601 North Stream Restoration Project
Annual Monitoring Report
Monitoring Year: 2011
Monitoring Year: 4
As-built Date: 2008
NCEEP Project Number: D 06054-A

Submitted to:
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601 North Stream Restoration Project Annual Monitoring Report

Year: 2011 Monitoring Year: 4 **NCEEP Project Number: D 06054-A**

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1.0 Executive Summary

This Annual Monitoring Report documents the results of monitoring activities during the 2011 (MY4) growing season on the 601 North Stream Restoration Project. Construction of the site, including planting of trees, was completed in March 2008. The 2011 data documents results from the fourth year of geomorphic and vegetation monitoring at the site.

The design of the 601 North Stream Restoration Project involved a major stream restoration. After construction, it was determined that the project generated 3,036 feet of stream restoration. The As-Built Survey is included as Appendix B.

This Annual Monitoring Report presents data from three vegetation monitoring plots, one crest gauge, one rain gauge, six cross sections, approximately 3,000 linear feet of profile survey and photographic reference locations, as specified in the approved Restoration Plan for the site.

The NOAA Regional Rainfall database was used to validate the onsite automatic rain gauge precipitation data. Although dryer conditions typically develop during the second and third quarters in this region, the entire monitoring year had normal rainfall at this site for the second year in a row. The total annual rainfall was 31.2 inches, allowing excellent vegetation growth.

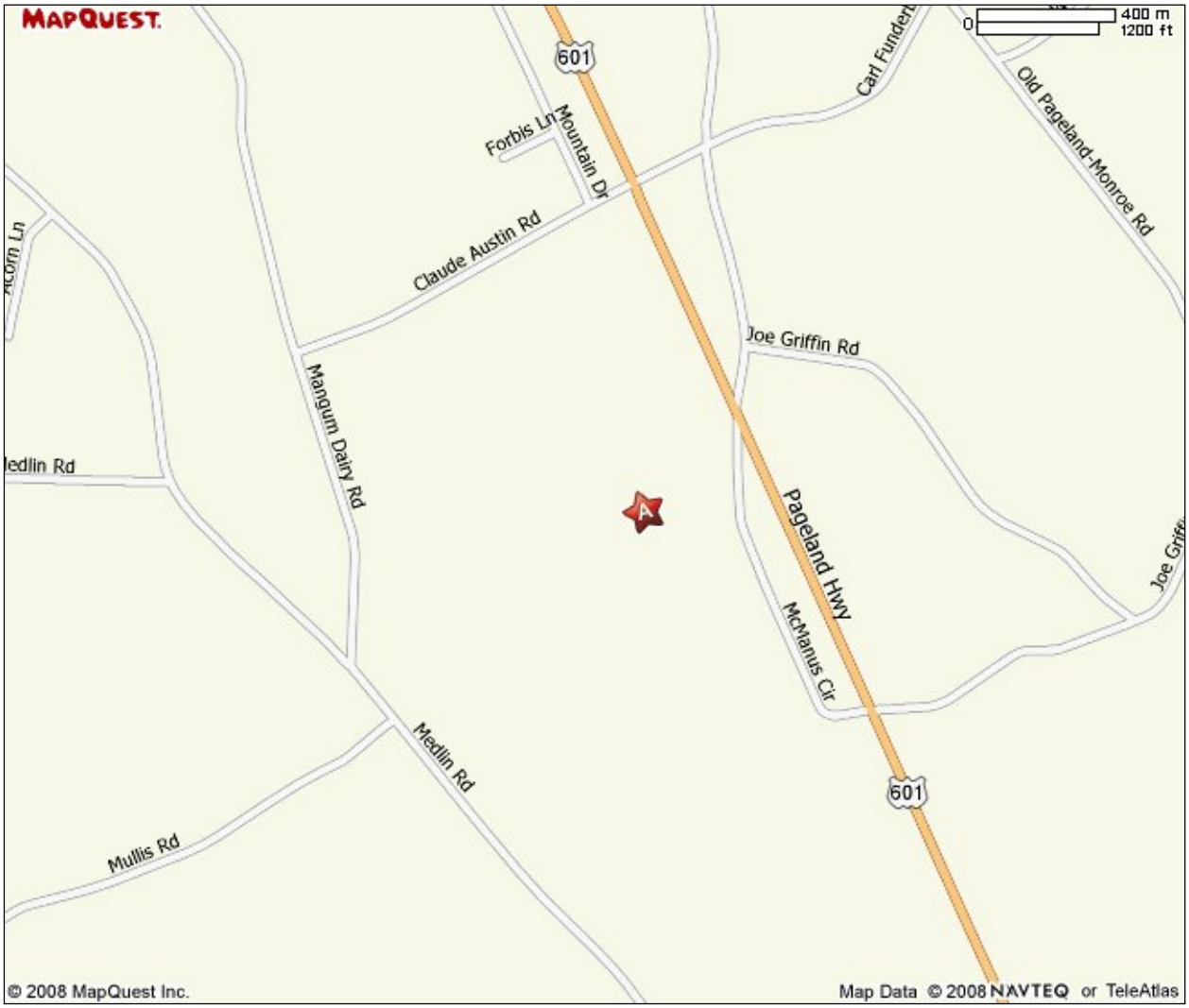
The 2011 vegetation monitoring documented the surviving planted stem density for the plots between 323 and 566 stems per acre. The average density was 459 stems per acre. This represents a survival rate of approximately 76% based on a baseline density of 608 stems per acre. The site is on track to achieve the final vegetative success criteria of 260 five-year-old planted stems surviving per acre at the end of five years of monitoring.

No bankfull events were recorded during the MY 4 period. The restored stream channel has remained stable and is providing the intended habitat and hydrologic functions. The minor pre-existing problem areas of concern are improving with the growth of vegetation. All monitored cross sections and the longitudinal profile for 2011 display very little adjustment in stream dimension.

2.0 Introduction

2.1 Project Description

Figure 1 – 601 North Location Map



The 601 North site is located approximately 10 miles south of Monroe in Union County (see Figure 1). The property is located off of McManus Circle, SR 2110, from Pageland Highway/US Hwy 601 South. The property is accessed by a gravel farm road off McManus Circle.

The project is a restoration of approximately 3,000 linear feet of unnamed tributary to Wicker Branch in the Yadkin Pee-Dee River Basin. The project is made up of an upper and lower section of UT, referred to as Reach 1 for monitoring. Reach 1 stationing is summarized in Table 1. The 601 North site has a drainage area of 0.23 ¹œ° ˚ß˘⋕ £˘¹ in the upper section and 0.3 ¹œ° ˚ß˘⋕ £˘¹ in the lower section.

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 – 601 North Monitoring Reaches

Reach Name	As-Built Length (ft.)	Monitoring Stations	Restoration Approach
UT/Reach 1	3,036	100+21 – 130+31	Restoration (Priority I/II)
Total	3,036	3,010	

2.2 Project Objectives

The 601 North 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 3,000 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. The last 1,000 feet of the project utilizes some Priority II approaches to create a lower elevation flood plain in order to meet the required elevations at the confluence with Wicker Branch. Given the valley type VIII drainage, a C4 channel was chosen as the design channel. Due to the coarseness of the native bed material, few structures were utilized in the design.

Monitoring of the 601 North site is required to demonstrate successful mitigation based on the 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 2011 (MY4).

The as-built data documented 3,036 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 – 601 North 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	October 2010	December 2010
Year 4 Monitoring	September 2011	November 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

Three 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 – 601 North 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

601 North is characterized by Goldenrod, Blackberry, and Groundsel tree (*Baccharis halimifolia*). All of the surviving plot plantings are in excellent vigor with few exceptions. Due to recent rain, the stream had pools in the meanders, but no flow was observed. Vegetation along the banks is still stunted so little shade is present to keep upland vegetation from growing in the channel. Due to Groundsel tree obscuring the origin corner of plot N2, two plot photographs were taken adjacent to the origin. A few areas have sparse vegetation, which is slowly filling in, but overall, the site appears to be doing well. No trees were lost from the spring monitoring and the site appears to be stable. No impacts were observed, however farm activities have the field abutting one corner of Plot N1.

Original planting density, based on the three 0.01 hectare plots, (100 square meters) was 608 stems per acre. The current density is 459 stems per acre which represents a survival rate of approximately 76%. The planted stems in the monitoring plots ranged from 323 to 566 stems per acre. This site has met the interim success criteria of 360 stems per acre after three years and is on track to meet the final criteria of 260 stems per acre after five years.

Table 4 - Baseline Stem Counts

601 North Baseline Stem Data									
601 North May 2008 (Baseline)									
Plot	PLANTED SPECIES								
	AT	BN	CO	FP	QM	QN	QP	Q	PLANTED STEMS
N1		2		9	1	2			14
N2	2	3	2	2	1	2	1	1	14
N3		4		3	5		3	2	17
TOTALS	2	9	2	14	7	4	4	3	45
Percent %	4.4	20	4.4	31.1	15.6	8.9	8.9	6.7	100

Table 5 – MY4 (2011) Stem Counts

601 North September 2011 (MY4)									
Plot	PLANTED SPECIES								LIVE PLANTED STEMS
	AT	BN	CO	FP	QM	QN	QP	Q	
N1		2		9		1			12
N2		3		2	1	1	1		8
N3		4		3	5		2		14
TOTALS	0	9	0	14	6	2	3	0	34
Percent %	0	26.5	0	41.2	17.6	5.9	8.8	0	100

Table 6 - Baseline Stems per Acre

601 North Monitoring Plots Baseline Data					
601 North May 2008 (Baseline)					
Plot	**Trees**	**Plot size**	**Plot size**	**Plot size**	**Stems**
	n_i	m^2	ft^2	acre	**per acre**
N1	14	100	1076	0.0247	566
N2	14	100	1076	0.0247	566
N3	17	100	1076	0.0247	688
Totals:	45	300	3228	0.074	
Stems per plot	15			Average	608

Table 7 – MY4 (2011) Stems per Acre

601 North Fall Monitoring Data					
601 North September 2011 (MY4)					
Plot	**Trees**	**Plot size**	**Trees**	**Percent**	**Stems**
	n_i	m^2	**Loss**	**Loss**	**per acre**
N1	12	100	0	0.000	485
N2	8	100	0	0.000	323
N3	14	100	0	0.000	566
Totals:	34	300	0	0.000	
Stems per plot	11.33333			Average	459

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: A minimum of 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. Bank vegetation is established and providing the stability as intended. The original coir matting is still in place but degrading also as planned. Water was in the channel but flow was not present during the survey. Stream features including pools and riffles are remaining stable. All structures appear to be stable. Constructed riffles are holding grade with no down cutting or headcuts observed.

Cross Sections
The survey data was collected in September 2011, and the results are presented in Appendix C. Cross sections appear to be stable.

Longitudinal Profile
The longitudinal profile survey was conducted in September 2011, and the results are presented in Appendix C. The profile survey showed little change in channel dimensions or profile. The presence of water in the channel enabled a much improved survey of the profile and identification of pools.

Hydrology
No bankfull events were documented during this year of monitoring by a crest gauge. The two largest rainfall events were recorded in September 2010 and May 2011. Both events developed stages below bankfull, as evidenced by the maximum stage recorder.

3.2.4 Problem Areas

There were nine problem areas identified from MY 2 (2009). Each of these problem areas were minor bank erosion issues. With two years of normal rainfall all of these identified areas are resolving themselves with improved vegetative cover providing the needed bank stability. All of the MY 2 (2009) problem areas are stable but vegetative recovery is slower in some due to soil conditions. A new tenth problem area (PA10 MY3) was identified at station 119+24 where the top of bank was eroding outside the coir matting. The improved soil moisture, lack of bankfull

events and normal rainfall patterns enabled the reestablishment of the vegetation and the area is stable and no longer a problem area.

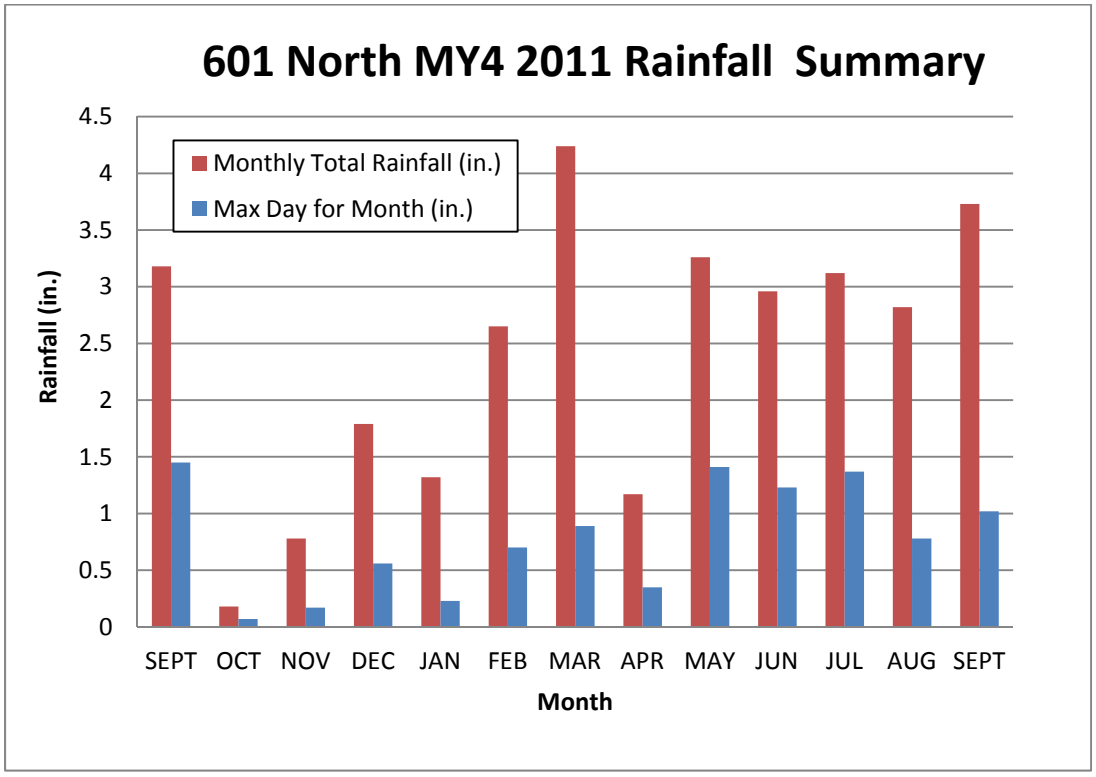
Table 8 - 601 North MY4 Problem Areas

ID	Year Identified	Station	Description/ recommendation
PA1	MY2	130+42 –130+62	Corrected
PA2	MY2	130+00 –130+75	Corrected
PA3	MY2	129+49 –129+76	Corrected
PA4	MY2	128+72 – 129+39	Corrected
PA5	MY2	128+12 – 128+65	Corrected
PA6	MY2	127+50 – 127+94	Corrected
PA7	MY2	126+70 – 127+24	Corrected
PA8	MY2	125+20 – 125+58	Corrected
PA9	MY2	121+50 –122+11	Corrected
PA10	MY3	119+24 – 119+61	Corrected

3.3 Rainfall Data

Rainfall data is collected by an automated rain gauge and confirmed with a manual rain gauge. The site data was validated with NOAA Regional Rainfall Database which has rainfall data for nearby locations. Rainfall data shows that normal rainfall occurred throughout the monitoring period. The average monthly peak for the 2011 monitoring period was 0.79 inches with a maximum of 1.45 inches occurring in September. The average monthly sum was 2.40 inches with a maximum of 4.24 inches occurring in December. The total rainfall for the year at this site was 31.2 inches. Complete rainfall data is shown in Appendix F.

Figure 2 - MY4 20011 Rainfall Data Summary



4.0 Conclusions

Overall stream dimension, pattern, and profile are stable with only minor erosional problem areas. Drought conditions that threatened vegetation in 2008 and 2009 have eased, and riparian vegetation is flourishing with two consecutive years of normal rainfall. The entire channel had water but was not flowing during data collection. All stream structures appear stable and properly functional. 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

Appendix B – MY4 (2011) Survey

Figure B 1 - 601 North Reach 1 Sheet 1

Figure B 2 - 601 North Reach 1 Sheet 2

601N R1 RXS-1
STA: 103+58

EASEMENT

601N R1 PXS-1
STA: 101+43

601N R1 RXS-2
STA:110+78

601N R1 PXS-2
STA: 114+17

EXISTING INV= 607.26'

42"RCP

EXISTING INV= 606.56'

LEGEND

- DESIGN TOP OF BANK
- MONITORING ALIGNMENT (ALL YEARS)
- 2008 (MY1) THALWEG
- 2008 (MY1) TOP OF BANK
- 2009 (MY2) THALWEG
- 2009 (MY2) TOP OF BANK
- 2010 (MY3) THALWEG
- 2010 (MY3) TOP OF BANK
- 2011 (MY4) THALWEG
- 2011 (MY4) TOP OF BANK

SHEET 1

SHEET 2

NORTH

NO.	NOTES:	DRN	CHK	DATE

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

NCDENR-EEP
RALEIGH, NC

601N - REACH 1

601N YEAR 01 (MY1)
MONITORING

UNION COUNTY, NC

DATE 03/20/2009

PROJECT NO. 06054-B

FILENAME 601N.DWG

SHEET NO. 1 OF 2

LEGEND

- DESIGN TOP OF BANK
- MONITORING ALIGNMENT (ALL YEARS)
- 2008 (MY1) THALWEG
- 2008 (MY1) TOP OF BANK
- 2009 (MY2) THALWEG
- 2009 (MY2) TOP OF BANK
- 2010 (MY3) THALWEG
- 2010 (MY3) TOP OF BANK
- 2011 (MY4) THALWEG
- 2011 (MY4) TOP OF BANK

EASEMENT

601N R1 RXS-3
STA:121+55

601N R1 PXS-3
STA: 126+54

N2

N1

116+00
117+00
118+00
119+00
120+00
121+00
122+00
123+00
124+00
125+00
126+00
127+00
128+00
129+00
130+00
130+96.12

SHEET 1

SHEET 2

NORTH

NO.	NOTES:	DRN	CHK	DATE

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

NCDENR-EEP
RALEIGH, NC

601N - REACH 1

601N YEAR 01 (MY1)
MONITORING

UNION COUNTY, NC

DATE
03/20/2009

PROJECT NO.
06054-B

FILENAME
601N.DWG

SHEET NO.
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Appendix C – Profile, Cross Sections, and Pebble Counts

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601 North R1 RXS-1

Photo C 1 - R1 RXS-1 Left Pin

Photo C 2 - R1 RXS-1 Right Pin

Photo C 3 - R1 RXS-1 Downstream

Figure C 1 - R1 RXS-1 Cross Section Plot

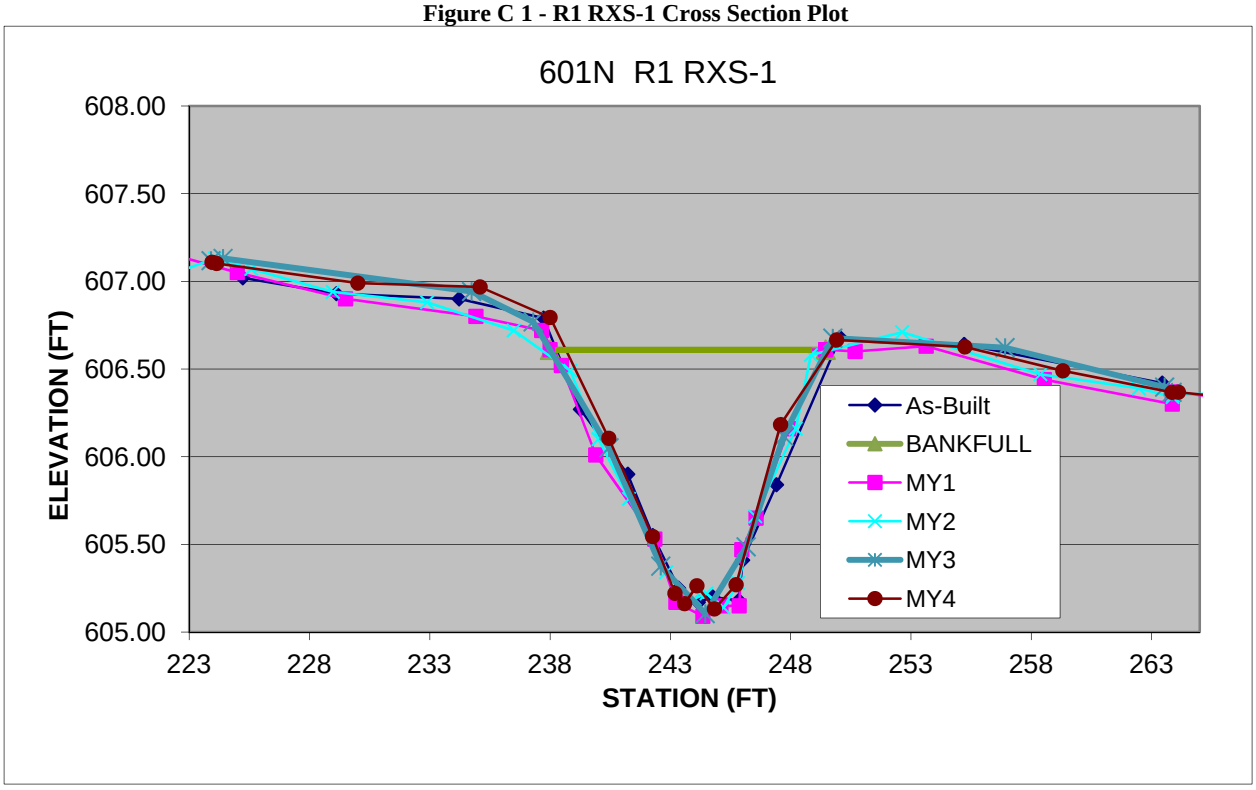

Table C 1 - R1 RXS-1 Dimension Data

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
225.23	607.02	r1rxs1	19.5	613.62	RXS1	222.87	607.07	(XS)	223.91	607.118	L pin	223.95	607.109	(XSRP)XSRP			
229.12	606.93	r1rxs1	21.16	613.79	RXS1	224.08	607.13	(PL)	224.41	607.131	Ground	224.14	607.102	(XS)XS			
234.22	606.9	r1rxs1tob	40.93	612.91	RXS1	225.58	607.07	(XS)	234.74	606.942	Ground	230.01	606.99	(XS)XS			
237.73	606.79	r1rxs1	60.81	611.9	RXS1	228.97	606.94	(XS)	237.3	606.769	Ground	235.09	606.968	(XS)XS			
239.26	606.27	r1rxs1	79.02	610.99	RXS1	232.89	606.88	(XS)	240.45	606.051	Ground	238	606.794	(XS)XS			
241.23	605.9	r1rxs1	97.46	609.58	RXS1	236.49	606.72	(XS)	242.6	605.376	Ground	240.44	606.105	(XS)XS			
242.27	605.55	r1rxs1tos	116.64	609.08	RXS1	238.84	606.49	(XS)	244.45	605.105	Ground	242.26	605.545	(XS)XS			
243.34	605.25	r1rxs1	135.42	608.38	RXS1	240.01	606.1	(XS)	246.15	605.486	Ground	243.19	605.221	(XS)XS			
244.16	605.17	r1rxs1	151.49	607.79	RXS1	241.28	605.76	(XS)	247.71	606.117	Ground	243.59	605.162	(XS)XS			
244.76	605.2	r1rxs1	164.76	607.75	RXS1	242.82	605.34	(XS)	249.75	606.676	Ground	244.1	605.264	(XS)XS			
245.84	605.18	r1rxs1	175.55	607.16	RXS1	244	605.19	(XS)	256.91	606.622	Ground	244.83	605.132	(XS)XS			
246	605.41	r1rxs1tos	185.58	607.07	RXS1	244.5	605.22	(XS)	263.54	606.397	Ground	245.73	605.27	(XS)XS			
247.41	605.84	r1rxs1	189.68	606.31	RXS1	245.21	605.14	(XS)	263.85	606.367	R pin	247.58	606.183	(XS)XS			
250.05	606.68	r1rxs1tob	192.92	605.89	RXS1	245.81	605.28	(XS)				249.91	606.666	(XS)XS			
255.21	606.64	r1rxs1	195.61	606.01	RXS1	246.53	605.66	(XS)				255.24	606.626	(XS)XS			
263.44	606.42	r1rxs1	198.29	606.32	RXS1	248.21	606.16	(XS)				259.31	606.49	(XS)XS			
			201.53	607.09	RXS1	248.84	606.58	(XS)				263.85	606.367	(XSLP)XSLP			
			217.66	607.33	RXS1	252.63	606.71	(XS)									
			225	607.05	RXS1	258.38	606.47	(XS)									
			229.5	606.9	RXS1	262.47	606.39	(XS)									
			234.92	606.8	RXS1	263.87	606.34	(XS)									
			237.65	606.72	RXS1	263.89	606.35	(PR)									
			238.47	606.52	RXS1	265.43	606.36	(XS)									
			239.9	606.01	RXS1	268.61	606.31	(XS)									
			242.35	605.53	RXS1	272.71	606.08	(XS)									
			243.23	605.17	RXS1	285.22	605.99	(XS)									
			244.35	605.09	RXS1	302.13	606.21	(XS)									
			245.1	605.15	RXS1	316.6	606.05	(XS)									
			245.86	605.15	RXS1												
			245.97	605.47	RXS1												
			246.56	605.65	RXS1												
			247.92	606.16	RXS1												
			249.45	606.61	RXS1												
			250.68	606.6	RXS1												
			253.63	606.63	RXS1												
			258.54	606.44	RXS1												
			263.86	606.3	RXS1												
			263.87	606.37	RXS1PR												
			269.75	606.27	RXS1												
			269.91	606.26	RXS1												
			277.62	606.11	RXS1												
			290.36	606.16	RXS1												
			290.54	606.16	RXS1												
			299.79	606.13	RXS1												
			310.54	606.04	RXS1												
			318.2	606.15	RXS1												
			326.26	606.25	RXS1												
			333.62	606.43	RXS1												
			341.01	606.39	RXS1												
			352.16	606.53	RXS1												
			359.63	606.69	RXS1												
			364.26	606.76	RXS1												
			376.28	607.56	RXS1												
			389.13	608.51	RXS1												
			401.27	609.79	RXS1												
			412.86	610.99	RXS1												
			424.34	612.3	RXS1												
			436.14	613.58	RXS1												
			448.82	614.94	RXS1												
			458.18	615.85	RXS1												
			465.83	616.43	RXS1												

Bankfull Width (ft)	12.3	Bankfull Width (ft)	10.98	Bankfull Width (ft)	11.72	Bankfull Width (ft)	10.41	Bankfull Width (ft)	11.9	Bankfull Width (ft)	
Bankfull Cross Sectional Area (sq ft)	11.6	Bankfull Cross Sectional Area (sq ft)	9.62	Bankfull Cross Sectional Area (sq ft)	9.17	Bankfull Cross Sectional Area (sq ft)	9.02	Bankfull Cross Sectional Area (sq ft)	8.6	Bankfull Cross Sectional Area (sq ft)	
Bankfull Mean Depth (ft)	0.94	Bankfull Mean Depth (ft)	0.88	Bankfull Mean Depth (ft)	0.78	Bankfull Mean Depth (ft)	0.87	Bankfull Mean Depth (ft)	0.7	Bankfull Mean Depth (ft)	
Bankfull Max Depth (ft)	1.51	Bankfull Max Depth (ft)	1.52	Bankfull Max Depth (ft)	1.58	Bankfull Max Depth (ft)	1.57	Bankfull Max Depth (ft)	1.5	Bankfull Max Depth (ft)	
Flood Prone Width (ft)	>100	Flood Prone Width (ft)	135.4	Flood Prone Width (ft)	135.4	Flood Prone Width (ft)	135.4	Flood Prone Width (ft)	135.4	Flood Prone Width (ft)	
Entrenchment Ratio (ft/ft)	>8.1	Entrenchment Ratio (ft/ft)	14	Entrenchment Ratio (ft/ft)	14	Entrenchment Ratio (ft/ft)	13	Entrenchment Ratio (ft/ft)	11.4	Entrenchment Ratio (ft/ft)	
Width/Depth Ratio (ft/ft)	13.05	Width/Depth Ratio (ft/ft)	12.5	Width/Depth Ratio (ft/ft)	14.98	Width/Depth Ratio (ft/ft)	12.01	Width/Depth Ratio (ft/ft)	16.5	Width/Depth Ratio (ft/ft)	
D50 (mm)	14.91	D50 (mm)	13.39	D50 (mm)	13.6	D50 (mm)	17.56	D50 (mm)	10.3	D50 (mm)	
D84 (mm)	39.77	D84 (mm)	32.0	D84 (mm)	20.7	D84 (mm)	45.0	D84 (mm)	32.0	D84 (mm)	

601 North 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

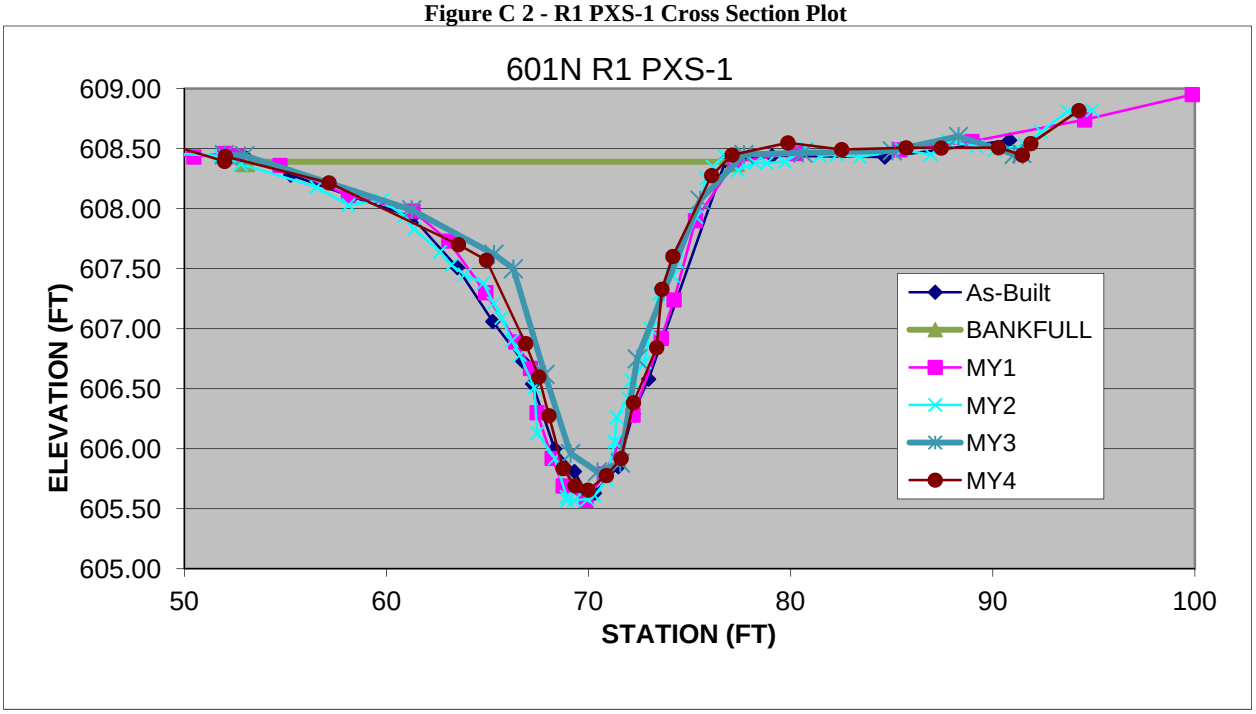

Table C 2 - R1 PXS-1 Dimension Data

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
53.09	608.42	r1pxs1	12.96	609.51	PXS1	1.19	609.61	PXS1	51.98	608.449	L pin	22.11	590.165	(XSLP)XSLP			
55.26	608.28	r1pxs1	20.84	608.88	PXS1	8.14	609.64	PXS1	52.99	608.442	Ground	24.03	590.02	(XS)XS			
58.31	608.1	r1pxs1	29.15	608.78	PXS1	12.2	609.48	PXS1	61.25	607.991	Ground	26.54	589.764	(XS)XS			
61.27	607.93	r1pxs1tob	38.4	608.59	PXS1	16.17	609.25	PXS1	65.32	607.62	Ground	28.53	589.551	(XS)XS			
63.51	607.51	r1pxs1	45.25	608.53	PXS1	20.69	608.91	PXS1	66.28	607.5	Ground	31.38	589.46	(XS)XS			
65.26	607.06	r1pxs1	50.47	608.43	PXS1	25.16	608.85	PXS1	67.84	606.619	Ground	32.76	589.346	(XS)XS			
66.74	606.73	r1pxs1	51.99	608.46	XS1PL	31.01	608.8	XS1PL	69.11	605.96	Ground	34.92	589.096	(XS)XS			
67.23	606.54	r1pxs1tos	52.65	608.44	PXS1	33.91	608.62	PXS1	70.44	605.808	Ground	36.68	588.954	(XS)XS			
68.32	606	r1pxs1	54.73	608.36	PXS1	37.32	608.55	PXS1	71.57	605.882	Ground	39.66	588.756	(XS)XS			
69.3	605.81	r1pxs1	58.12	608.11	PXS1	39.48	608.54	PXS1	72.41	606.749	Ground	41.61	588.617	(XS)XS			
69.85	605.64	r1pxs1	61.31	607.98	PXS1	43.41	608.44	PXS1	75.52	608.07	Ground	44.35	588.457	(XS)XS			
70.29	605.63	r1pxs1	63.08	607.73	PXS1	46.99	608.52	PXS1	77.69	608.451	Ground	44.93	588.393	(XS)XS			
71.47	605.85	r1pxs1	64.91	607.3	PXS1	49	608.46	PXS1	80.6	608.464	Ground	45.91	588.22	(XS)XS			
72.2	606.29	r1pxs1	66.4	606.89	PXS1	51.77	608.44	PXS1	85.03	608.482	Ground	47.23	587.996	(XS)XS			
72.97	606.58	r1pxs1tos	67.13	606.67	PXS1	52.8	608.37	PXS1	88.3	608.602	Ground	48.1	587.964	(XS)XS			
76.78	608.4	r1pxs1tob	67.45	606.3	PXS1	56.54	608.18	PXS1	91.06	608.452	Ground	48.46	587.267	(XS)XS			
79.08	608.44	r1pxs1	68.2	605.92	PXS1	58.12	608.03	PXS1	91.43	608.459	R pin	49.34	586.872	(XS)XS			
84.66	608.43	r1pxs1	68.74	605.69	PXS1	59.77	608.07	PXS1				50.08	586.639	(XS)XS			
90.83	608.57	r1pxs1	69.88	605.57	PXS1	60.9	607.94	PXS1				50.44	586.427	(XS)XS			
			70.8	605.79	PXS1	61.37	607.83	PXS1				51.44	586.338	(XS)XS			
			72.2	606.28	PXS1	62.65	607.64	PXS1				52.1	586.398	(XS)XS			
			73.6	606.92	PXS1	63.21	607.53	PXS1				52.16	586.506	(XS)XS			
			74.23	607.24	PXS1	63.86	607.45	PXS1				52.45	586.779	(XS)XS			
			75.29	607.9	PXS1	64.8	607.38	PXS1				52.84	587.031	(XS)XS			
			77.22	608.39	PXS1	65.3	607.21	PXS1				53.43	587.363	(XS)XS			
			80.23	608.46	PXS1	65.69	607.09	PXS1				54.09	587.774	(XS)XS			
			85.43	608.49	PXS1	66.21	606.9	PXS1				54.57	587.737	(XS)XS			
			88.97	608.56	PXS1	66.6	606.78	PXS1				55.01	587.719	(XS)XS			
			94.54	608.74	PXS1	67.31	606.51	PXS1				56.63	588.101	(XS)XS			
			99.87	608.95	PXS1	67.46	606.13	PXS1				57.69	588.371	(XS)XS			
			106.73	608.95	PXS1	68.33	605.92	PXS1				59.49	588.53	(XS)XS			
			115.9	609.28	PXS1	68.91	605.6	PXS1				60.87	588.734	(XS)XS			
			128.59	610.92	PXS1	68.94	605.57	PXS1				61.96	588.799	(XS)XS			
			137.66	612.28	PXS1	69.28	605.57	PXS1				63.56	589.059	(XS)XS			
						69.95	605.58	PXS1				64.68	589.346	(XS)XS			
						70.29	605.61	PXS1				65.96	589.64	(XS)XS			
						70.91	605.74	PXS1				66.6	589.906	(XS)XS			
						71.29	606.06	PXS1				69.31	590.576	(XS)XS			
						71.39	606.26	PXS1				71.32	591.43	(XS)XS			
						71.96	606.42	PXS1				73.4	591.948	(XS)XS			
						72.13	606.57	PXS1				75.44	592.212	(XS)XS			
						72.77	606.72	PXS1				77.86	592.447	(XS)XS			
						73.06	607	PXS1				80.21	592.466	(XS)XS			
						73.49	607.29	PXS1				80.36	592.494	(XSRP)XSRP			
						74.16	607.44	PXS1									
						74.36	607.56	PXS1									
						75.33	607.93	PXS1									
						75.83	608.25	PXS1									
						76.14	608.35	PXS1									
						76.74	608.44	PXS1									
						77.39	608.32	PXS1									
						78.23	608.38	PXS1									
						78.81	608.38	PXS1									
						79.71	608.39	PXS1									
						80.79	608.5	PXS1									
						81.44	608.44	PXS1									
						82.29	608.45	PXS1									
						83.41	608.43	PXS1									
						85.5	608.49	PXS1									
						86.94	608.45	PXS1									
						87.81	608.56	PXS1									
						89.19	608.52	PXS1									

Bankfull Width (ft)	23.7		Bankfull Width (ft)	24.22		Bankfull Width (ft)	26.01		Bankfull Width (ft)	22.53		Bankfull Width (ft)	24.1		Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)	25.7		Bankfull Cross Sectional Area (sq ft)	24.6		Bankfull Cross Sectional Area (sq ft)	24.43		Bankfull Cross Sectional Area (sq ft)	20.63		Bankfull Cross Sectional Area (sq ft)	22.8		Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)	1.09		Bankfull Mean Depth (ft)	1.02		Bankfull Mean Depth (ft)	0.94		Bankfull Mean Depth (ft)	0.92		Bankfull Mean Depth (ft)	0.9		Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)	2.77		Bankfull Max Depth (ft)	2.8		Bankfull Max Depth (ft)	2.8		Bankfull Max Depth (ft)	2.3		Bankfull Max Depth (ft)	2.9		Bankfull Max Depth (ft)		
Flood Prone Width (ft)	>100		Flood Prone Width (ft)	-		Flood Prone Width (ft)	-		Flood Prone Width (ft)	-		Flood Prone Width (ft)	-		Flood Prone Width (ft)		
Entrenchment Ratio (ft/ft)	>4.2		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)	21.7		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)	11.0		D50 (mm)	0.06		D50 (mm)	0.06		D50 (mm)	0.06		D50 (mm)	0.06		D50 (mm)		
D84 (mm)	26.13		D84 (mm)	5.13		D84 (mm)	0.06		D84 (mm)	0.06		D84 (mm)	0.06		D84 (mm)		

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Photo C 7 – R1 RXS-2 Left Pin

Photo C 8 – R1 RXS-2 Right Pin

Photo C 8 – R1 RXS-2 Downstream

Figure C 3 – R1 RXS-2 Cross Section Plot

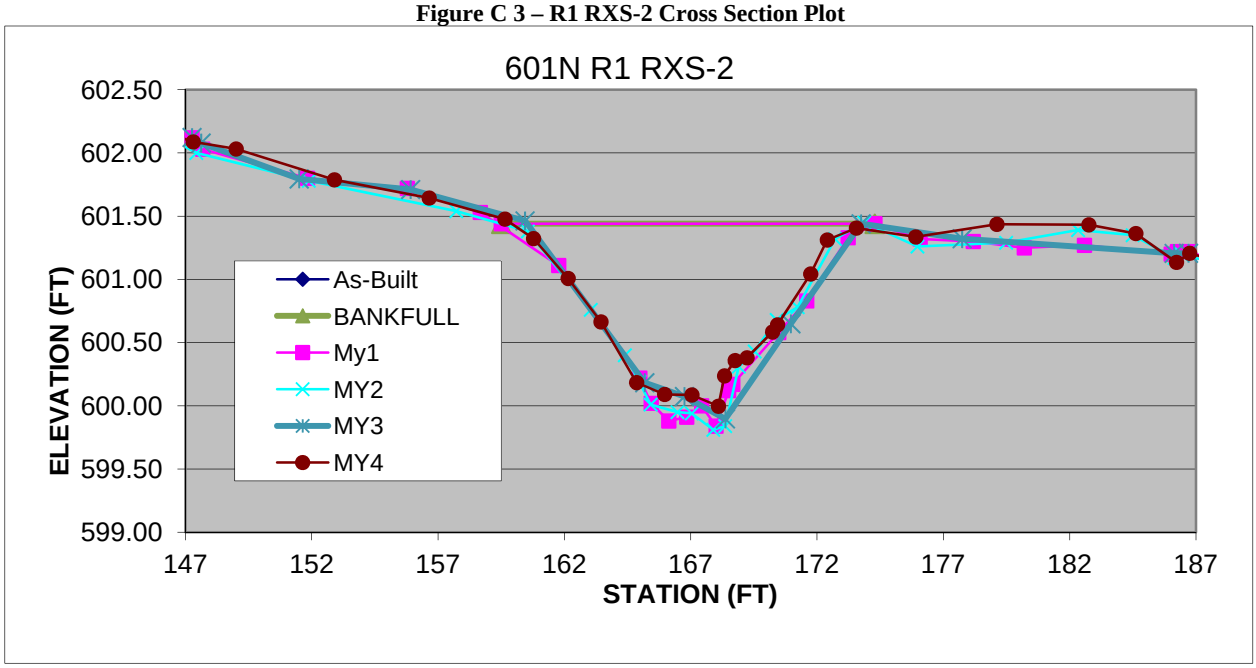

Table C 3 - R1 RXS-2 Dimension Data

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
147.07	602.09	(r1rxs2l	18.55	610.81	(RXS2	135.29	602.46	(XS) XS	147.26	602.123	L pin	147.305	602.088	(XSLP)XSLP			
148	602.04	(r1rxs2	33.41	609.76	(RXS2	142.49	602.27	(XS) XS	147.62	602.079	Ground	149.005	602.032	(XS)XS			
152.63	601.76	(r1rxs2	46.47	608.54	(RXS2	146.79	602.07	(XSLP) XSLP	151.5	601.795	Ground	152.895	601.788	(XS)XS			
156.63	601.62	(r1rxs2	59.78	607.42	(RXS2	147.43	602	(XS) XS	155.91	601.711	Ground	156.645	601.644	(XS)XS			
159.26	601.45	(r1rxs2tob	70.38	606.43	(RXS2	151.88	601.78	(XS) XS	160.44	601.463	Ground	159.645	601.477	(XS)XS			
162.71	600.91	(r1rxs2	81.73	605.43	(RXS2	157.72	601.54	(XS) XS	165.18	600.183	Ground	160.775	601.323	(XS)XS			
165.09	600.13	(r1rxs2tos	94.56	604.29	(RXS2	160.55	601.38	(XS) XS	166.75	600.074	Ground	162.145	601.008	(XS)XS			
166.22	600.06	(r1rxs2	100.95	603.72	(RXS2	163.04	600.76	(XS) XS	168.37	599.897	Ground	163.445	600.664	(XS)XS			
166.94	600.06	(r1rxs2	110.72	603.05	(RXS2	164.39	600.4	(XS) XS	170.96	600.649	Ground	164.855	600.184	(XS)XS			
167.85	599.93	(r1rxs2	119.67	602.85	(RXS2	164.97	600.19	(XS) XS	173.74	601.44	Ground	165.965	600.09	(XS)XS			
168.38	599.95	(r1rxs2	130.34	602.62	(RXS2	165.41	600.01	(XS) XS	177.74	601.322	Ground	167.045	600.086	(XS)XS			
168.92	600.25	(r1rxs2tos	138.59	602.33	(RXS2	166.47	599.95	(XS) XS	186.13	601.206	Ground	168.095	599.997	(XS)XS			
170.45	600.59	(r1rxs2	145.71	602.11	(RXS2	167.04	599.94	(XS) XS	186.7	601.207	R pin	168.335	600.237	(XS)XS			
173.49	601.42	(r1rxs2tob	147.26	602.12	(RXS2PL	167.89	599.81	(XS) XS				168.755	600.358	(XS)XS			
177.85	601.29	(r1rxs2	147.68	602.03	(RXS2	168.36	599.84	(XS) XS				169.225	600.38	(XS)XS			
186.1	601.19	(r1rxs2	151.83	601.8	(RXS2	168.9	600.31	(XS) XS				170.235	600.584	(XS)XS			
186.65	601.19	(r1rxs2r	155.78	601.72	(RXS2	169.53	600.43	(XS) XS				170.435	600.641	(XS)XS			
			158.67	601.53	(RXS2	170.4	600.68	(XS) XS				171.745	601.043	(XS)XS			
			161.77	601.11	(RXS2	171.23	600.78	(XS) XS				172.405	601.312	(XS)XS			
			164.98	600.22	(RXS2	172.71	601.32	(XS) XS				173.555	601.406	(XS)XS			
			165.43	600.02	(RXS2	173.86	601.45	(XS) XS				175.905	601.336	(XS)XS			
			166.13	599.88	(RXS2	175.97	601.26	(XS) XS				179.115	601.436	(XS)XS			
			166.84	599.91	(RXS2	179.48	601.29	(XS) XS				182.755	601.432	(XS)XS			
			167.43	600	(RXS2	182.33	601.39	(XS) XS				184.615	601.363	(XS)XS			
			168	599.84	(RXS2	184.49	601.35	(XS) XS				186.225	601.135	(XS)XS			
			168.5	600.12	(RXS2	186.14	601.17	(XS) XS				186.745	601.207	(XSRP)XSRP			
			168.66	600.17	(RXS2	186.42	601.2	(XSRP) XSRP									
			170.48	600.58	(RXS2	188.44	601.09	(XS) XS									
			171.59	600.83	(RXS2	191.8	601	(XS) XS									
			173.23	601.33	(RXS2												
			174.28	601.44	(RXS2												
			176.08	601.32	(RXS2												
			178.18	601.3	(RXS2												
			180.2	601.25	(RXS2												
			182.58	601.27	(RXS2												
			186.01	601.2	(RXS2												
			186.26	601.22	(RXS2												
			186.67	601.22	(RXS2PR												
			190.4	600.99	(RXS2												
			193.8	600.8	(RXS2												
			196.14	600.19	(RXS2												
			198.99	599.8	(RXS2												
			201.64	600.04	(RXS2												
			205.37	600.48	(RXS2												
			210.87	601.13	(RXS2												
			215.82	601.53	(RXS2												
			223.34	602.13	(RXS2												
			232.26	602.31	(RXS2												
			245.05	602.43	(RXS2												
			258.91	603.14	(RXS2												
			267.38	603.8	(RXS2												
			280.02	604.81	(RXS2												
			294.93	605.91	(RXS2												
			307.56	606.87	(RXS2												
			321.05	607.41	(RXS2												
			321.24	607.38	(RXS2												
			342.9	608.33	(RXS2												
			364.24	609.38	(RXS2												

Bankfull Width (ft)	14.23	Bankfull Width (ft)	15.6	Bankfull Width (ft)	13.31	Bankfull Width (ft)	25.7	Bankfull Width (ft)	13.9	Bankfull Width (ft)	
Bankfull Cross Sectional Area (sq ft)	11.3	Bankfull Cross Sectional Area (sq ft)	11.8	Bankfull Cross Sectional Area (sq ft)	11.42	Bankfull Cross Sectional Area (sq ft)	13.31	Bankfull Cross Sectional Area (sq ft)	12.6	Bankfull Cross Sectional Area (sq ft)	
Bankfull Mean Depth (ft)	0.8	Bankfull Mean Depth (ft)	0.75	Bankfull Mean Depth (ft)	0.85	Bankfull Mean Depth (ft)	0.52	Bankfull Mean Depth (ft)	0.9	Bankfull Mean Depth (ft)	
Bankfull Max Depth (ft)	1.5	Bankfull Max Depth (ft)	1.6	Bankfull Max Depth (ft)	1.58	Bankfull Max Depth (ft)	1.54	Bankfull Max Depth (ft)	1.41	Bankfull Max Depth (ft)	
Flood Prone Width (ft)	>100	Flood Prone Width (ft)	148	Flood Prone Width (ft)	148	Flood Prone Width (ft)	148.2	Flood Prone Width (ft)	148.2	Flood Prone Width (ft)	
Entrenchment Ratio (ft/ft)	>7	Entrenchment Ratio (ft/ft)	9.5	Entrenchment Ratio (ft/ft)	9.5	Entrenchment Ratio (ft/ft)	11.142	Entrenchment Ratio (ft/ft)	10.7	Entrenchment Ratio (ft/ft)	
Width/Depth Ratio (ft/ft)	17.9	Width/Depth Ratio (ft/ft)	20.7	Width/Depth Ratio (ft/ft)	15.52	Width/Depth Ratio (ft/ft)	15.12	Width/Depth Ratio (ft/ft)	15.4	Width/Depth Ratio (ft/ft)	
D50 (mm)	18.97	D50 (mm)	12.48	D50 (mm)	5.58	D50 (mm)	12.08	D50 (mm)	13.65	D50 (mm)	
D84 (mm)	40.0	D84 (mm)	28.87	D84 (mm)	20.42	D84 (mm)	27.30	D84 (mm)	25.73	D84 (mm)	

601 North R1 PXS-2

Photo C 9 – R1 PXS-2 Left Pin

Photo C 10 – R1 PXS-2 Right Pin

Photo C 11 – R1 PXS-2 Downstream

Figure C 4 - R1 PXS-2 Cross Section Plot

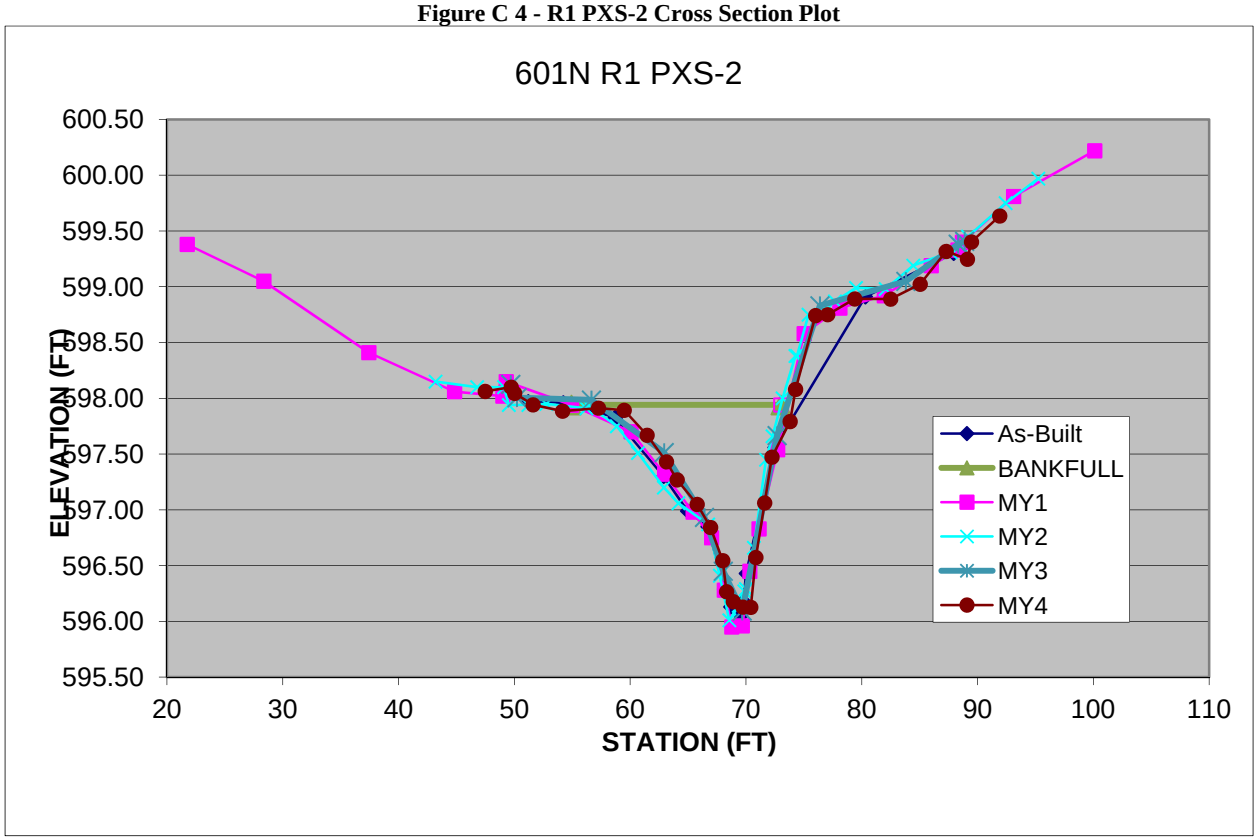

Table C 4 – R1 PXS-2 Dimension Data

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
49.29	598.11	r1pxs2l	21.75	599.38	PXS2	43.19	598.15	(XS)	49.68	598.125	L pin	50.02	598.045	(XSLP)XSLP			
51.2	597.97	r1pxs2	28.36	599.05	PXS2	46.78	598.1	(XS)	50.22	598.006	Ground	51.61	597.942	(XS)XS			
54.22	597.96	r1pxs2	37.43	598.41	PXS2	49.1	598.1	(XSLP) X	56.65	597.985	Ground	54.16	597.885	(XS)XS			
58.7	597.83	r1pxs2tob	44.83	598.06	PXS2	49.52	597.94	(XS)	62.93	597.514	Ground	57.26	597.912	(XS)XS			
58.7	597.82	r1pxs2tob	49	598.02	PXS2	51.21	597.94	(XS)	66.41	596.933	Ground	59.48	597.893	(XS)XS			
62.89	597.3	r1pxs2	49.29	598.15	PXS2PL	52.75	597.95	(XS)	68.04	596.45	Ground	61.46	597.669	(XS)XS			
64.95	596.99	r1pxs2	54.92	597.94	PXS2	56.22	597.91	(XS)	69.67	596.094	Ground	63.13	597.431	(XS)XS			
66.71	596.85	r1pxs2	60.07	597.7	PXS2	56.23	597.95	(XS)	72.69	597.666	Ground	64.05	597.269	(XS)XS			
68.14	596.29	r1pxs2tos	62.97	597.32	PXS2	58.84	597.75	(XS)	76.38	598.83	Ground	65.78	597.049	(XS)XS			
68.68	596.13	r1pxs2	65.43	596.98	PXS2	60.67	597.51	(XS)	83.8	599.049	Ground	66.94	596.842	(XS)XS			
69.53	596.05	r1pxs2	67.03	596.75	PXS2	62.91	597.2	(XS)	88.32	599.382	Ground	67.99	596.545	(XS)XS			
69.78	596.18	r1pxs2	68.13	596.28	PXS2	64.16	597.06	(XS)	88.88	599.408	R pin	68.32	596.266	(XS)XS			
70.02	596.43	r1pxs2tos	68.77	595.95	PXS2	66.73	596.87	(XS)				68.9	596.177	(XS)XS			
72.49	597.56	r1pxs2	69.68	595.96	PXS2	67.74	596.41	(XS)				69.73	596.128	(XS)XS			
80.31	598.91	r1pxs2	70.33	596.45	PXS2	68.56	596.01	(XS)				70.41	596.126	(XS)XS			
87.93	599.3	r1pxs2	71.12	596.83	PXS2	69.37	596.14	(XS)				70.85	596.573	(XS)XS			
88.48	599.34	r1pxs2r	72.73	597.54	PXS2	69.85	596.27	(XS)				71.61	597.062	(XS)XS			
			75.02	598.58	PXS2	70	596.29	(XS)				72.24	597.473	(XS)XS			
			78.1	598.81	PXS2	70.68	596.66	(XS)				73.81	597.792	(XS)XS			
			81.94	598.92	PXS2	71.73	597.45	(XS)				74.28	598.08	(XS)XS			
			85.99	599.19	PXS2	72.29	597.66	(XS)				76.01	598.742	(XS)XS			
			88.3	599.33	PXS2	73.16	598	(XS)				77.05	598.75	(XS)XS			
			88.69	599.4	PXS2PR	74.27	598.38	(XS)				79.39	598.891	(XS)XS			
			93.11	599.81	PXS2	74.41	598.38	(XS)				82.49	598.89	(XS)XS			
			100.11	600.22	PXS2	75.4	598.75	(XS)				85.04	599.023	(XS)XS			
						77.68	598.87	(XS)				87.28	599.317	(XS)XS			
						79.5	598.99	(XS)				89.12	599.247	(XSRP)XSRP			
						82.06	598.98	(XS)									
						84.44	599.19	(XS)									
						87.66	599.31	(XS)									
						88.5	599.37	(XSRP) X									
						89.17	599.45	(XS)									
						92.42	599.75	(XS)									
						95.24	599.97	(XS)									

Bankfull Width (ft)	20.28	Bankfull Width (ft)	18.1	Bankfull Width (ft)	19.54	Bankfull Width (ft)	13.02	Bankfull Width (ft)	18.1	Bankfull Width (ft)	
Bankfull Cross Sectional Area (sq ft)	13.4	Bankfull Cross Sectional Area (sq ft)	13.4	Bankfull Cross Sectional Area (sq ft)	13.22	Bankfull Cross Sectional Area (sq ft)	11.64	Bankfull Cross Sectional Area (sq ft)	12.3	Bankfull Cross Sectional Area (sq ft)	
Bankfull Mean Depth (ft)	0.66	Bankfull Mean Depth (ft)	0.74	Bankfull Mean Depth (ft)	0.68	Bankfull Mean Depth (ft)	0.89	Bankfull Mean Depth (ft)	0.7	Bankfull Mean Depth (ft)	
Bankfull Max Depth (ft)	1.9	Bankfull Max Depth (ft)	2	Bankfull Max Depth (ft)	1.9	Bankfull Max Depth (ft)	1.89	Bankfull Max Depth (ft)	1.8	Bankfull Max Depth (ft)	
Flood Prone Width (ft)	>80	Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)	
Entrenchment Ratio (ft/ft)	>4	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)	30.6	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)	17.5	D50 (mm)	4.68	D50 (mm)	6.08	D50 (mm)	8.83	D50 (mm)	15.22	D50 (mm)	
D84 (mm)	34.17	D84 (mm)	16.0	D84 (mm)	20.4	D84 (mm)	36.3	D84 (mm)	37.20	D84 (mm)	

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Photo C 12 – R1 RXS-3 Left Pin

Photo C 13 – R1 RXS-3 Right Pin

Photo C 14 – R1 RXS-3 Downstream

Figure C 5 – R1 RXS-3 Cross Section Plot

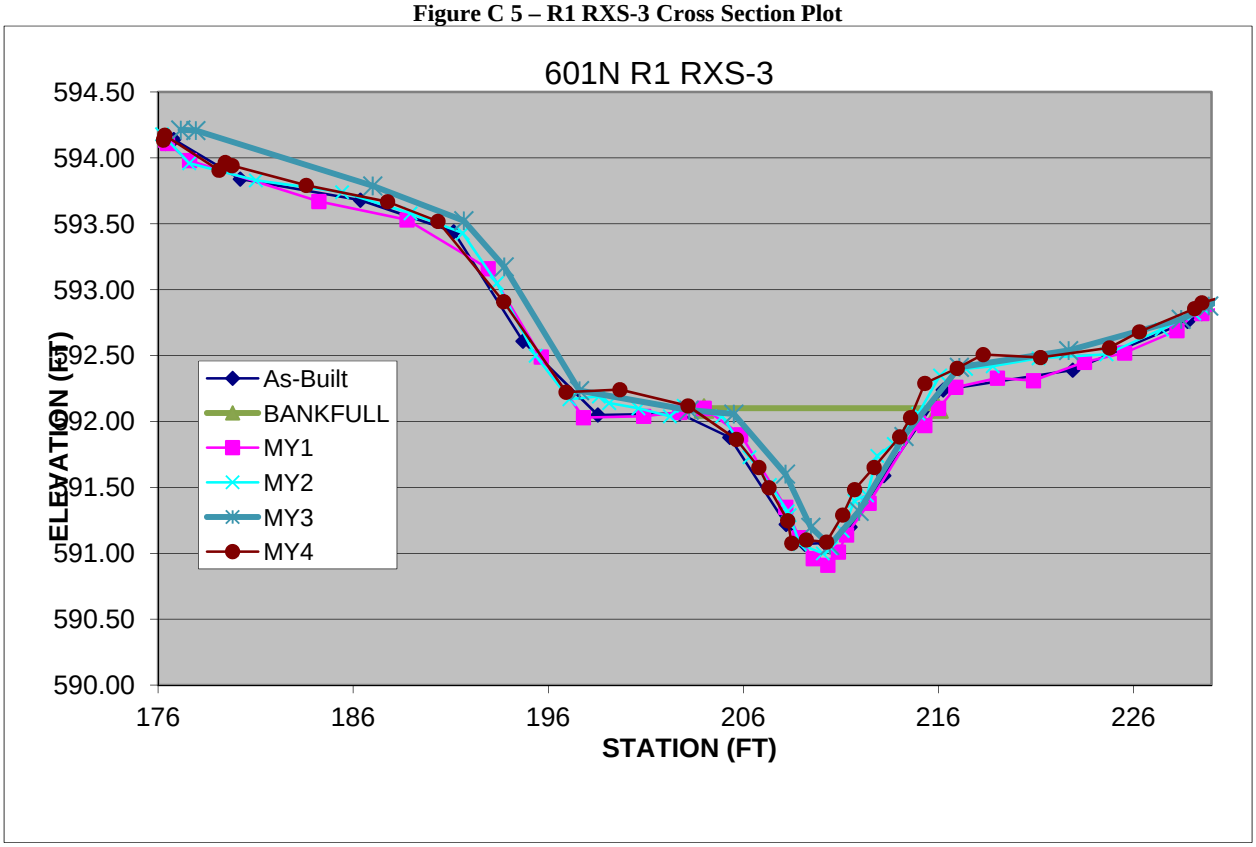

Table C 5 - R1 RXS-3 Dimension Data

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
176.37	594.11	r1rxs3l	14.15	602.28	RXS3	168.62	593.84	(XS)	177.16	594.212	L pin	176.34	594.173	(XSLP)XSLP			
176.8	594.14	r1rxs3	30.58	600.87	RXS3	172.95	594.02	(XS)	177.93	594.208	Ground	179.12	593.907	(XS)XS			
180.21	593.84	r1rxs3	66.21	597.45	RXS3	175.98	594.11	(XS)	187	593.788	Ground	179.44	593.966	(XS)XS			
186.37	593.68	r1rxs3	92.86	595.43	RXS3	176.2	594.18	(XSLP) X	191.67	593.524	Ground	179.79	593.942	(XS)XS			
191.15	593.44	r1rxs3	115.15	595.14	RXS3	177.59	593.96	(XS)	193.74	593.174	Ground	183.59	593.792	(XS)XS			
194.7	592.61	r1rxs3	115.33	595.15	RXS3	181.01	593.83	(XS)	197.6	592.235	Ground	187.76	593.668	(XS)XS			
198.54	592.05	r1rxs3	130.33	594.57	RXS3	185.43	593.74	(XS)	203.22	592.086	Ground	190.34	593.519	(XS)XS			
202.74	592.06	r1rxs3tob	130.39	594.6	RXS3	188.94	593.58	(XS)	205.51	592.057	Ground	193.71	592.91	(XS)XS			
205.3	591.88	r1rxs3	139.86	594.38	RXS3	191.61	593.43	(XS)	208.16	591.602	Ground	196.91	592.223	(XS)XS			
208.19	591.22	r1rxs3tos	149.95	593.8	RXS3	193.36	593.05	(XS)	209.46	591.198	Ground	199.67	592.242	(XS)XS			
208.92	591.12	r1rxs3	150.06	593.81	RXS3	195.35	592.5	(XS)	210.43	591.061	Ground	203.16	592.119	(XS)XS			
209.14	591.07	r1rxs3	161.42	593.48	RXS3	197.08	592.17	(XS)	211.93	591.319	Ground	205.64	591.865	(XS)XS			
210.17	591.08	r1rxs3	166.56	593.26	RXS3	198.59	592.19	(XS)	214.23	591.887	Ground	206.79	591.652	(XS)XS			
211.28	591.15	r1rxs3	171.07	593.7	RXS3	199.12	592.14	(XS)	217.07	592.412	Ground	207.31	591.498	(XS)XS			
211.47	591.2	r1rxs3tos	174.86	594.03	RXS3	200.62	592.1	(XS)	222.67	592.539	Ground	208.27	591.248	(XS)XS			
213.2	591.59	r1rxs3	176.48	594.11	RXS3L	202.23	592.04	(XS)	228.44	592.776	Ground	208.48	591.077	(XS)XS			
216.24	592.24	r1rxs3tob	177.61	593.98	RXS3	202.94	592.12	(XS)	229.85	592.877	Ground	209.22	591.102	(XS)XS			
222.88	592.39	r1rxs3	184.24	593.67	RXS3	204.91	592.04	(XS)	230.25	592.907	R pin	210.26	591.086	(XS)XS			
228.77	592.76	r1rxs3	188.76	593.53	RXS3	206.31	591.73	(XS)				211.09	591.291	(XS)XS			
229.5	592.82	r1rxs3r	192.92	593.16	RXS3	207.36	591.52	(XS)				211.7	591.484	(XS)XS			
			195.64	592.49	RXS3	208.27	591.32	(XS)				212.7	591.652	(XS)XS			
			197.8	592.03	RXS3	208.37	591.29	(XS)				214.01	591.884	(XS)XS			
			200.89	592.04	RXS3	208.89	591.07	(XS)				214.57	592.03	(XS)XS			
			202.74	592.07	RXS3	210.07	591	(XS)				215.3	592.29	(XS)XS			
			203.98	592.1	RXS3	210.49	591.04	(XS)				216.96	592.404	(XS)XS			
			205.86	591.9	RXS3	211.09	591.17	(XS)				218.29	592.508	(XS)XS			
			208.17	591.35	RXS3	211.69	591.4	(XS)				221.23	592.486	(XS)XS			
			208.86	591.12	RXS3	212.34	591.44	(XS)				224.76	592.559	(XS)XS			
			209.58	590.96	RXS3	212.86	591.74	(XS)				226.3	592.681	(XS)XS			
			210.33	590.91	RXS3	213.71	591.83	(XS)				229.13	592.857	(XS)XS			
			210.87	591.01	RXS3	214.97	592.06	(XS)				229.5	592.901	(XSRP)XSRP			
			211.29	591.14	RXS3	216.08	592.35	(XS)									
			212.44	591.38	RXS3	217.41	592.4	(XS)									
			214.98	591.99	RXS3	218.78	592.42	(XS)									
			215.3	591.97	RXS3	221.13	592.48	(XS)									
			216.89	592.26	RXS3	224.61	592.51	(XS)									
			219.02	592.33	RXS3	227.44	592.7	(XS)									
			220.87	592.31	RXS3	229.11	592.82	(XS)									
			223.48	592.45	RXS3	229.51	592.87	(XSRP) X									
			225.54	592.52	RXS3	231.63	593	(XS)									
			228.22	592.69	RXS3	235.42	593.07	(XS)									
			229.34	592.85	RXS3	236.84	593.19	(XS)									
			229.5	592.82	RXS3PR	240.95	593.21	(XS)									
			233.99	593.02	RXS3												
			240.09	593.22	RXS3												
			246.14	593.21	RXS3												
			251.73	593.44	RXS3												
			259.01	593.27	RXS3												
			266.34	593.24	RXS3												
			274.91	593.44	RXS3												
			283.68	593.56	RXS3												
			289.9	593.68	RXS3												
			290.31	593.71	RXS3												
			328.26	595.49	RXS3												

Bankfull Width (ft)	10.5		Bankfull Width (ft)	11		Bankfull Width (ft)	13.09		Bankfull Width (ft)	8.71		Bankfull Width (ft)	10.85		Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)	6.4		Bankfull Cross Sectional Area (sq ft)	6.6		Bankfull Cross Sectional Area (sq ft)	6.04		Bankfull Cross Sectional Area (sq ft)	5.14		Bankfull Cross Sectional Area (sq ft)	5.86		Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)	0.61		Bankfull Mean Depth (ft)	0.6		Bankfull Mean Depth (ft)	0.46		Bankfull Mean Depth (ft)	0.59		Bankfull Mean Depth (ft)	0.54		Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)	1		Bankfull Max Depth (ft)	1.2		Bankfull Max Depth (ft)	1.1		Bankfull Max Depth (ft)	1.02		Bankfull Max Depth (ft)	1.04		Bankfull Max Depth (ft)		
Flood Prone Width (ft)	>150		Flood Prone Width (ft)	166		Flood Prone Width (ft)	166		Flood Prone Width (ft)	86.15		Flood Prone Width (ft)	86.15		Flood Prone Width (ft)		
Entrenchment Ratio (ft/ft)	>10		Entrenchment Ratio (ft/ft)	15		Entrenchment Ratio (ft/ft)	12.68		Entrenchment Ratio (ft/ft)	9.89		Entrenchment Ratio (ft/ft)	7.94		Entrenchment Ratio (ft/ft)		
Width/Depth Ratio (ft/ft)	17.2		Width/Depth Ratio (ft/ft)	18.3		Width/Depth Ratio (ft/ft)	28.35		Width/Depth Ratio (ft/ft)	14.7		Width/Depth Ratio (ft/ft)	20.09		Width/Depth Ratio (ft/ft)		
D50 (mm)	15.77		D50 (mm)	8.0		D50 (mm)	6.28		D50 (mm)	6.8		D50 (mm)	13.18		D50 (mm)		
D84 (mm)	31.1		D84 (mm)	25.73		D84 (mm)	14.12		D84 (mm)	22.6		D84 (mm)	32.00		D84 (mm)		

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Photo C 15 – R1 PXS-3 Left Pin

Photo C 16 – R1 PXS-3 Right Pin

Photo C 17 – R1 PXS-3 Downstream

Figure C 6 – R1 PXS-3 Cross Section Plot

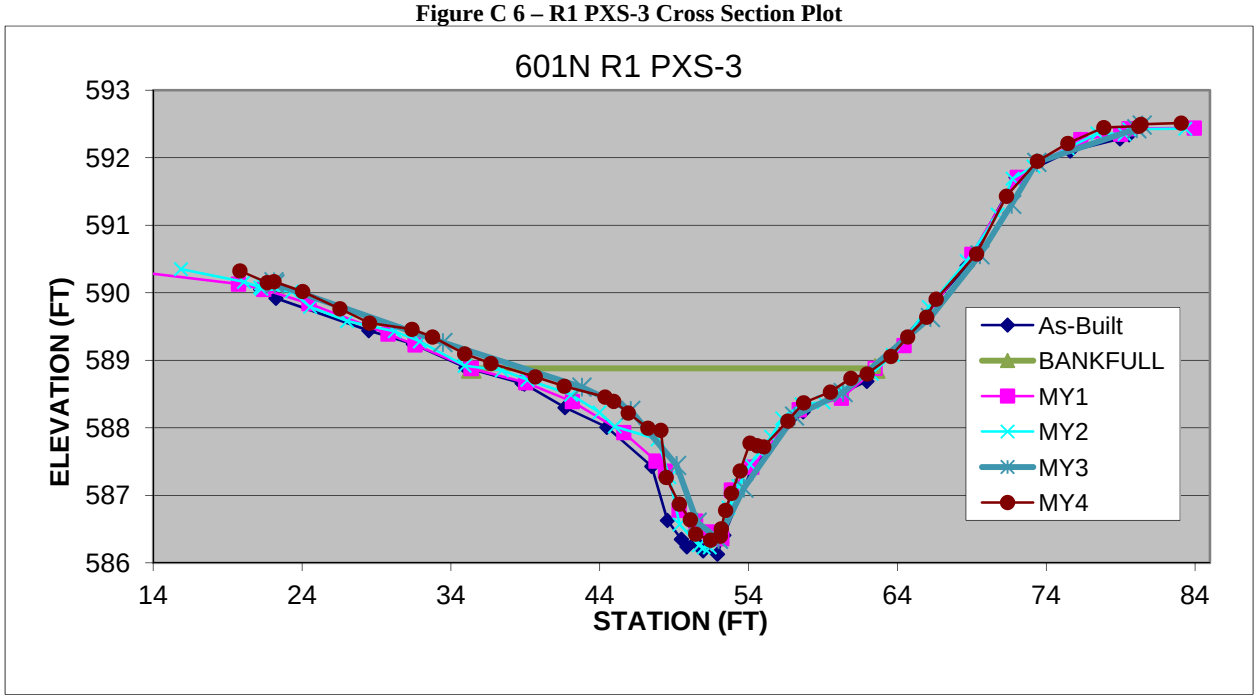


Table C 6 - R1 PXS-3 Dimension Data

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
21.22	590.05	r1pxs3l	13.71	590.29	PXS3	15.86	590.35	(XS)	22.11	590.165	L pin	22.11	590.165	(XSLP)XSLP			
22.24	589.92	r1pxs3	19.72	590.13	PXS3	20.09	590.16	(XS)	22.17	590.132	Ground	24.03	590.02	(XS)XS			
28.48	589.44	r1pxs3	21.42	590.05	PXS3PL	21.18	590.08	(XS)	33.46	589.265	Ground	26.54	589.764	(XS)XS			
31.47	589.24	r1pxs3	24.46	589.84	PXS3	21.25	590.14	(XSLP) X	42.8	588.604	Ground	28.53	589.551	(XS)XS			
35	588.89	r1pxs3	29.77	589.39	PXS3	21.27	590.06	(XS)	46.08	588.26	Ground	31.38	589.46	(XS)XS			
38.78	588.66	tob	31.59	589.23	PXS3	23.31	590.02	(XS)	49.16	587.445	Ground	32.76	589.346	(XS)XS			
38.93	588.65	r1pxs3tob	35.36	588.88	PXS3	24.54	589.79	(XS)	50.54	586.604	Ground	34.92	589.096	(XS)XS			
41.66	588.3	r1pxs3	39.02	588.67	PXS3	27.02	589.58	(XS)	51.98	586.35	Ground	36.68	588.954	(XS)XS			
44.47	588.01	r1pxs3	42.15	588.39	PXS3	30.22	589.43	(XS)	53.68	587.107	Ground	39.66	588.756	(XS)XS			
47.49	587.43	r1pxs3	45.61	587.93	PXS3	31.91	589.28	(XS)	57.08	588.176	Ground	41.61	588.617	(XS)XS			
48.54	586.63	r1pxs3tos	47.78	587.51	PXS3	34.92	588.92	(XS)	60.35	588.523	Ground	44.35	588.457	(XS)XS			
49.48	586.35	r1pxs3	48.41	587.36	PXS3	37.42	588.85	(XS)	66.21	589.634	Ground	44.93	588.393	(XS)XS			
49.85	586.24	r1pxs3	49.32	586.78	PXS3	39.14	588.71	(XS)	69.54	590.563	Ground	45.91	588.22	(XS)XS			
50.44	586.31	r1pxs3	50.43	586.62	PXS3	42.07	588.49	(XS)	71.67	591.31	Ground	47.23	587.996	(XS)XS			
50.94	586.18	r1pxs3	51.4	586.46	PXS3	43.98	588.23	(XS)	73.36	591.932	Ground	48.1	587.964	(XS)XS			
51.9	586.13	r1pxs3	52.2	586.36	PXS3	45	588.02	(XS)	80.08	592.43	Ground	48.46	587.267	(XS)XS			
52.33	586.41	r1pxs3tos	52.84	587.08	PXS3	47.89	587.83	(XS)	80.44	592.485	R pin	49.34	586.872	(XS)XS			
54.29	587.43	r1pxs3	54.21	587.42	PXS3	48.67	587.27	(XS)				50.08	586.639	(XS)XS			
57.66	588.24	r1pxs3tob	57.4	588.27	PXS3	49.36	586.57	(XS)				50.44	586.427	(XS)XS			
61.94	588.69	r1pxs3toe	60.23	588.44	PXS3	50.66	586.26	(XS)				51.44	586.338	(XS)XS			
66.6	589.88	r1pxs3	64.44	589.22	PXS3	50.98	586.23	(XS)				52.1	586.398	(XS)XS			
68.67	590.4	r1pxs3	69	590.57	PXS3	51.39	586.23	(XS)				52.16	586.506	(XS)XS			
71.96	591.71	r1pxs3	72.05	591.71	PXS3	52.07	586.33	(XS)				52.45	586.779	(XS)XS			
75.6	592.1	r1pxs3top	76.32	592.27	PXS3	52.66	586.82	(XS)				52.84	587.031	(XS)XS			
78.94	592.28	r1pxs3	78.99	592.35	PXS3	53.32	587.14	(XS)				53.43	587.363	(XS)XS			
79.56	592.34	r1pxs3r	79.56	592.43	PXS3PR	54.1	587.46	(XS)				54.09	587.774	(XS)XS			
			83.94	592.44	PXS3	54.75	587.64	(XS)				54.57	587.737	(XS)XS			
						55.51	587.87	(XS)				55.01	587.719	(XS)XS			
						56.26	588.14	(XS)				56.63	588.101	(XS)XS			
						57.55	588.35	(XS)				57.69	588.371	(XS)XS			
						59.03	588.38	(XS)				59.49	588.53	(XS)XS			
						59.93	588.53	(XS)				60.87	588.734	(XS)XS			
						62.28	588.8	(XS)				61.96	588.799	(XS)XS			
						63.68	589.08	(XS)				63.56	589.059	(XS)XS			
						66.1	589.79	(XS)				64.68	589.346	(XS)XS			
						68.64	590.47	(XS)				65.96	589.64	(XS)XS			
						70.73	591.16	(XS)				66.6	589.906	(XS)XS			
						71.73	591.69	(XS)				69.31	590.576	(XS)XS			
						73.14	591.87	(XS)				71.32	591.43	(XS)XS			
						75.43	592.14	(XS)				73.4	591.948	(XS)XS			
						77.43	592.36	(XS)				75.44	592.212	(XS)XS			
						79.25	592.35	(XS)				77.86	592.447	(XS)XS			
						79.56	592.42	(XSRP) X				80.21	592.466	(XS)XS			
						83.33	592.43	(XS)				80.36	592.494	(XSRP)XSRP			

Bankfull Width (ft)	26.94	Bankfull Width (ft)	24.9	Bankfull Width (ft)	22.51	Bankfull Width (ft)	17.55	Bankfull Width (ft)	16.97	Bankfull Width (ft)	
Bankfull Cross Sectional Area (sq ft)	28.2	Bankfull Cross Sectional Area (sq ft)	24.3	Bankfull Cross Sectional Area (sq ft)	23.5	Bankfull Cross Sectional Area (sq ft)	20.26	Bankfull Cross Sectional Area (sq ft)	20.86	Bankfull Cross Sectional Area (sq ft)	
Bankfull Mean Depth (ft)	1.05	Bankfull Mean Depth (ft)	0.98	Bankfull Mean Depth (ft)	1.04	Bankfull Mean Depth (ft)	1.15	Bankfull Mean Depth (ft)	1.23	Bankfull Mean Depth (ft)	
Bankfull Max Depth (ft)	2.76	Bankfull Max Depth (ft)	2.5	Bankfull Max Depth (ft)	2.62	Bankfull Max Depth (ft)	2.25	Bankfull Max Depth (ft)	2.42	Bankfull Max Depth (ft)	
Flood Prone Width (ft)	>100	Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)	-	Flood Prone Width (ft)	-
Entrenchment Ratio (ft/ft)	>3.7	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)	25.7	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)	6.90	D50 (mm)	2.86	D50 (mm)	0.06	D50 (mm)	1.1	D50 (mm)	0.061	D50 (mm)	
D84 (mm)	15.48	D84 (mm)	6.47	D84 (mm)	4.85	D84 (mm)	4.7	D84 (mm)	5.05	D84 (mm)	

Figure C 7 - R1 Longitudinal Profile Single Sheet

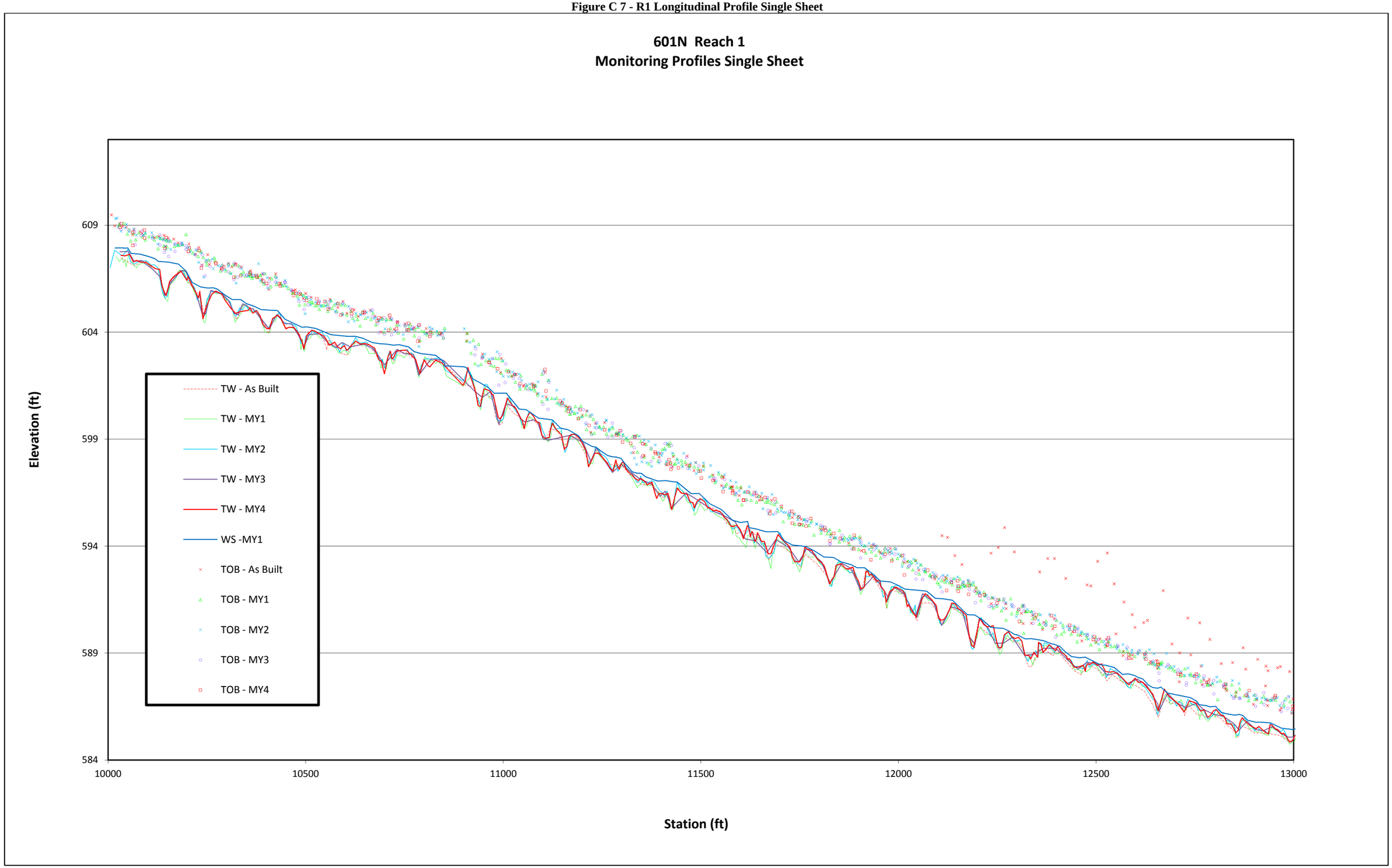


Figure C 8 - R1 Longitudinal Profile Sheet 1

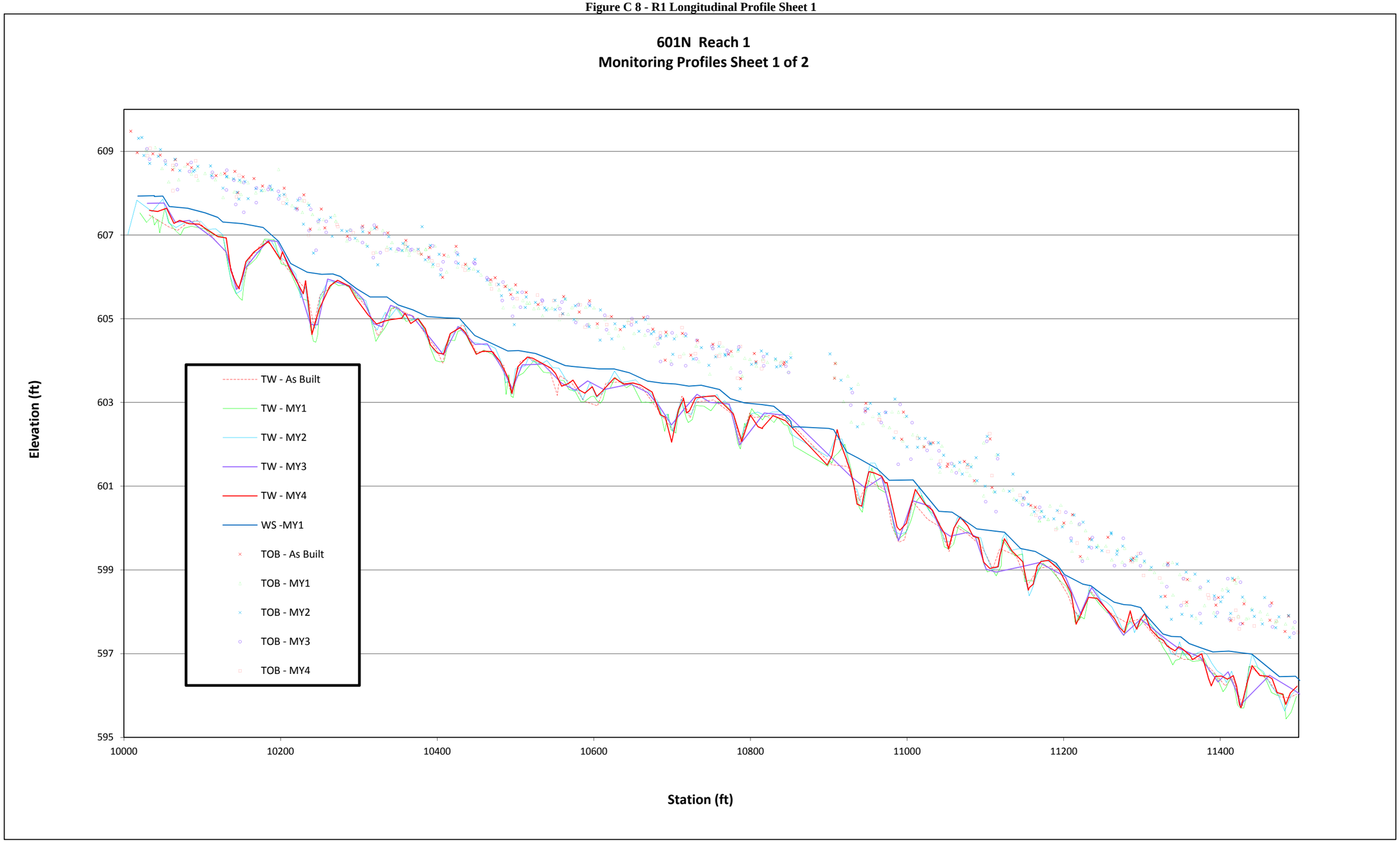


Figure C 9 - R1 Longitudinal Profile Sheet 2

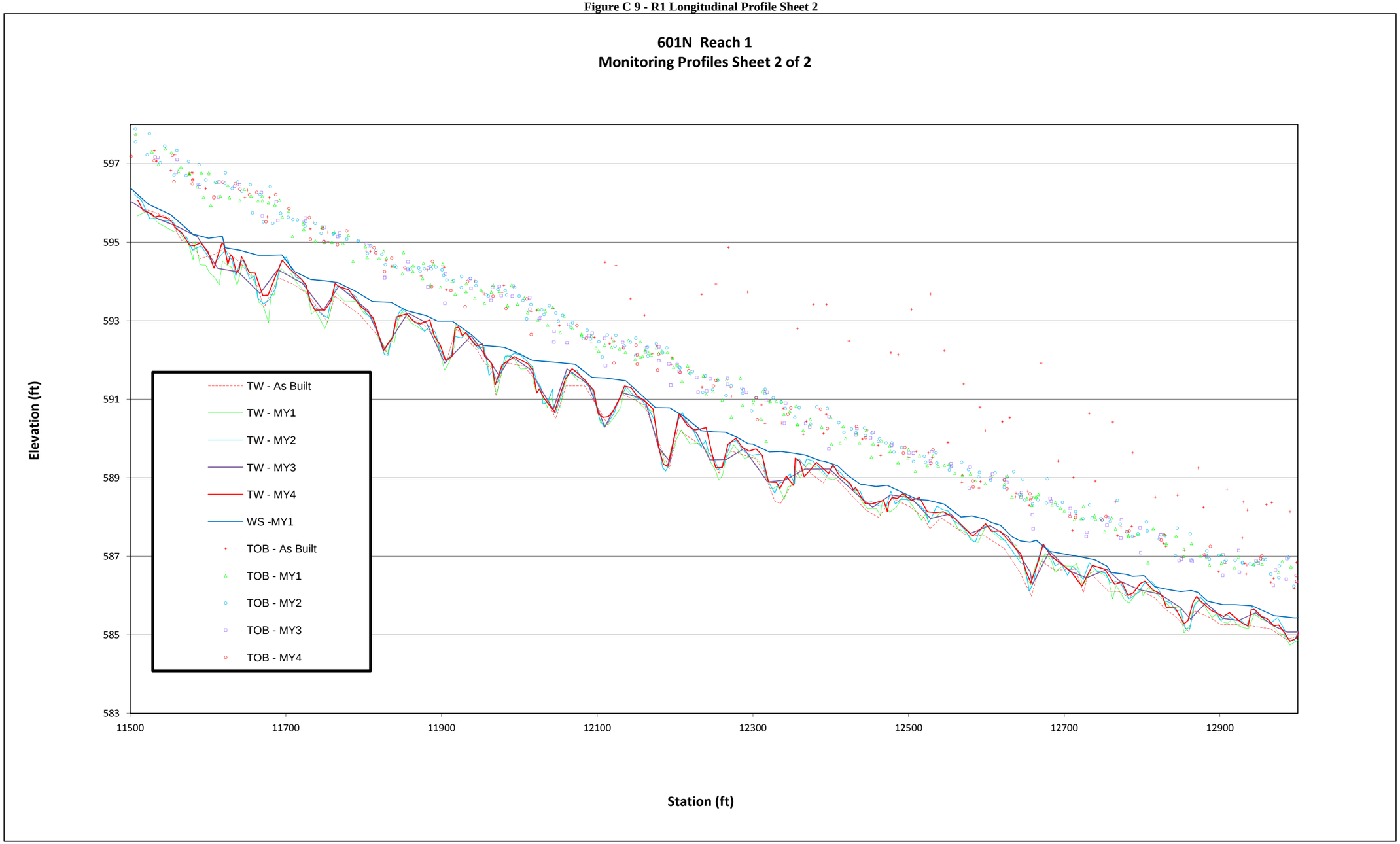


Figure C 10 - R1 RXS-1 Pebble Count

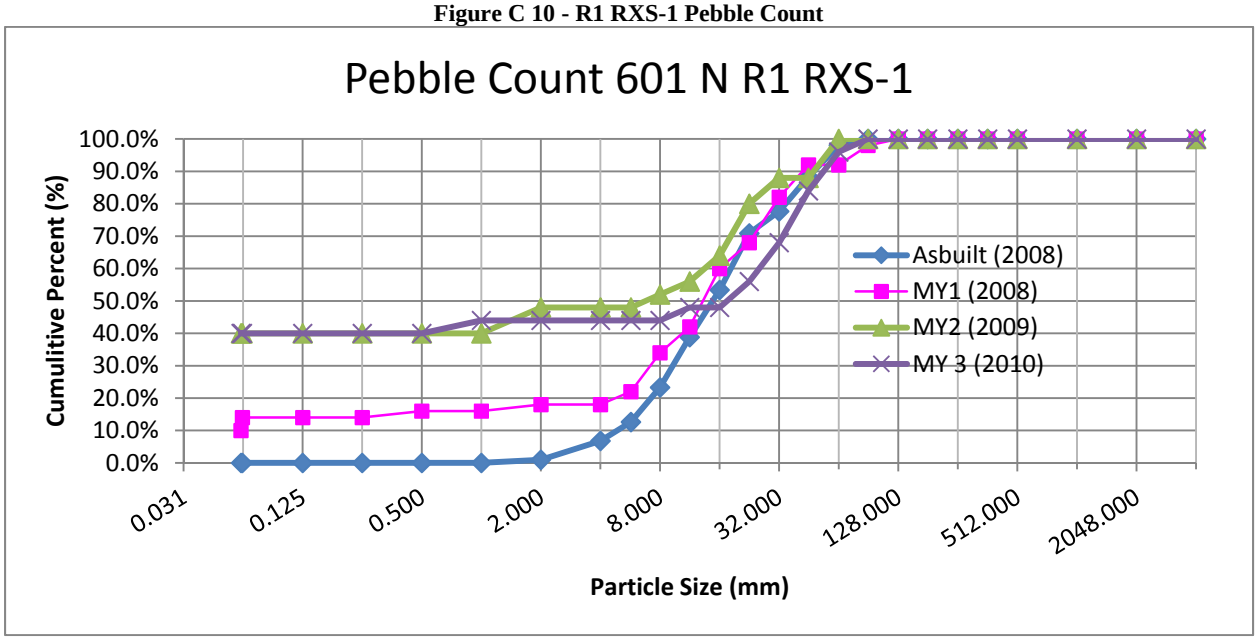


Figure C 11 - R1 PXS-1 Pebble Count

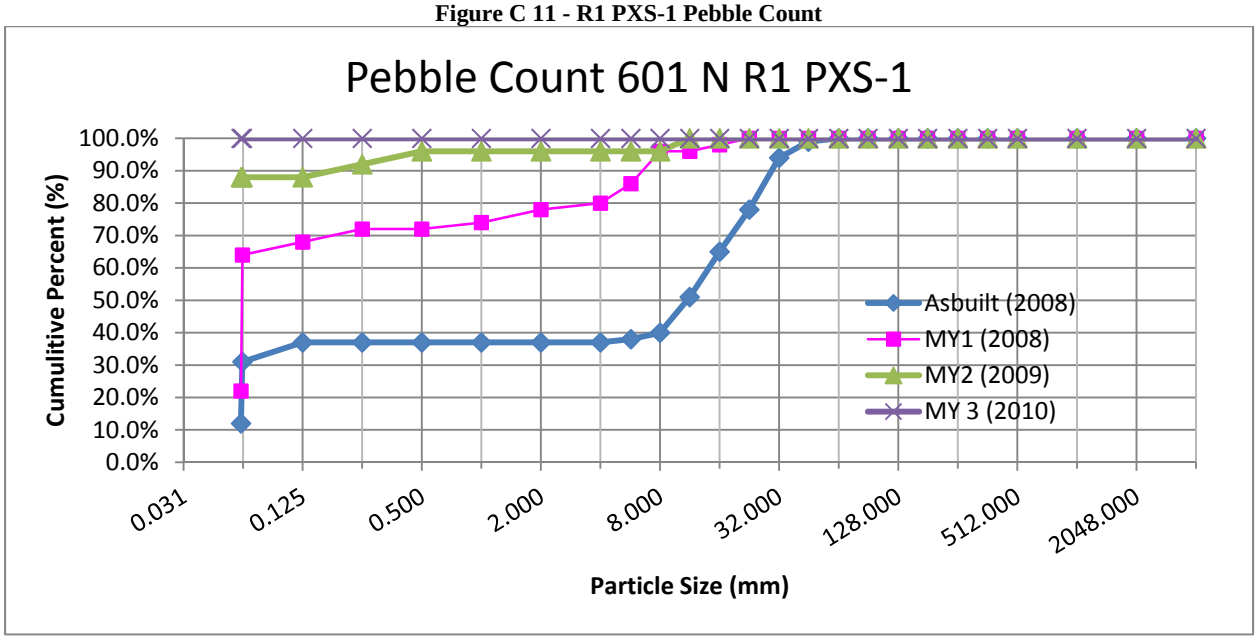


Figure C 12 - R1 RXS-2 Pebble Count

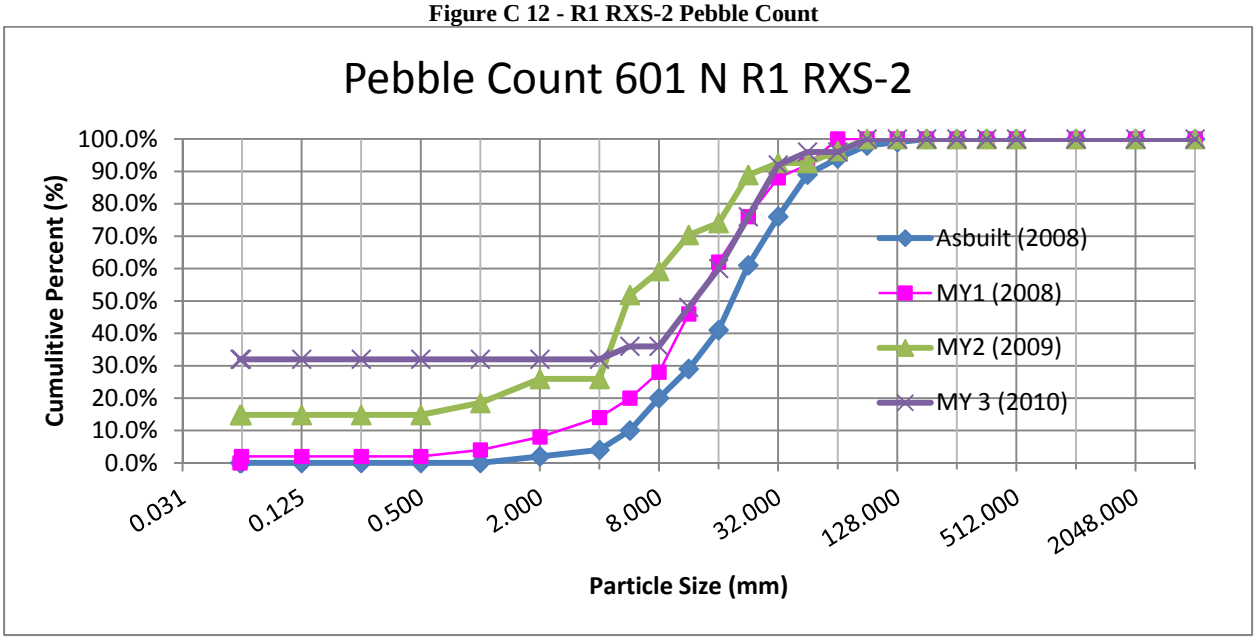


Figure C 13 - R1 PXS-2 Pebble Count

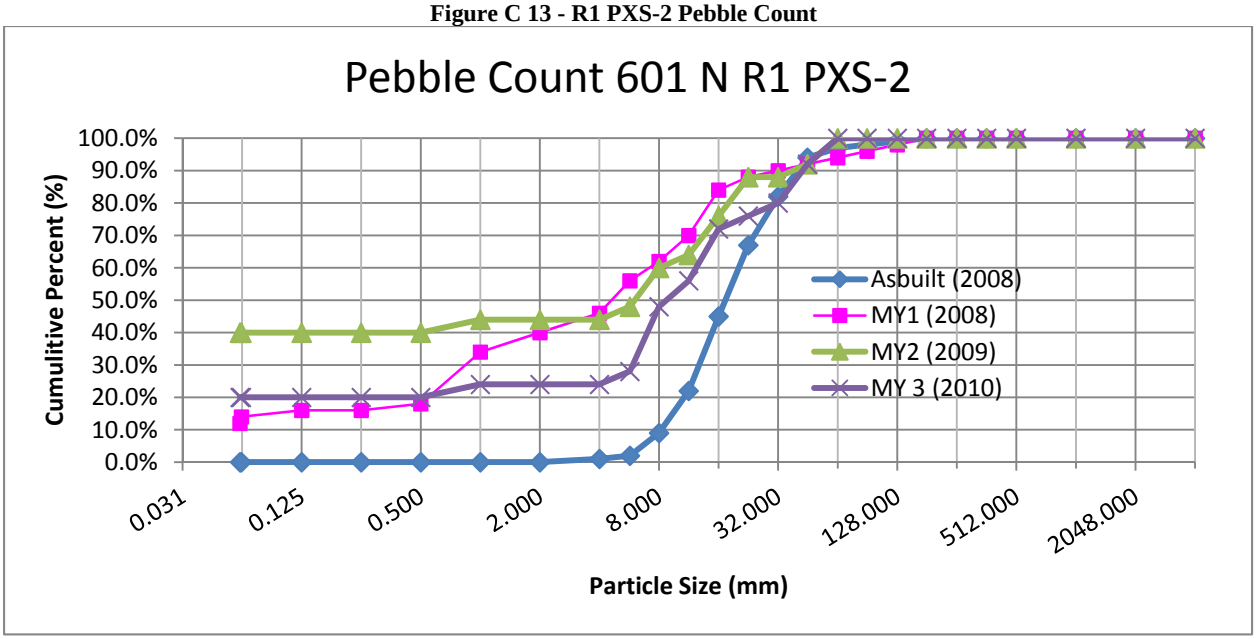


Figure C 14 - R1 RXS-3 Pebble Count

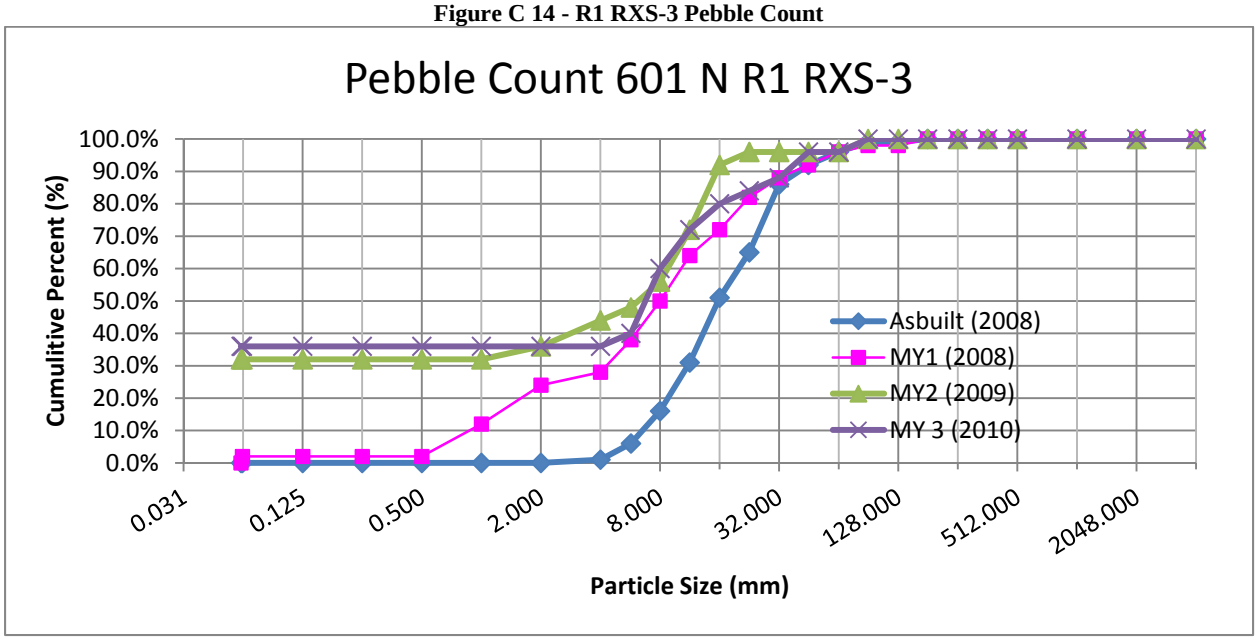
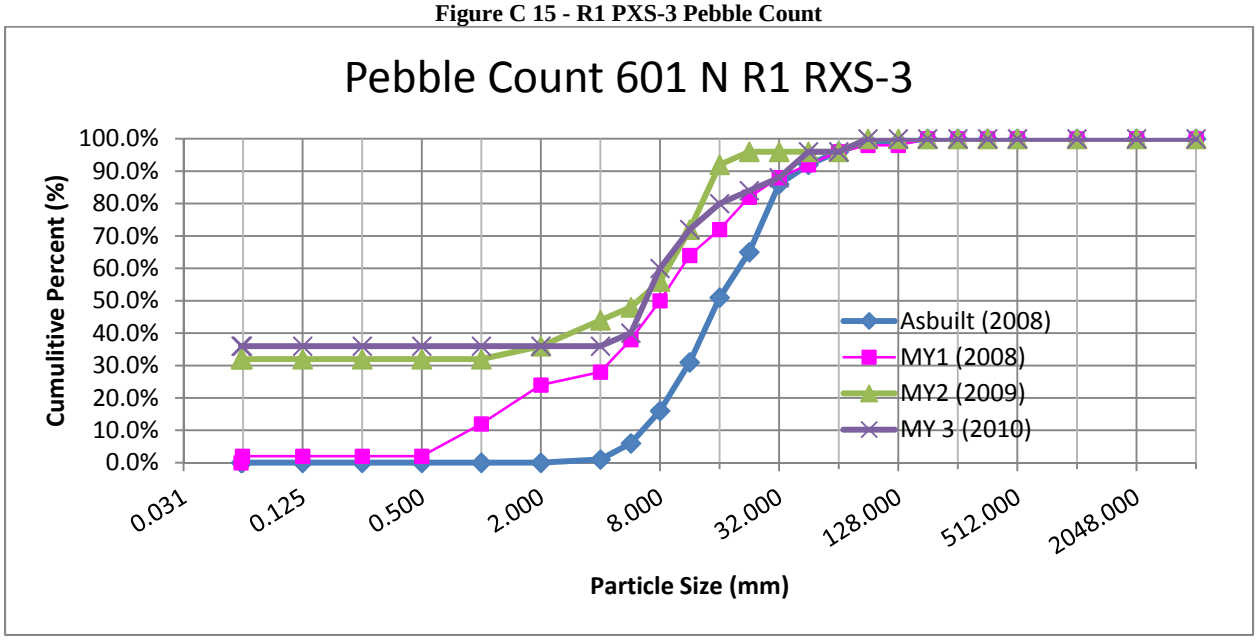


Figure C 15 - R1 PXS-3 Pebble Count



Appendix D – Site Photos

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List of Photos

List of Photos (contd.)

Photo Points

Photo Point 1

Photo Point 2

Photo Point 3

Photo Point 4

Photo Point 5

Photo Point 6

Photo Point 7

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Photo Point 11

Photo Point 12

Photo Point 13

Photo Point 14

Photo Point 15

Photo Point 16

Photo Point 17

Photo Point 18

Photo Point 19

Vegetation Photos

Photo D 1 - Vegetation Plot N1

Photo D 2A - Vegetation Plot N2

Photo D 3B - Vegetation Plot N2

Photo D 4 - Vegetation Plot N3

Appendix E – Vegetation Data

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Table E 1 – MY4 (2011) Plot N1 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	0.16	3.57		249		4		280	20	4	
2	FP	0.36	5.86		174	6	4		283	16	4	
3	QM	0.65	8.00									
4	FP	2.80	2.04		173	6	4	24	182	8	4	
5	FP	3.08	4.61		150	4	4	21	162	6	4	
6	FP	3.39	7.01	7	81		3	10	99		4	
7	FP	3.71	9.61		233	10	4		282	16	4	
8	QN	6.11	2.65		226	9	4	31	239	12	4	
9	BN	6.41	5.14		195	6	4	33	249	12	4	
10	BN	6.92	7.98		264	18	4		323	25	4	
11	QN	8.80	2.22									
12	FP	9.35	4.59		174	4	4	19	195	7	4	
13	FP	9.58	7.03	7	65		3	7	66		3	
14	FP	9.72	9.32	10	84		3	11	95		3	

Table E 2 – MY4 (2011) Plot N2 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	0.17	0.42									
2	AT	0.25	3.30									
3	CO	0.36	6.50									
4	CO	0.43	9.42									
5	BN	3.01	2.20		218	12	4		297	23	4	
6	QM	3.50	8.67		202	11	4	31	248	18	4	
7	QN	3.65	6.16		141	2	4	16	188	7	4	
8	BN	6.75	9.46		324	28	4		418	38	4	
9	BN	6.88	6.85		363	32	4		429	41	4	
10	QN	7.05	2.23									
11	FP	7.15	4.69		278	17	4		336	25	4	
12	FP	9.21	7.94		272	16	4		299	20	4	
13	QP	9.64	5.33	10	105		4	14	164	3	4	
14	Q	9.85	2.74									

Table E 3 – MY4 (2011) Plot N3 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	QP	0.75	8.62		226	12	4		313	20	4	
2	QM	0.78	6.15	4	69		4	8	134		4	
3	Q	1.00	3.82									
4	QP	1.25	1.35		390	22	4		418	30	4	
5	FP	3.39	9.33		146	2	4	24	167	5	4	
6	FP	3.69	6.56		251	19	4		283	26	4	
7	FP	3.89	4.00		275	20	4		302	25	4	
8	BN	3.90	1.38		342	39	4		437	48	4	
9	QP	6.37	8.21									
10	BN	6.47	3.47		369	29	4		456	40	4	
11	BN	6.65	1.20		287	18	4		366	26	4	
12	Q	6.88	5.78									
13	QM	9.23	7.75	6	95		4	11	164	4	4	
14	QM	9.35	0.41		11		4	4	45		4	
15	QM	9.55	2.90	4	54		4	8	39		4	Browsed, Trunk gnawed
16	BN	9.60	9.94		348	36	4		461	64	4	
17	QM	9.67	5.21	6	130		4	16	177	5	4	

Species Code
AT = Asimina triloba
BN = Betula nigra
CO = Carya ovata
FP = Fraxinus pennsylvanica
QM = Quercus michauxii
QN = Quercus nigra
QP = Quercus phellos
Q = Quercus species unknown

Vigor Code
4 = Excellent
3 = Good
2 = Weak
1 = Unlikely to survive
0 = Dead
M = Missing

Appendix F – Rainfall Data

Date	Rainfall (in.)
9/17/2010	0.11
9/18/2010	0.01
9/26/2010	0.69
9/27/2010	0.65
9/28/2010	0.01
9/29/2010	1.45
9/30/2010	0.26
10/14/2010	0.02
10/20/2010	0.07
10/25/2010	0.05
10/26/2010	0.02
10/27/2010	0.01
10/30/2010	0.01
11/5/2010	0.01
11/7/2010	0.01
11/8/2010	0.06
11/16/2010	0.07
11/17/2010	0.01
11/18/2010	0.08
11/19/2010	0.1
11/23/2010	0.09
11/24/2010	0.01
11/25/2010	0.01
11/26/2010	0.17
11/30/2010	0.16
12/1/2010	0.56
12/4/2010	0.04
12/11/2010	0.04
12/12/2010	0.38
12/16/2010	0.05
12/18/2010	0.28
12/19/2010	0.01
12/25/2010	0.19
12/26/2010	0.11
12/27/2010	0.13
1/1/2011	0.23
1/2/2011	0.09
1/5/2011	0.03
1/6/2011	0.03
1/7/2011	0.01
1/11/2011	0.2
1/12/2011	0.18
1/13/2011	0.09
1/14/2011	0.04
1/16/2011	0.01
1/17/2011	0.09
1/18/2011	0.07
1/19/2011	0.02
1/20/2011	0.08
1/25/2011	0.01
1/26/2011	0.14
2/1/2011	0.04
2/2/2011	0.38
2/3/2011	0.03
2/4/2011	0.36
2/5/2011	0.41
2/6/2011	0.7
2/7/2011	0.02
2/8/2011	0.01
2/10/2011	0.11
2/25/2011	0.07
2/28/2011	0.52
3/1/2011	0.46
3/2/2011	0.19
3/6/2011	0.28
3/7/2011	0.65
3/9/2011	0.24
3/10/2011	0.23
3/11/2011	0.45
3/15/2011	0.04
3/16/2011	0.03
3/17/2011	0.01
3/24/2011	0.1
3/26/2011	0.19
3/27/2011	0.08
3/28/2011	0.05
3/29/2011	0.89
3/30/2011	0.26
3/31/2011	0.09

4/1/2011	0.03
4/2/2011	0.01
4/3/2011	0.11
4/5/2011	0.13
4/6/2011	0.35
4/7/2011	0.02
4/9/2011	0.1
4/10/2011	0.07
4/12/2011	0.01
4/16/2011	0.01
4/21/2011	0.01
4/22/2011	0.01
4/23/2011	0.04
4/24/2011	0.06
4/26/2011	0.05
4/28/2011	0.13
4/29/2011	0.02
4/30/2011	0.01
5/3/2011	0.01
5/4/2011	0.64
5/5/2011	0.06
5/6/2011	0.03
5/11/2011	0.66
5/12/2011	0.01
5/13/2011	0.02
5/14/2011	0.17
5/15/2011	0.01
5/16/2011	0.01
5/17/2011	0.2
5/20/2011	0.03
5/27/2011	1.41
6/5/2011	0.02
6/9/2011	0.94
6/10/2011	0.04
6/11/2011	1.23
6/12/2011	0.18
6/13/2011	0.01
6/15/2011	0.08
6/18/2011	0.07
6/21/2011	0.02
6/22/2011	0.03
6/23/2011	0.01
6/24/2011	0.02
6/25/2011	0.01
6/28/2011	0.13
6/29/2011	0.17
7/4/2011	0.04
7/5/2011	0.01
7/8/2011	0.01
7/9/2011	0.01
7/12/2011	0.01
7/15/2011	0.04
7/15/2011	0.03
7/24/2011	0.61
7/25/2011	0.46
7/26/2011	0.14
7/30/2011	0.39
7/31/2011	1.37
8/1/2011	0.01
8/3/2011	0.02
8/5/2011	0.72
8/6/2011	0.03
8/8/2011	0.2
8/9/2011	0.02
8/11/2011	0.37
8/12/2011	0.01
8/13/2011	0.26
8/22/2011	0.78
8/29/2011	0.4
9/2/2011	0.04
9/3/2011	0.01
9/5/2011	0.11
9/6/2011	0.14
9/17/2011	0.03
9/21/2011	0.07
9/22/2011	0.32
9/23/2011	1.02
9/24/2011	0.58
9/25/2011	0.45
9/26/2011	0.11
9/27/2011	0.8
9/28/2011	0.05

Appendix G – Morphology Tables

Morphology and Hydraulic Monitoring Summary

Parameter	601 N R1 RXS-1						601 N R1 PXS-1						601 N R1 RXS-2						601 N R1 PXS-2						601 N R1 RXS-3						601 N R1 PXS-3					
	Riffle						Pool						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	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	12.3	10.98	11.7	10.41	11.9	-	23.7	24.22	26.0	22.5	24.1	-	14.23	15.61	13.31	13.39	13.9	-	20.28	18.08	19.54	13.02	18.1	-	10.5	11	13.1	8.71	10.85	-	26.94	24.87	22.51	17.55	16.97	-
Floodprone Width (ft)	135	135	135	135.40	135.4	-	-	-	-	-	-	-	148.2	148.2	148.2	148.2	148.2	-	-	-	-	-	-	-	86.15	86.15	86.15	86.15	86.15	-	-	-	-	-	-	-
BF Cross Sectional Area (ft^2)	10.4	9.62	9.17	9.02	8.6	-	25.7	24.6	24.4	20.6	22.8	-	11.32	11.78	11.42	11.7	12.6	-	13.44	13.44	13.23	11.64	12.3	-	6.4	6.624	6.0	5.14	5.86	-	28.22	24.32	23.50	20.26	20.86	-
BF Mean Depth (ft)	0.84	0.88	0.782	0.87	0.7	-	1.09	1.016	0.939	0.92	0.9	-	0.80	0.75	0.86	0.88	0.9	-	0.66	0.74	0.68	0.89	0.7	-	0.61	0.602	0.46	0.59	0.54	-	1.05	0.98	1.04	1.15	1.23	-
BF Max Depth (ft)	1.51	1.52	1.58	1.57	1.5	-	2.77	2.82	2.8	2.26	2.9	-	1.49	1.64	1.58	1.54	1.14	-	1.91	1.99	1.90	1.89	1.8	-	0.99	1.19	1.1	1.02	1.04	-	2.76	2.52	2.62	2.25	2.42	-
Width/Depth Ratio	14.60	12.54	14.98	12.01	16.5	-	-	-	-	-	-	-	17.90	20.68	15.52	15.12	15.4	-	-	-	-	-	-	-	17.12	18.27	28.35	14.75	20.09	-	-	-	-	-	-	-
Entrenchment Ratio	10.96	12.30	11.52	13.00	11.4	-	-	-	-	-	-	-	10.4	9.5	11.1	11.14	10.7	-	-	-	-	-	-	-	8.23	7.83	6.57	9.89	7.94	-	-	-	-	-	-	-
Bank Height Ratio	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	1.00	1.00	1.00	1.00	1.0	-	-	-	-	-	-	-	1.00	1.00	1.00	1.00	1.0	-	-	-	-	-	-	-
Substrate																													-							
d50 (mm)	6.90	2.86	0.06	17.65	10.3	-	11.00	2.86	0.06	0.06	0.06	-	18.97	12.48	5.58	12.08	13.65	-	17.50	4.68	6.08	8.83	15.22	-	15.77	8.00	6.28	6.85	13.18	-	6.90	2.86	0.06	1.10	0.06	-
d84 (mm)	15.48	6.47	4.85	45	32.0	-	15.48	6.47	4.85	0.06	0.06	-	15.48	28.87	20.42	27.30	25.73	-	34.17	16.00	20.40	36.33	37.20	-	31.10	25.73	14.12	22.60	32.0	-	15.48	6.47	4.85	4.68	5.05	-

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)	31.59	80.59	48.33	30	82	50.00	31.4	79.44	50	25.43	68.91	46	29.3	70.1	47.2	-	-	-
Radius of Curvature (ft)	13.29	45.23	24.78	15	46	25.00	18.1	35.63	22.09	15.76	33.89	21.66	16.1	35.1	22.2	-	-	-
Meander Wavelength (ft)	89.19	163.33	119.32	92	165	120.00	87.6	137.7	115.4	95.55	131.9	112.22	93.2	135.3	110.8	-	-	-
Meander Width ratio	2.56	6.54	3.92	2.73	7.45	4.55	2.4	6.069	3.82	2.443	6.62	4.4188	2.8	6.7	4.5	-	-	-
Profile																		
Riffle length (ft)	9.69	89.79	33	12	92	34	15.4	89.73	30.74	17.6	86	29	6.4	92.2	18.0	-	-	-
Riffle slope (ft/ft)	0.0032	0.0329	0.0136	0.0050	0.0290	0.0140	0.002	0.015	0.006	0.004	0.018	0.008	0.009	0.059	0.023	-	-	-
Pool length (ft)	13.84	75.77	35.05	14.6	78	36	7.78	72.77	43.19	10.13	82.55	45	10.73	58.3	30.7	-	-	-
Pool spacing (ft)	41.92	144.39	68.08	44	150	70	34.1	120.6	69.57	32.05	118.8	70.57	18.0	36.0	94.5	-	-	-

Additional Reach Parameters						
Valley Length (ft)	2407					
Channel Length (ft)	2976	2976	2976	2976	2976	-
Sinuosity	1.24	1.24	1.24	1.24	1.24	-
Water Surface Slope (ft/ft)	N/A	0.0079	0.0079	N/A	N/A	-
BF slope (ft/ft)	0.0082	0.0079	0.0079	0.0076	0.0079	-
Rosgen Classification	C4	C4	C5	C5	C5	-
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