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1.0 Executive Summary

This Annual Monitoring Report documents the results of monitoring activities during the 2012 growing season on the 601 West Stream Restoration Project. Construction of the site, including planting of trees, was completed in March 2008. The 2012 data documents results from the fourth year of geomorphic and vegetation monitoring at the site.

The design for the 601 West Stream Restoration Project consisted of 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 3,580 linear feet of profile survey and photographic reference locations, as specified in the approved Restoration Plan for the site.

A manual rain gauge was used in conjunction with the onsite automatic rain gauge to validate precipitation data. The total rainfall amount for the monitoring year was 39.9 inches. This is a normal rainfall amount for this monitoring period. Three possible bankfull events were recorded during the monitoring year but due to the debris blockage backwaters they cannot be assured.

The vegetation monitoring documented surviving planted stem densities between 161 and 445 stems per acre with an average of 308 stems per acre. This represents a survival rate of approximately 48% based on a baseline density of 634 stems per acre. Supplemental planting with five year old stems will be completed before the start of the 2012-2013 growing season in the areas around the plot that had a stem density of only 161 (W2). The final vegetative success criteria of an average survival across the entire reach of 260 five-year-old planted stems per acre at the end of five years of monitoring was met.

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 2012 document only minor adjustment in stream dimension. Beaver dams, in-stream vegetation and woody debris continue to cause backwater and deposition. The failed structure from MY4 was repaired. The failed log sill identified in MY4 is still in need of stabilization. Several problem areas are cutoff channels being created on the flood plain in areas with poor vegetation.

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.

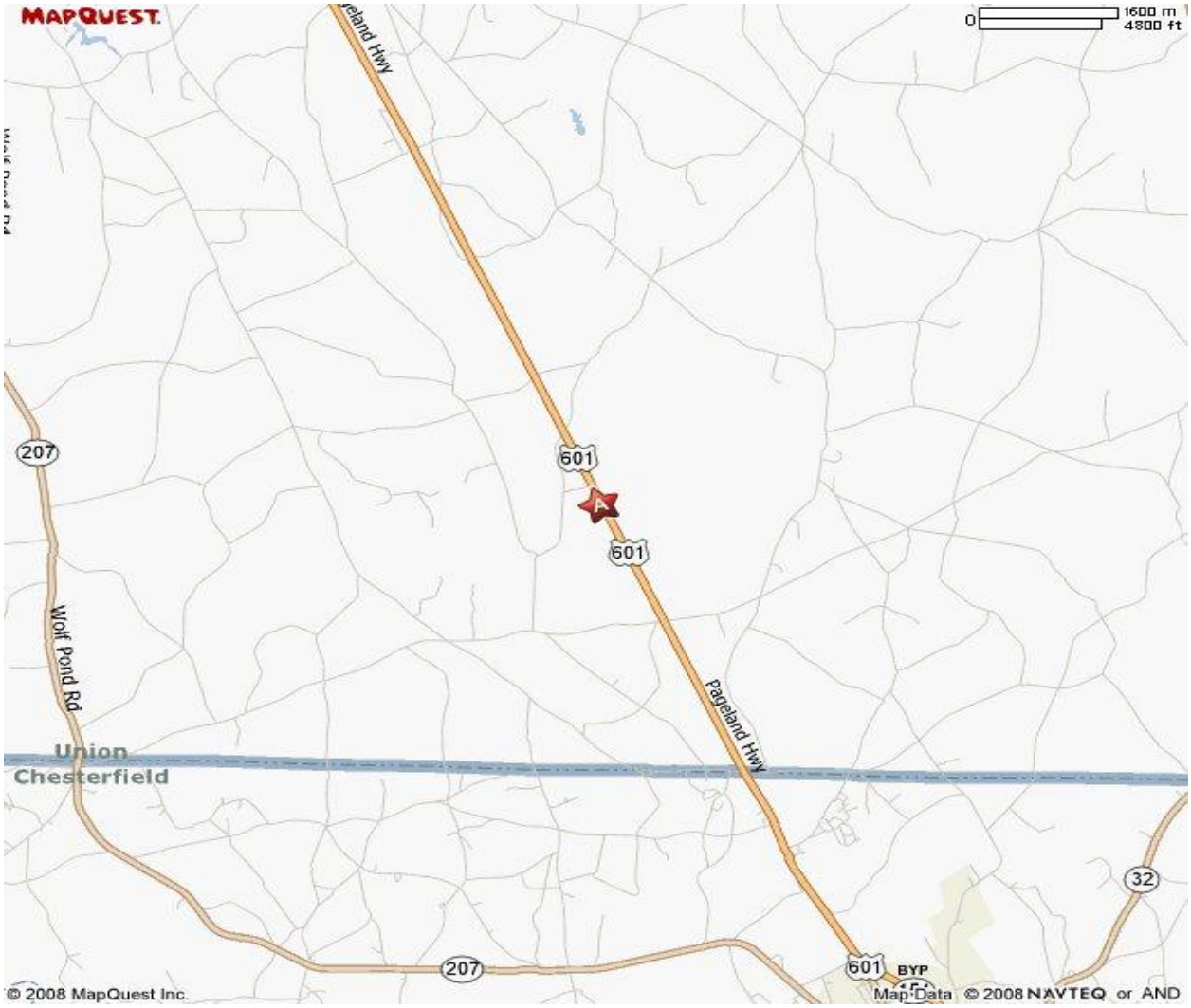


Figure 1 – 601 West Location Map

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 0.41mi^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	December 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
Oak (other spp.)	Quercus	Q

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

All of the surviving 601 West plot plantings are in excellent vigor with few exceptions. The stream had a slight flow of water with all the pools full of water. Fish were observed in some pools. Overall, the site is beginning to appear more wooded, but the growth of Black berry (*Rubus* sp.) is so dense in many areas that a bush axe was needed to access the trees. No disturbance to the site was noted and supplemental plantings appear to be doing fine. Three trees were lost from the spring monitoring.

Original planting density, based on the five 0.01 hectare plots, (100 square meters) was 634 stems per acre. The current density is currently 308 stems per acre which represents a survival rate of approximately 48%. The planted stems in the monitoring plots ranged from 161 to 445 stems per acre. Supplemental planting with four year old stock occurred February 2012 in the area around plot W4. Supplemental planting with five year old stock is planned for winter 2012-2013 in the area around plot W1. This is the plot with a 5 year survival of 161 stems. The final success criterion of an average of 260 stems per acre after five years has been met.

Table 4 - Baseline Stem Counts

May 2008									
	PLANTED SPECIES								PLANTED
PLOT	AT	BN	CO	FP	QM	QN	QP	Q	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
Percent's	7.7%	20.5%	9%	14.1 %	14.1%	16.7%	11.5%	6.4%	100%

Table 5 – MY5 (2012) Surviving Stem Counts (% of baseline total)

October 2012 (MY5)									
	PLANTED SPECIES								LIVE
PLOT	AT	BN	CO	FP	QM	QN	QP	Q	STEMS
W1		5	1	1					7
W2		2			1		1		4
W3		1	1	5		1	2		10
W4				4		2			6
W5		4	1	1	3		2		11
TOTALS	0	12	3	11	4	3	5	0	38
Percent	0%	15.4%	3.8%	14.1%	5.1%	3.8%	6.4%	0%	48.7%
Surviving Stem Counts (% of no. of species planted)									
Percent	0%	75%	42%	100%	36.4%	23%	55.5%	0%	

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 – MY5 (2012) Stems per Acre

Fall Monitoring Data					
November 2012					
Plot	**Trees**	**Plot size**	**Plot size**	**Plot size**	**Trees**
	n_i	**m^2**	**ft^2**	**acre**	**per acre**
W1	7	100	1076	0.0247	283
W2	4	100	1076	0.0247	161
W3	10	100	1076	0.0247	404
W4	6	100	1076	0.0247	242
W5	11	100	1076	0.0247	445
Totals:	38	500	5380	0.123	
Stems per plot	7.6			Average	308

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 one remains a problem area. 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 current measurement of the water surface.

Cross Sections

The survey data was collected in September 2012, and the results are presented in Appendix C. All six cross sections appear to be stable. When identified in the MY4 Monitoring Report; Reach 2 Riffle Cross Section 1 appeared to have degraded along the right bank but the photos showed that it had not. The MY5 survey data verified this idea and showed that the cross section is not significantly degrading but that a willow growing just above the cross section is causing some channel deepening, some right bank erosion and a small right bank bypass channel has begun to form. As with much of this restored stream, trees growing in the channel will continue to impact the as-built channel pattern, dimensions and profile.

Longitudinal Profile

The longitudinal profile survey was conducted in September 2012, 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 some of 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

Three possible bankfull events were documented during this year of monitoring by a crest gauge. However the amount and frequency of backwater on this stream make these measurements somewhat suspect. They do correlate to some high rainfall days during the appropriate time frame so are possibly accurate.

3.2.4 Problem Areas

There were thirteen problem areas identified during MY 4 at the 601 West site. Three were resolved and have been removed from the list. The remaining problems are continuing to be issues and remain listed as problem areas. Two additional problem areas were discovered during the MY5 survey for a total of twelve problem areas.

MY3-PA4 and MY3-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 2012 survey, causing backwater for approximately 200 feet upstream of the dams, flooding the stream banks and vanes and eliminating stream function.

MY4-PA6 is a sill log that the stream has cut under. While the structure was under water due to the normal rainfall and backwater in the stream the structure is still in a failed condition.

MY4-PA8 is approximately 140 feet of both banks that lack woody vegetation. Both banks are eroding to develop flood plain diversion channels due to the many stream flow obstructions throughout the restoration.

MY2-PA3, MY5-PA1 and MY5-PA2 are all existing or new eroding diversion channels on a flood plain from the previously mentioned obstructions.

The remaining five problem areas are all in stream woody obstructions that will continue to create issues if not removed. If left unchecked, the debris these trees collect will cause further erosion by forcing the channel to migrate away from the existing channel.

Photographs of all problem areas are included in Appendix D (pp. 54-60)

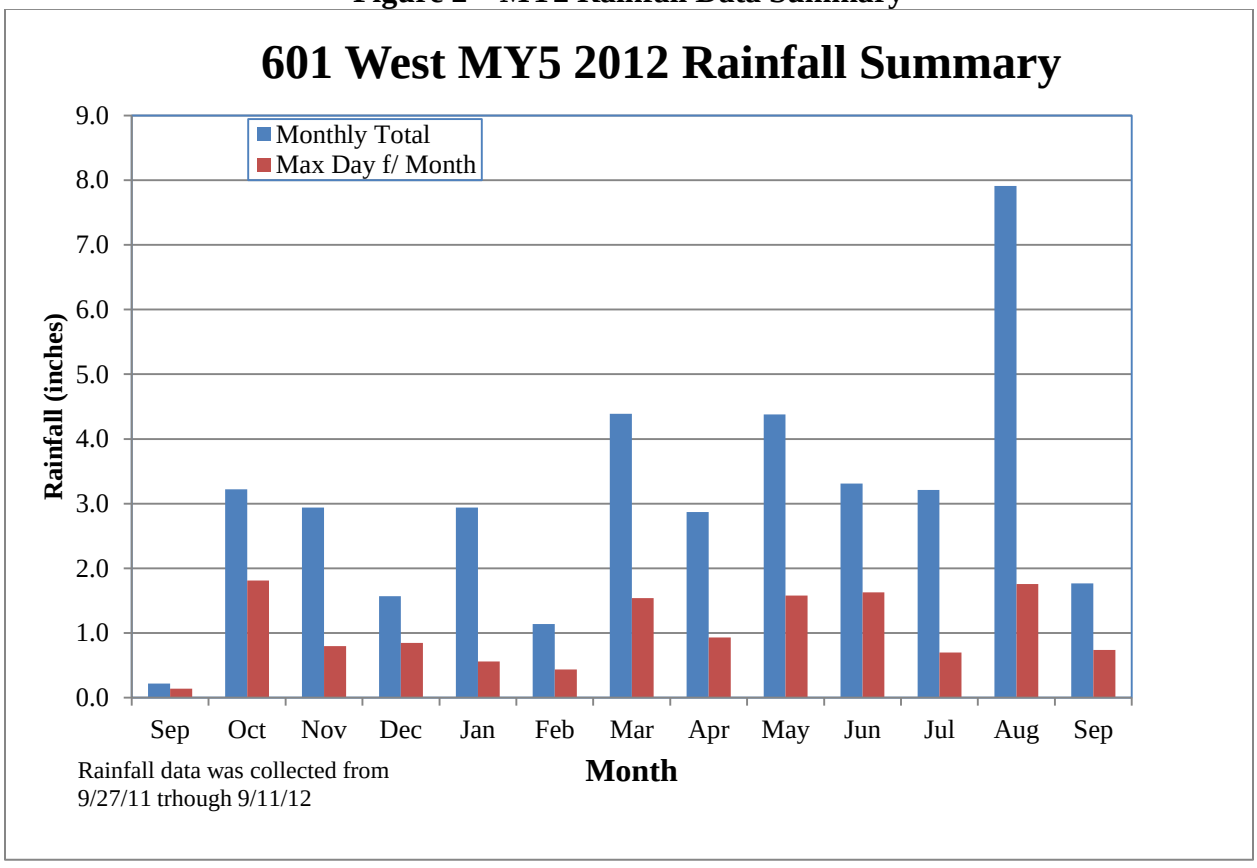
Table 8 - 601 West MY5 Problem Areas

ID	Station	Description	Impact
MY4-PA9	10232	Stream obstruction	backwater and flooding
MY2-PA3	10373 –10383	Diversion Channel	poor vegetation
MY5-PA1	10492-10521	Diversion Channel	poor vegetation
MY5-PA2	10591-10615	Diversion Channel	poor vegetation
MY4-PA10	10670	Stream obstruction	backwater and flooding
MY4-PA6	10752	Washed out Sill Log	impairs stream stability
MY4-PA8	10883 – 11028	Diversion Channel	poor vegetation
MY4-PA11	13512	Stream obstruction	backwater and flooding
MY4-PA12	13515	Stream obstruction	backwater and flooding
MY4-PA13	13645	Stream obstruction	backwater and flooding
MY3-PA4	14028	Beaver Dam	backwater and flooding
MY3-PA5	14234	Beaver Dam	backwater and flooding

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 year of 39.9 inches. The average maximum peak day per month event for the 2011-12 growing season was 1.04 inches with a maximum single peak day of 1.76 inches occurring in August. The average monthly rainfall was 3.07 inches with a maximum of 7.90 inches during August 2012. Complete daily 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 flood plain 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 five year old stems will be completed in early 2013.

Although the beaver were removed during MY3, the remnants of the beaver dams continue to degrade the bedform. In addition large woody vegetation has become established in the stream bed causing many debris dams and forcing channel migration which is impacting the developing flood plain vegetation**.** Repairs these issues are planned for winter 2013.

The channel was wet but not flowing during data collection preventing full assessment of structure function; however fourteen of the fifteen stream structures are stable. Repairs to the one problem structure (a sill log) is planned for winter 2012/2013. Overall, the site has achieved the stream stability and vegetative success criteria specified in the Restoration Plan

Appendix A – As Built Survey

Appendix B – MY5 (2012) Survey

Figure B 1 – 601 West Reach 1

Figure B 2 – 601 West Reach 1/Reach 2

Figure B 3 - 601 West Reach 2

Appendix C – Profile, Cross Sections, and Pebble Counts

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Photo C 2 - R1 RXS-1 Right Pin

Photo C 3 - R1 RXS-1 Downstream

Figure C 1 - R1 RXS-1 Cross Section Plot

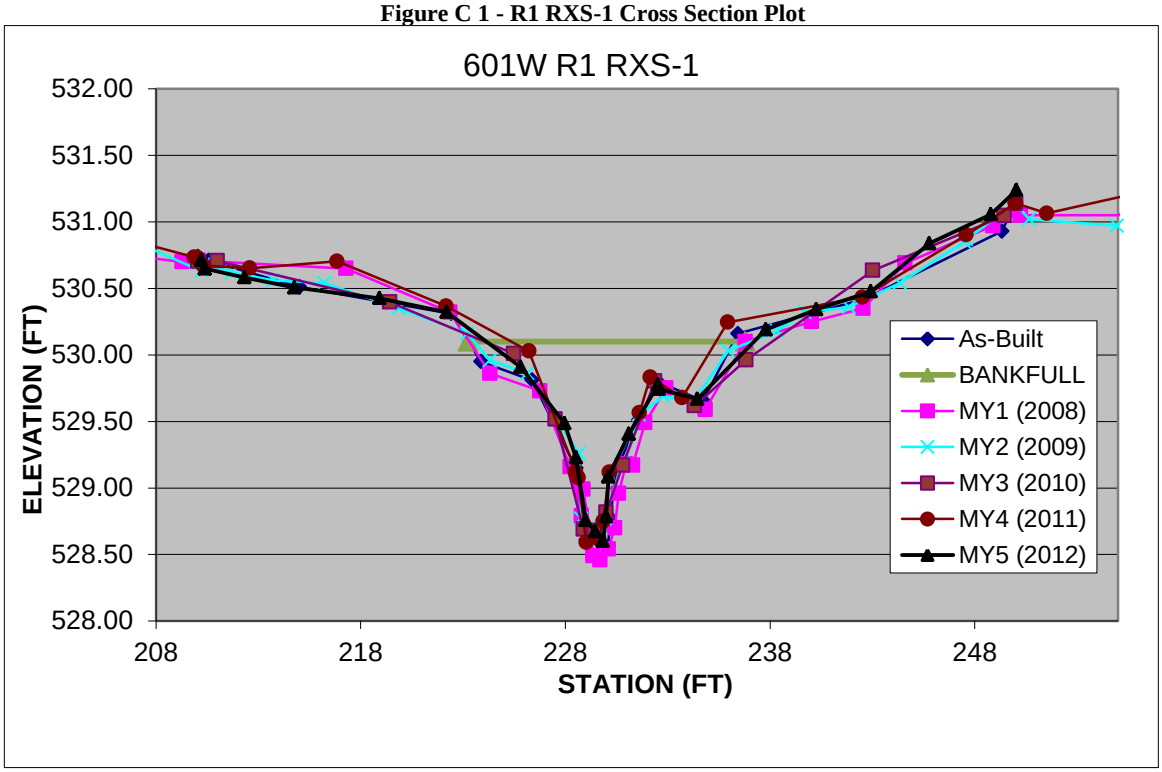


Table C 1 - R1 RXS-1 Dimension Data

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	210.21	530.713	XSLP
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	210.39	530.648	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	212.33	530.582	XS
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	214.77	530.506	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	218.92	530.426	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	222.2	530.322	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	225.82	529.909	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	227.96	529.487	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	228.52	529.228	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	229	528.758	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	229.46	528.674	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	229.84	528.602	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	229.99	528.785	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	230.11	529.085	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	231.11	529.406	XS
234.78	529.65	r1rxs1	228.24	529.16	RXS1	229.22	528.67	XS				231.62	529.566	(XS)XS	232.53	529.777	XS
234.71	529.65	r1rxs1	228.79	528.79	RXS1	229.72	528.7	XS				232.15	529.833	(XS)XS	232.57	529.743	XS
236.43	530.16	r1rxs1tob	228.86	528.99	RXS1	229.94	528.77	XS				233.7	529.679	(XS)XS	234.45	529.669	XS
242.61	530.42	r1rxs1	229.25	528.65	RXS1	230.78	529.2	XS				235.93	530.246	(XS)XS	237.79	530.19	XS
249.33	530.93	r1rxs1	229.35	528.49	RXS1	230.84	529.18	XS				242.51	530.434	(XS)XS	240.27	530.343	XS
249.98	531.14	r1rxs1r	229.69	528.46	RXS1	231.6	529.55	XS				247.59	530.902	(XS)XS	242.93	530.476	XS
			230.1	528.54	RXS1	232.79	529.69	XS				250	531.139	(XSRP)XSRP	245.79	530.838	XS
			230.41	528.7	RXS1	234.27	529.65	XS				251.53	531.064	(XS)XS	248.78	531.056	XS
			230.61	528.96	RXS1	235.96	530.03	XS				257.75	531.28	(XS)XS	250.04	531.239	XSRP
			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)	8.6
Bankfull XS Area (sq ft)	7.84	Bankfull XS Area (sq ft)	7.954	Bankfull XS Area (sq ft)	6.7157	Bankfull XS Area (sq ft)	6.9806	Bankfull XS Area (sq ft)	6.81	Bankfull XS Area (sq ft)	6.3
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)	0.7
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)	1.3
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)	94
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)	11
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)	12
D50 (mm)	16.28	D50 (mm)	4.00	D50 (mm)	0.06	D50 (mm)	0.06	D50 (mm)	0.19	D50 (mm)	0.28
D84 (mm)	31.22	D84 (mm)	28.87	D84 (mm)	0.06	D84 (mm)	0.06	D84 (mm)	20.95	D84 (mm)	10.75

601 West 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

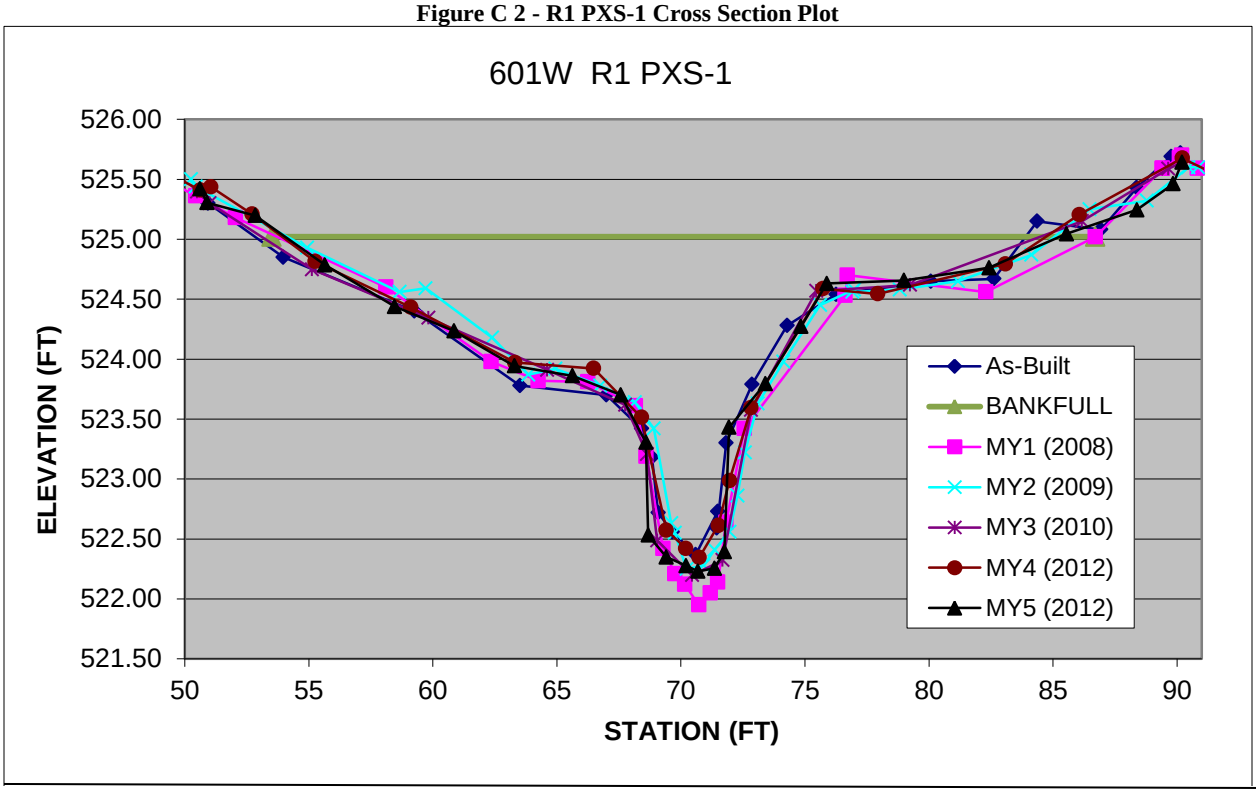


Table C 2 - R1 PXS-1 Dimension Data

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
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	50.62	525.42	XSLP
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	50.9	525.304	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	52.84	525.198	XS
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	55.65	524.786	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	58.46	524.438	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	60.86	524.235	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	63.29	523.944	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	65.63	523.861	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	67.57	523.702	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	68.59	523.305	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	68.68	522.531	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	69.41	522.349	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	70.21	522.277	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	70.69	522.23	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	71.35	522.256	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	71.75	522.393	XS
76.26	524.54	r1pxs1	71.19	522.05	PXS1	71.96	522.56	XS				75.73	524.586	(XS)XS	71.94	523.431	XS
80.07	524.65	r1pxs1	71.49	522.14	PXS1	72.28	522.86	XS				77.93	524.544	(XS)XS	73.4	523.796	XS
82.61	524.67	r1pxs1	71.82	522.64	PXS1	72.58	523.22	XS				83.08	524.794	(XS)XS	74.84	524.272	XS
84.36	525.15	r1pxs1tob	72.56	523.42	PXS1	73.1	523.63	XS				86.06	525.205	(XS)XS	75.88	524.631	XS
86.93	525.08	r1pxs1	76.62	524.53	PXS1	74.13	523.98	XS				90.21	525.676	(XSRP)XSRP	78.99	524.656	XS
88.37	525.43	r1pxs1	76.71	524.7	PXS1	75.61	524.45	XS				91.45	525.553	(XS)XS	82.42	524.761	XS
89.76	525.69	r1pxs1	82.29	524.56	PXS1	76.98	524.58	XS				95.9	525.873	(XS)XS	85.54	525.045	XS
90.14	525.72	r1pxs1r	86.71	525.02	PXS1	76.91	524.56	XS				101.32	525.627	(XS)XS	88.38	525.244	XS
			89.42	525.59	PXS1	78.83	524.58	XS				105.74	526.2	(XS)XS	89.84	525.462	XS
			89.4	525.59	PXS1	81.17	524.65	XS							90.2	525.641	XSRP
			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)	29.6
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)	27.2
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)	0.92
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)	2.5
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)	4.62
D84 (mm)	13.76	D84 (mm)	27.30	D84 (mm)	22.60	D84 (mm)	27.3	D84 (mm)	16.0	D84 (mm)	10.75

601 West R2 RXS-1

Photo C 7 - R2 RXS-1 Left Pin

Photo C 8 - R2 RXS-1 Right Pin

Photo C 9 - R2 RXS-1 Downstream

Figure C 3 - R2 RXS-1 Cross Section Plot

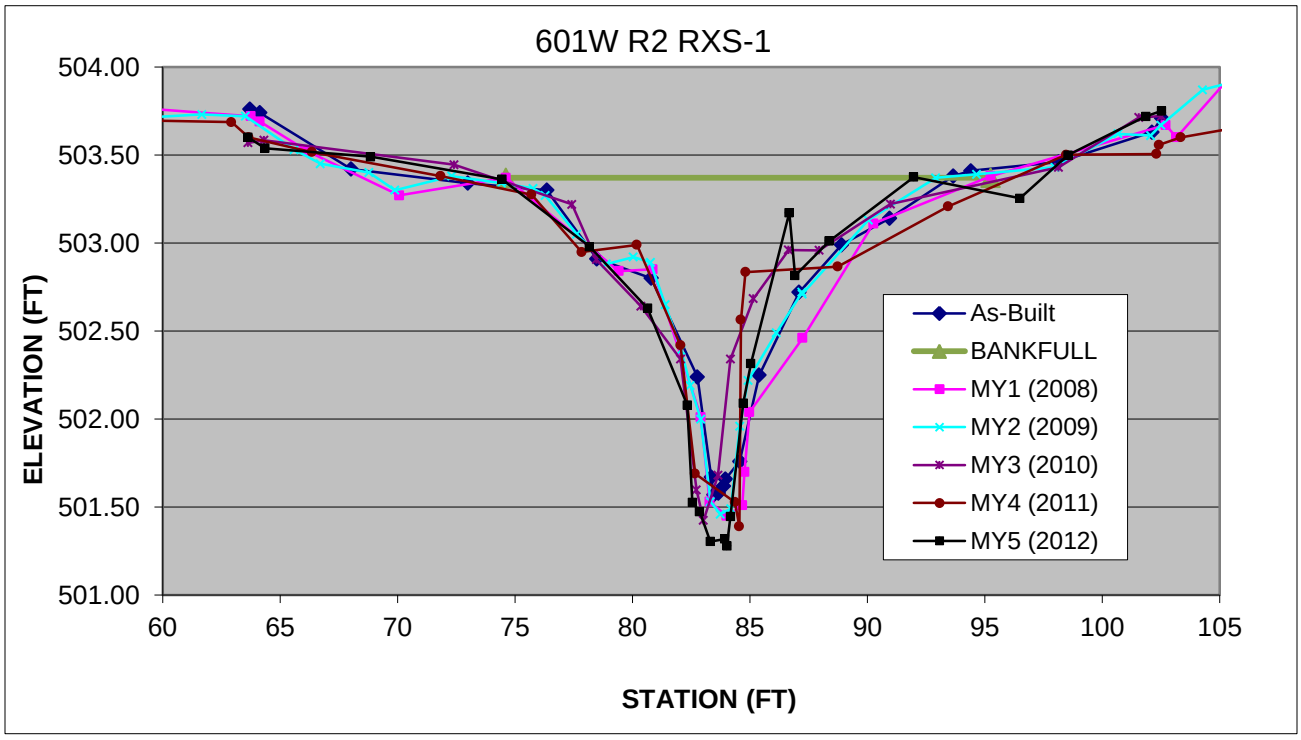


Table C 3 - R2 RXS-1 Dimension Data

As Built			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
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	63.64	503.6	XSLP
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	64.36	503.538	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	68.86	503.49	XS
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	74.45	503.362	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	78.18	502.979	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	80.65	502.629	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	82.34	502.08	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	82.56	501.526	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	82.86	501.474	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	83.32	501.304	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	83.94	501.319	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	84.03	501.279	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	84.18	501.447	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	84.72	502.09	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	85.04	502.315	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	86.68	503.172	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	86.92	502.815	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	88.38	503.011	XS
93.66	503.38	r2rxs1	95.26	503.38	R2RXS1	82.07	502.39	XS				102.43	503.557	(XSRP)XSRP	91.98	503.375	XS
94.41	503.41	r2rxs1tob	102.71	503.67	R2RXS1RP	82.47	502.19	XS				103.35	503.6	(XS)XS	96.5	503.254	XS
98.14	503.46	r2rxs1	103.16	503.6	R2RXS1	82.91	502	XS				108.08	503.711	(XS)XS	98.55	503.499	XS
102.13	503.63	r2rxs1	105.5	503.95	R2RXS1	83.33	501.53	XS				58.52	503.697	(XS)XS	101.86	503.719	XS
102.54	503.71	r2rxs1r	109.34	504	R2RXS1	83.75	501.46	XS				62.93	503.686	(XS)XS	102.54	503.75	XSRP
			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)	17.5	
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)	11.4	
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)	0.65	
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)	2.1	
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)	143	
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)	8	
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)	27	
D50 (mm)	8.17		D50 (mm)	1.67		D50 (mm)	0.22		D50 (mm)	0.06		D50 (mm)	0.50		D50 (mm)	0.33	
D84 (mm)	16.00		D84 (mm)	9.65		D84 (mm)	9.65		D84 (mm)	9.65		D84 (mm)	8.00		D84 (mm)	7.14	

601 West R2 RXS-2

Photo C 10 - R2 RXS-2 Left Pin

Photo C 11 - R2 RXS-2 Right Pin

Photo C 12 - R2 RXS-2 Downstream

Figure C 4 - R2 RXS-2 Cross Section Plot

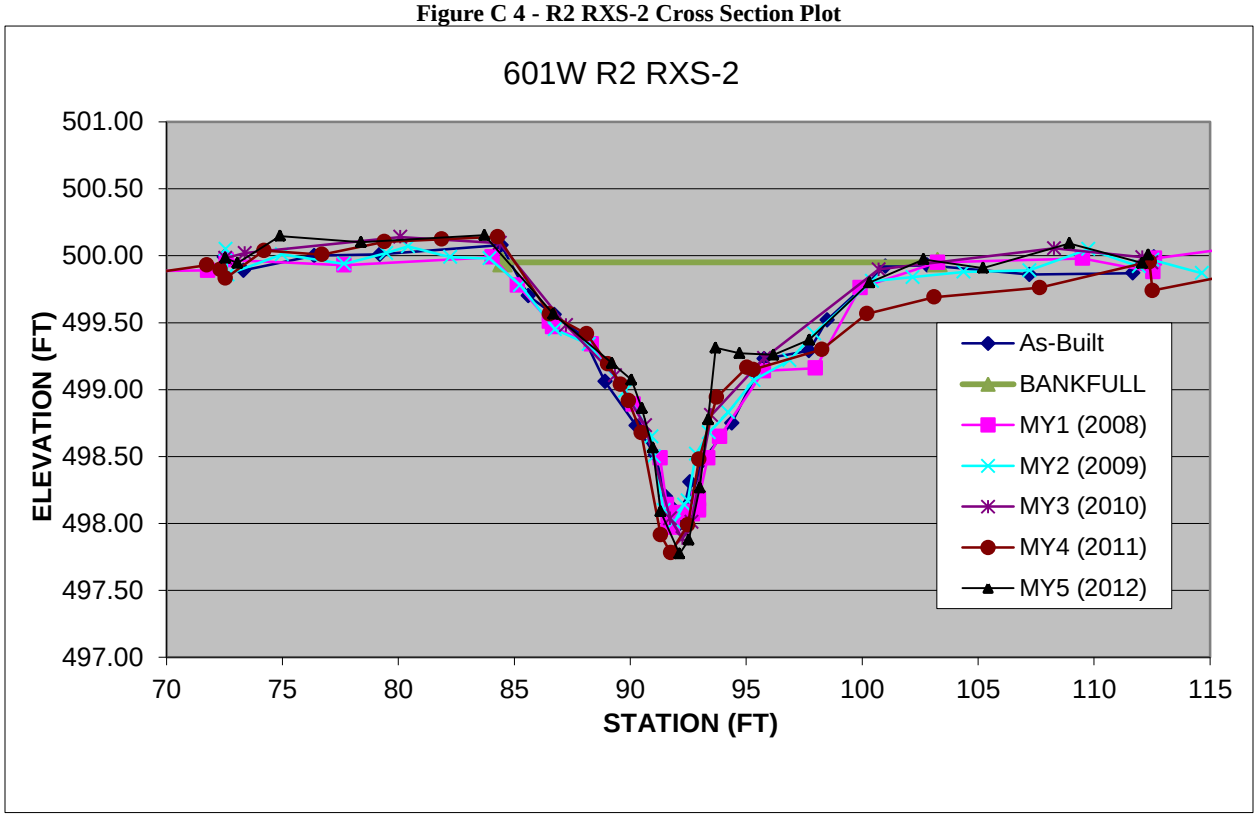


Table C 4 - R2 RXS-2 Dimension Data

As Built			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
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	72.54	499.983	XSLP
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	73.06	499.946	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	74.89	500.148	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	78.38	500.101	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	83.71	500.153	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	86.68	499.566	XS
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	89.21	499.197	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	90.05	499.073	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	90.5	498.86	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	90.97	498.565	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	91.31	498.089	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	92.12	497.774	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	92.52	497.878	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	93	498.267	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	93.36	498.776	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	93.68	499.312	XS
92.6	498.16	r2rxs2w	92.59	498.09	R2RXS2	92.32	498.14	XS				90.47	498.678	(XS)XS	94.71	499.271	XS
93.08	498.46	r2rxs2	92.68	498.07	R2RXS2	92.48	498.17	XS				91.31	497.914	(XS)XS	96.18	499.259	XS
94.38	498.75	r2rxs2	92.94	498.1	R2RXS2	92.83	498.52	XS				91.74	497.782	(XS)XS	97.72	499.372	XS
95.77	499.23	r2rxs2	92.94	498.11	R2RXS2	93.39	498.68	XS				92.48	497.989	(XS)XS	100.32	499.8	XS
97.71	499.29	r2rxs2	92.95	498.18	R2RXS2WS	94.22	498.83	XS				92.96	498.48	(XS)XS	102.65	499.973	XS
98.49	499.52	r2rxs2	93.34	498.49	R2RXS2	95.32	499.07	XS				93.72	498.943	(XS)XS	105.21	499.908	XS
101	499.92	r2rxs2tob	93.86	498.65	R2RXS2	96.87	499.22	XS				95.03	499.165	(XS)XS	108.94	500.093	XS
102.8	499.93	r2rxs2	95.75	499.14	R2RXS2	97.93	499.42	XS				95.3	499.149	(XS)XS	112.08	499.946	XS
107.22	499.86	r2rxs2	97.99	499.16	R2RXS2	100.42	499.81	XS				98.26	499.3	(XS)XS	112.33	500.006	XSRP
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)	18.9
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)	11.9
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)	0.63
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)	2.2
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)	174
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)	2
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)	30
D50 (mm)	9.20	D50 (mm)	3.00	D50 (mm)	0.06	D50 (mm)	0.06	D50 (mm)	0.06	D50 (mm)	0.33
D84 (mm)	16.00	D84 (mm)	13.99	D84 (mm)	0.06	D84 (mm)	0.06	D84 (mm)	12.87	D84 (mm)	7.14

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

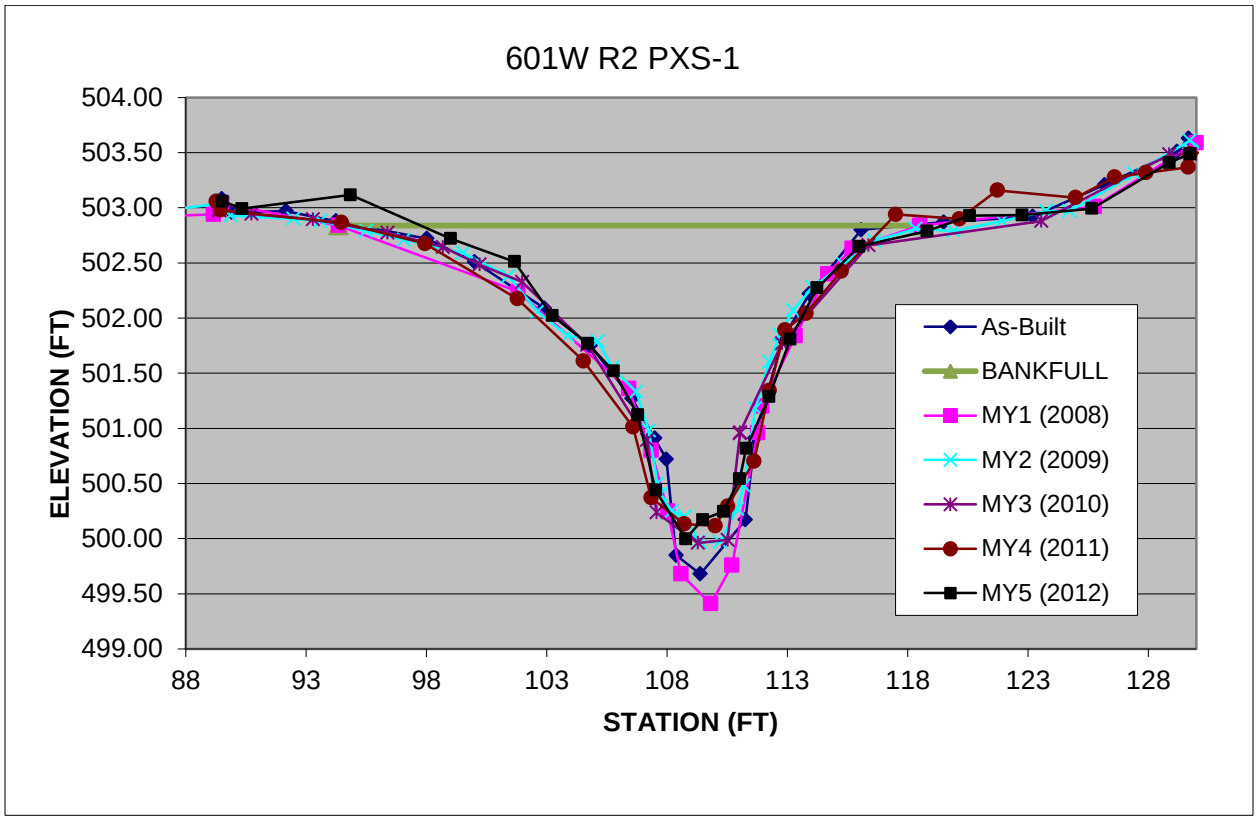


Table C 5 - R2 PXS-1 Dimension Data

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	89.53	503.058	XSLP
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	90.34	502.992	XS
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	94.85	503.117	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	99.01	502.721	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	101.66	502.512	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	103.23	502.023	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	104.7	501.769	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	105.78	501.519	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	106.78	501.123	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	107.53	500.44	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	108.78	499.998	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	109.48	500.172	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	110.35	500.247	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	111.02	500.542	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	111.29	500.817	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	112.24	501.289	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	113.12	501.806	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	114.24	502.273	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	115.98	502.65	XS
123.2	502.92	r2pxs1	118.5	502.84	R2PXS1	109.37	499.97	XS				124.98	503.092	(XS)XS	118.81	502.788	XS
126.19	503.21	r2pxs1	125.76	503.01	R2PXS1	110.2	499.97	XS				126.6	503.278	(XS)XS	120.58	502.928	XS
129.19	503.51	r2pxs1	129.99	503.59	R2PXS1PL	110.92	500.27	XS				127.91	503.318	(XS)XS	122.76	502.933	XS
129.68	503.63	r2pxs1r	130.43	503.52	R2PXS1	111.19	500.48	XS				129.66	503.367	(XS)XS	125.66	502.993	XS
			144.54	504.58	R2PXS1	111.67	501.18	XS				129.74	503.488	(XSRP)XSRP	128.88	503.409	XS
			170.93	508.6	R2PXS1	112.25	501.6	XS				136.03	503.67	(XS)XS	129.74	503.488	XSRP
						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		Bankfull Width (ft)	21		Bankfull Width (ft)	17	
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)	23.1		Bankfull Cross Sectional Area (sq ft)	24.2		Bankfull Cross Sectional Area (sq ft)	21.7	
Bankfull Mean Depth (ft)	0.94		Bankfull Mean Depth (ft)	1.04		Bankfull Mean Depth (ft)	0.85		Bankfull Mean Depth (ft)	1.2		Bankfull Mean Depth (ft)	1.2		Bankfull Mean Depth (ft)	1.3	
Bankfull Max Depth (ft)	3.2		Bankfull Max Depth (ft)	3.43		Bankfull Max Depth (ft)	2.74		Bankfull Max Depth (ft)	2.9		Bankfull Max Depth (ft)	2.7		Bankfull Max Depth (ft)	2.7	
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)	0.06	
D84 (mm)	11.30		D84 (mm)	6.21		D84 (mm)	0.06		D84 (mm)	0.06		D84 (mm)	10.1		D84 (mm)	8.9	

601 West R2 PXS-2

Photo C 16 - R2 PXS-2 Left Pin

Photo C 17 - R2 PXS-2 Right Pin

Photo C 18 - R2 PXS-2 Downstream

Figure C 6 - R2 PXS-2 Cross Section Plot

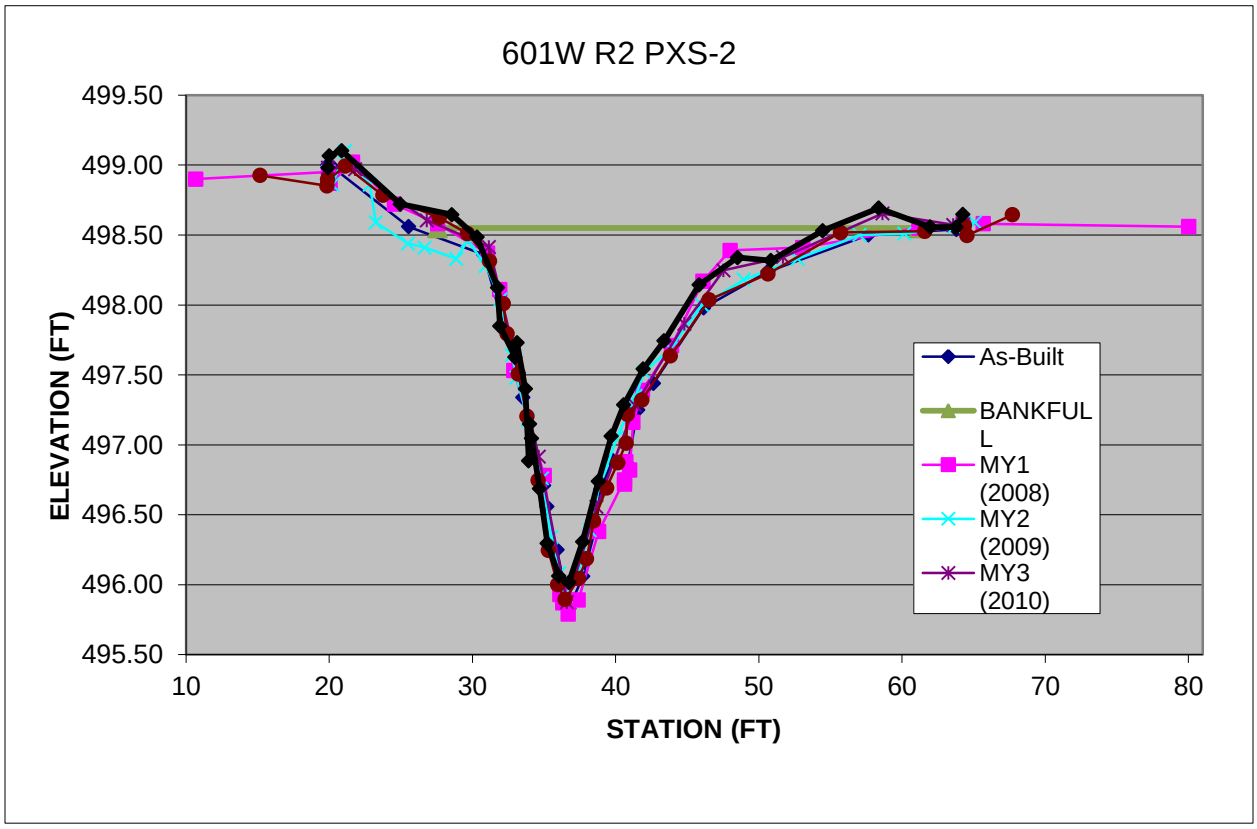


Table C 6 - R2 PXS-2 Dimension Data

As Built			MY1 (2008)			MY2 (2009)			MY3 (2010)			MY4 (2011)			MY5 (2012)		
Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description	Station	Elevation	Description
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	19.92	498.982	XSLP
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	20.01	499.067	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	20.87	499.103	XS
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	24.96	498.721	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	28.55	498.646	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	30.32	498.484	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	31.75	498.124	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	31.92	497.849	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	32.97	497.628	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	33.11	497.73	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	33.69	497.4	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	33.93	496.886	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	34.13	497.046	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	34.69	496.686	XS
41.54	497.25	r2pxs2	38.81	496.38	R2PXS2	34.86	496.76	XS				35.95	496.001	(XS)XS	35.22	496.295	XS
42.64	497.44	r2pxs2	40.62	496.75	R2PXS2	35.5	496.34	XS				36.47	495.895	(XS)XS	36.03	496.063	XS
46.15	497.98	r2pxs2	40.63	496.72	R2PXS2	36.05	496.08	XS				37.41	496.045	(XS)XS	36.73	496.016	XS
50.64	498.24	r2pxs2tob	40.71	496.88	R2PXS2WS	36.51	495.92	XS				37.97	496.187	(XS)XS	37.7	496.308	XS
57.65	498.5	r2pxs2	40.98	496.82	R2PXS2	37.32	496.06	XS				38.46	496.457	(XS)XS	38.79	496.739	XS
63.81	498.54	r2pxs2	41.21	497.16	R2PXS2	38.19	496.39	XS				39.37	496.692	(XS)XS	39.7	497.062	XS
64.31	498.59	r2pxs2r	41.87	497.39	R2PXS2	38.82	496.69	XS				40.15	496.872	(XS)XS	40.57	497.286	XS
			43.92	497.71	R2PXS2	40.08	497.05	XS				40.73	497.012	(XS)XS	41.93	497.543	XS
			46.1	498.17	R2PXS2	41.39	497.35	XS				40.82	497.217	(XS)XS	43.38	497.743	XS
			48	498.39	R2PXS2	41.97	497.52	XS				41.84	497.321	(XS)XS	45.83	498.143	XS
			53.07	498.41	R2PXS2	43.84	497.69	XS				43.83	497.636	(XS)XS	48.51	498.339	XS
			61.19	498.55	R2PXS2	46.03	498	XS				46.53	498.037	(XS)XS	50.83	498.317	XS
			64.28	498.58	R2PXS2PR	48.95	498.18	XS				50.64	498.223	(XS)XS	54.46	498.531	XS
			65.68	498.58	R2PXS2	52.72	498.33	XS				55.71	498.518	(XS)XS	58.37	498.692	XS
			80.03	498.56	R2PXS2	57.02	498.5	XS				61.58	498.527	(XS)XS	61.96	498.558	XS
						60.16	498.51	XS				64.35	498.568	(XSRP)XSRP	63.77	498.556	XS
						63.65	498.56	XS				64.54	498.497	(XS)XS	64.25	498.647	XSRP
						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)	20
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)	22
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)	1.0
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)	2.3
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)	0.06
D84 (mm)	14.66	D84 (mm)	9.89	D84 (mm)	0.06	D84 (mm)	0.06	D84 (mm)	0.06	D84 (mm)	7.5

Figure C 7 - R1 Longitudinal Profile Sheet 1

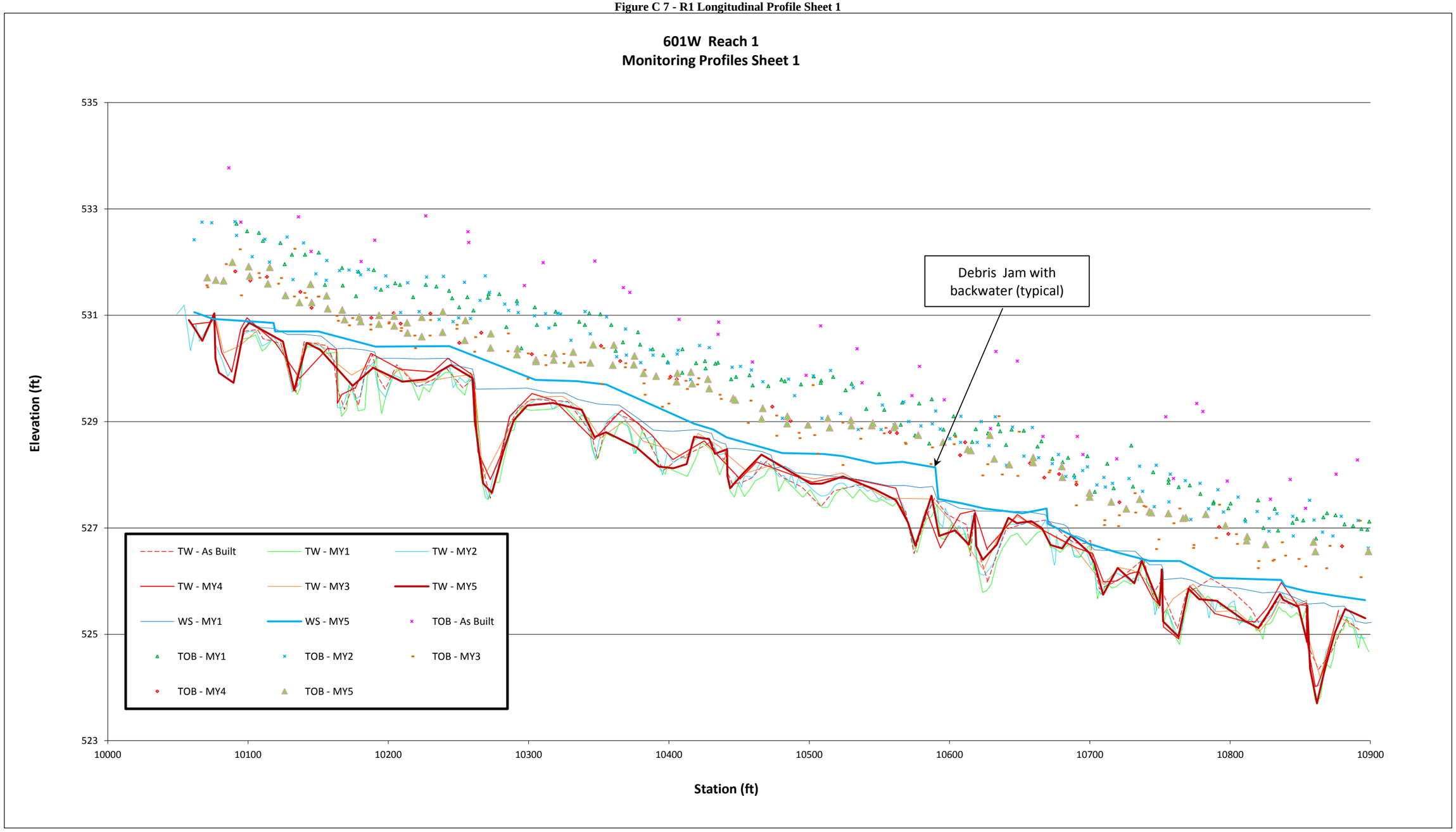


Figure C 8 - R1 Longitudinal Profile Sheet 2

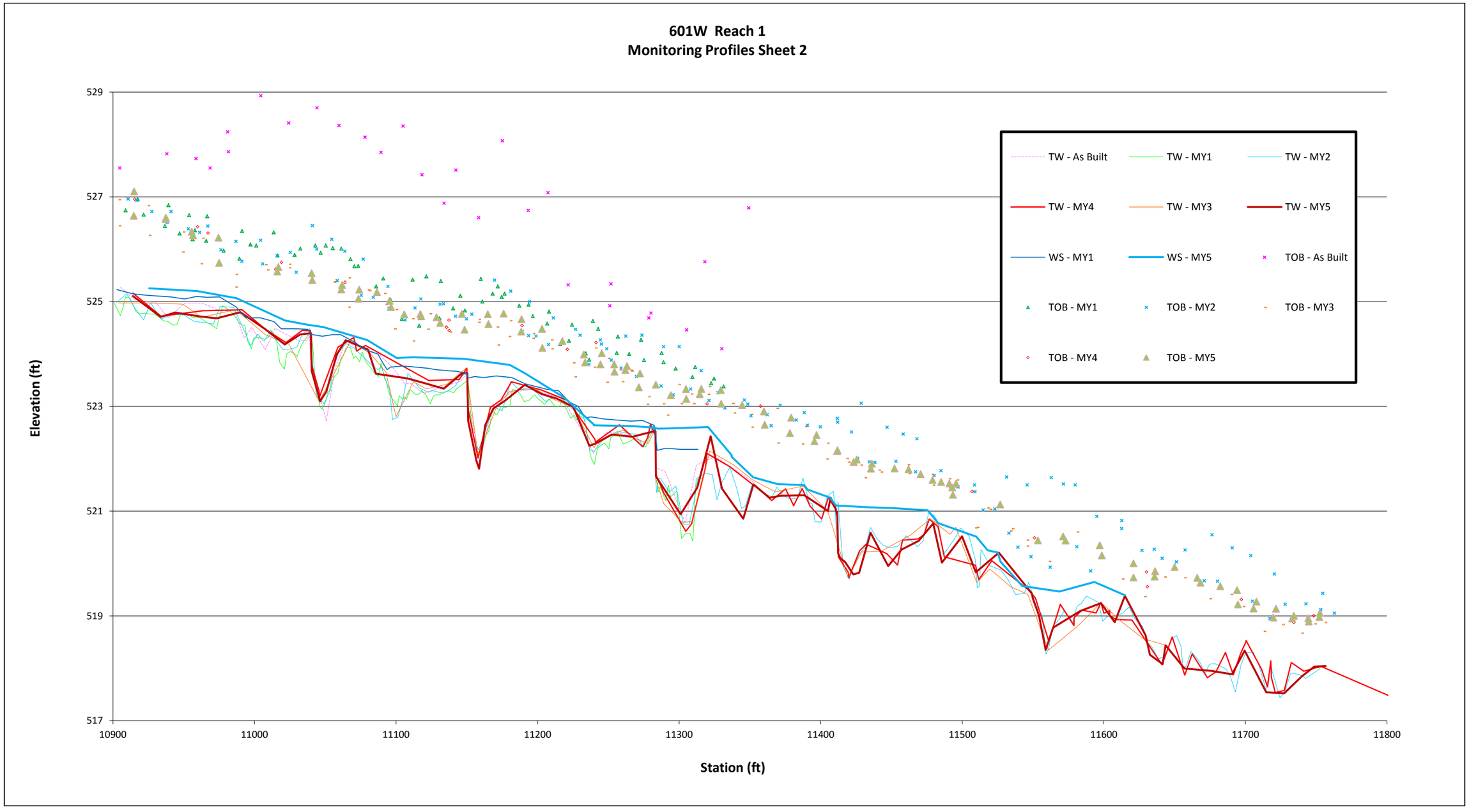


Figure C 9 – R2 Longitudinal Profile Sheet

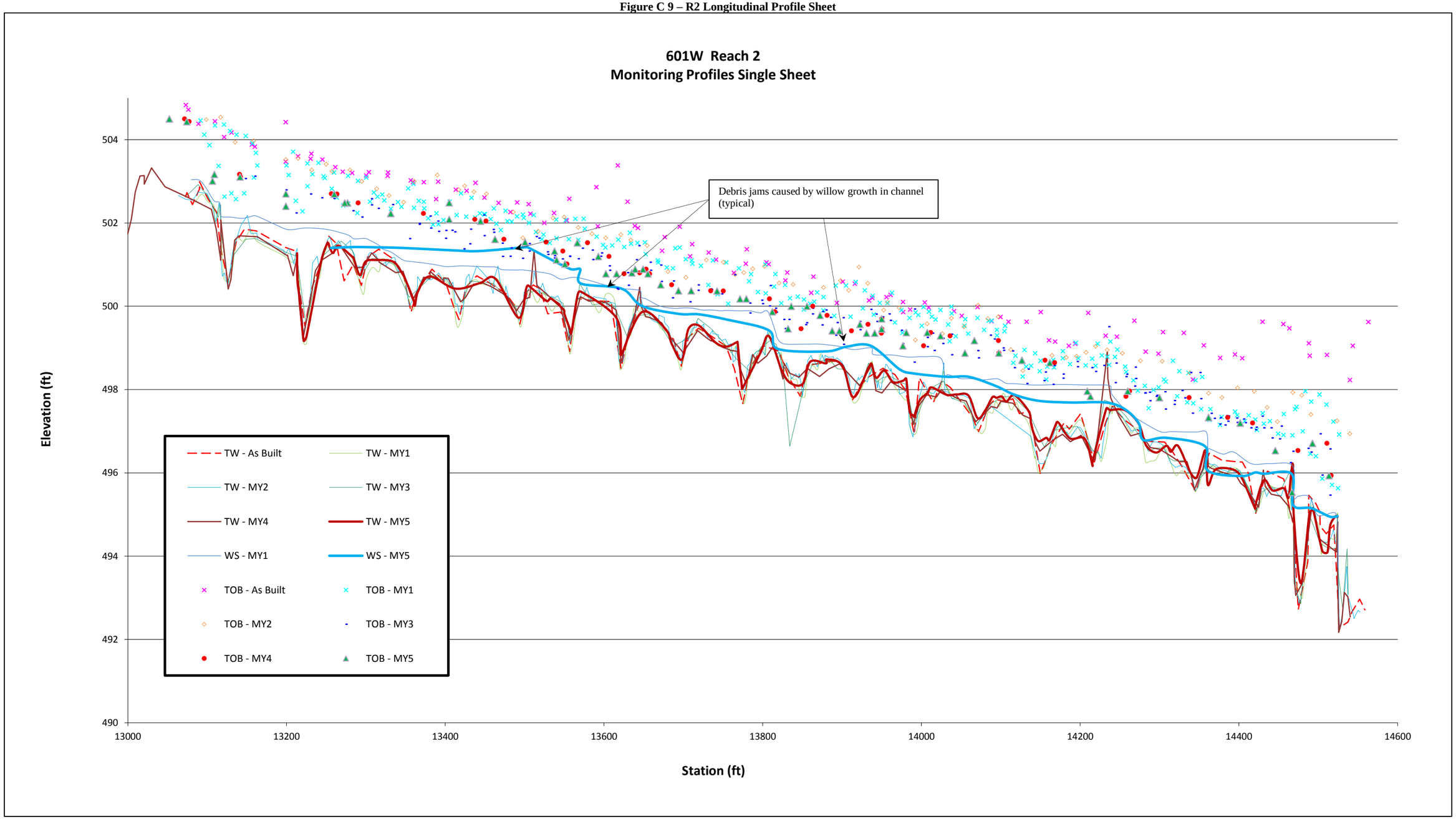


Figure C 7 - R1 RXS-1 Pebble Count

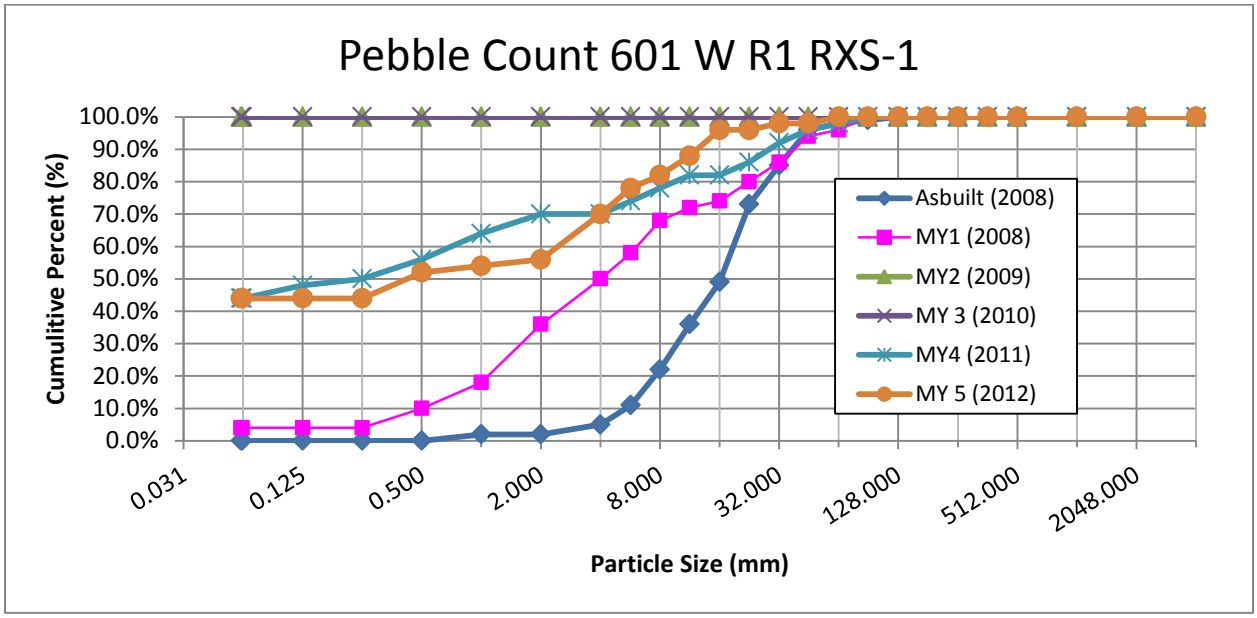


Figure C 8 - R1 PXS-1 Pebble Count

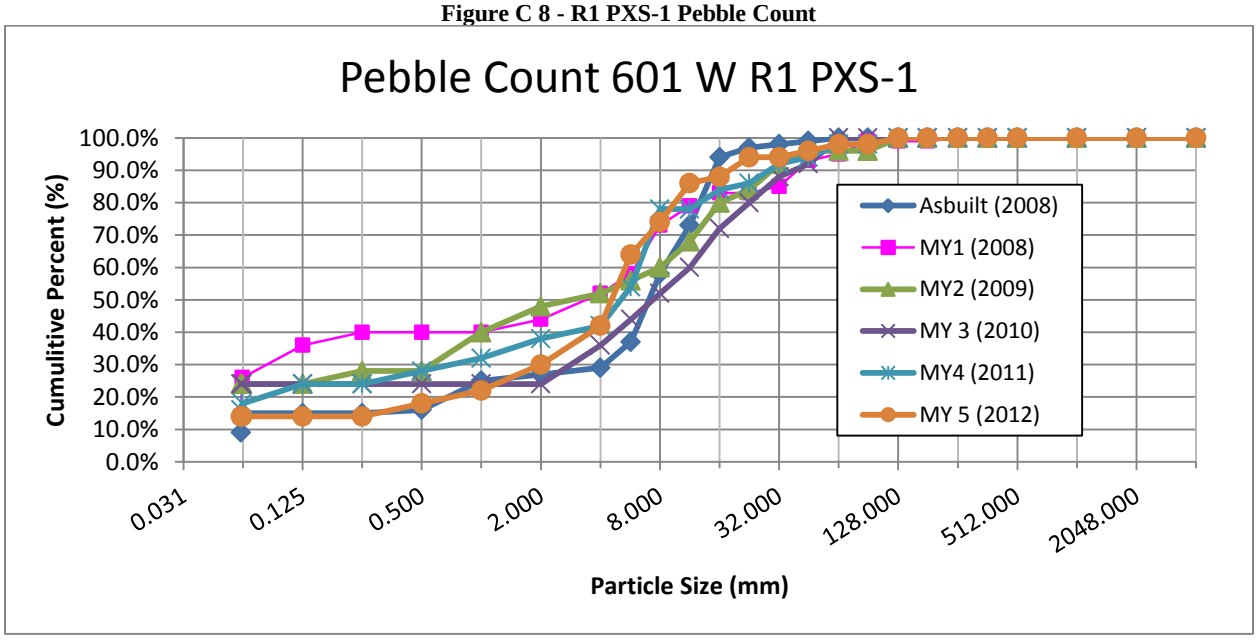


Figure C 9 - R2 RXS-1 Pebble Count

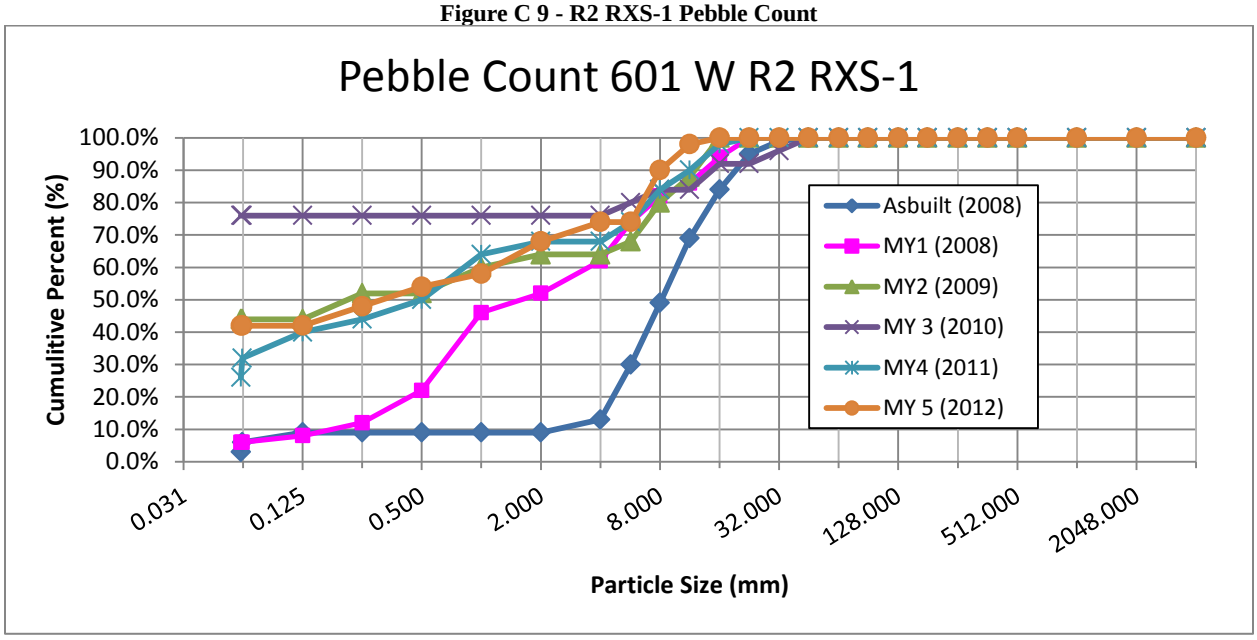


Figure C 10 - R2 RXS-2 Pebble Count

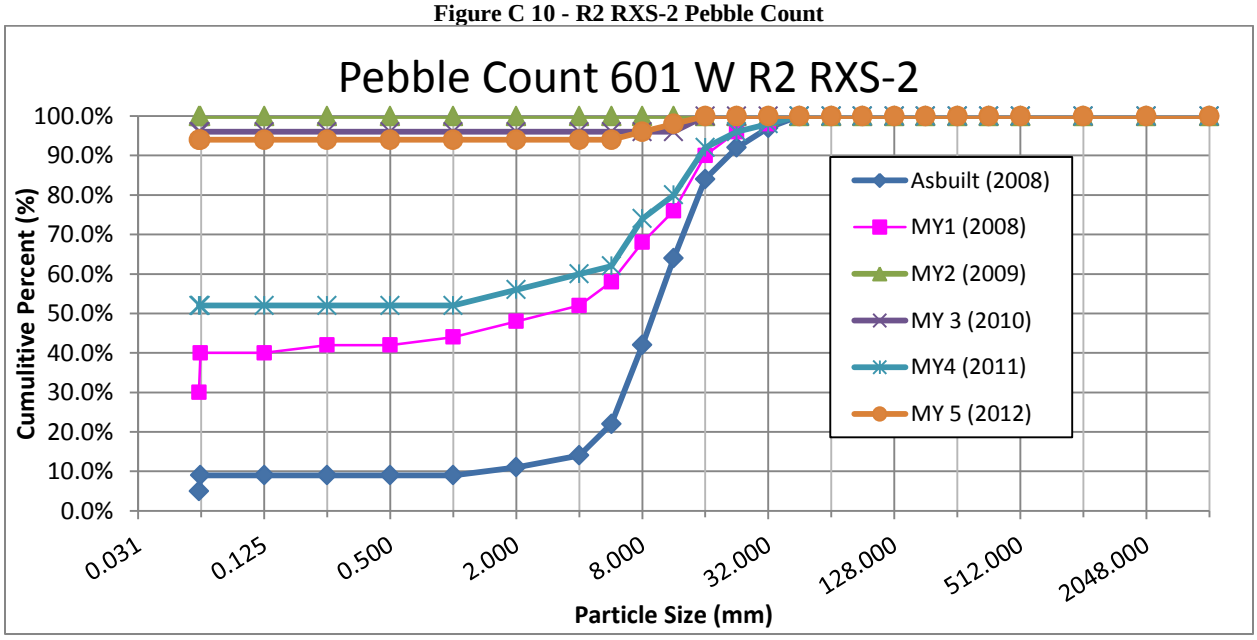


Figure C 11 - R2 PXS-1 Pebble Count

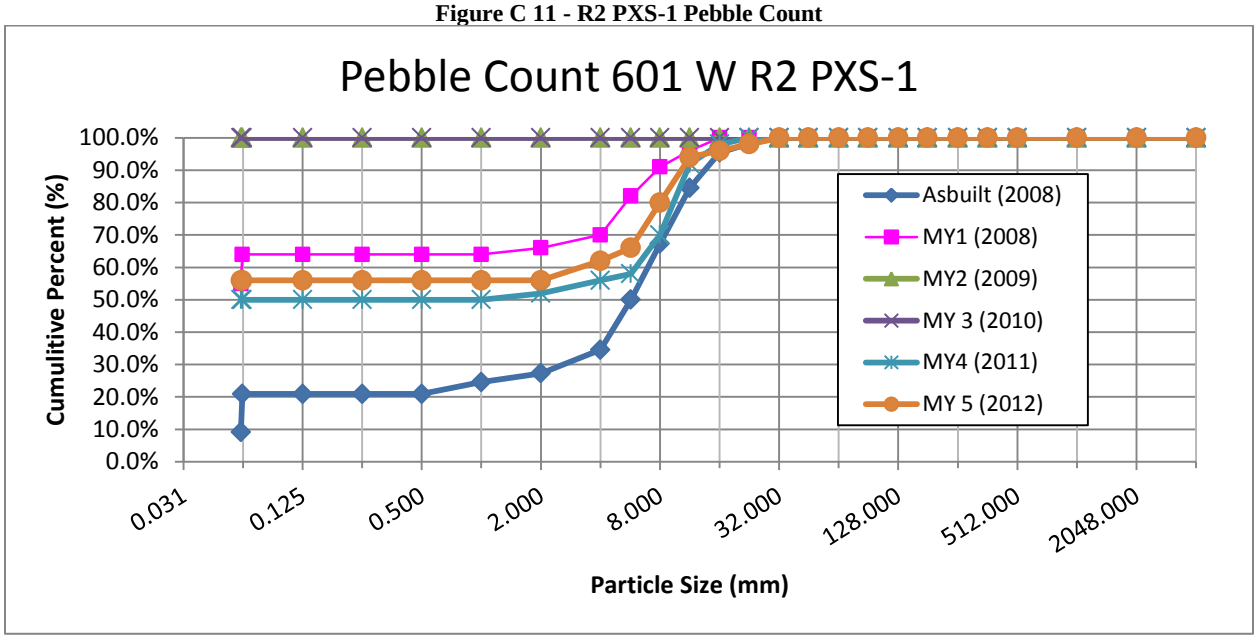
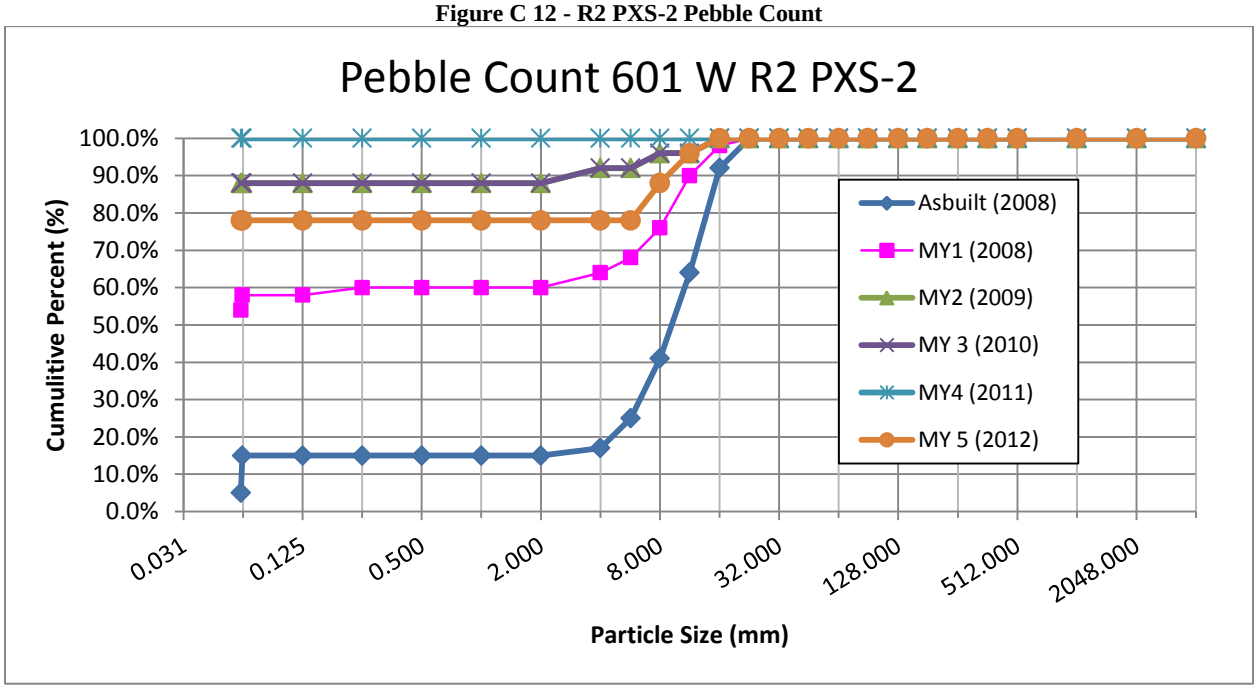


Figure C 12 - R2 PXS-2 Pebble Count



Appendix D – Site Photos

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List of Photos

Photo Points

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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 (repaired cross vane)

Problem Area Photos

MY4-PA9 - Stream Obstruction

MY2_PA3 - Diversion channel 45 feet of left bank from channel blockage

MY5-PA1 - Diversion channel cutting 30 feet of left bank from channel blockage

MY5-PA2 - Diversion channel cutting 40 feet of right bank from channel blockage

MY4-PA10 – channel obstruction

MY4-PA6 – failed sill log (flooded in photo from 9/2012)

MY4-PA6 – failed sill log (photo from MY4 2011)

MY4-PA8 Diversion channels cutting 140 feet of both banks, no woody vegetation

MY4-PA11 Channel obstruction

MY4-PA12 Channel obstruction

MY4-PA13 Channel obstruction (breached by monitoring team)

MY3-PA4 Beaver dam (breached by monitoring team)

MY3-PA5 Beaver dam (breached by monitoring team)

Vegetation Photos

Photo D 1a - Vegetation Plot W1 MY5 Spring 2012

Photo D 2b - Vegetation Plot W1 MY5 Fall 2012

Photo D 3a - Vegetation Plot W2 Spring 2012

Photo D 4b - Vegetation Plot W2 Fall 2012

Photo D 5a - Vegetation Plot W3 Spring 2012

Photo D 3b - Vegetation Plot W3 Fall 2012

Photo D 4a - Vegetation Plot W4 Spring 2012

Photo D 4b - Vegetation Plot W4 Fall 2012

Photo D 5a - Vegetation Plot W5 Spring 2012

Photo D 6b - Vegetation Plot W5 Fall 2012

Appendix E – Vegetation Data

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Table E 1 – MY5 (2012) 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	29	229	18	4		306	24	4	
3	AT	1.84	7.17									
4	BN	2.81	4.45		396*	36	4		396*	56	4	
5	BN	3.44	9.80									
6	BN	3.95	2.15		467*	51	4		467*	76	4	
7	AT	4.50	7.63									
8	CO	5.03	5.41	12	112		4	20	113		4	
9	AT	6.55	2.96									
10	QM	7.14	8.45									
11	BN	7.80	5.92		295	29	4		295*	62	4	
12	BN	7.99	0.26		370*	71	4		370*	110	4	
13	BN	8.81	3.92		313	31	4		313*	59	4	

Table E 2 – MY5 (2012) 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		267	15	4		346	22	4	
2	QP	0.55	1.26		296	24	4		388	36	4	
3	QP	1.14	4.03									
4	QM	2.18	6.50	15	207	8	4		290	21	4	
5	QN	3.15	0.16									
6	BN	3.19	9.11		368	31	3		368*	46	4	
7	QN	3.92	2.53									
8	Q	4.53	4.79									
9	QN	5.38	7.04									
10	BN	5.93	0.21									
11	QN	6.20	9.30									
12	Q	6.76	3.03									
13	QP	7.55	5.71									
14	Q	8.55	8.61									
15	QM	9.35	2.49									

* No attempt to measure height

Table E 3 – MY5 (2012) 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		262	17	4		287	24	4	
2	FP	1.09	3.13		269	17	4		323	25	4	
3	FP	1.24	5.18	27	220	12	3		272	21	4	
4	QP	1.60	7.62									
5	CO	3.59	2.73	8	63		4	11	72		4	
6	CO	3.88	5.11									
7	QP	4.46	7.64	18	200	6	4		274	18	4	
8	BN	4.49	9.89		383	26	3		383*	43	4	
9	QP	5.79	1.22		286	15	4		393	23	4	
10	FP	6.08	3.36		340	27	4		340*	43	4	
11	QN	6.40	5.85	20	221	10	4		310	18	4	
12	FP	6.90	8.01		386	38	4		386*	56	4	
13	QN	8.30	0.45									
14	QM	8.73	3.18	1	15		4				0	
15	QN	9.13	6.14									
16	QN	9.55	9.00									

Table E 4 – MY5 (2012) 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		424	38	4		424*	57	4	
4	FP	1.24	9.52		347	25	4		347*	44	4	
5	FP	3.19	4.56		471*	35	4		471*	58	4	
6	FP	3.23	2.07		418*	31	4		418*	38	4	
7	QN	3.35	7.24		290	19	4		290*	34	4	
8	QN	3.44	9.60									
9	QN	5.52	2.19	11	185	5	4	15	247	9	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									

* No attempt to measure height

Table E 5 – MY5 (2012) 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		420*	40	4		420*	57	4	
2	QM	2.19	5.29	4	25		4				0	Browsed
3	AT	2.47	2.69									
4	FP	2.92	0.20		281	21	4		359	34	4	
5	QM	4.40	9.95		327	26	4		327*	42	4	
6	QM	4.74	3.46	28	246	15	4		309	27	4	
7	QN	4.75	7.82									
8	CO	4.80	5.61									
9	QM	4.96	1.26		317	26	4		317*	42	4	
10	CO	7.14	0.80									
11	CO	7.18	8.09	5	29		4	5	27		1	Browsed
12	BN	7.20	3.16		374*	33	4		374*	47	4	
13	CO	7.23	5.55		4		4					
14	QP	9.25	9.55	15	214	6	3		301	12	4	
15	BN	9.56	4.46		308	20	4		416	27	4	
16	BN	9.62	7.05		292	16	4		387	25	4	
17	QP	9.66	1.97		252	9	4		327	18	4	

* No attempt to measure height

Appendix F – Rainfall Data

EBX 601 W MY 5 2012 Rainfall Daily Summary

Date	Rainfall
9/27/2011	0.14
9/28/2011	0.07
9/30/2011	0.01
10/11/2011	0.53
10/12/2011	0.16
10/13/2011	0.09
10/18/2011	1.81
10/19/2011	0.21
10/26/2011	0.01
10/28/2011	0.03
10/29/2011	0.37
10/30/2011	0.01
11/2/2011	0.01
11/3/2011	0.18
11/4/2011	0.57
11/8/2011	0.01
11/10/2011	0.10
11/12/2011	0.01
11/16/2011	0.08
11/17/2011	0.18
11/19/2011	0.01
11/21/2011	0.02
11/22/2011	0.01
11/23/2011	0.72
11/25/2011	0.01
11/27/2011	0.02
11/28/2011	0.80
11/29/2011	0.21
12/2/2011	0.01
12/5/2011	0.04
12/7/2011	0.28
12/18/2011	0.01
12/20/2011	0.02
12/21/2011	0.18
12/22/2011	0.16
12/23/2011	0.01
12/26/2011	0.01
12/27/2011	0.85
1/8/2012	0.26
1/9/2012	0.53
1/10/2012	0.01
1/11/2012	0.37
1/17/2012	0.39
1/18/2012	0.17
1/20/2012	0.12
1/21/2012	0.56
1/23/2012	0.15
1/24/2012	0.01
1/25/2012	0.01
1/27/2012	0.36
2/2/2012	0.26
2/4/2012	0.07
2/5/2012	0.05
2/10/2012	0.01
2/16/2012	0.01
2/19/2012	0.44
2/22/2012	0.01
2/23/2012	0.07
2/24/2012	0.13
2/27/2012	0.09
3/1/2012	0.01
3/2/2012	0.45
3/3/2012	1.54
3/4/2012	0.15
3/6/2012	0.03
3/9/2012	0.15
3/13/2012	0.01
3/17/2012	0.13
3/18/2012	0.08
3/19/2012	0.01
3/22/2012	0.01
3/23/2012	0.07
3/24/2012	0.63
3/25/2012	0.01
3/30/2012	0.04
3/31/2012	1.07
4/2/2012	0.01
4/4/2012	0.93
4/5/2012	0.14
4/6/2012	0.23
4/18/2012	0.10
4/19/2012	0.01
4/22/2012	0.83
4/25/2012	0.11
4/27/2012	0.50
4/30/2012	0.01
5/9/2012	1.58
5/13/2012	0.33
5/14/2012	0.96
5/15/2012	0.07
5/17/2012	0.05
5/22/2012	0.44
5/23/2012	0.18
5/28/2012	0.34
5/29/2012	0.37
5/30/2012	0.06
6/1/2012	0.65
6/3/2012	0.01
6/4/2012	0.01
6/5/2012	0.11
6/11/2012	1.63
6/12/2012	0.18
6/13/2012	0.07
6/24/2012	0.63
6/26/2012	0.02
7/1/2012	0.70
7/2/2012	0.03
7/5/2012	0.46
7/9/2012	0.05
7/10/2012	0.53
7/12/2012	0.17
7/13/2012	0.16
7/14/2012	0.01
7/16/2012	0.04
7/17/2012	0.01
7/19/2012	0.02
7/20/2012	0.02
7/21/2012	0.05
7/24/2012	0.61
7/25/2012	0.13
7/28/2012	0.13
7/31/2012	0.09
8/1/2012	0.14
8/2/2012	0.34
8/3/2012	0.01
8/6/2012	0.04
8/7/2012	1.19
8/8/2012	1.76

8/9/2012	1.47
8/10/2012	0.03
8/13/2012	0.01
8/17/2012	0.62
8/19/2012	1.21
8/20/2012	0.51
8/21/2012	0.07
8/25/2012	0.01
8/28/2012	0.22
8/29/2012	0.27
8/30/2012	0.01
9/3/2012	0.70
9/4/2012	0.74
9/6/2012	0.18
9/8/2012	0.13
9/9/2012	0.01
9/11/2012	0.01

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	8.6	33.42	34.67	26.24	24.1	27.8	29.6						
Floodprone Width (ft)	83.40	83.4	83.4	83.4	83.4	83.4	-	-	-	-	-	-						
BF Cross Sectional Area (ft^2)	7.84	7.954	6.7157	6.98	6.81	6.3	31.71	29.37	26.43	27.3	26.3	27.2						
BF Mean Depth (ft)	0.56	0.55	0.61	0.79	0.7	0.72	0.95	0.85	1.01	1.13	0.95	0.92						
BF Max Depth (ft)	1.60	1.64	1.49	1.33	1.4	1.31	2.78	3.07	2.31	2.42	2.45	2.5						
Width/Depth Ratio	24.99	26.14	18.21	11.17	13.86	11.91	-	-	-	-	-	-						
Entrenchment Ratio	5.96	5.78	7.54	9.45	8.60	11	-	-	-	-	-	-						
Bank Height Ratio	1.00	1.00	1.00	1.00	1.00	1	-	-	-	-	-	-						
Substrate																		
d50 (mm)	16.28	4.00	0.06	0.06	0.019	0.28	7.12	3.50	3.00	7.43	5.13	4.62						
d84 (mm)	31.22	28.87	0.06	0.06	20.95	10.75	13.76	27.30	22.60	27.3	16	10.75						
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	20	44	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	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	76	133	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	2.1	4.5	3.7
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	1	56	19
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	0.01	0.11	0.02
Pool length (ft)	18.43	49.38	29.37	20	51	30	24	64	37	25	67	39	9.11	84.235	30.8	14	79	33
Pool spacing (ft)	38.67	84.96	55.13	40	86	55	42	141	60	39	144	59	7.467	73.596	25.033	11	71	35
Additional Reach Parameters																		
Valley Length (ft)	1060																	
Channel Length (ft)	1221			1221			1221			1221			1221			1221		
Sinuosity	1.152			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			N/A		
BF slope (ft/ft)	0.0072			0.0071			0.0071			0.0079			0.0080			0.0079		
Rosgen Classification	C4			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	21.6	17.5	16.57	19.20	20.45	11.41	12.08	18.9	25.26	24.15	26.30	19.99	20.78	17	32.11	33.62	36.91	24.87	34.7	21
Floodprone Width (ft)	142	142	142	142	142	142	174	174	174	174	174	174	-	-	-	-	-	-	-	-	-	-	-	-
BF Cross Sectional Area (ft^2)	9.62	12.59	10.89	10.61	11	11.4	10.49	13.89	13.46	9.01	10.60	11.9	23.71	25.17	22.24	23.11	24.15	21.7	24.12	24.12	24.96	22.83	25.12	22
BF Mean Depth (ft)	0.53	0.61	0.51	0.57	0.51	0.65	0.63	0.72	0.66	0.79	0.88	0.63	0.94	1.04	0.85	1.16	1.16	1.28	0.75	0.72	0.68	0.92	0.72	1.1
BF Max Depth (ft)	1.73	1.92	1.94	1.797	1.8	02.1	1.92	1.2	1.4	1.4	1.8	2.2	3.2	3.43	2.91	2.93	2.75	2.7	2.67	2.76	2.59	2.468	2.6	2.3
Width/Depth Ratio	33.88	33.85	41.52	32.54	43	27	26.18	26.55	31.06	14.45	13.77	30	26.91	23.17	31.11	17.29	17.88	13	42.74	46.86	54.59	27.09	47.93	19
Entrenchment Ratio	7.87	6.88	6.68	7.64	7	8	10.50	9.06	8.51	15.25	14.40	9	-	-	-	-	-	-	-	-	-	-	-	-
Bank Height Ratio	1.00	1.00	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	0.33	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	.06
d84 (mm)	16.00	9.65	9.65	9.65	8.0	7.14	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	7.54

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	27	80	51
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	19	45	26
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	96	160	124
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	1.6	4.8	3.0
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	5	44	19
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	0.004	0.075	0.016
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	13	167	37
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	4	61	36
Additional Reach Parameters																		
Valley Length (ft)	1204																	
Channel Length (ft)	1458			1458			1458			1458			1458			1458		
Sinuosity	1.211			1.211			1.211			1.211			1.211			1.2		
Water Surface Slope (ft/ft)	0.0050			0.0053			0.0053			N/A			N/A			N/A		
BF slope (ft/ft)	0.0046			0.0047			0.0047			0.0055			0.0047			0.0047		
Rosgen Classification	C4			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		