601 West Stream Restoration Project
Annual Monitoring Report

Monitoring Year: 2011
Monitoring Year: 4
As-built Date: 2008
NCEEP Project Number: D 06054-E

Submitted to:
NCDENR-Ecosystem Enhancement Program
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601 West Stream Restoration Project Annual Monitoring Report

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

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1.0 Executive Summary

This Annual Monitoring Report documents the results of monitoring activities during the 2011 growing season on the 601 West 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 for the 601 West Stream Restoration Project involved stream restoration. After construction, it was determined that the project generated 4,532 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, six cross sections, approximately 3,160 linear feet of profile survey and photographic reference locations, as specified in the approved Restoration Plan for the site. Approximately 420 linear feet of profile survey were added to Reach 1 from previous monitoring years in Monitoring year 2 (2009) in order to meet the minimum of 3,000 linear feet of longitudinal monitoring required for EEP Full Delivery projects.

A manual rain gauge was used in conjunction with the onsite automatic rain gauge to validate precipitation data. Normal rainfall occurred throughout this monitoring period.

The vegetation monitoring documented surviving planted stem densities between 242 and 526 stems per acre with an average of 357 stems per acre. This represents a survival rate of approximately 56% based on a baseline density of 634 stems per acre. Supplemental planting with four year old stems will be completed before the start of the 2011-2012 growing season in the areas around the plot that had a stem density of only 242 (W4). 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.

No bankfull events were recorded during the monitoring year. The restored stream channel has remained basically stable and is providing the intended habitat and hydrologic functions. All monitored cross sections and the longitudinal profile for 2011 document only minor adjustment in stream dimension. Portions of the remaining beaver dams, in-stream vegetation and woody debris continue to cause backwater and minor deposition. Two new problem areas, a failing structure and a washed out log sill were identified. An additional problem area is minimal vegetation due to poor soil conditions at station 8+72 and continuing downstream for nearly 120 feet.

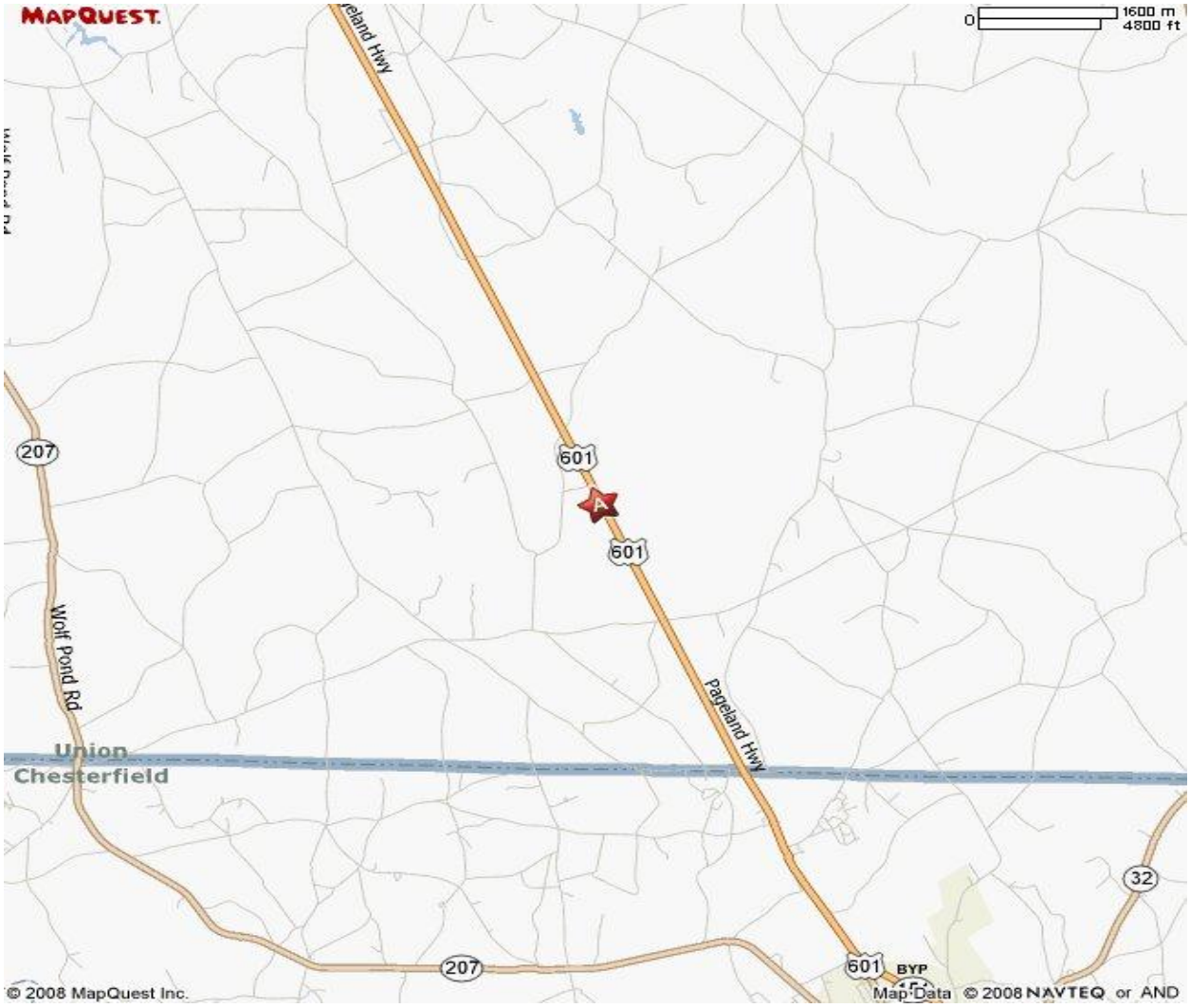
The bed material in some riffles has remained fine primarily due to the large number of woody debris blockages that exist. When sediment is able to move through the reach, riffles should begin to move to a coarser distribution.

2.0 Introduction

2.1 Project Description

The 601 West site is located approximately 13 miles south of Monroe in Union County (see Figure 1). The property is located directly off Pageland Highway/US Hwy 601 South just south of Ervin Thomas Road, SR 2112.

Figure 1 – 601 West Location Map



The project is a restoration of approximately 4,500 linear feet of unnamed tributary to Lanes Creek 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 and Reach 2, respectively for monitoring. Reach 1 and Reach 2 stationing is summarized in Table 1. The 601 West site has a drainage area of 0.41 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 – 601 West Monitoring Reaches

Reach Name	As-Built Length (ft)	Monitoring Stations	Restoration Approach
UT/Reach 1/Reach 2	4,532	100+98 – 117+50 130+50 – 145+02	Restoration (Priority I)
Total	4,532	3,104	

2.2 Project Objectives

The 601 West 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. 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 601 West 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 2011 (Year 4).

The as-built data documented 4,532 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 West 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	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

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 – 601 West 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

Vegetation at 601 West continues to be dominated by Goldenrod (*Solidago* spp.). Blackberry (*Rubus* spp.) is now so common and in such great height (6 feet plus), it is quite difficult to monitor some plots. All of the surviving plot plantings are in excellent vigor with few exceptions. The stream banks have good vegetative cover with the Black willow exceeding 10 feet. Again, as in the spring, the stream was not flowing and no pools were observed. Only a muddy hole remained behind the Beaver dam adjacent to plot W1. Farm management continues to cause impacts with a minor encroachment into Plot W2. See Photo 15. There was also an obvious vehicle path looping through the site adjacent to Plot W4 which has damaged a few trees. No trees were lost from the spring monitoring. Overall, the site appears to be stable and doing well.

Original planting density, based on the five 0.01 hectare plots, (100 square meters) was 634 stems per acre. The current density is currently 357 stems per acre which represents a survival rate of approximately 56%. The planted stems in the monitoring plots ranged from 242 to 526 stems per acre. Supplemental planting with four year old stock is scheduled for February 2012 in the area around plot W4. The final success criteria of 260 stems per acre after five years can still be met.

Table 4 - Baseline Stem Counts

Baseline Data									
May 2008									
Plot	PLANTED SPECIES								
	AT	BN	CO	FP	QM	QN	QP	Q	PLANTED STEMS
W1	3	6	1		2		1		13
W2		3			2	4	3	3	15
W3		1	2	5	1	4	3		16
W4	2	2		5	2	4		2	17
W5	1	4	4	1	4	1	2		17
TOTALS	6	16	7	11	11	13	9	5	78
Percents	0.077	0.205	0.090	0.141	0.141	0.167	0.115	0.064	1.000

Table 5 – MY4 (2011) Stem Counts

October 2011 (MY4)									
Plot	**PLANTED SPECIES**								**LIVE PLANTED STEMS**
	AT	**BN**	**CO**	**FP**	**QM**	**QN**	**QP**	**Q**	
W1		5	1	1					7
W2		2			1	2	3		8
W3		1	1	5	1	1	2		11
W4				4		2			6
W5		4		1	4		2		11
TOTALS	0	12	2	11	6	5	7	0	43
Percent	0.000	0.279	0.047	0.256	0.140	0.116	0.163	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	acre	**per acre**
W1	13	100	1076	0.0247	526
W2	15	100	1076	0.0247	607
W3	16	100	1076	0.0247	647
W4	17	100	1076	0.0247	688
W5	17	100	1076	0.0247	688
Totals:	78	500	5380	0.123	
Stems per plot	15.6			Average	634

Table 7 – MY4 (2011) Stems per Acre

Fall Monitoring Data					
September 2011					
Plot	Trees	Plot size	Plot size	Plot size	Trees
	(n_i)	(m2)	(ft2)	(ac)	per acre
W1	7	100	1076	0.0247	283
W2	7	100	1076	0.0247	283
W3	11	100	1076	0.0247	445
W4	6	100	1076	0.0247	242
W5	13	100	1076	0.0247	526
Totals:	44	500	5380	0.123	
Trees/plot	8.8			Average=	357

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 generally stable. As the riparian vegetation develops it is becoming the significant stabilizing factor for the channel and stream banks. Stream features including pools and riffles are remaining stable. There are 15 structures within the monitoring reaches and two have been identified as problem areas. All remaining structures are functioning as designed with no evidence of relocation or piping. The beaver have been removed but portions of the dams remain and are a source of backwater that has allowed woody vegetation to establish in the stream bed causing several significant debris dams. Constructed riffles are holding grade with no down cutting or headcuts observed. There was water only in the pools during the survey period preventing a measurement of the water surface.

Cross Sections

The survey data was collected in September 2011, and the results are presented in Appendix C. Cross sections appear to be stable. Reach 2 Riffle Cross Section 1 seems to have degraded along the right bank but the photos show it has not. One explanation might be that in clearing a lane in the vegetation to allow surveying, the bank was trampled down. The cross sectional area and width did not change significantly. The 2012 monitoring will resolve this question.

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. Note that the profiles in Appendix C display the listed problem area dams and obstructions. The morphological dimensions as listed on the Appendix G Morphological Tables were developed while ignoring those identified problems so as to correctly portray the stream bed profile and the riffle and pool lengths and ratios.

Hydrology

No bankfull events were documented during this year of monitoring by a crest gauge.

3.2.4 Problem Areas

There were five problem areas previously identified at the 601 West site. Three were located in Reach 1 and were related to lack of vegetation. Two of these problem areas (PA1 and PA2) have repaired themselves with improved vegetative cover growth. PA3 has not recovered well enough and supplemental planting will be undertaken in 2011.

PA4 and PA5 are beaver dams that appeared in the Reach 2 section of channel during MY 2 (2009). The beavers were removed in 2010 but remnants of the dams were still in place at the time of the 2011 survey, causing backwater for approximately 200 feet upstream of the dams.

The beaver dams are scheduled to be fully removed in December 2011. Once the dams are removed replanting of the perimeter of the backwater areas may be needed.

Additionally, this stream flows into Lanes Creek which is also dammed up by beaver activity causing back water from the end of the restoration reach upstream for about 50 feet, flooding a cross vane.

Eight additional problem areas were identified during the 2011 survey. All are minor and will be repaired or replanted in the winter of 2011/2012. The stream obstructions (PAs 9-13) are the result of the beaver impact, which left some areas of stream bed exposed to sunlight and allowed woody plants to establish within the bed. If left unchecked, the debris these trees collect will cause the channel to migrate away from the existing channel.

Table 8 - 601 West MY4 Problem Areas

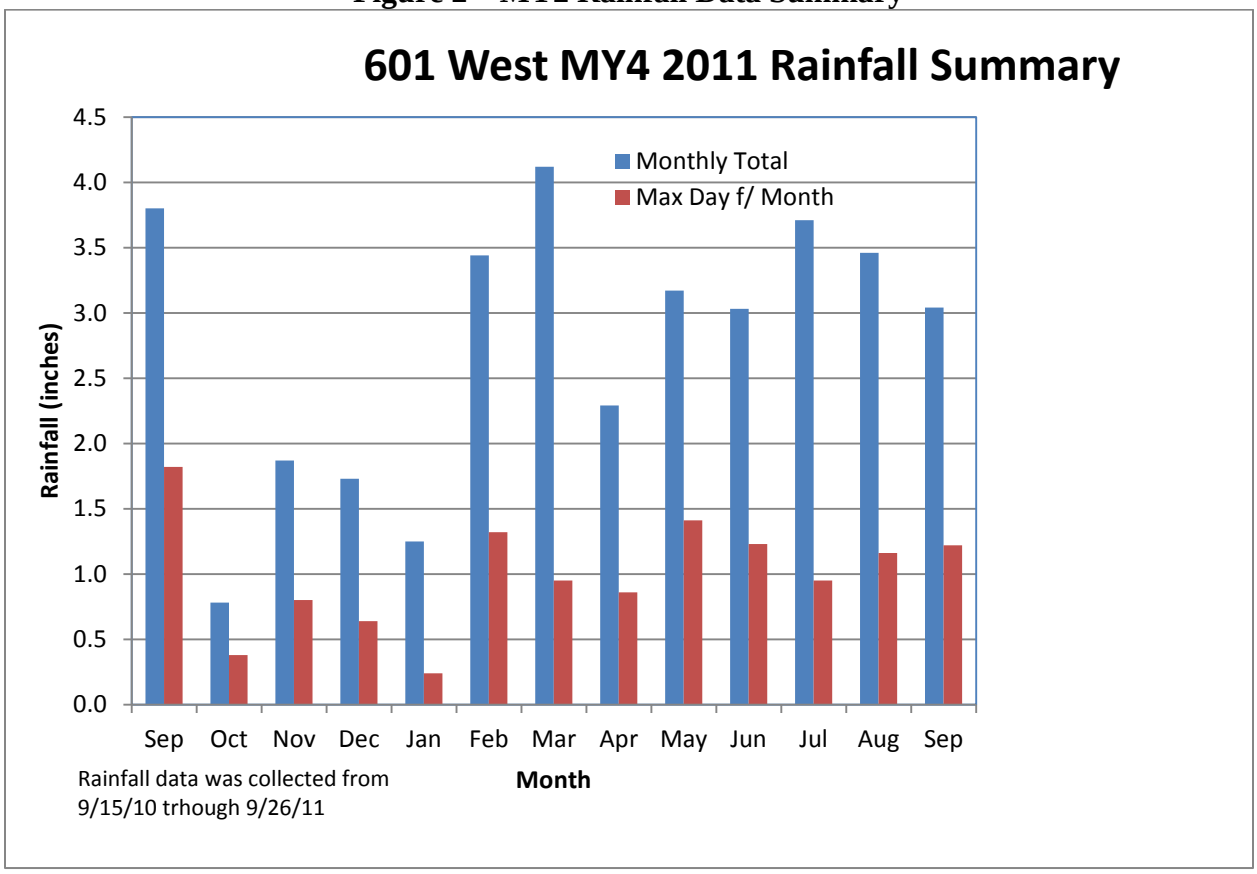
ID	Station	Description	Status	Photo Number[1]
PA1-MY2	10630 –10651	Poor Vegetation	Corrected	PA Photo 1
PA2-MY2	10779 –10792	Poor Vegetation	Corrected	PA Photo 2
PA3-MY2	10373 –10383	Poor Vegetation	Replant	PA Photo 3
PA4-MY3	14028	Beaver Dam	Remove dam	PA Photo 4
PA5-MY3	14234	Beaver Dam	Remove dam	PA Photo 5
PA6 MY4	10752	Washed out Sill Log	Repair	PA Photo 6
PA7 MY4	14365	Failing Cross Vane	Repair	PA Photo 7
PA8 MY4	10883 – 11028	Poor Vegetation	Replant	PA Photo 8
PA9 MY4	10232	Stream obstruction	Remove	PA Photo 9
PA10 MY4	10670	Stream obstruction	Remove	PA Photo 10
PA11 MY4	13512	Stream obstruction	Remove	PA Photo 11
PA12 MY4	13515	Stream obstruction	Remove	PA Photo 12
PA13 MY4	13645	Stream obstruction	Remove	PA Photo 13

[1] See Appendix D.

3.3 Rainfall Data

Rainfall data is collected by an automated rain gauge, confirmed with a manual rain gauge and validated with nearby weather stations from the NOAA Regional Rainfall Data. Rainfall data shows normal rainfall during the monitoring period. The average maximum single peak day per month event for the 2010-11 growing season was 1.0 inches with a maximum single peak day of 1.8 inches occurring in September. The average monthly rainfall was 2.75 inches with a maximum of 4.12 inches during March 2011. 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 with only minor erosional problem areas. With normal rainfall, riparian vegetation is flourishing. Most areas of erosion that remain as problem areas are improved as woody vegetation becomes more established.

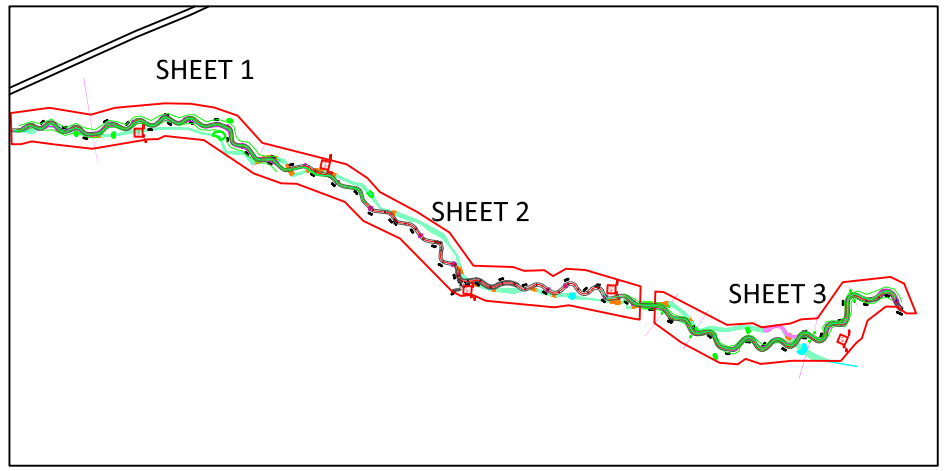
One of the five vegetative monitoring sites had dropped below the final vegetative success criteria and supplemental planting with four year old stems will be completed in early 2012.

Although the beaver have been removed, the remnants of the beaver dams continue to degrade the bedform. In addition large woody vegetation has become established in the stream bed threatening to cause channel migration. Repairs to both of these issues are planned for winter 2011

The channel was dry again during data collection; however thirteen of the fifteen stream structures are stable. Repairs to the two problem structures are planned for winter 2011/2012. 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 Survey



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

601W R1 RXS-1
STA: 104+25

601W R1 PXS-1
STA: 112+40

102+00 103+00 104+00 105+00 106+00 107+00 108+00 109+00 110+00 111+00 112+00 113+00 114+00 115+00

WS

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

601W - REACH 1

601W YEAR 01 (MY1)
MONITORING

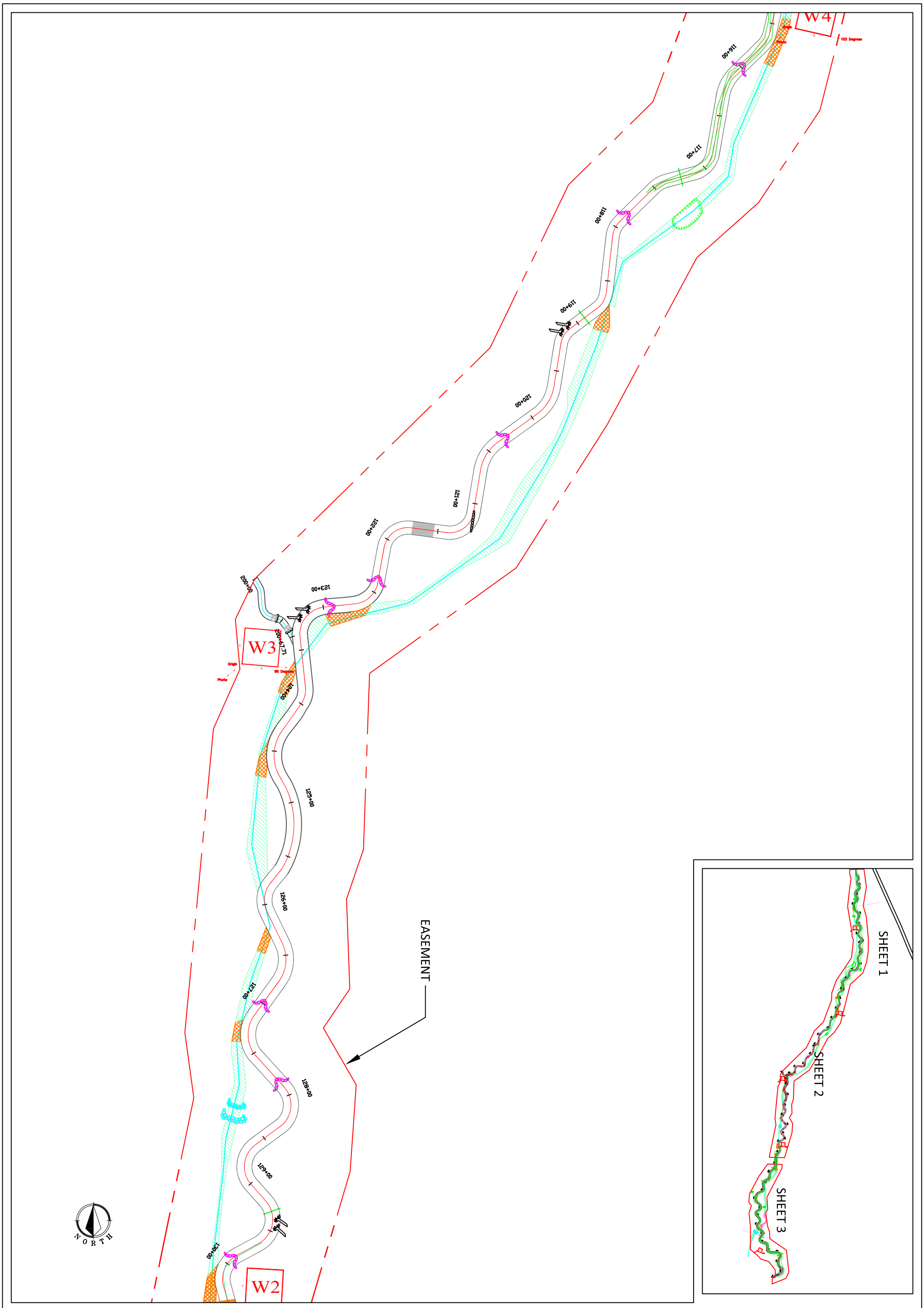
UNION COUNTY, NC

DATE
03/20/2009

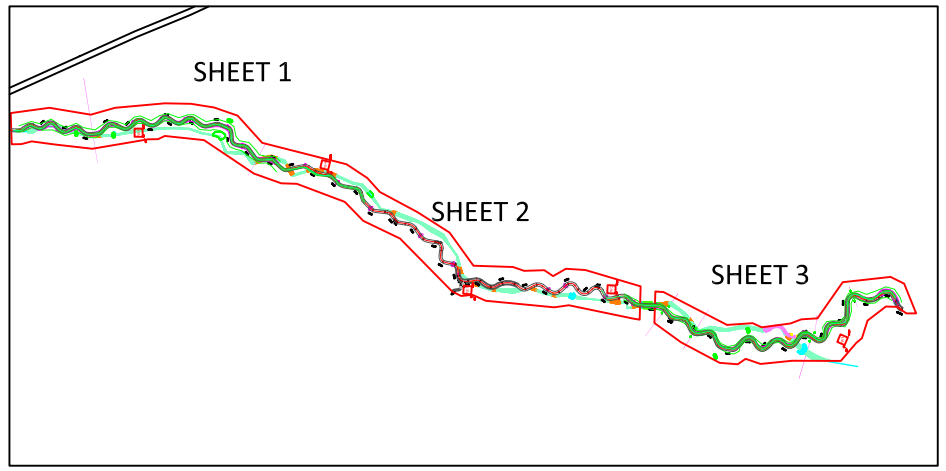
PROJECT NO.
06054-B

FILENAME
601W.DWG

SHEET NO.
1 OF 3



SHEET NO. 2 OF 3	FILENAME 601W.DWG	PROJECT NO. 06054-B	DATE 03/20/2009	601W YEAR 01 (MY1) MONITORING	NCDENR-EEP RALEIGH, NC	BIOLOGICAL & AGRICULTURAL ENGINEERING WEAVER LABS CAMPUS BOX 7625 NORTH CAROLINA STATE UNIVERSITY RALEIGH NC 27695	NO. / NOTES: / DRN / CHK / DATE
				UNION COUNTY, NC	601W		



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

601W R2 RXS-1
STA: 132+61

601W R2 PXS-2
STA: 143+38

EASEMENT

601W R2 RXS-2
STA: 140+32

601W R2 PXS-1
STA: 134+17

W1

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

601W - REACH 2

601W YEAR 01 (MY1)
MONITORING

UNION COUNTY, NC

DATE
03/20/2009

PROJECT NO.
06054-B

FILENAME
601W.DWG

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

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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

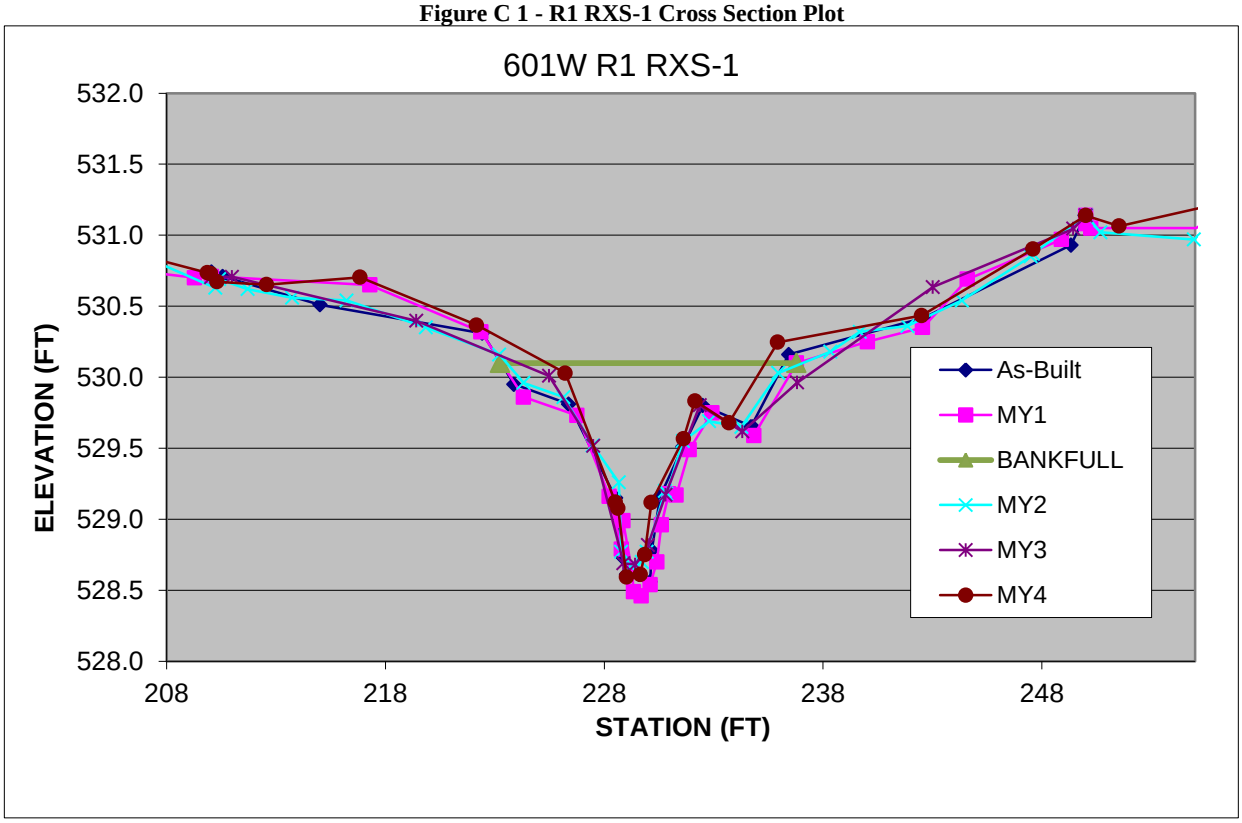

Table C 1 - R1 RXS-1 Dimension Data

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
210.06	530.74	r1rxs1l	19.74	541.1	RXS1	199.96	531.17	XS	3	530.704	L pin	198.84	531.305	(XS)XS			
210.57	530.71	r1rxs1	63.05	537.87	RXS1	204.64	530.82	XS	210.99	530.707	Ground	207.22	530.844	(XS)XS			
215.02	530.51	r1rxs1	143.51	532.79	RXS1	207.86	530.79	XS	219.42	530.397	Ground	209.87	530.735	(XSLP)XSLP			
222.43	530.31	r1rxs1tob	162.97	532.14	RXS1	210.23	530.63	XS	225.48	530.01	Ground	210.02	530.73	(XS)XS			
223.88	529.95	r1rxs1	163.13	532.12	RXS1	210.41	530.69	XSLP	227.5	529.518	Ground	210.31	530.672	(XS)XS			
226.38	529.81	r1rxs1	176.6	531.75	RXS1	211.71	530.62	XS	228.88	528.689	Ground	212.57	530.652	(XS)XS			
228.52	529.15	r1rxs1	176.51	531.73	RXS1	213.75	530.56	XS	229.42	528.681	Ground	216.85	530.704	(XS)XS			
228.86	528.73	r1rxs1w	189.57	531.76	RXS1	216.23	530.54	XS	230	528.818	Ground	222.17	530.367	(XS)XS			
229.02	528.61	r1rxs1	202.24	530.83	RXS1	219.86	530.35	XS	230.8	529.172	Ground	226.22	530.029	(XS)XS			
229.59	528.61	r1rxs1	209.28	530.7	RXS1	223.21	530.16	XS	232.37	529.803	Ground	228.51	529.121	(XS)XS			
230.1	528.56	r1rxs1	210.06	530.71	RXS1LP	224.32	529.96	XS	234.31	529.618	Ground	228.63	529.078	(XS)XS			
230.17	528.78	r1rxs1w	217.29	530.65	RXS1	226.14	529.86	XS	236.82	529.962	Ground	229.02	528.592	(XS)XS			
230.55	529.16	r1rxs1	222.37	530.32	RXS1	227.48	529.52	XS	243.02	530.635	Ground	229.65	528.612	(XS)XS			
231.59	529.51	r1rxs1	224.32	529.86	RXS1	228.67	529.26	XS	249.44	531.046	Ground	229.85	528.751	(XS)XS			
232.51	529.8	r1rxs1	226.76	529.73	RXS1	228.78	528.77	XS	250	531.139	R pin	230.15	529.119	(XS)XS			
234.78	529.65	r1rxs1	228.24	529.16	RXS1	229.22	528.67	XS				231.62	529.566	(XS)XS			
234.71	529.65	r1rxs1	228.79	528.79	RXS1	229.72	528.7	XS				232.15	529.833	(XS)XS			
236.43	530.16	r1rxs1tob	228.86	528.99	RXS1	229.94	528.77	XS				233.7	529.679	(XS)XS			
242.61	530.42	r1rxs1	229.25	528.65	RXS1	230.78	529.2	XS				235.93	530.246	(XS)XS			
249.33	530.93	r1rxs1	229.35	528.49	RXS1	230.84	529.18	XS				242.51	530.434	(XS)XS			
249.98	531.14	r1rxs1r	229.69	528.46	RXS1	231.6	529.55	XS				247.59	530.902	(XS)XS			
			230.1	528.54	RXS1	232.79	529.69	XS				250	531.139	(XSRP)XSRP			
			230.41	528.7	RXS1	234.27	529.65	XS				251.53	531.064	(XS)XS			
			230.61	528.96	RXS1	235.96	530.03	XS				257.75	531.28	(XS)XS			
			230.95	529.18	RXS1	238.34	530.18	XS									
			231.29	529.17	RXS1	239.68	530.32	XS									
			231.89	529.49	RXS1	241.86	530.36	XS									
			232.92	529.75	RXS1	244.34	530.54	XS									
			234.84	529.59	RXS1	247.49	530.85	XS									
			236.79	530.1	RXS1	247.59	530.87	XS									
			240.03	530.25	RXS1	250.02	531.14	XSRP									
			242.55	530.35	RXS1	250.67	531.02	XS									
			244.6	530.69	RXS1	254.95	530.97	XS									
			248.89	530.97	RXS1	257.37	531.35	XS									
			250	531.14	RXS1RP												
			250.02	531.08	RXS1												
			250.24	531.05	RXS1												
			255.04	531.05	RXS1												
			260.02	531.51	RXS1												
			270.46	532.02	RXS1												
			280.51	533.05	RXS1												
			289.53	534.47	RXS1												
			329.13	538.39	RXS1												

Bankfull Width (ft)		14.00	Bankfull Width (ft)		14.42	Bankfull Width (ft)		11.06	Bankfull Width (ft)		8.83	Bankfull Width (ft)		9.7	Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)		7.84	Bankfull Cross Sectional Area (sq ft)		7.954	Bankfull Cross Sectional Area (sq ft)		6.7157	Bankfull Cross Sectional Area (sq ft)		6.9806	Bankfull Cross Sectional Area (sq ft)		6.81	Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)		0.56	Bankfull Mean Depth (ft)		0.55	Bankfull Mean Depth (ft)		0.61	Bankfull Mean Depth (ft)		0.79	Bankfull Mean Depth (ft)		0.7	Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)		1.60	Bankfull Max Depth (ft)		1.64	Bankfull Max Depth (ft)		1.49	Bankfull Max Depth (ft)		1.33	Bankfull Max Depth (ft)		1.4	Bankfull Max Depth (ft)		
Flood Prone Width (ft)		-	Flood Prone Width (ft)		93.8	Flood Prone Width (ft)		93.8	Flood Prone Width (ft)		93.8	Flood Prone Width (ft)		93.8	Flood Prone Width (ft)		
Entrenchment Ratio (ft/ft)		-	Entrenchment Ratio (ft/ft)		6.51	Entrenchment Ratio (ft/ft)		6.49	Entrenchment Ratio (ft/ft)		10.63	Entrenchment Ratio (ft/ft)		9.7	Entrenchment Ratio (ft/ft)		
Width/Depth Ratio (ft/ft)		-	Width/Depth Ratio (ft/ft)		26.14	Width/Depth Ratio (ft/ft)		18.25	Width/Depth Ratio (ft/ft)		11.17	Width/Depth Ratio (ft/ft)		13.8	Width/Depth Ratio (ft/ft)		
D50 (mm)		16.28	D50 (mm)		4.00	D50 (mm)		0.06	D50 (mm)		0.06	D50 (mm)		0.19	D50 (mm)		
D84 (mm)		31.22	D84 (mm)		28.87	D84 (mm)		0.06	D84 (mm)		0.06	D84 (mm)		20.95	D84 (mm)		

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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

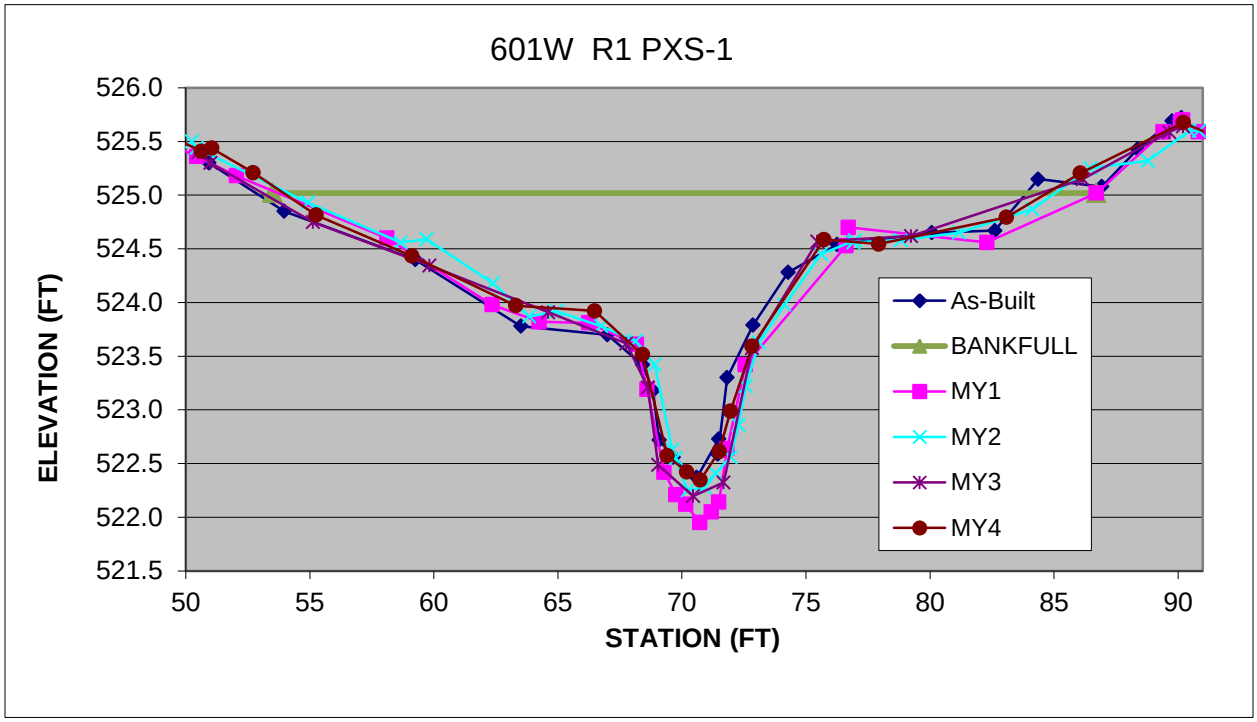

Table C 2 - R1 PXS-1 Dimension Data

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
50.44	525.37	r1pxs1l	13.42	528.58	PXS1	50.25	525.5	XS	50.5	525.396	L pin	44.2	526.17	(XS)XS			
50.94	525.3	r1pxs1tob	24.03	527.95	PXS1	50.44	525.44	LP	51	525.3	Ground	48.22	525.673	(XS)XS			
53.97	524.85	r1pxs1	34.45	527.05	PXS1	54.93	524.93	XS	55.13	524.748	Ground	50.63	525.409	(XSLP)XSLP			
59.25	524.4	r1pxs1	43.71	526.11	PXS1	58.66	524.56	XS	59.82	524.344	Ground	51.05	525.437	(XS)XS			
63.51	523.78	r1pxs1	50.45	525.36	PXS1PL	59.71	524.59	XS	64.61	523.91	Ground	52.72	525.209	(XS)XS			
67	523.7	r1pxs1	52.04	525.18	PXS1	62.39	524.18	XS	67.76	523.618	Ground	55.26	524.814	(XS)XS			
68.41	523.42	r1pxs1	58.11	524.6	PXS1	63.85	523.87	XS	68.63	523.208	Ground	59.12	524.432	(XS)XS			
68.83	523.18	r1pxs1	62.35	523.98	PXS1	64.94	523.92	XS	69.04	522.488	Ground	63.31	523.971	(XS)XS			
69.08	522.72	r1pxs1w	64.25	523.82	PXS1	66.75	523.78	XS	70.45	522.198	Ground	66.48	523.922	(XS)XS			
69.65	522.56	r1pxs1	66.25	523.81	PXS1	68.14	523.64	XS	71.68	522.324	Ground	68.41	523.514	(XS)XS			
70.6	522.37	r1pxs1	68.17	523.61	PXS1	68.91	523.42	XS	72.83	523.575	Ground	69.41	522.573	(XS)XS			
71.49	522.73	r1pxs1w	68.6	523.19	PXS1	69.61	522.63	XS	75.46	524.568	Ground	70.2	522.421	(XS)XS			
71.45	522.59	r1pxs1	69.28	522.42	PXS1	69.75	522.55	XS	79.24	524.619	Ground	70.74	522.346	(XS)XS			
71.82	523.3	r1pxs1	69.76	522.21	PXS1	70.23	522.25	XS	86.16	525.15	Ground	71.51	522.613	(XS)XS			
72.87	523.79	r1pxs1	70.16	522.12	PXS1	70.92	522.28	XS	89.64	525.588	Ground	71.96	522.987	(XS)XS			
74.28	524.28	r1pxs1	70.72	521.95	PXS1	71.36	522.41	XS	90.2	525.641	R pin	72.83	523.594	(XS)XS			
76.26	524.54	r1pxs1	71.19	522.05	PXS1	71.96	522.56	XS				75.73	524.586	(XS)XS			
80.07	524.65	r1pxs1	71.49	522.14	PXS1	72.28	522.86	XS				77.93	524.544	(XS)XS			
82.61	524.67	r1pxs1	71.82	522.64	PXS1	72.58	523.22	XS				83.08	524.794	(XS)XS			
84.36	525.15	r1pxs1tob	72.56	523.42	PXS1	73.1	523.63	XS				86.06	525.205	(XS)XS			
86.93	525.08	r1pxs1	76.62	524.53	PXS1	74.13	523.98	XS				90.21	525.676	(XSRP)XSRP			
88.37	525.43	r1pxs1	76.71	524.7	PXS1	75.61	524.45	XS				91.45	525.553	(XS)XS			
89.76	525.69	r1pxs1	82.29	524.56	PXS1	76.98	524.58	XS				95.9	525.873	(XS)XS			
90.14	525.72	r1pxs1r	86.71	525.02	PXS1	76.91	524.56	XS				101.32	525.627	(XS)XS			
			89.42	525.59	PXS1	78.83	524.58	XS				105.74	526.2	(XS)XS			
			89.4	525.59	PXS1	81.17	524.65	XS									
			90.1	525.68	PXS1PR	84.13	524.87	XS									
			90.19	525.7	PXS1PR	86.47	525.25	XS									
			90.82	525.59	PXS1	88.78	525.32	XS									
			93.35	525.73	PXS1	90.46	525.6	RP									
			96.25	525.68	PXS1	90.85	525.6	XS									
			99.63	525.57	PXS1	91.19	525.59	XS									
			104.15	525.91	PXS1	93.44	525.68	XS									
			113.04	527	PXS1	97.07	525.68	XS									
			116.79	527.32	PXS1	107.63	526.27	XS									
			124.82	527.52	PXS1												
			132.95	528.16	PXS1												
			137.54	528.12	PXS1												
			142.58	529.02	PXS1												

Bankfull Width (ft)	33.42		Bankfull Width (ft)	34.7		Bankfull Width (ft)	26.2		Bankfull Width (ft)	24.11		Bankfull Width (ft)	27.8		Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)	31.71		Bankfull Cross Sectional Area (sq ft)	29.37		Bankfull Cross Sectional Area (sq ft)	26.43		Bankfull Cross Sectional Area (sq ft)	27.34		Bankfull Cross Sectional Area (sq ft)	26.3		Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)	0.95		Bankfull Mean Depth (ft)	0.85		Bankfull Mean Depth (ft)	1.01		Bankfull Mean Depth (ft)	1.13		Bankfull Mean Depth (ft)	0.95		Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)	2.78		Bankfull Max Depth (ft)	3.07		Bankfull Max Depth (ft)	2.31		Bankfull Max Depth (ft)	2.42		Bankfull Max Depth (ft)	2.45		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)	7.12		D50 (mm)	3.50		D50 (mm)	3.00		D50 (mm)	7.43		D50 (mm)	5.13		D50 (mm)		
D84 (mm)	13.76		D84 (mm)	27.30		D84 (mm)	22.60		D84 (mm)	27.3		D84 (mm)	16.0		D84 (mm)		

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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

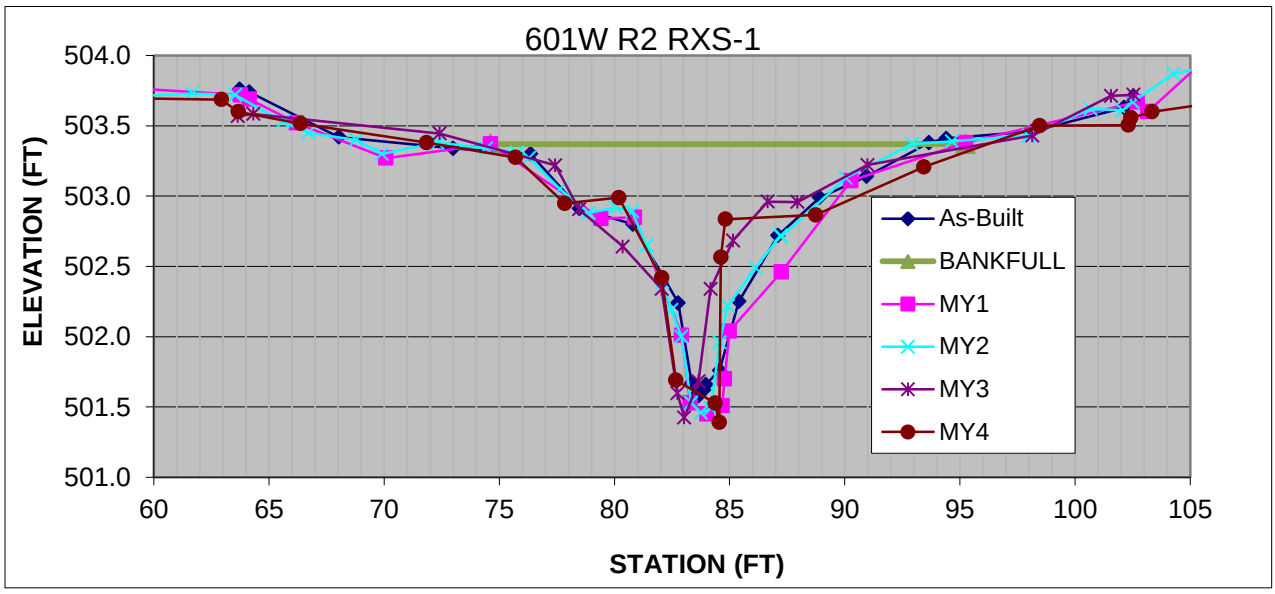

Table C 3 - R2 RXS-1 Dimension Data

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
63.72	503.76	r2rxs1l	14.53	513.25	R2RXS1	51.31	503.75	XS	102.54	503.569	Left pin	58.52	503.697	(XS)XS			
64.14	503.74	r2rxs1	41.93	504.09	R2RXS1	53.9	503.73	XS	101.86	503.584	Ground	62.93	503.686	(XS)XS			
68.03	503.42	r2rxs1	51.66	503.84	R2RXS1	57.56	503.7	XS	93.77	503.445	Ground	63.67	503.6	(XSLP)XSLP			
72.99	503.34	r2rxs1	63.76	503.72	R2RXS1PR	61.67	503.73	XS	88.75	503.219	Ground	66.36	503.516	(XS)XS			
76.36	503.3	r2rxs1tob	64.14	503.69	R2RXS1	63.53	503.72	XSLP09	87.71	502.906	Ground	71.84	503.38	(XS)XS			
78.49	502.91	r2rxs1	66.19	503.52	R2RXS1	65.6	503.53	XS	85.82	502.641	Ground	75.71	503.275	(XS)XS			
80.8	502.8	r2rxs1	70.08	503.27	R2RXS1	66.72	503.45	XS	84.13	502.34	Ground	77.84	502.948	(XS)XS			
82.77	502.24	r2rxs1	74.62	503.37	R2RXS1	68.79	503.4	XS	83.45	501.598	Ground	80.19	502.989	(XS)XS			
83.36	501.67	r2rxs1w	79.42	502.84	R2RXS1	69.89	503.3	XS	83.15	501.424	Ground	82.05	502.419	(XS)XS			
83.47	501.57	r2rxs1	80.87	502.85	R2RXS1	72.32	503.38	XS	82.53	501.681	Ground	82.67	501.69	(XS)XS			
83.66	501.58	r2rxs1	82.92	502.01	R2RXS1	74.43	503.34	XS	82.00	502.34	Ground	84.37	501.528	(XS)XS			
83.88	501.62	r2rxs1	83.29	501.53	R2RXS1	75.77	503.31	XS	81.03	502.684	Ground	84.55	501.39	(XS)XS			
83.97	501.66	r2rxs1w	84.02	501.45	R2RXS1	76.29	503.27	XS	79.53	502.96	Ground	84.62	502.564	(XS)XS			
84.57	501.76	r2rxs1	84.68	501.51	R2RXS1	77.63	503.05	XS	78.23	502.958	Ground	84.82	502.835	(XS)XS			
85.4	502.25	r2rxs1	84.78	501.7	R2RXS1	78.89	502.88	XS	75.19	503.221	Ground	88.74	502.866	(XS)XS			
87.1	502.72	r2rxs1	84.99	502.04	R2RXS1	80.04	502.92	XS	68.03	503.43	Ground	93.44	503.207	(XS)XS			
88.91	502.99	r2rxs1	87.25	502.46	R2RXS1	80.77	502.89	XS	64.62	503.713	Ground	98.47	503.501	(XS)XS			
90.95	503.14	r2rxs1	90.27	503.11	R2RXS1	81.4	502.65	XS	63.64	503.721	Right pin	102.31	503.505	(XS)XS			
93.66	503.38	r2rxs1	95.26	503.38	R2RXS1	82.07	502.39	XS				102.43	503.557	(XSRP)XSRP			
94.41	503.41	r2rxs1tob	102.71	503.67	R2RXS1RP	82.47	502.19	XS				103.35	503.6	(XS)XS			
98.14	503.46	r2rxs1	103.16	503.6	R2RXS1	82.91	502	XS				108.08	503.711	(XS)XS			
102.13	503.63	r2rxs1	105.5	503.95	R2RXS1	83.33	501.53	XS				58.52	503.697	(XS)XS			
102.54	503.71	r2rxs1r	109.34	504	R2RXS1	83.75	501.46	XS				62.93	503.686	(XS)XS			
			122.46	504.57	R2RXS1	84.19	501.49	XS									
			133	504.39	R2RXS1	84.57	501.96	XS									
			144.77	503.95	R2RXS1	84.93	502.22	XS									
			156.26	503.91	R2RXS1	86.13	502.49	XS									
			173.95	504.68	R2RXS1	87.22	502.72	XS									
			184.22	506	R2RXS1	87.24	502.71	XS									
			207.57	508.03	R2RXS1	90.05	503.13	XS									
						92.92	503.37	XS									
						94.66	503.39	XS									
						97.99	503.43	XS									
						100.68	503.62	XS									
						102.07	503.61	XS									
						102.51	503.67	XSRP09									
						104.28	503.87	XS									
						106.03	503.93	XS									
						107.6	503.82	XS									
						111.92	504.01	XS									
						116.16	504.09	XS									
						120.21	504.35	XS									
						123.32	504.3	XS									
						129.77	504.32	XS									
						135.85	504.26	XS									

Bankfull Width (ft)	18.05		Bankfull Width (ft)	20.64		Bankfull Width (ft)	21.26		Bankfull Width (ft)	18.58		Bankfull Width (ft)	21.6		Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)	9.62		Bankfull Cross Sectional Area (sq ft)	12.585		Bankfull Cross Sectional Area (sq ft)	10.885		Bankfull Cross Sectional Area (sq ft)	10.61		Bankfull Cross Sectional Area (sq ft)	10.97		Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)	0.53		Bankfull Mean Depth (ft)	0.61		Bankfull Mean Depth (ft)	0.51		Bankfull Mean Depth (ft)	0.571		Bankfull Mean Depth (ft)	0.51		Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)	1.73		Bankfull Max Depth (ft)	1.92		Bankfull Max Depth (ft)	1.94		Bankfull Max Depth (ft)	1.797		Bankfull Max Depth (ft)	1.8		Bankfull Max Depth (ft)		
Flood Prone Width (ft)	-		Flood Prone Width (ft)	143		Flood Prone Width (ft)	143		Flood Prone Width (ft)	143		Flood Prone Width (ft)	143		Flood Prone Width (ft)		
Entrenchment Ratio (ft/ft)	-		Entrenchment Ratio (ft/ft)	6.89		Entrenchment Ratio (ft/ft)	6.69		Entrenchment Ratio (ft/ft)	7.64		Entrenchment Ratio (ft/ft)	6.6		Entrenchment Ratio (ft/ft)		
Width/Depth Ratio (ft/ft)	-		Width/Depth Ratio (ft/ft)	33.85		Width/Depth Ratio (ft/ft)	41.52		Width/Depth Ratio (ft/ft)	35.52		Width/Depth Ratio (ft/ft)	42.5		Width/Depth Ratio (ft/ft)		
D50 (mm)	8.17		D50 (mm)	1.67		D50 (mm)	0.22		D50 (mm)	0.06		D50 (mm)	0.50		D50 (mm)		
D84 (mm)	16.00		D84 (mm)	9.65		D84 (mm)	9.65		D84 (mm)	9.65		D84 (mm)	8.00		D84 (mm)		

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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

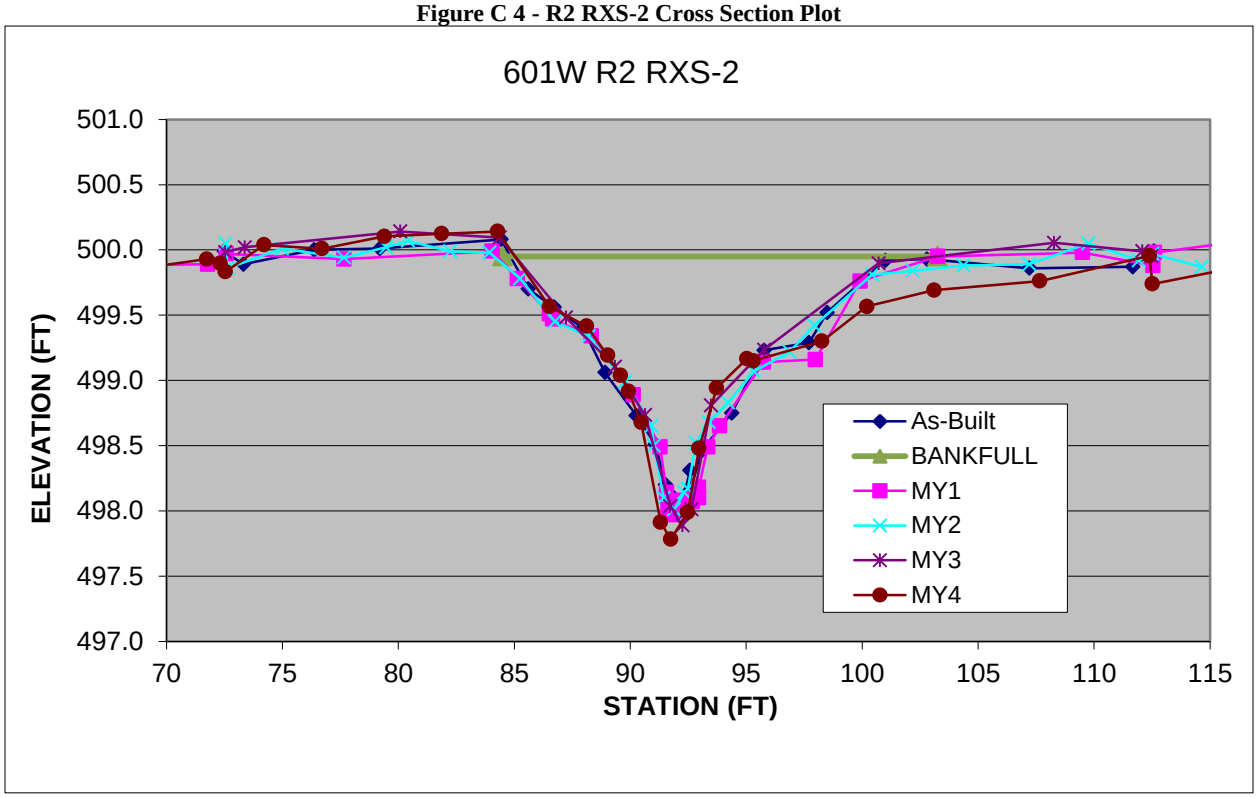

Table C 4 - R2 RXS-2 Dimension Data

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
72.49	499.99	r2rxs2l	16.82	499.69	R2RXS2	72.55	500.05	XSLP09	72.54	499.983	L PIN	66.64	499.9	(XS)XS			
73.32	499.89	r2rxs2	43.81	499.83	R2RXS2	72.63	499.86	XS	73.37	500.02	Ground	68.35	499.878	(XS)XS			
76.37	500	r2rxs2	71.78	499.89	R2RXS2	74.98	500.01	XS	80.08	500.141	Ground	69.89	499.883	(XS)XS			
79.2	500.01	r2rxs2	72.58	499.97	R2RXS2PL	77.66	499.94	XS	84.37	500.095	Ground	71.73	499.93	(XS)XS			
84.43	500.08	r2rxs2tob	77.65	499.93	R2RXS2	79.47	500.02	XS	87.23	499.482	Ground	72.31	499.897	(XS)XS			
85.61	499.7	r2rxs2	84.05	499.99	R2RXS2	80.41	500.07	XS	89.34	499.105	Ground	72.54	499.832	(XSLP)XSLP			
86.72	499.56	r2rxs2	85.14	499.78	R2RXS2	82.24	499.99	XS	90.64	498.734	Ground	74.2	500.039	(XS)XS			
87.96	499.4	r2rxs2	86.51	499.51	R2RXS2	83.93	499.98	XS	91.72	498.036	Ground	76.7	500.009	(XS)XS			
88.91	499.06	r2rxs2	86.65	499.47	R2RXS2	85.25	499.78	XS	92.25	497.888	Ground	79.39	500.104	(XS)XS			
90.26	498.73	r2rxs2	88.32	499.34	R2RXS2	86.75	499.45	XS	92.64	498.012	Ground	81.86	500.124	(XS)XS			
91.08	498.51	r2rxs2	90.13	498.89	R2RXS2	88.21	499.34	XS	93.49	498.809	Ground	84.28	500.142	(XS)XS			
91.53	498.2	r2rxs2	91.29	498.49	R2RXS2	89.78	498.99	XS	95.78	499.236	Ground	86.52	499.565	(XS)XS			
91.72	498.13	r2rxs2w	91.57	498.14	R2RXS2	90.92	498.65	XS	100.71	499.898	Ground	88.12	499.416	(XS)XS			
91.97	498	r2rxs2	91.63	498.01	R2RXS2	91.02	498.5	XS	108.28	500.055	Ground	89.02	499.193	(XS)XS			
92.15	498	r2rxs2	91.83	497.97	R2RXS2	91.44	498.1	XS	112.09	499.989	Ground	89.58	499.039	(XS)XS			
92.58	498.31	r2rxs2	91.97	498.08	R2RXS2	91.89	498.01	XS	112.47	499.95	R PIN	89.92	498.917	(XS)XS			
92.6	498.16	r2rxs2w	92.59	498.09	R2RXS2	92.32	498.14	XS				90.47	498.678	(XS)XS			
93.08	498.46	r2rxs2	92.68	498.07	R2RXS2	92.48	498.17	XS				91.31	497.914	(XS)XS			
94.38	498.75	r2rxs2	92.94	498.1	R2RXS2	92.83	498.52	XS				91.74	497.782	(XS)XS			
95.77	499.23	r2rxs2	92.94	498.11	R2RXS2	93.39	498.68	XS				92.48	497.989	(XS)XS			
97.71	499.29	r2rxs2	92.95	498.18	R2RXS2WS	94.22	498.83	XS				92.96	498.48	(XS)XS			
98.49	499.52	r2rxs2	93.34	498.49	R2RXS2	95.32	499.07	XS				93.72	498.943	(XS)XS			
101	499.92	r2rxs2tob	93.86	498.65	R2RXS2	96.87	499.22	XS				95.03	499.165	(XS)XS			
102.8	499.93	r2rxs2	95.75	499.14	R2RXS2	97.93	499.42	XS				95.3	499.149	(XS)XS			
107.22	499.86	r2rxs2	97.99	499.16	R2RXS2	100.42	499.81	XS				98.26	499.3	(XS)XS			
111.68	499.87	r2rxs2	99.91	499.76	R2RXS2	102.18	499.84	XS				100.2	499.567	(XS)XS			
112.58	499.99	r2rxs2r	103.25	499.95	R2RXS2	104.38	499.88	XS				103.11	499.691	(XS)XS			
			109.51	499.98	R2RXS2	107.21	499.89	XS				107.66	499.761	(XS)XS			
			112.55	499.88	R2RXS2	109.75	500.05	XS				112.39	499.955	(XSRP)XSRP			
			112.61	499.98	R2RXS2PR	111.94	499.92	XS				112.52	499.74	(XS)XS			
			120.83	500.17	R2RXS2	112.51	499.97	XSRP09				115.26	499.834	(XS)XS			
			128.37	500.47	R2RXS2												
			145.25	500.14	R2RXS2												
			156.43	500.18	R2RXS2												
			165.3	500.62	R2RXS2												
			173.2	500.81	R2RXS2												
			190.62	501.71	R2RXS2												
			219.25	504.94	R2RXS2												
			258.25	512.52	R2RXS2												

Bankfull Width (ft)	16.57	Bankfull Width (ft)	12.85	Bankfull Width (ft)	12.68	Bankfull Width (ft)	11.41	Bankfull Width (ft)	12.08	Bankfull Width (ft)	
Bankfull Cross Sectional Area (sq ft)	10.49	Bankfull Cross Sectional Area (sq ft)	10.69	Bankfull Cross Sectional Area (sq ft)	9.89	Bankfull Cross Sectional Area (sq ft)	9.01	Bankfull Cross Sectional Area (sq ft)	10.6	Bankfull Cross Sectional Area (sq ft)	
Bankfull Mean Depth (ft)	0.63	Bankfull Mean Depth (ft)	0.83	Bankfull Mean Depth (ft)	0.78	Bankfull Mean Depth (ft)	0.79	Bankfull Mean Depth (ft)	0.88	Bankfull Mean Depth (ft)	
Bankfull Max Depth (ft)	1.92	Bankfull Max Depth (ft)	1.19	Bankfull Max Depth (ft)	1.41	Bankfull Max Depth (ft)	1.35	Bankfull Max Depth (ft)	1.8	Bankfull Max Depth (ft)	
Flood Prone Width (ft)	-	Flood Prone Width (ft)	174	Flood Prone Width (ft)	174	Flood Prone Width (ft)	174	Flood Prone Width (ft)	174	Flood Prone Width (ft)	
Entrenchment Ratio (ft/ft)	-	Entrenchment Ratio (ft/ft)	13.54	Entrenchment Ratio (ft/ft)	13.72	Entrenchment Ratio (ft/ft)	15.25	Entrenchment Ratio (ft/ft)	14.4	Entrenchment Ratio (ft/ft)	
Width/Depth Ratio (ft/ft)	-	Width/Depth Ratio (ft/ft)	15.44	Width/Depth Ratio (ft/ft)	16.26	Width/Depth Ratio (ft/ft)	14.45	Width/Depth Ratio (ft/ft)	13.8	Width/Depth Ratio (ft/ft)	
D50 (mm)	9.20	D50 (mm)	3.00	D50 (mm)	0.06	D50 (mm)	0.06	D50 (mm)	0.06	D50 (mm)	
D84 (mm)	16.00	D84 (mm)	13.99	D84 (mm)	0.06	D84 (mm)	0.06	D84 (mm)	12.87	D84 (mm)	

601 West 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

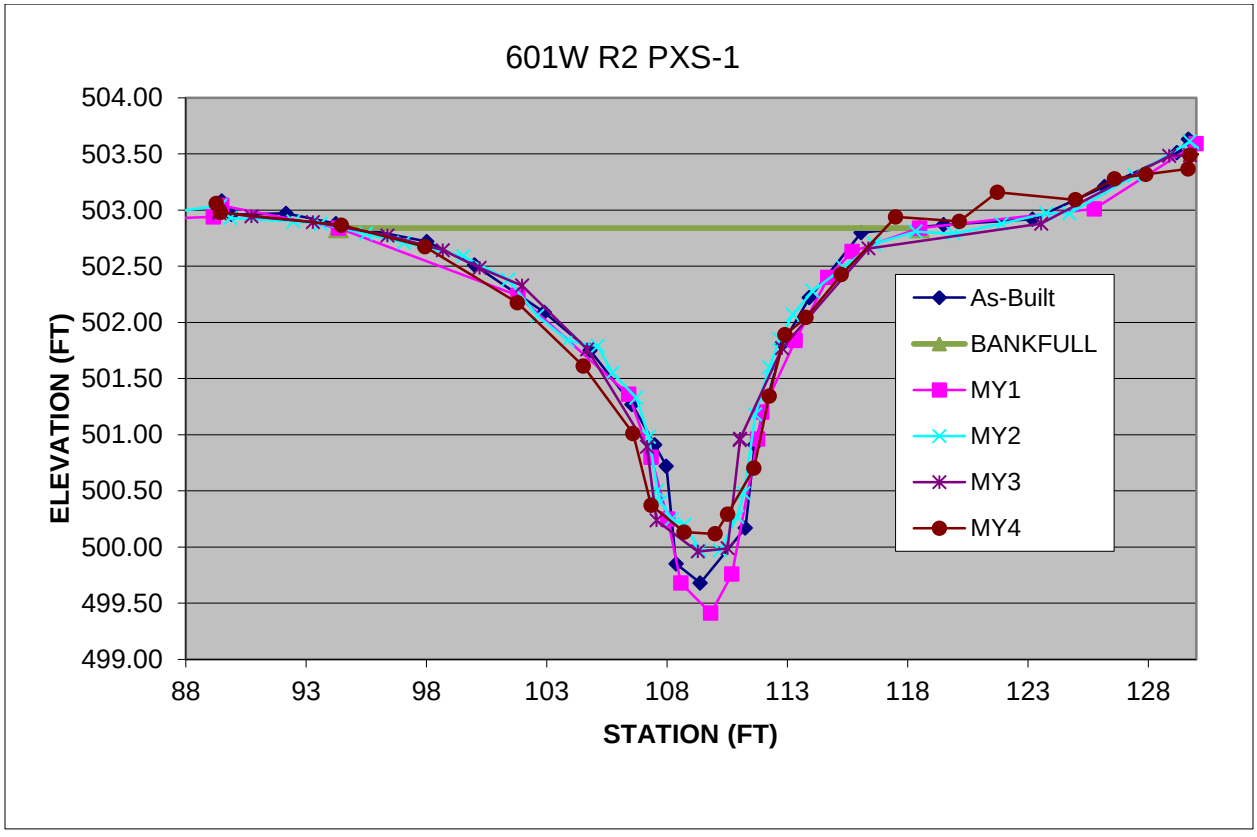

Table C 5 - R2 PXS-1 Dimension Data

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
89.5	503.08	r2pxs1l	13.66	507.59	R2PXS1	87.3	502.98	XS	89.38	502.986	L pin	89.27	503.058	(XS)XS			
89.91	502.96	r2pxs1	28.55	504.21	R2PXS1	89.45	503.04	XSLP09	90.73	502.944	Ground	89.44	502.979	(XSLP)XSLP			
92.17	502.97	r2pxs1	48.46	503.47	R2PXS1	89.85	502.93	XS	93.29	502.894	Ground	94.47	502.865	(XS)XS			
94.24	502.88	r2pxs1	75.92	502.84	R2PXS1	92.48	502.9	XS	96.38	502.774	Ground	97.94	502.675	(XS)XS			
98.02	502.72	r2pxs1tob	89.15	502.94	R2PXS1	93.61	502.88	XS	98.69	502.643	Ground	101.78	502.175	(XS)XS			
100	502.51	r2pxs1	89.5	503.04	R2PXS1PL	95.49	502.79	XS	100.21	502.486	Ground	104.53	501.61	(XS)XS			
102.9	502.09	r2pxs1	94.35	502.84	R2PXS1	97.06	502.71	XS	101.98	502.328	(pin)pin	106.59	501.011	(XS)XS			
104.81	501.75	r2pxs1	101.81	502.24	R2PXS1	99.54	502.59	XS	104.69	501.759	Ground	107.34	500.372	(XS)XS			
106.55	501.27	r2pxs1	106.41	501.36	R2PXS1	101.4	502.38	XS	107.17	500.894	Ground	108.72	500.133	(XS)XS			
107.49	500.91	r2pxs1w	107.34	500.8	R2PXS1	102.62	502.06	XS	107.57	500.237	Ground	110	500.117	(XS)XS			
107.97	500.72	r2pxs1	108.03	500.25	R2PXS1	103.87	501.84	XS	109.28	499.961	Ground	110.52	500.293	(XS)XS			
108.38	499.85	r2pxs1	108.58	499.68	R2PXS1	105.13	501.79	XS	110.52	499.989	Ground	111.62	500.703	(XS)XS			
109.38	499.68	r2pxs1	109.82	499.41	R2PXS1	105.73	501.55	XS	111.03	500.954	Ground	112.25	501.343	(XS)XS			
111.26	500.17	r2pxs1	110.7	499.76	R2PXS1	106.72	501.33	XS	111.04	500.964	Ground	112.9	501.89	(XS)XS			
111.65	500.91	r2pxs1w	111.77	500.96	R2PXS1WS	107.25	500.98	XS	112.78	501.77	Ground	113.78	502.043	(XS)XS			
112.8	501.81	r2pxs1	111.94	501.2	R2PXS1	107.6	500.5	XSW	116.37	502.659	Ground	115.25	502.425	(XS)XS			
113.92	502.22	r2pxs1	113.33	501.84	R2PXS1	107.73	500.4	XS	123.55	502.88	Ground	117.51	502.939	(XS)XS			
116.07	502.8	r2pxs1tob	114.69	502.4	R2PXS1	108.2	500.25	XS	128.88	503.484	Ground	120.15	502.899	(XS)XS			
119.5	502.87	r2pxs1	115.69	502.63	R2PXS1	108.74	500.2	XS	129.74	503.488	R pin	121.73	503.159	(XS)XS			
123.2	502.92	r2pxs1	118.5	502.84	R2PXS1	109.37	499.97	XS				124.98	503.092	(XS)XS			
126.19	503.21	r2pxs1	125.76	503.01	R2PXS1	110.2	499.97	XS				126.6	503.278	(XS)XS			
129.19	503.51	r2pxs1	129.99	503.59	R2PXS1PL	110.92	500.27	XS				127.91	503.318	(XS)XS			
129.68	503.63	r2pxs1r	130.43	503.52	R2PXS1	111.19	500.48	XS				129.66	503.367	(XS)XS			
			144.54	504.58	R2PXS1	111.67	501.18	XS				129.74	503.488	(XSRP)XSRP			
			170.93	508.6	R2PXS1	112.25	501.6	XS				136.03	503.67	(XS)XS			
						112.68	501.85	XS									
						113.23	502.07	XS									
						114.05	502.28	XS									
						115.33	502.49	XS									
						116.62	502.7	XS									
						118.33	502.81	XS									
						119.91	502.79	XS									
						121.91	502.88	XS									
						123.76	502.97	XS									
						124.73	502.97	XS									
						127.43	503.31	XS									
						129.73	503.61	XSRP09									
						130.33	503.51	XS									

Bankfull Width (ft)	25.26		Bankfull Width (ft)	24.2		Bankfull Width (ft)	26.3		Bankfull Width (ft)	20.0		Bankfull Width (ft)	20.78		Bankfull Width (ft)		
Bankfull Cross Sectional Area (sq ft)	23.71		Bankfull Cross Sectional Area (sq ft)	25.17		Bankfull Cross Sectional Area (sq ft)	22.24		Bankfull Cross Sectional Area (sq ft)	23.11		Bankfull Cross Sectional Area (sq ft)	24.15		Bankfull Cross Sectional Area (sq ft)		
Bankfull Mean Depth (ft)	0.94		Bankfull Mean Depth (ft)	1.04		Bankfull Mean Depth (ft)	0.85		Bankfull Mean Depth (ft)	1.16		Bankfull Mean Depth (ft)	1.16		Bankfull Mean Depth (ft)		
Bankfull Max Depth (ft)	3.2		Bankfull Max Depth (ft)	3.43		Bankfull Max Depth (ft)	2.74		Bankfull Max Depth (ft)	2.93		Bankfull Max Depth (ft)	2.75		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)	5.70		D50 (mm)	0.06		D50 (mm)	0.06		D50 (mm)	0.06		D50 (mm)	0.06		D50 (mm)		
D84 (mm)	11.30		D84 (mm)	6.21		D84 (mm)	0.06		D84 (mm)	0.06		D84 (mm)	10.10		D84 (mm)		

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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

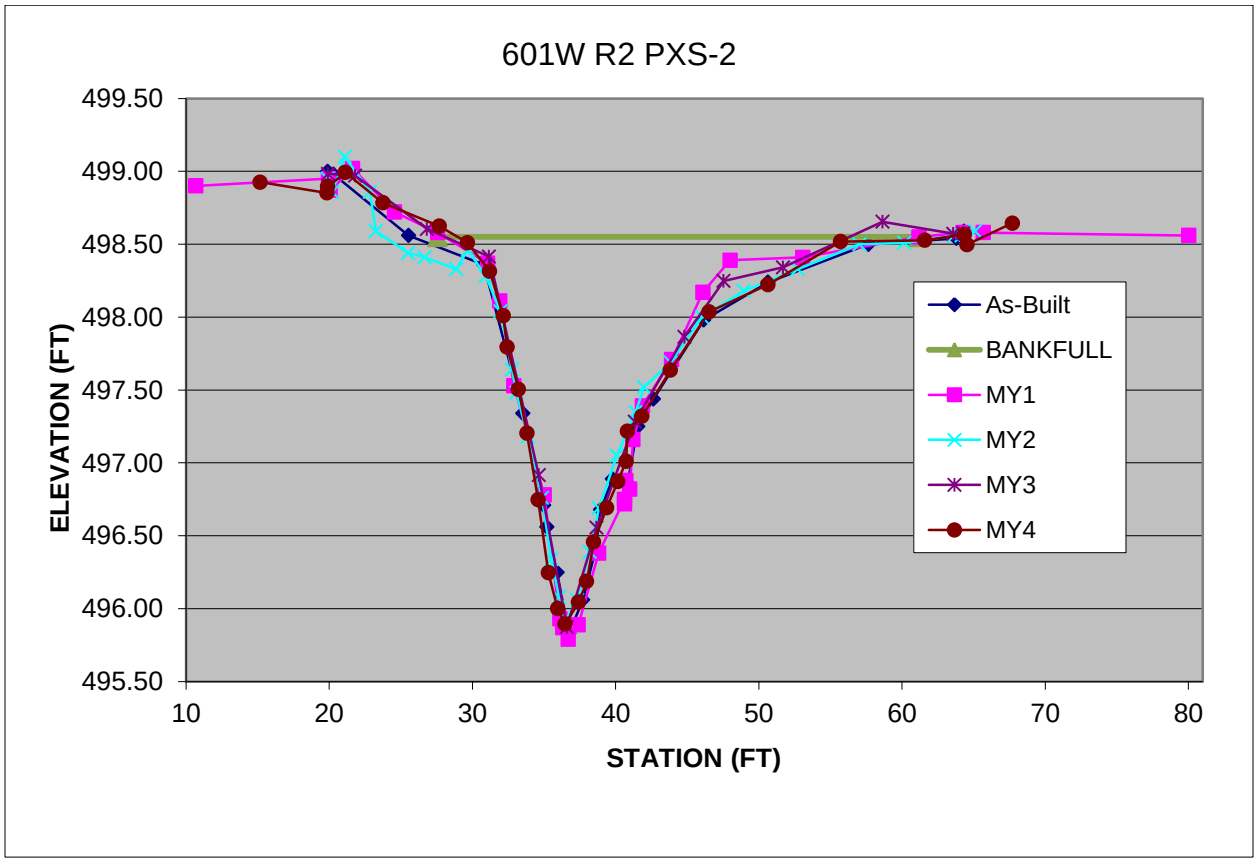


Table C 6 - R2 PXS-2 Dimension Data

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
19.89	499	r2pxs2l	10.68	498.9	R2PXS2	19.89	498.95	XSLP09	19.92	498.982	L pin	15.18	498.926	(XS)XS			
20.29	498.98	r2pxs2	19.95	498.95	R2PXS2PR	20.21	498.86	XS	21.81	498.97	Ground	19.84	498.852	(XS)XS			
25.54	498.56	r2pxs2	20.07	498.87	R2PXS2	21.09	499.1	XS	26.82	498.605	Ground	19.9	498.896	(XSLP)XSLP			
30.79	498.36	r2pxs2tob	21.63	499.02	R2PXS2	22.83	498.86	XS	31.16	498.415	Ground	21.12	498.992	(XS)XS			
33.53	497.34	r2pxs2	24.57	498.72	R2PXS2	23.25	498.59	XS	34.63	496.916	Ground	23.75	498.784	(XS)XS			
34.97	496.71	r2pxs2w	27.57	498.58	R2PXS2	25.49	498.44	XS	36.6	495.874	Ground	27.69	498.624	(XS)XS			
35.19	496.56	r2pxs2	31.06	498.37	R2PXS2	26.67	498.41	XS	38.67	496.556	Ground	29.65	498.511	(XS)XS			
35.91	496.25	r2pxs2	31.92	498.11	R2PXS2	28.87	498.33	XS	41.35	497.284	Ground	31.2	498.314	(XS)XS			
36.73	495.83	r2pxs2	32.9	497.53	R2PXS2	29.67	498.46	XS	44.8	497.865	Ground	32.15	498.01	(XS)XS			
37.71	496.06	r2pxs2	35.01	496.78	R2PXS2	30.93	498.28	XS	47.54	498.248	Ground	32.42	497.795	(XS)XS			
38.61	496.41	r2pxs2	36.11	495.93	R2PXS2	31.95	498.04	XS	51.69	498.342	Ground	33.21	497.505	(XS)XS			
38.95	496.68	r2pxs2w	36.32	495.87	R2PXS2	32.77	497.64	XS	58.63	498.654	Ground	33.81	497.204	(XS)XS			
39.78	496.89	r2pxs2	36.69	495.79	R2PXS2	33.07	497.48	XS	63.58	498.572	Ground	34.59	496.747	(XS)XS			
40.85	496.86	r2pxs2	37.39	495.89	R2PXS2	33.89	497.18	XS	64.28	498.576	R pin	35.3	496.246	(XS)XS			
41.54	497.25	r2pxs2	38.81	496.38	R2PXS2	34.86	496.76	XS				35.95	496.001	(XS)XS			
42.64	497.44	r2pxs2	40.62	496.75	R2PXS2	35.5	496.34	XS				36.47	495.895	(XS)XS			
46.15	497.98	r2pxs2	40.63	496.72	R2PXS2	36.05	496.08	XS				37.41	496.045	(XS)XS			
50.64	498.24	r2pxs2tob	40.71	496.88	R2PXS2WS	36.51	495.92	XS				37.97	496.187	(XS)XS			
57.65	498.5	r2pxs2	40.98	496.82	R2PXS2	37.32	496.06	XS				38.46	496.457	(XS)XS			
63.81	498.54	r2pxs2	41.21	497.16	R2PXS2	38.19	496.39	XS				39.37	496.692	(XS)XS			
64.31	498.59	r2pxs2r	41.87	497.39	R2PXS2	38.82	496.69	XS				40.15	496.872	(XS)XS			
			43.92	497.71	R2PXS2	40.08	497.05	XS				40.73	497.012	(XS)XS			
			46.1	498.17	R2PXS2	41.39	497.35	XS				40.82	497.217	(XS)XS			
			48	498.39	R2PXS2	41.97	497.52	XS				41.84	497.321	(XS)XS			
			53.07	498.41	R2PXS2	43.84	497.69	XS				43.83	497.636	(XS)XS			
			61.19	498.55	R2PXS2	46.03	498	XS				46.53	498.037	(XS)XS			
			64.28	498.58	R2PXS2PR	48.95	498.18	XS				50.64	498.223	(XS)XS			
			65.68	498.58	R2PXS2	52.72	498.33	XS				55.71	498.518	(XS)XS			
			80.03	498.56	R2PXS2	57.02	498.5	XS				61.58	498.527	(XS)XS			
						60.16	498.51	XS				64.35	498.568	(XSRP)XSRP			
						63.65	498.56	XS				64.54	498.497	(XS)XS			
						64.15	498.56	XSRP09				67.7	498.644	(XS)XS			
						65.1	498.59	XS									

Bankfull Width (ft)	32.11	Bankfull Width (ft)	33.6	Bankfull Width (ft)	36.9	Bankfull Width (ft)	24.9	Bankfull Width (ft)	34.7	Bankfull Width (ft)	
Bankfull Cross Sectional Area (sq ft)	24.12	Bankfull Cross Sectional Area (sq ft)	24.12	Bankfull Cross Sectional Area (sq ft)	24.96	Bankfull Cross Sectional Area (sq ft)	22.83	Bankfull Cross Sectional Area (sq ft)	25.1	Bankfull Cross Sectional Area (sq ft)	
Bankfull Mean Depth (ft)	0.75	Bankfull Mean Depth (ft)	0.72	Bankfull Mean Depth (ft)	0.68	Bankfull Mean Depth (ft)	0.92	Bankfull Mean Depth (ft)	0.7	Bankfull Mean Depth (ft)	
Bankfull Max Depth (ft)	2.67	Bankfull Max Depth (ft)	2.76	Bankfull Max Depth (ft)	2.59	Bankfull Max Depth (ft)	2.47	Bankfull Max Depth (ft)	2.6	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)	9.29	D50 (mm)	0.06	D50 (mm)	0.06	D50 (mm)	0.06	D50 (mm)	0.06	D50 (mm)	
D84 (mm)	14.66	D84 (mm)	9.89	D84 (mm)	0.06	D84 (mm)	0.06	D84 (mm)	0.06	D84 (mm)	

Figure C 7 - R1 Longitudinal Profile Sheet 1

Figure C 8 - R1 Longitudinal Profile Sheet 2

Figure C 9 – R2 Longitudinal Profile Sheet

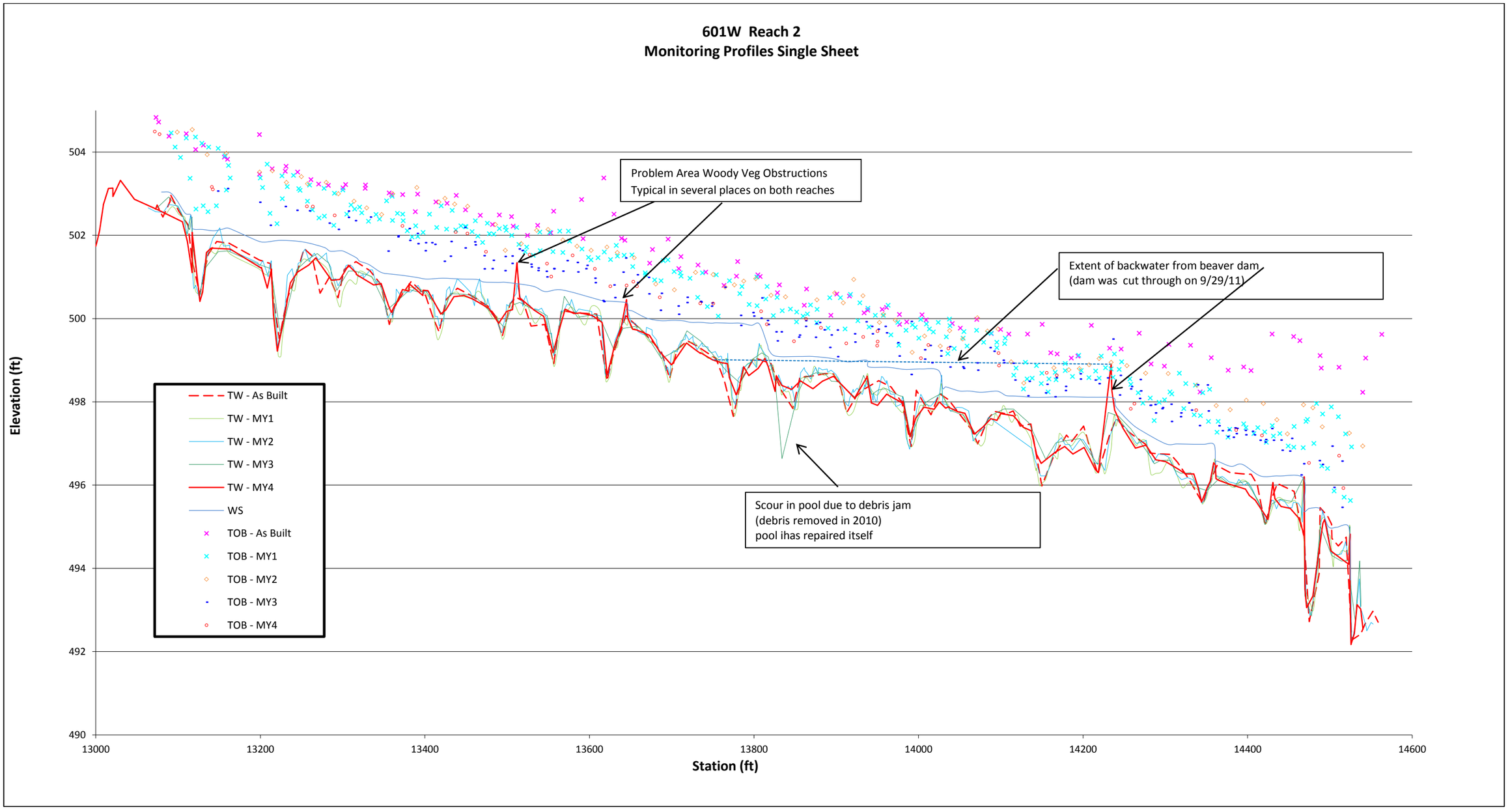


Figure C 7 - R1 RXS-1 Pebble Count

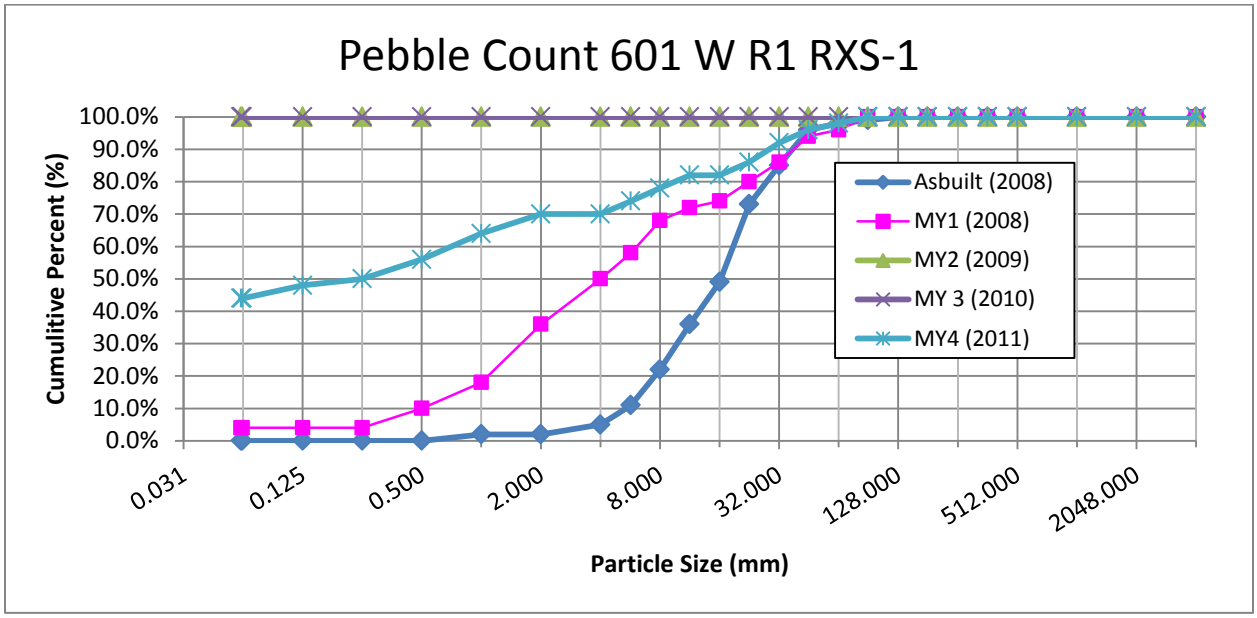


Figure C 8 - R1 PXS-1 Pebble Count

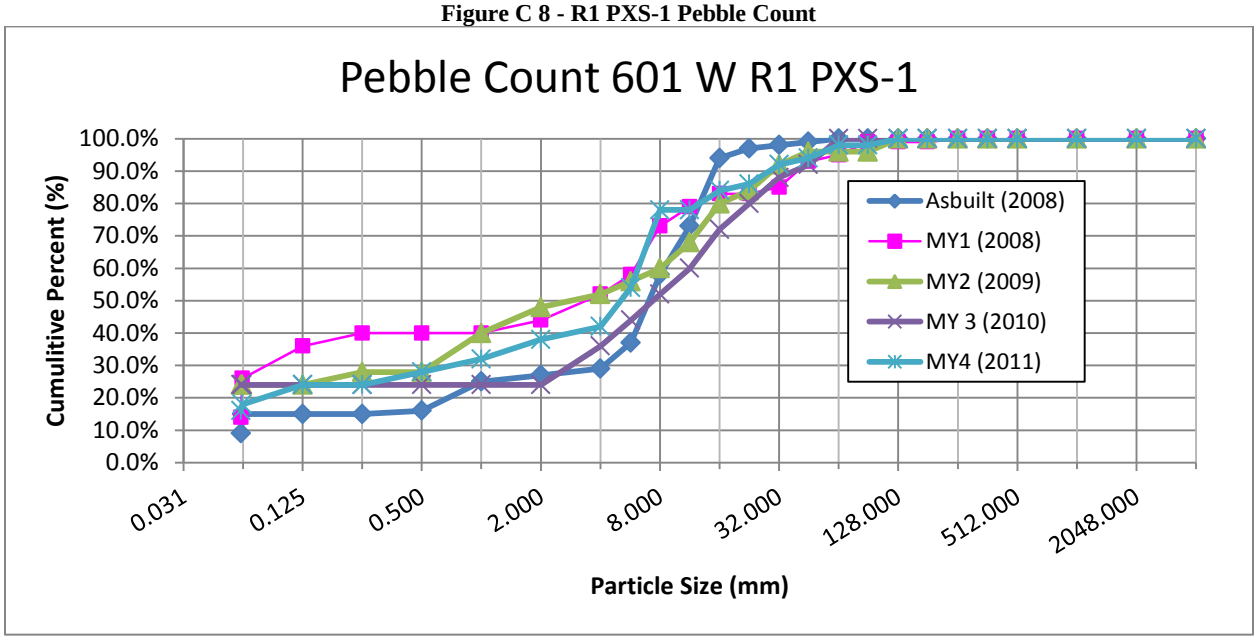


Figure C 9 - R2 RXS-1 Pebble Count

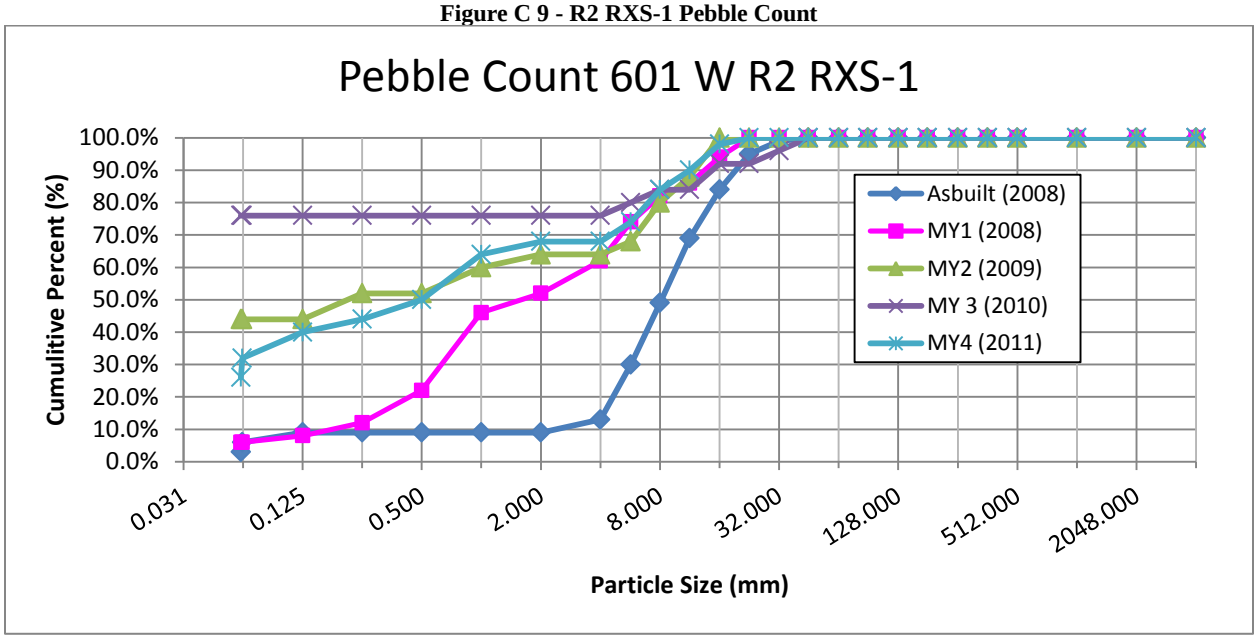


Figure C 10 - R2 RXS-2 Pebble Count

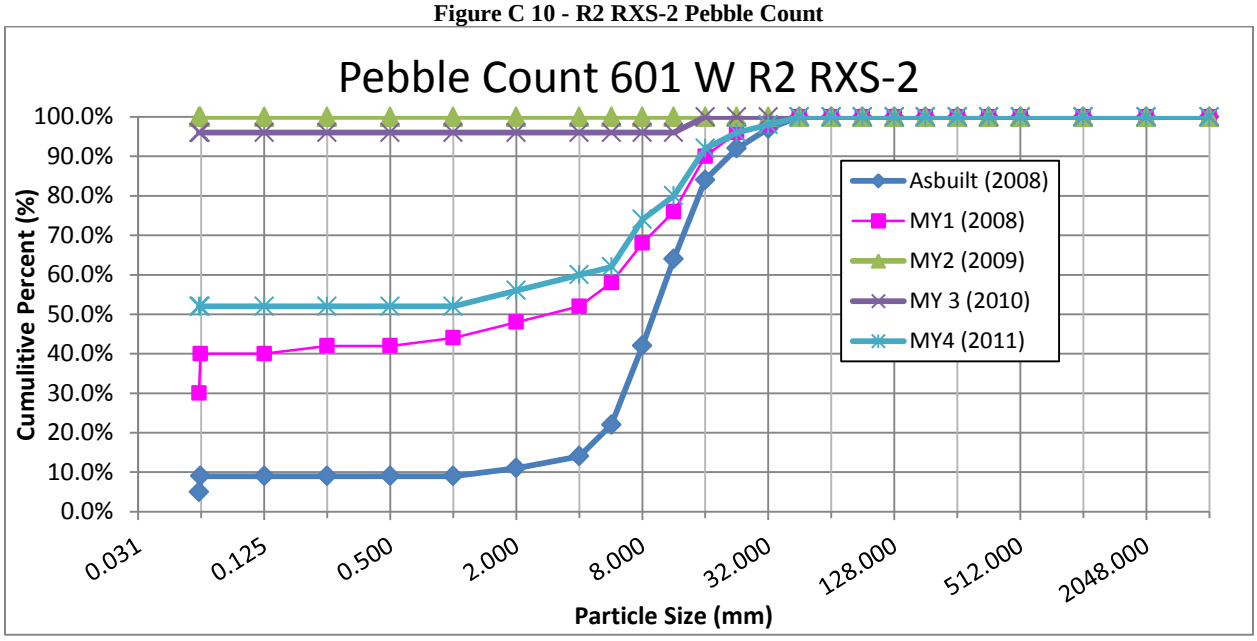


Figure C 11 - R2 PXS-1 Pebble Count

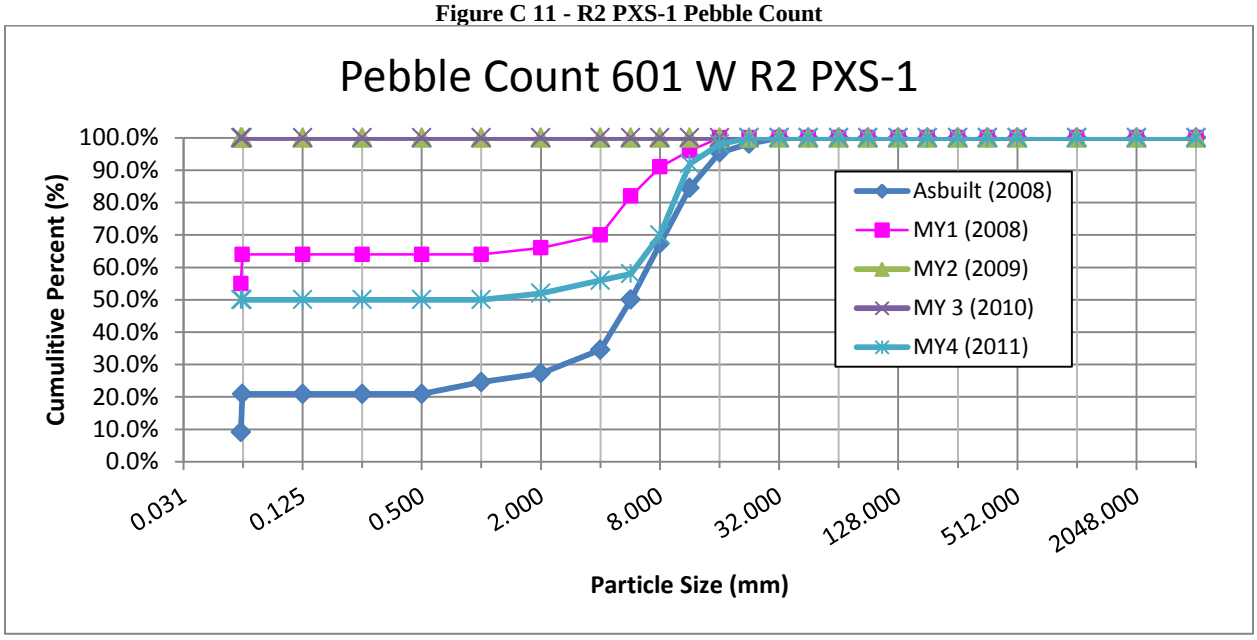
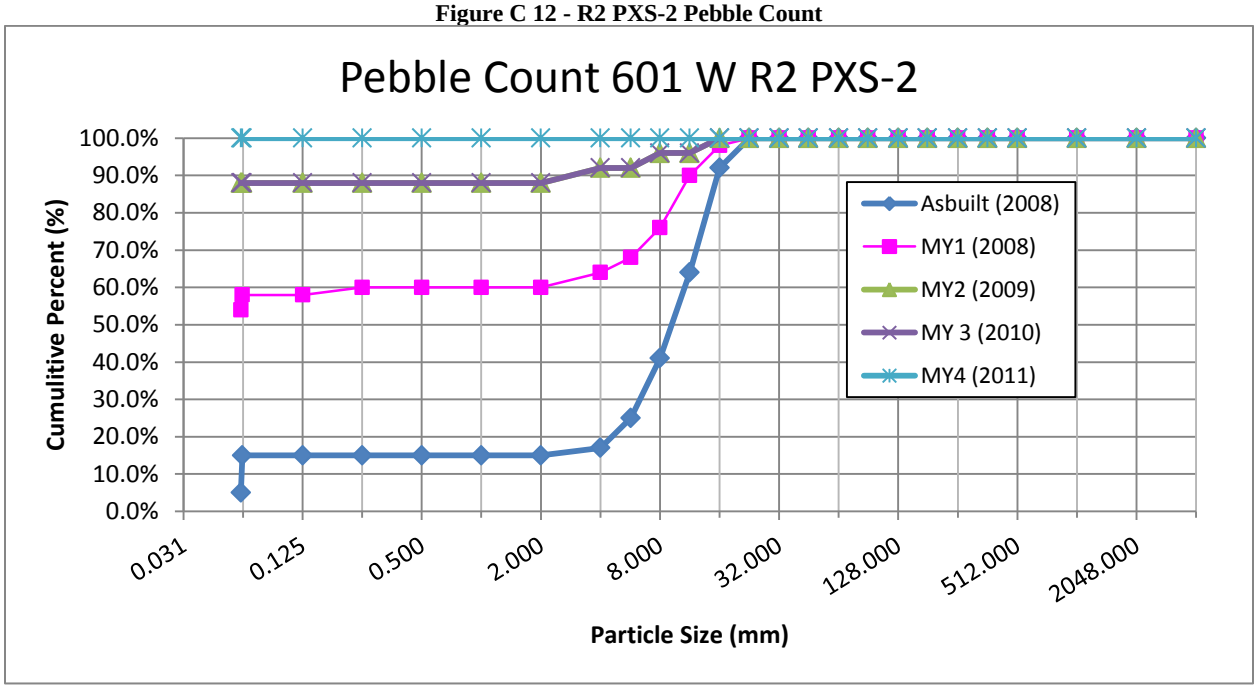


Figure C 12 - R2 PXS-2 Pebble Count



Appendix D – Site Photos

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Vegetation Photos

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Appendix E – Vegetation Data

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Table E 1 – MY4 (2011) Plot W1 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	QM	0.80	9.56									
2	FP	0.82	2.35		159	6	4	28	219	11	4	
3	AT	1.84	7.17									
4	BN	2.81	4.45		267	14	4		396	30	4	
5	BN	3.44	9.80									
6	BN	3.95	2.15		370	30	4		467	45	4	
7	AT	4.50	7.63									
8	CO	5.03	5.41	12	73		4	12	73		4	
9	AT	6.55	2.96									
10	QM	7.14	8.45									
11	BN	7.80	5.92		222	12	4		286	23	4	
12	BN	7.99	0.26		370	45	4			64	4	
13	BN	8.81	3.92		252	19	4		302	26	4	

Table E 2 – MY4 (2011) Plot W2 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	BN	0.53	9.68		219	9	4		259	12	4	
2	QP	0.55	1.26		286	16	4		295	21	4	
3	QP	1.14	4.03									
4	QM	2.18	6.50	5	108		4	13	193	6	4	
5	QN	3.15	0.16									
6	BN	3.19	9.11		344	26	4		676	28	3	
7	QN	3.92	2.53	1	19		4	1	11		4	Dieback
8	Q	4.53	4.79									
9	QN	5.38	7.04	2	43		4	1	13		4	Browsed
10	BN	5.93	0.21									
11	QN	6.20	9.30									
12	Q	6.76	3.03									
13	QP	7.55	5.71	1	48		4	3	62		4	
14	Q	8.55	8.61									
15	QM	9.35	2.49									

Table E 3 – MY4 (2011) Plot W3 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	1.03	0.93		252	15	4		258	17	4	
2	FP	1.09	3.13		257	14	4		260	15	4	
3	FP	1.24	5.18		207	9	4	26	207	11	4	
4	QP	1.60	7.62									
5	CO	3.59	2.73	8	46		4	8	47		4	
6	CO	3.88	5.11									
7	QP	4.46	7.64		152	2	4		284	4	4	
8	BN	4.49	9.89		345	22	4		375	24	3	
9	QP	5.79	1.22		256	11	4		268	13	4	
10	FP	6.08	3.36		313	19	4		326	25	4	
11	QN	6.40	5.85		188	6	4	18	221	9	4	
12	FP	6.90	8.01		369	28	4		380	35	4	
13	QN	8.30	0.45									
14	QM	8.73	3.18	5	18		4	6	32		4	
15	QN	9.13	6.14									
16	QN	9.55	9.00				0					

Table E 4 – MY4 (2011) Plot W4 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	QM	0.78	4.93									
2	QM	0.89	2.23									
3	FP	1.08	7.25		402	30	4		417	35	4	
4	FP	1.24	9.52		288	17	4		336	23	4	
5	FP	3.19	4.56		329	29	4		471	33	4	
6	FP	3.23	2.07		274	21	4		418	29	4	
7	QN	3.35	7.24		278	13	4		278	16	4	
8	QN	3.44	9.60									
9	QN	5.52	2.19	9	122		4	10	146	3	4	
10	AT	5.59	6.79									
11	Q	5.60	4.41									
12	AT	5.69	9.01									
13	BN	7.66	1.94									
14	Q	8.00	8.32									
15	BN	8.14	6.45									
16	QN	8.53	4.13									
17	FP	9.95	1.79									

Table E 5 – MY4 (2011) Plot W5 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	BN	2.08	7.73		358	31	4		420	33	3	
2	QM	2.19	5.29	3	28		4	4	31		4	
3	AT	2.47	2.69									
4	FP	2.92	0.20		267	16	4		267	19	4	
5	QM	4.40	9.95		273	16	4		295	23	4	
6	QM	4.74	3.46		211	10	4	28	232	14	4	
7	QN	4.75	7.82									
8	CO	4.80	5.61									
9	QM	4.96	1.26		273	18	4		287	24	4	
10	CO	7.14	0.80									
11	CO	7.18	8.09	4	19		4	5	20		4	
12	BN	7.20	3.16		300	21	4		374	28	4	
13	CO	7.23	5.55	1	14		4	1	15		3	
14	QP	9.25	9.55		139	1	4	14	213	6	4	
15	BN	9.56	4.46		256	14	4		308	17	4	
16	BN	9.62	7.05		245	11	4		282	15	4	
17	QP	9.66	1.97		165	3	4	21	204	6	4	

Appendix F – Rainfall Data

EBX 601 W MY 3 2010 Rainfall Daily Summary

Date	Rainfall (in)	1/12/2011	0.18	4/23/2011	0.01
9/17/2010	0.06	1/13/2011	0.03	4/26/2011	0.01
9/26/2010	0.72	1/14/2011	0.02	4/27/2011	0.04
9/27/2010	0.97	1/17/2011	0.24	4/28/2011	0.38
9/29/2010	1.82	1/18/2011	0.02	4/29/2011	0.01
9/30/2010	0.23	1/19/2011	0.01	5/3/2011	0.04
10/14/2010	0.16	1/25/2011	0.01	5/4/2011	0.27
10/20/2010	0.06	1/26/2011	0.13	5/5/2011	0.01
10/21/2010	0.01	2/1/2011	0.06	5/6/2011	0.03
10/25/2010	0.38	2/2/2011	0.34	5/7/2011	0.03
10/27/2010	0.13	2/3/2011	0.03	5/8/2011	0.03
10/28/2010	0.04	2/4/2011	1.02	5/9/2011	0.03
11/3/2010	0.02	2/5/2011	0.45	5/10/2011	0.03
11/4/2010	0.58	2/7/2011	0.04	5/11/2011	0.66
11/16/2010	0.80	2/10/2011	0.12	5/12/2011	0.01
11/23/2010	0.07	2/25/2011	0.06	5/13/2011	0.02
11/24/2010	0.01	2/28/2011	1.32	5/14/2011	0.17
11/25/2010	0.03	3/6/2011	0.78	5/15/2011	0.01
11/26/2010	0.19	3/9/2011	0.90	5/16/2011	0.01
11/30/2010	0.17	3/10/2011	0.15	5/17/2011	0.20
12/1/2010	0.64	3/15/2011	0.12	5/20/2011	0.03
12/4/2010	0.03	3/16/2011	0.03	5/21/2011	0.03
12/11/2010	0.02	3/17/2011	0.01	5/22/2011	0.03
12/12/2010	0.30	3/24/2011	0.02	5/23/2011	0.03
12/16/2010	0.04	3/26/2011	0.95	5/24/2011	0.03
12/17/2010	0.01	3/27/2011	0.25	5/25/2011	0.03
12/18/2010	0.34	3/28/2011	0.19	5/26/2011	0.03
12/19/2010	0.01	3/30/2011	0.64	5/27/2011	1.41
12/25/2010	0.18	3/31/2011	0.08	6/5/2011	0.02
12/26/2010	0.14	4/5/2011	0.86	6/6/2011	0.02
12/27/2010	0.02	4/9/2011	0.39	6/7/2011	0.02
1/1/2011	0.19	4/10/2011	0.26	6/8/2011	0.02
1/2/2011	0.11	4/11/2011	0.03	6/9/2011	0.94
1/5/2011	0.04	4/12/2011	0.01	6/10/2011	0.04
1/6/2011	0.02	4/16/2011	0.09	6/11/2011	1.23
1/7/2011	0.03	4/21/2011	0.04	6/12/2011	0.18
1/11/2011	0.22	4/22/2011	0.16	6/13/2011	0.01

6/14/2011	0.01	7/10/2011	0.01	8/15/2011	0.01
6/15/2011	0.08	7/11/2011	0.01	8/21/2011	0.46
6/18/2011	0.07	7/13/2011	0.79	8/22/2011	0.30
6/21/2011	0.02	7/14/2011	0.01	8/25/2011	0.01
6/22/2011	0.03	7/24/2011	0.77	8/29/2011	0.15
6/23/2011	0.01	7/25/2011	0.81	9/2/2011	0.05
6/24/2011	0.02	7/26/2011	0.21	9/5/2011	0.24
6/25/2011	0.01	7/27/2011	0.01	9/6/2011	0.07
6/28/2011	0.13	7/30/2011	0.05	9/21/2011	0.11
6/29/2011	0.17	7/31/2011	0.95	9/22/2011	0.27
7/4/2011	0.04	8/3/2011	0.02	9/23/2011	0.68
7/5/2011	0.01	8/5/2011	1.16	9/24/2011	0.31
7/6/2011	0.01	8/8/2011	0.13	9/25/2011	1.22
7/7/2011	0.01	8/11/2011	0.40	9/26/2011	0.07
7/8/2011	0.01	8/12/2011	0.01		
7/9/2011	0.01	8/13/2011	0.80		

Appendix G – Morphology Table

Reach 1 Morphology and Hydraulic Monitoring Summary

Parameter	601 W R1 RXS-1 Riffle						601 W R1 PXS-1 Pool					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	14.00	14.42	11.06	8.83	9.7	-	33.42	34.67	26.24	24.1	27.8	-
Floodprone Width (ft)	83.40	83.4	83.4	83.4	83.4	-	-	-	-	-	-	-
BF Cross Sectional Area (ft^2)	7.84	7.954	6.7157	6.98	6.81	-	31.71	29.37	26.43	27.3	26.3	-
BF Mean Depth (ft)	0.56	0.55	0.61	0.79	0.7	-	0.95	0.85	1.01	1.13	0.95	-
BF Max Depth (ft)	1.60	1.64	1.49	1.33	1.4	-	2.78	3.07	2.31	2.42	2.45	-
Width/Depth Ratio	24.99	26.14	18.21	11.17	13.86	-	-	-	-	-	-	-
Entrenchment Ratio	5.96	5.78	7.54	9.45	8.60	-	-	-	-	-	-	-
Bank Height Ratio	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-
Substrate												
d50 (mm)	16.28	4.00	0.06	0.06	0.019	-	7.12	3.50	3.00	7.43	5.13	-
d84 (mm)	31.22	28.87	0.06	0.06	20.95	-	13.76	27.30	22.60	27.3	16	-

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)	20.37	47.83	31.95	22	50	33	27	44	41	17.1	44.89	34.19	20	43	35	-	-	-
Radius of Curvature (ft)	9.68	33.37	22.66	12	35	25	14	37	25	10.3	34.1	20.97	12	35	22	-	-	-
Meander Wavelength (ft)	83.27	124.15	108.7	85	130	103	86	135	109	57.7	141.22	103	80	131	106	-	-	-
Meander Width ratio	1.455	3.416	2.282	1.528	3.472	2.292	2.451	4.005	3.665	1.93	5.08	3.87	2.06	4.43	3.61	-	-	-
Profile																		
Riffle length (ft)	1.18	43.33	27.77	2	45	30	1.07	76.32	22.45	1.21	50.81	24.67	1.24	54.844	16.33	-	-	-
Riffle slope (ft/ft)	0.0060	0.1377	0.0161	0.008	0.11	0.019	0.01	0.18	0.02	0.01	0.1599	0.017	0.0049	0.0835	0.0235	-	-	-
Pool length (ft)	18.43	49.38	29.37	20	51	30	24	64	37	25	67	39	9.11	84.235	30.8	-	-	-
Pool spacing (ft)	38.67	84.96	55.13	40	86	55	42	141	60	39	144	59	7.467	73.596	25.033	-	-	-
Additional Reach Parameters																		
Valley Length (ft)	1060																	
Channel Length (ft)	1221			1221			1221			1221			1221			-		
Sinuosity	1.152			1.152			1.152			1.152			1.152			-		
Water Surface Slope (ft/ft)	0.0070			0.0071			0.0071			N/A			N/A			-		
BF slope (ft/ft)	0.0072			0.0071			0.0071			0.0079			0.0080			-		
Rosgen Classification	C4			C4			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	601 W R2 RXS-1 Riffle						601 W R2 RXS-2 Riffle						601 W R2 PXS-1 Pool						601 W R2 PXS-2 Pool					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY 5	MY0	MY1	MY2	MY3	MY4	MY5
BF Width (ft)	18.05	20.64	21.26	18.58	21.58	-	16.57	19.20	20.45	11.41	12.08	-	25.26	24.15	26.30	19.99	20.78	-	32.11	33.62	36.91	24.87	34.7	-
Floodprone Width (ft)	142	142	142	142	142	-	174	174	174	174	174	-	-	-	-	-	-	-	-	-	-	-	-	-
BF Cross Sectional Area (ft^2)	9.62	12.59	10.89	10.61	10.97	-	10.49	13.89	13.46	9.01	10.60	-	23.71	25.17	22.24	23.11	24.15	-	24.12	24.12	24.96	22.83	25.12	-
BF Mean Depth (ft)	0.53	0.61	0.51	0.57	0.51	-	0.63	0.72	0.66	0.79	0.88	-	0.94	1.04	0.85	1.16	1.16	-	0.75	0.72	0.68	0.92	0.72	-
BF Max Depth (ft)	0.53	0.61	0.51	0.57	0.51	-	0.63	0.72	0.66	0.79	0.88	-	0.94	1.04	0.85	1.16	1.16	-	0.75	0.72	0.68	0.92	0.72	-
Width/Depth Ratio	33.88	33.85	41.52	32.54	42.45	-	26.18	26.55	31.06	14.45	13.77	-	26.91	23.17	31.11	17.29	17.88	-	42.74	46.86	54.59	27.09	47.93	-
Entrenchment Ratio	7.87	6.88	6.68	7.64	6.58	-	10.50	9.06	8.51	15.25	14.40	-	-	-	-	-	-	-	-	-	-	-	-	-
Bank Height Ratio	1.00	1.00	1.00	1.00	1.00	-	1.00	1.00	1.00	1.00	1.00	-	-	-	-	-	-	-	-	-	-	-	-	-
Substrate																								
d50 (mm)	8.17	1.67	0.22	0.06	0.5	-	9.20	3.00	0.06	0.06	0.06	-	5.70	0.06	0.06	0.06	0.061	-	9.29	0.06	0.06	0.06	0.061	-
d84 (mm)	16.00	9.65	9.65	9.65	10.10	-	16.00	13.99	0.06	0.06	12.87	-	11.30	6.21	0.06	0.06	10.1	-	14.66	9.89	0.06	0.06	0.061	-

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)	22.92	72.99	45.635	25	78	48	32.73	82.29	53.03	25.62	76.6	49.57	26.32	80.45	51.3	-	-	-
Radius of Curvature (ft)	21.64	42.9	27.82	25	50	28	18.82	42.51	23.99	20.2	42.47	25.41	19.45	45.87	26.78	-	-	-
Meander Wavelength (ft)	107.59	158.5	120.39	108	160	122	103.8	155.5	121.3	84.77	152	118.675	98.61	163.3	125.3	-	-	-
Meander Width ratio	1.324	4.217	2.636	1.214	3.786	2.32	1.569	3.946	2.543	1.709	5.11	3.31	1.56	4.78	3.05	-	-	-
Profile																		
Riffle length (ft)	18.04	76.4	29.67	18	75	30	10.51	68.17	28.67	8.52	55.5	31.1	3.67	37.5	14.22	-	-	-
Riffle slope (ft/ft)	0.0017	0.0279	0.0122	0.0022	0.026	0.013	0.004	0.039	0.012	0.004	0.068	0.013	0.004	0.071	0.0156	-	-	-
Pool length (ft)	27.42	59.12	40.27	30	60	41	23.04	155	45.78	26	120.1	43.4	7.33	182.2	34.66	-	-	-
Pool spacing (ft)	53.26	126.94	70.775	55	130	72	57.22	192.4	75.1	51.05	155.82	78.29	1.8	62.19	17.99	-	-	-
Additional Reach Parameters																		
Valley Length (ft)	1204																	
Channel Length (ft)	1458			1458			1458			1458			1458			-		
Sinuosity	1.211			1.211			1.211			1.211			1.211			-		
Water Surface Slope (ft/ft)	0.0050			0.0053			0.0053			N/A			N/A			-		
BF slope (ft/ft)	0.0046			0.0047			0.0047			0.0055			0.0047			-		
Rosgen Classification	C4			C4			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		