Fall Data				Notes
No	Species	Coordinates		ddh	Height	DBH	Vigor	ddh	Height	DBH	Vigor	
		X (m)	Y (m)	(mm)	(cm)	(cm)		(mm)	(cm)	(cm)		
1	AT	0.32	7.22				0		6		2	Re-sprout
2	AT	1.38	2.12	1	15		4	2	17		4	
3	AT	1.40	4.89				0				0	
4	FP	2.49	9.88	8	66		4	11	106		4	
5	QP	3.65	7.74				0				0	
6	QP	4.35	5.29	7	68		4	8	108		4	
7	FP	4.47	2.61	7	81		4	11	128		4	
8	CO	5.60	9.50	4	19		3	4	20		4	
9	CO	6.67	7.21		7		2				0	
10	Q	6.95	2.18				0				0	
11	CO	7.18	4.73	3	19		4	4	19		4	
12	BN	8.91	8.37				0				0	
13	BN	9.57	0.48	11	113		4	15	197	4	4	
14	BN	9.88	3.00	11	95		4	11	150	2	4	
15	BN	9.95	5.40	11	127		4	18	203	6	4	Base gnawed but healing

Appendix F – Rainfall Data

MY2 (2009)	
Date	
12/19/2008	0.03
12/20/2008	0.29
12/21/2008	0.09
12/25/2008	0.10
12/26/2008	0.08
12/27/2008	0.04
12/28/2008	0.03
12/29/2008	0.01
1/2/2009	0.01
1/4/2009	0.69
1/4/2009	0.69
1/6/2009	0.61
1/7/2009	0.65
1/10/2009	0.01
1/11/2009	0.04
1/13/2009	0.01
1/18/2009	0.01
1/19/2009	0.01
1/20/2009	0.06
1/21/2009	0.04
1/28/2009	0.35
2/2/2009	0.20
2/3/2009	0.03
2/11/2009	0.16
2/12/2009	0.02
2/15/2009	0.01
2/16/2009	0.28
2/18/2009	0.32
2/19/2009	0.08
2/20/2009	0.21
2/21/2009	0.05
2/27/2009	0.12
2/28/2009	1.35
3/1/2009	1.40
3/2/2009	0.18
3/13/2009	0.04
3/14/2009	0.32
3/15/2009	0.50
3/16/2009	0.22
3/17/2009	0.03
3/18/2009	0.01
3/19/2009	0.28
3/25/2009	0.19
3/26/2009	0.05
3/27/2009	0.09

3/28/2009	0.91
3/29/2009	0.28
4/2/2009	0.34
4/3/2009	0.07
4/6/2009	0.14
4/10/2009	0.83
4/11/2009	0.04
4/14/2009	0.09
4/15/2009	0.04
4/20/2009	0.40
5/2/2009	0.09
5/4/2009	0.09
5/5/2009	0.29
5/7/2009	0.03
5/8/2009	0.02
5/9/2009	0.13
5/10/2009	0.01
5/11/2009	0.29
5/17/2009	0.54
5/18/2009	0.10
5/23/2009	0.08
5/24/2009	0.64
5/25/2009	0.64
5/26/2009	0.06
5/27/2009	0.08
5/28/2009	1.99
6/4/2009	0.33
6/5/2009	0.11
6/10/2009	2.78
6/11/2009	0.06
6/12/2009	0.01
6/16/2009	0.02
6/17/2009	0.92
6/18/2009	0.27
6/19/2009	0.01
7/6/2009	0.01
7/8/2009	0.40
7/10/2009	0.01
7/13/2009	0.10
7/14/2009	0.01
7/16/2009	0.38
7/20/2009	1.18
7/21/2009	0.07
7/22/2009	0.07
7/23/2009	0.12
7/24/2009	0.12
7/27/2009	0.01

7/28/2009	1.22
7/29/2009	0.10
7/30/2009	0.15
7/31/2009	0.21
8/1/2009	0.01
8/2/2009	0.31
8/5/2009	0.03
8/6/2009	0.01
8/12/2009	0.07
8/20/2009	0.10
8/22/2009	0.15
8/27/2009	0.01
8/30/2009	0.38
8/31/2009	0.13
9/9/2009	0.04
9/10/2009	0.08
9/15/2009	0.92
9/16/2009	0.02
9/18/2009	0.01
9/19/2009	0.22
9/20/2009	0.06
9/24/2009	0.02
9/25/2009	0.07
9/26/2009	0.01
9/27/2009	0.17
9/28/2009	0.01
10/4/2009	0.01
10/5/2009	1.07
10/6/2009	0.04
10/7/2009	0.08
10/11/2009	0.08
10/12/2009	0.16
10/13/2009	0.13

Appendix G – Morphology Table

Reach 1 Morphology and Hydraulic Monitoring Summary

Parameter	Wolf Pond R1 RXS-1						Wolf Pond R1 PXS-1					
	Riffle						Pool					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	23.7	22.0	26.4	-	-	-	33.0	35.1	43.8	-	-	-
Floodprone Width (ft)	97	97	97	-	-	-	-	-	-	-	-	-
BF Cross Sectional Area (ft^2)	20.4	24.2	24.7	-	-	-	40.0	48.6	52.2	-	-	-
BF Mean Depth (ft)	0.86	1.10	0.94	-	-	-	1.21	1.3831	1.19	-	-	-
BF Max Depth (ft)	2.24	2.83	2.84	-	-	-	3.06	3.39	3.52	-	-	-
Width/Depth Ratio	27.50	19.95	28.15	-	-	-	-	-	-	-	-	-
Entrenchment Ratio	4.09	4.42	3.68	-	-	-	-	-	-	-	-	-
Bank Height Ratio	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-
Substrate												
d50 (mm)	8.88	0.88	0.06	-	-	-	6.21	4.00	0.06	-	-	-
d84 (mm)	18.75	8.00	0.06	-	-	-	14.21	11.30	0.06	-	-	-

Parameter	MY0 (2008)			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	56.02	94.54	79.61	55	98	81	50.72	90.9	74.52	-	-	-	-	-	-	-	-	-
Radius of Curvature (ft)	36.57	66.6	39.06	35	70	40	37.1	69.36	39.89	-	-	-	-	-	-	-	-	-
Meander Wavelength (ft)	160.54	233.36	179.37	158	230	177	167.1	221.05	180.59	-	-	-	-	-	-	-	-	-
Meander Width ratio	2.36	3.99	3.36	2.5	4.45	3.68	1.924	3.4484	2.827	-	-	-	-	-	-	-	-	-
Profile																		
Riffle length (ft)	21.96	62.85	40.81	20.833	52.63	38.77	14.42	78.37	43.635	-	-	-	-	-	-	-	-	-
Riffle slope (ft/ft)	0.0093	0.0401	0.0134	0.006	0.036	0.011	0.011	0.020	0.011	-	-	-	-	-	-	-	-	-
Pool length (ft)	49.25	84.26	73.26	59.28	82.66	72.57	34.32	139.45	47.07	-	-	-	-	-	-	-	-	-
Pool spacing (ft)	94.75	136.11	113.19	92	145	119	91.17	124.71	105.41	-	-	-	-	-	-	-	-	-
Additional Reach Parameters																		
Valley Length (ft)	835																	
Channel Length (ft)	1056			1056			1056			-			-			-		
Sinuosity	1.26			1.26			1.26			-			-			-		
Water Surface Slope (ft/ft)	0.0062			0.0058			0.0058			-			-			-		
BF slope (ft/ft)	0.0068			0.0059			0.0059			-			-			-		
Rosgen Classification	C4			C4			C4			-			-			-		
Habitat Index*	N/A			N/A			N/A			N/A			N/A			N/A		
Macrobenthos*	N/A			N/A			N/A			N/A			N/A			N/A		

Reach 2 Morphology and Hydraulic Monitoring Summary

Parameter	Wolf Pond R2 RXS-1						Wolf Pond R2 PXS-1						Wolf Pond R2 RXS-2						Wolf Pond R2 PXS-2					
	Riffle						Pool						Riffle						Pool					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	24.1	22.8	26.5	-	-	-	25.2	28.5	27.9	-	-	-	30.6	30.4	30.8	-	-	-	21.6	21.3	17.3	-	-	-
Floodprone Width (ft)	94	94	94	-	-	-	-	-	-	-	-	-	203	203	203	-	-	-	-	-	-	-	-	-
BF Cross Sectional Area (ft^2)	22.1	22.4	20.6	-	-	-	21.9	27.7	32.4	-	-	-	42.5	41.4	41.7	-	-	-	11.4	12.2	11.8	-	-	-
BF Mean Depth (ft)	0.92	0.99	0.78	-	-	-	0.87	0.97	1.16	-	-	-	1.39	1.36	1.35	-	-	-	0.53	0.57	0.68	-	-	-
BF Max Depth (ft)	2.2	2.09	2.07	-	-	-	2.35	2.84	2.86	-	-	-	2.93	3.06	2.86	-	-	-	1.51	1.56	1.46	-	-	-
Width/Depth Ratio	26.35	23.10	34.01	-	-	-	-	-	-	-	-	-	22.07	22.36	22.71	-	-	-	-	-	-	-	-	-
Entrenchment Ratio	3.90	4.13	3.55	-	-	-	-	-	-	-	-	-	6.63	6.68	6.6	-	-	-	-	-	-	-	-	-
Bank Height Ratio	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-	1.00	1.02	1.02	-	-	-	-	-	-	-	-	-
Substrate																								
d50 (mm)	19.87	13.49	13.65	-	-	-	0.15	0.06	0.06	-	-	-	14.53	2.00	10.97	-	-	-	0.06	0.06	0.06	-	-	-
d84 (mm)	34.40	21.40	32.00	-	-	-	0.40	8.00	13.65	-	-	-	27.85	11.30	22.60	-	-	-	4.85	0.06	0.06	-	-	-

Parameter	MY0 (2008)			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	24.7	50.55	39.92	23	48	40	28.36	57.94	40.44	-	-	-	-	-	-	-	-	-
Radius of Curvature (ft)	14.24	38.46	25.26	18	40	28	19.41	39.89	25.26	-	-	-	-	-	-	-	-	-
Meander Wavelength (ft)	88.22	147.9	104.23	85	140	100	85.4	123.5	99.83	-	-	-	-	-	-	-	-	-
Meander Width ratio	0.90	1.85	1.46	1.01	2.11	1.75	0.9913	2.025	1.4135	-	-	-	-	-	-	-	-	-
Profile																		
Riffle length (ft)	12.09	54.61	32.17	15	60	35	9.1	79.53	27.67	-	-	-	-	-	-	-	-	-
Riffle slope (ft/ft)	0.0016	0.0502	0.0114	0.002	0.048	0.011	0.001	0.028	0.006	-	-	-	-	-	-	-	-	-
Pool length (ft)	9.96	59.93	23.94	15	60	36	7.25	79.53	25.89	-	-	-	-	-	-	-	-	-
Pool spacing (ft)	24.68	94.77	58.865	30	105	66	34.99	105.1	54.33	-	-	-	-	-	-	-	-	-
Additional Reach Parameters																		
Valley Length (ft)	1332																	
Channel Length (ft)	1590			1590			1590			-			-			-		
Sinuosity	1.19			1.19			1.19			-			-			-		
Water Surface Slope 1 (ft/ft)	0.0099			0.0089			0.0089			-			-			-		
Water Surface Slope 2 (ft/ft)	0.0041			0.0039			0.0039			-			-			-		
BF slope 1 (ft/ft)	0.0103			0.01			0.01			-			-			-		
BF slope 2 (ft/ft)	0.0043			0.004			0.004			-			-			-		
Rosgen Classification	C4			C4			C4			-			-			-		
Habitat Index*	N/A			N/A			N/A			N/A			N/A			N/A		
Macrobenthos*	N/A			N/A			N/A			N/A			N/A			N/A		

Reach 3 Morphology and Hydraulic Monitoring Summary

Parameter	Wolf Pond R3 RXS-1						Wolf Pond R3 PXS-1					
	Riffle						Pool					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	20.1	21.2	25.2	-	-	-	35.8	34.4	37.1	-	-	-
Floodprone Width (ft)	121	121	121	-	-	-	-	-	-	-	-	-
BF Cross Sectional Area (ft^2)	10.4	10.3	9.7	-	-	-	31.6	32.1	31.4	-	-	-
BF Mean Depth (ft)	0.52	0.49	0.39	-	-	-	0.88	0.93	0.85	-	-	-
BF Max Depth (ft)	1.6	1.86	1.94	-	-	-	2.6	2.62	2.3	-	-	-
Width/Depth Ratio	39.10	43.35	65.17	-	-	-	-	-	-	-	-	-
Entrenchment Ratio	6.01	5.72	4.80	-	-	-	-	-	-	-	-	-
Bank Height Ratio	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-
Substrate												
d50 (mm)	13.47	6.47	0.06	-	-	-	5.96	2.63	0.96	-	-	-
d84 (mm)	22.60	20.95	5.70	-	-	-	12.71	5.70	5.70	-	-	-

Parameter	MY0 (2008)			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	49.12	97.21	69.46	47	100	72	43.26	87.52	61.08	-	-	-	-	-	-	-	-	-
Radius of Curvature (ft)	22.52	41.45	31.91	25	44	33	28.42	59.06	35.96	-	-	-	-	-	-	-	-	-
Meander Wavelength (ft)	129.62	203.67	158.46	135	206	165	128.1	178	159	-	-	-	-	-	-	-	-	-
Meander Width ratio	2.44	4.83	3.45	2.13	4.72	3.40	1.717	3.473	2.424	-	-	-	-	-	-	-	-	-
Profile																		
Riffle length (ft)	21.73	65.62	44.5	25	60	42	3.05	65.66	20.83	-	-	-	-	-	-	-	-	-
Riffle slope (ft/ft)	0.0006	0.0309	0.0107	0.009	0.03	0.011	0.001	0.068	0.018	-	-	-	-	-	-	-	-	-
Pool length (ft)	30.54	74.55	42.32	32	78	45	21.3	97.79	58.68	-	-	-	-	-	-	-	-	-
Pool spacing (ft)	64.93	119.90	92.23	66	122	94	29.81	122.1	79.28	-	-	-	-	-	-	-	-	-
Additional Reach Parameters																		
Valley Length (ft)	1129																	
Channel Length (ft)	1351			1351			1351			-			-			-		
Sinuosity	1.20			1.2			1.2			-			-			-		
Water Surface Slope 1 (ft/ft)	0.0019			0.002			0.002			-			-			-		
Water Surface Slope 2 (ft/ft)	0.0068			0.007			0.007			-			-			-		
BF slope 1 (ft/ft)	0.0040			0.004			0.004			-			-			-		
BF slope 2 (ft/ft)	0.0063			0.006			0.006			-			-			-		
Rosgen Classification	C4			C4			C4			-			-			-		
Habitat Index*	N/A			N/A			N/A			N/A			N/A			N/A		
Macrobenthos*	N/A			N/A			N/A			N/A			N/A			N/A		