

# Cane Creek Tributary Stream Restoration Site Monitoring Report MY02 Basin 03010104 / Contract # D06002



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## EXECUTIVE SUMMARY

The Cane Creek Tributary Site (CCTS) is located in the Piedmont physiographic province in northwestern Person County, North Carolina. The project will provide mitigation for stream impacts within the 8-digit hydrologic cataloging unit 03010104 in the Roanoke River Basin by restoring, enhancing, and preserving 19,059 linear feet on the CCTS, generating 14,621 stream mitigation units (SMU's.) The goals of the project include restoring the stream's riparian buffer and creating a stable stream system. In order to reach these goals, the project objectives included planting a functional Piedmont Alluvial Forest floodplain community along with Mesic Mixed Hardwood Forest to create an effective riparian buffer, removing cattle from the riparian areas with fencing, removing relic spoil piles that disrupt overland flowpaths, stopping bank erosion by developing the appropriate channel dimension, arresting bed elevation lowering, and stabilizing seep outlets.

The western portion of the project drains to the southeast and has a contributing drainage area of approximately 0.70 square mile. The eastern portion of the project also drains towards the southeast with a contributing drainage area of approximately 0.62 square mile. Each half of the project is made up of a series of headwater and first-order streams. Both sides of the project drain to Cane Creek downstream of the site. The project watershed is rural and faces low development pressure from the surrounding area. The stream design and the restoration plan were completed in December 2007, construction began in May 2008, and the site was planted in December 2008.

The site was planted with bare root trees, shrubs, and live stakes. A total of 17 different species were planted at the site. Twenty vegetation monitoring plots were established during the as-built survey. Riparian vegetation must meet a minimum survival success rate of 320 stems/acre after five years. The plots were monitored following the CVS-EEP monitoring Level 2 protocol and the second-year monitoring counted an average of 439 planted stems/acre and 1,143 total stems/acre, including volunteers. There are some plots with low planted stem densities, including four plots with planted stem densities below 320 stems/acre: plots 6, 8, 13, and 17. When including volunteers in these four plots, only plot 13 has an average below 320 total stems/acre. KCI will review the vegetation monitoring data and the condition of the vegetation during the 2011 growing season to determine if supplemental planting is necessary at the site in the future. Considering the plentiful volunteers and overall vegetative condition of the site, the second-year monitoring found the vegetation component of the project to be on track to meeting the success criterion.

The stream restoration included thirty-four separate reaches, which have been enhanced and restored based on a combination of Priority 2 and 3 approaches. Rock cross vanes, step pools, and riffle grade controls were used to control grade throughout the profile. The streams were restored to B4, B4/1, B4c, B4/1c, Bc/C4, C/B4, and C/E4 stream types. In addition to the restored and enhanced reaches, there are nine preservation reaches. These reaches are intermittent headwater streams that were identified as project assets during the as-built stage. The second year of monitoring found the majority of the project to be functioning as designed. Isolated areas of bank erosion and streambed degradation have been noted in this report, but there are no systematic problems that indicate that the project streams are unstable or becoming so. In 2010, there were two bankfull events at the site. The project is on track to meeting the success criterion of at least two bankfull events in five years with each occurring in different years.

The site will continue to be monitored through 2013 or until the success criteria are achieved. Reports will be submitted to the EEP each year. The planted riparian buffer must meet the success criteria of 320 planted stems/acre at the end of the monitoring period. Stream success will be assessed utilizing measurements of stream dimension, pattern, and profile as well as through site photographs. Two bankfull events also must occur on the restored stream over the monitoring period in separate monitoring years.

## **1.0 PROJECT BACKGROUND**

### **1.1 Location and Setting**

The Cane Creek Tributary Site (CCTS) is spread over two separate drainage areas on two parcels under the same ownership. The site is located off of Cunningham Road in northwestern Person County, North Carolina. Specifically, the site is approximately 0.85 mile east of the intersection of Cunningham Road and NC 119 (Figure 1). The project is centered at approximately 36.5038 degrees north and 79.1310 degrees west (WGS84). To reach the site from Raleigh, proceed west on US-70 until it merges with I-85/US-15 south. Continue on I-85 for approximately 1.5 miles and then take exit 176B for Duke St/US-501 Bypass. Take a right off of the exit and travel on US-501 for 27.5 miles. Within the town of Roxboro, turn left onto Court St/US-158 west. Follow US-158 west 0.4 mile and turn right onto NC-57, continuing northwest for another 12.3 miles. Once within the small community of Semora, turn right onto NC-119 and drive north 0.5 mile. Turn right onto Cunningham Road and continue east for 0.85 mile. The CCTS is accessible through a metal gate on the right.

### **1.2 Project Goals and Objectives**

The goals and objectives of the project are as follows:

*Project Goals:*

- Restore the stream's riparian buffer.
- Create a stable network of headwater streams.

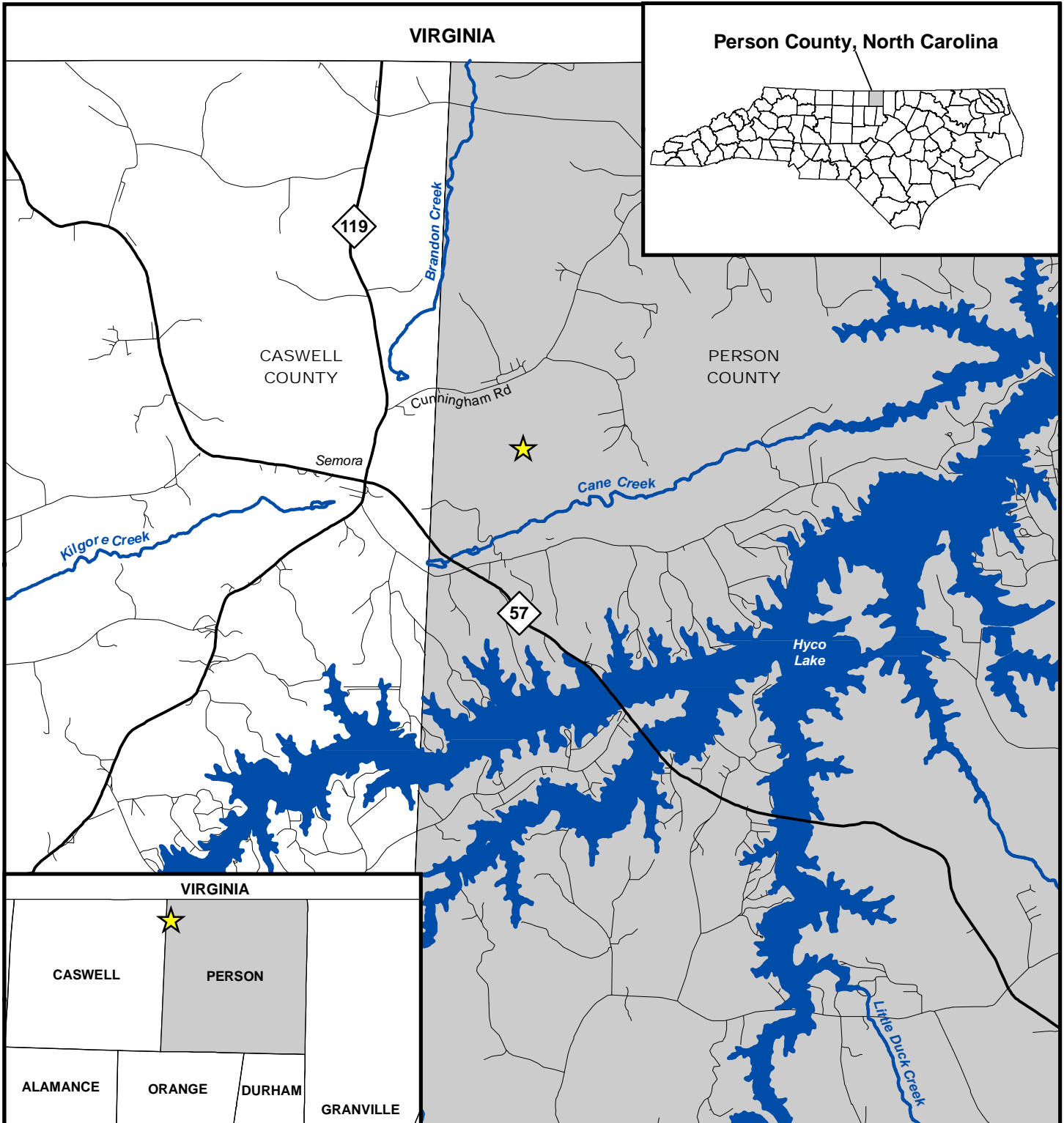
*Project Objectives:*

- Plant a functional Piedmont Alluvial Forest floodplain community along with a Mesic Mixed Hardwood Forest to create an effective riparian buffer.
- Arrest bed elevation lowering and stabilize seep outlets.
- Stop bank erosion by developing the appropriate channel dimension and stabilizing with vegetation.
- Remove relic spoil piles that disrupt overland flowpaths.
- Exclude livestock from the riparian areas with fencing.






### **1.3 Project Structure, Restoration Type and Approach**

The project streams had become degraded primarily through poor grazing management and vegetation removal. Historically, the two parcels were cleared and converted into pasture except for narrow strips of riparian vegetation along the streams and intact forest in the southern portion of the western parcel. Prior to restoration, many of the project streams were experiencing severe bank erosion. Severe bed degradation was also evident throughout the different project reaches. All of the reaches exhibited areas of vertical instability. Restoration, enhancement, and preservation of 19,059 linear feet of channel was accomplished utilizing a combination of Priority 2 and 3 approaches (Table 1). Reaches T1-T6 are on the western side of the project and reaches T7-T10 are on the eastern side.

All of T1 was built as a B4c channel with small sections of C channel in those areas without constrictive valley walls. T1 has been divided into five different reaches to reflect changes in drainage area and the type of mitigation. T1-1 runs from Station 10+00 to 17+64 and stops at the confluence with T3. A second reach, T1-2, goes from this confluence with T3 at Station 17+64 until Station 21+50. Both T1-1 and T1-2 were enhanced by grading back the existing eroding banks, building a bankfull bench, and developing distinct riffles and pools (Enhancement I).

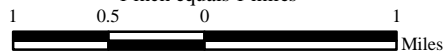


**Figure 1. Vicinity Map**

-  Project Site Location
-  Major Roads
-  Other Roads
-  Major Streams and Rivers
-  Major Lakes and Reservoirs
-  County Boundaries



1:63,360  
1 inch equals 1 miles



T1 was restored from Station 21+50 until it ends at the property boundary. There are three separate reaches in this section of T1: T1-3 from Station 21+50 to 24+76 where T4 enters; T1-4 from Station 24+76 to 34+85 where T6 flows into T1, and T1-5 from Station 34+85 to 37+67. These three lower reaches of T1 were restored using a Priority 3 approach. Along this section of T1, the restoration established riffle and pool features and a new stable planform, while also utilizing existing bedrock as grade control.

T2, a B4 stream, was divided into four separate reaches. T2-1 begins at Station 50+00 and ends at Station 53+05. This reach was improved by fencing out the livestock, removing adjacent relic spoil piles to restore natural drainage to the stream, and planting the riparian buffer with native vegetation (Enhancement II). Beginning at Station 53+05 and ending at Station 55+00, T2-2 was restored using a Priority 3 approach. This reach was relocated away from a severely eroding valley wall and reconnected to the existing stream at Station 55+00. The next reach, T2-3, was enhanced by sloping back the existing eroding banks, building a bankfull bench, removing the adjacent relic spoil piles, and developing distinct riffles and pools (Enhancement I). T2-4 begins at Station 56+50, and was restored using a Priority 3 approach. This bottom section of T2 connects to T1 at Station 58+50 with a new stable pattern, dimension, and profile.

T3 is the next tributary to join T1, and is divided into two different reaches. T3-1 is a short headwater reach that runs from Stations 60+00 to 60+85 and was enhanced by shaping the existing eroding banks and defining distinct riffles and pools (Enhancement I). T3-2 was restored with dimension, profile, and pattern adjustments using a Priority 3 approach, and runs from Station 60+85 to its confluence with T1 at Station 76+97.

Similar to T3, T4 also flows into T1 and has been separated into two reaches. The entire length of T4 was restored as a B4 channel. T4-1 and T4-2 run from Station 80+00 to Station 82+53 and Station 82+53 to Station 102+81, respectively. These two reaches, which are distinguished by differences in slope, were restored with dimension, profile, and pattern adjustments using a Priority 3 approach.

T5 has two reaches and both are B4 channels. T5-1 runs from Stations 110+00 to 112+64 and was enhanced by fencing out the livestock and planting the riparian buffer with native vegetation (Enhancement II). T5-2, which goes from Station 112+64 to Station 113+95 at its confluence with T1, was restored with dimension, profile, and pattern adjustments using a Priority 3 approach.

T6 and its headwater tributaries consist of B4 channels. At the top of this headwater system, there are four intermittent headwater reaches. These reaches, T6B-1 (Stations 248+38 to 250+00), T6C-1 (Stations 117+02 to 120+00), T6C-2 (Stations 300+00 to 300+80), and T6C-3 (Stations 310+00 to 310+82) are stable streams surrounded by an established vegetated buffer and were therefore preserved. Two perennial headwater reaches, T6A (Stations 240+00 to 240+90) and T6B (Stations 250+00 to 251+04), were improved with bank and seep stabilization (Enhancement II). These two reaches come together to form T6AB from Station 240+90 to 241+21. T6C, from Station 120+00 to 121+75 at its confluence with T6AB, is another headwater tributary. T6 begins at Station 121+75, the confluence of T6AB and T6C, and ends at Station 134+25, where it meets T1. T6AB, T6C, and T6 were all restored using a Priority 3 approach with dimension, profile, and pattern adjustments.

On the eastern side of the property, T7 was divided into ten different design reaches. The headwaters of T7 include two preservation reaches. These two reaches, T7A-1 (Stations 259+38 to 260+00) and T7B (Stations 320+00 to 321+25), are both stable channels bordered by a riparian buffer. T7-1 begins at Station 140+00 and continues until Station 145+25. It is a B4/C4 stream



type that was improved with isolated bank stabilization, seep stabilization at the beginning of the reach, fencing out the livestock, and planting the riparian buffer with native vegetation (Enhancement II). T7A (Stations 260+00 to 261+36) and T7C (Stations 330+00 to 330+42) are similar to T7-1 and were also improved as a B4/C4 channel with the same Enhancement II methods. T7-2 (Stations 145+25 to 148+57) was improved to a B4 stream type by sloping back the existing eroding banks and enhancing the existing riffle and pool features (Enhancement I).

T7-3 begins at Station 148+57 where T7-2 and T8 join together. T7-3 was restored as a B4c channel using Priority 2 and 3 approaches with dimension, profile, and pattern adjustments. T7-4 begins at Station 169+86 where the stream enters a more confined valley with numerous bedrock features. The B4/1 channel was improved by building an appropriate stream dimension and enhancing distinct riffle and pool features that had been degraded by cattle and excess sediment inputs (Enhancement I).

T7-5 is a short B4 reach that was restored with dimension, profile, and pattern adjustments from Station 182+28 to 183+75 using a Priority 3 approach. From Station 183+75 to Station 191+59, T7-6 has frequent bedrock in the streambed and was improved by building an appropriate stream dimension and developing distinct riffle and pool features (Enhancement I), creating a B4/1 stream type. T7-7 begins at the confluence with T10 and continues until the stream enters Cane Creek at Station 198+13. This final reach along T7 was also modified as Enhancement I by building an appropriate stream dimension and creating distinct riffle and pool features.

There are three intermittent preservation reaches on the headwater system of T8. These include T8-1 (Stations 199+06 to 200+00), T8B (Stations 340+00 to 340+59), and T8A-1 (Stations 269+75 to 270+00), which are all stable streams with established riparian buffers. The remaining headwater reaches of T8 (Stations 200+00 to 204+38) and T8A (Stations 270+00 to 271+23) were improved using Enhancement I (building an appropriate stream dimension and creating distinct riffle and pool features) and Enhancement II (isolated bank stabilization, seep stabilization at the beginning of the reach, fencing out the livestock, and planting the riparian buffer with native vegetation), respectively. Both reaches are B4 stream types. T9 (Stations 210+00 to 213+68) is a similar headwater reach to T8 and received the same Enhancement I improvements as T8.

T10 runs along the eastern edge of the site and has been divided into two separate reaches. T10-1 is the longer reach and goes from Stations 220+00 to 233+00. T10-1 is a B4/1 channel and was improved with isolated bank stabilization, livestock exclusion, and riparian buffer plantings (Enhancement II). T10-2 begins at 233+00 and continues a short distance until the confluence with T7 at Station 235+94. This reach was improved using Enhancement I (building an appropriate stream dimension and creating distinct riffle and pool features) of the B4/1 channel.

Table 1 below provides the linear footage for existing and as-built stream length as well as the total stream mitigation units by reach. For this table, the existing linear footage was calculated from the existing stream centerline. In some instances, the linear footage is less for the as-built conditions than for the existing conditions. This situation can arise when the design changes the exact location of tributary confluences. In other locations, the pattern of the existing stream had an unstable meandering centerline that may have been influenced by debris blockages and cattle damage to the stream. In the as-built stream, the pattern is stable and more clearly defined, but the actual length may be shorter than the pre-restoration conditions. Some of these lengths are also slightly different than the designed lengths. On the restored reaches, this is due to occasional field changes to the pattern during construction. For the enhancement reaches, this is generally a result of the as-built survey being more detailed, and picking up a more accurate depiction of the pattern than was recorded in the existing conditions topographic survey.

## 1.4 Project History, Background, and Contact Information

<b>Project Segment / Reach ID</b>	<b>Pre-Project Footage</b>	<b>Mitigation Type</b>	<b>Approach</b>	<b>As-Built Footage</b>	<b>As-Built Stationing</b>	<b>Stream Mitigation Units*</b>	<b>Comment</b>
T1-1 and T1-2	1,087	Enhancement I	-	1,150	10+00-21+50	725 SMU*	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created around the existing bedrock, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T1-3, T1-4 and T1-5	1,688	Restoration	P3	1,617	21+50-37+67	1,617 SMU	Stable riffles and pools were established along a realigned stream planform, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T2-1	305	Enhancement II	-	305	50+00-53+05	122 SMU	Isolated eroding banks were graded to a stable slope, relic spoil piles adjacent to the stream were removed, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T2-2	227	Restoration	P2	195	53+05-55+00	195 SMU	The stream was realigned away from an unstable valley wall, relic spoil piles adjacent to the stream were removed, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T2-3	160	Enhancement I	-	150	55+00-56+50	100 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created, relic spoil piles adjacent to the stream were removed, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T2-4	151	Restoration	P3	180	56+50-58+50	180 SMU*	New riffles and pools were established along a new stream planform, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T3-1	107	Enhancement I	-	85	60+00-60+85	57 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created, the unvegetated portions of the buffer were planted, cattle exclusion fencing was erected along the easement, and entering seeps were stabilized.
T3-2	1,457	Restoration	P3	1,592	60+85-76+97	1,592 SMU*	Stable riffles and pools were established along a realigned stream planform, relic spoil piles adjacent to the stream were removed, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T4-1 and T4-2	1,979	Restoration	P3	2,281	80+00-102+81	2,261 SMU*	Stable riffles and pools were established along a realigned stream planform, relic spoil piles adjacent to the stream were removed, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T5-1	244	Enhancement II	-	242	110+00-112+64	97 SMU*	The unvegetated portions of the buffer were planted and cattle exclusion fencing was erected along the easement.
T5-2	118	Restoration	P3	132	112+64-113+95	132 SMU	Stable riffles and pools were established along a realigned stream planform creating a stable confluence with T1, the buffer was planted, and cattle exclusion fencing was erected along the easement.
<b>Total</b>				<b>7,929</b>		<b>7,078 SMU*</b>	

P2 = Priority 2

P3 = Priority 3

\* These SMUs have been calculated by excluding the easement exceptions, which include ford crossings for the landowner.

<b>Table 1. Project Restoration Components, continued</b>							
<b>Cane Creek Stream Restoration Site</b>							
<b>Project Segment / Reach ID</b>	<b>Pre-Project Footage</b>	<b>Mitigation Type</b>	<b>Approach</b>	<b>As-Built Footage</b>	<b>As-Built Stationing</b>	<b>Stream Mitigation Units*</b>	<b>Comment</b>
T6A	89	Enhancement II	-	90	240+00-240+90	36 SMU	Isolated eroding banks were graded to a stable slope, the seep where the stream originates was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T6B-1	162	Preservation	-	162	248+38-250+00	32 SMU	Installed cattle exclusion fencing along the easement.
T6B	103	Enhancement II	-	104	250+00-251+04	42 SMU	Isolated eroding banks were graded to a stable slope, the seep where the stream originates was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T6AB	30	Restoration	P3	31	240+90-241+21	31 SMU	Grade control structures were used to stabilize the bed and maintain pools, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T6C-1	297	Preservation	-	297	117+02-120+00	59 SMU	Installed cattle exclusion fencing along the easement.
T6C-2	80	Preservation	-	80	300+00-300+80	16 SMU	Installed cattle exclusion fencing along the easement.
T6C-3	82	Preservation	-	82	310+00-310+82	16 SMU	Installed cattle exclusion fencing along the easement.
T6C and T6	1,455	Restoration	P3	1,425	120+00-134+25	1,405 SMU*	New riffles and pools were established along a new stream planform, the headcut at the top of T6C was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T7A-1	62	Preservation	-	62	259+38-260+00	12 SMU	Installed cattle exclusion fencing along the easement.
T7A	136	Enhancement II	-	136	260+00-261+36	54 SMU	Isolated eroding banks were graded to a stable slope, a seep at the beginning of the reach was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T7B	125	Preservation	-	125	320+00-321+25	25 SMU	Installed cattle exclusion fencing along the easement.
T7C	42	Enhancement II	-	42	330+00-330+42	17 SMU	Removed a well house at the head of the reach, stabilized the seep, graded the banks to a stable slope, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T7-1	469	Enhancement II	-	525	140+00-145+25	210 SMU	Isolated eroding banks were graded to a stable slope, the seep where the stream originates was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T7-2	331	Enhancement I	-	332	145+25-148+57	221 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created around the existing bedrock, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T7-3	2,023	Restoration	P2/3	2,109	148+57-169+86	2,109 SMU*	New riffle and pool sequences were established along a realigned stream planform, the buffer was planted, and cattle exclusion fencing was erected along the easement.
<b>Total</b>				<b>5,602</b>		<b>4,285 SMU*</b>	

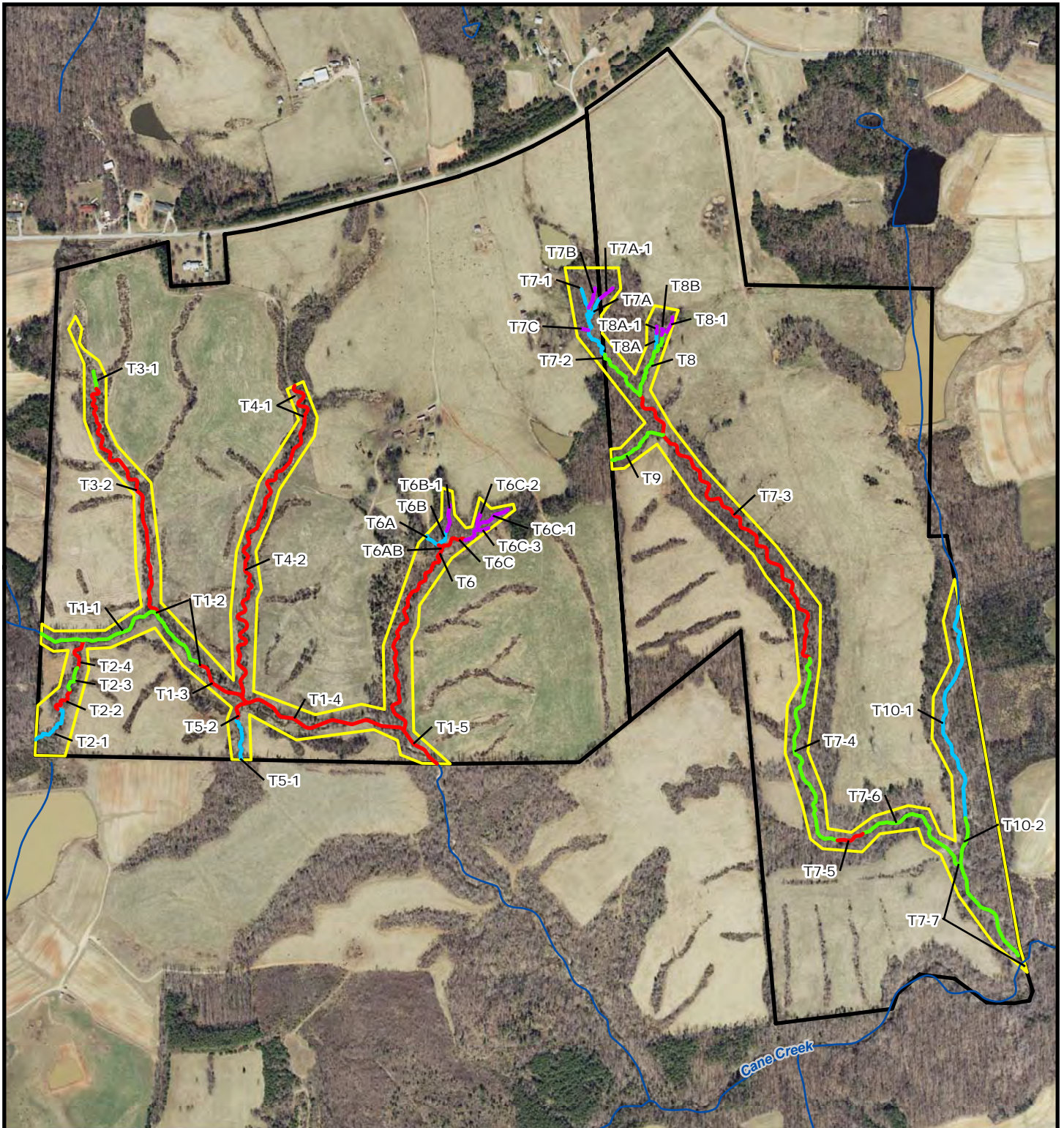
P3 = Priority 3      P2/P3 = Combination of Priorities 2 and 3

\* These SMUs have been calculated by excluding the easement exceptions, which include ford crossings for the landowner.

<b>Table 1. Project Restoration Components, continued</b>							
<b>Cane Creek Stream Restoration Site</b>							
<b>Project Segment / Reach ID</b>	<b>Pre-Project Footage</b>	<b>Mitigation Type</b>	<b>Approach</b>	<b>As-Built Footage</b>	<b>As-Built Stationing</b>	<b>Stream Mitigation Units*</b>	<b>Comment</b>
T7-4	1,246	Enhancement I	-	1,242	169+86-182+28	828 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, overwidened portions of stream were built to the appropriate cross-sectional area, distinct riffles and pools were created around the existing bedrock, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T7-5	185	Restoration	P3	147	182+28-183+75	147 SMU	The stream was realigned away from an unstable valley wall, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T7-6 and T7-7	1,365	Enhancement I	-	1,438	183+75-198+13	945 SMU*	Eroding banks were graded to a stable slope, bankfull benches were built, overwidened portions of stream were built to the appropriate cross-sectional area, distinct riffles and pools were created around the existing bedrock, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T8A-1	25	Preservation	-	25	269+75-300+00	5 SMU	Installed cattle exclusion fencing along the easement.
T8A	110	Enhancement II	-	123	270+00-271+23	49 SMU	Isolated eroding banks were graded to a stable slope, a seep at the beginning of the reach was stabilized, a log structure was added for grade control, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T8B	59	Preservation	-	59	340+00-340+59	12 SMU	Installed cattle exclusion fencing along the easement.
T8-1	94	Preservation	-	94	199+06-200+00	19 SMU	Installed cattle exclusion fencing along the easement.
T8	449	Enhancement I	-	438	200+00-204+38	292 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created with instream structures, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T9	369	Enhancement I	-	368	210+00-213+68	245 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created with instream log structures, the buffer was planted, and cattle exclusion fencing was erected along the easement.
T10-1	1,300	Enhancement II	-	1,300	220+00-233+00	520 SMU	Isolated eroding banks were graded to a stable slope, an eroding drainage swale was stabilized, the unvegetated portions of the buffer were planted, and cattle exclusion fencing was erected along the easement.
T10-2	282	Enhancement I	-	294	233+00-235+94	196 SMU	Eroding banks were graded to a stable slope, bankfull benches were built, distinct riffles and pools were created with instream structures, the buffer was planted, and cattle exclusion fencing was erected along the easement.
<b>Total</b>				<b>5,528</b>		<b>3,258</b>	
<b>Preservation Total</b>				<b>986</b>		<b>196 SMU*</b>	
<b>Enhancement II Total</b>				<b>2,867</b>		<b>1,147</b>	
<b>Enhancement I Total</b>				<b>5,497</b>		<b>3,609</b>	
<b>Restoration Total</b>				<b>9,709</b>		<b>9,669</b>	
<b>Total of All Reaches</b>				<b>19,059</b>		<b>14,621</b>	

P3 = Priority 3

\* These SMUs have been calculated by excluding the easement exceptions, which include ford crossings for the landowner



**Figure 2. As-Built Site Plan**

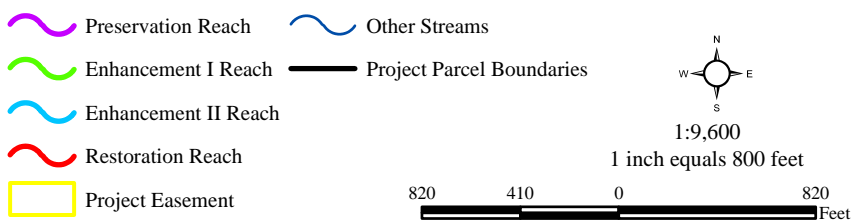


Image Source: Person County GIS, Orthoimagery 2004



<b>Table 2. Project Activity and Reporting History</b> <b>Cane Creek Stream Restoration Site</b>		
<b>Activity or Report</b>	<b>Data Collection Complete</b>	<b>Completion or Delivery</b>
Restoration Plan	2007	Dec 07
Final Design	2007	Dec 07
Construction	N/A	Dec 08
Planting - Stream	N/A	Dec 08
Mitigation Plan / As-Built (Year 0 Monitoring - Baseline)	Jan 09	May 09
Monitoring Year 01	Dec 09	Dec 09
Monitoring Year 02	Jan 11	Jan 11

<b>Table 3. Project Contact Table</b> <b>Cane Creek Stream Restoration Site</b>	
<b>Design Firm</b>	KCI Technologies, Inc. Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Gary Mryncza Phone: (919) 783-9214 Fax: (919) 783-9266
<b>Construction Contractors</b>	Environmental Technologies and Construction Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Ryan McDavitt Phone: (919) 278-2518 Fax: (919) 783-9266
	Quartermaster Environmental P.O. Drawer 400 Shelby, NC 28150 Contact: Mr. Brooks Cole Phone: (704) 473-5021
<b>Planting Contractor</b>	Bruton Nurseries & Landscapes 150 Black Creek Rd. Fremont, NC 27830 Contact: Charles Bruton Phone: (919) 242-6555
<b>Monitoring Performers</b>	
<b>MY-00 - MY-05</b>	KCI Technologies, Inc. Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 278-2514 Fax: (919) 783-9266

<b>Table 4. Project Background Table Cane Creek Stream Restoration Site</b>	
Project County	Person County
Physiographic Region	Piedmont
Ecoregion	Northern Inner Piedmont
Project River Basin	Roanoke
USGS HUC for Project and Reference	03010104061040 (UT to Cane Creek) 03040101090010 (UT Fisher River - reference)
NCDWQ Sub-basin for Project and Reference	03-02-05 (UT to Cane Creek) 03-07-02 (UT Fisher River - reference)
Drainage Area	1.32 sq. mi.
Stream Order	First, Second, and Third Order
Watershed Type (Rural, Urban, Developing, etc.)	Rural
Watershed LULC Distribution	Urban <1% Ag-Row Crop 49% Ag-Livestock 12% Forested 35% Water/Wetlands 1%
Watershed impervious cover (%)	<1%
Rosgen Classification of As-built (Stream)	B4 (T2-3, T2-4, T3-2, T4-1, T4-2, T5-2, T6, T6c, T7-2, T8, T9) B4/1 (T7-4, T7-6, T10-2) B4c (T7-3) B4c/1 (T7-7) B4c/C4 (T7-5) C/B4 (T1) C/E (T3-1) C/E4 (T2-2)
NCDWQ Classification for Project	Class C (Cane Creek)
Within EEP Watershed Plan?	No
Any portion of the project segment upstream of a 303d listed segment?	No
Reasons for 303d Listing or Stressor	N/A
Total project acreage of easement	52.1 Acres
Total planted acreage	32.4 Acres
WRC Class (Warm, Cool, Cold)	Warm
Species of concern, endangered etc.	None
Pre-construction Beaver activity?	No
Dominant Soil Types	Chewacla, Wehadkee, Wilkes, and Wedowee
% of Project Easement Fenced	100%

## **2.0 PROJECT CONDITIONS AND MONITORING RESULTS**

### **2.1 Vegetation Assessment**

The planted vegetation on the site is growing well. Due to the baseline vegetation monitoring occurring while the plants had not yet leafed out, some of the plants could not be identified initially and they were recorded as unknown. Since the baseline monitoring most of these plants were identified. Some of the previously unknown plants were dead, damaged, or missing and could still not be identified. These plants were again recorded as unknown.

The bankfull bench, stream banks, and riparian buffer have isolated areas with sparse vegetation, but overall they are well vegetated. Additional permanent seed was applied to areas of bare soil this past year. Some scattered populations of invasive species have been identified at the site. These include Chinese privet (*Ligustrum sinense*), multiflora rose (*Rosa multiflora*), tree-of-heaven (*Ailanthus altissima*), and princess tree (*Paulownia tomentosa*). Most of the invasive species are in areas where the existing vegetation was left intact. These populations will continue to be monitored.

KCI used the Level 2 CVS-EEP vegetation monitoring protocol to quantify the number of volunteer woody stems during Monitoring Year 2. The monitored vegetation plots revealed an average density of 439 planted stems/acre and 1,143 total stems/acre when including volunteers. There are four monitoring plots (Plots 6, 8, 13, and 17) that had a calculated planted stem density less than 320 stems/acre. This is not seen as problematic given the high potential for desirable volunteers to become established in the plots and across the site. Like natural vegetative communities, some areas will have slightly higher densities than others, but the data from the vegetation monitoring plots reveal that the site has an adequate average stem density. In the third year of monitoring KCI will continue to use the Level 2 CVS-EEP vegetation monitoring protocol to quantify the number of volunteer woody stems. KCI will review the vegetation monitoring data and the condition of the vegetation during the 2011 growing season to determine if supplemental planting is necessary at the site in the future. Considering the plentiful volunteers and overall vegetative condition of the site, the second-year monitoring found the vegetation component of the project to be on track to meeting the success criterion. The vegetative monitoring results are displayed in Appendix A.

### **2.2 Stream Assessment**

During the 2010 growing season, the project streams have been functioning as designed. There are isolated areas of erosion on the streambanks and the side slopes, which have been noted on the CCPV. The on-site stream gauge recorded two bankfull events in 2010.

The stream assessment found the stream to be stable overall. There are some cross-sections that show stream degradation since the previous monitoring year, but the profiles do not show systematic degradation so these areas are isolated and not indicative of instability across the reaches. It is also important to note that all of the streams across the site have grade control from in-stream structures, and in some instances significant bedrock. Additional visual monitoring and future surveying will determine if corrective actions are needed in these isolated erosion areas.



## 2.2.1 Bankfull Events

<b>Table 5. Verification of Bankfull Events Cane Creek Stream Restoration Site</b>			
<b>Date of Data Collection</b>	<b>Date of Occurrences</b>	<b>Method</b>	<b>Photo Number</b>
8/4/2009	5/28/2009	Stream Gauge	N/A
8/4/2009	6/5/2009	Stream Gauge	N/A
10/13/2009	9/21/2009	Stream Gauge	N/A
10/13/2009	9/28/2009	Stream Gauge	N/A
10/13/2009	10/9/2009	Stream Gauge	N/A
7/22/2010	3/22/2010	Stream Gauge	N/A

## 2.2.2 Quantitative Measures Summary Tables

<b>Table 6a. T1-3 Baseline Stream Summary</b>																
<b>Cane Creek Stream Restoration Site</b>																
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>		<b>As-built*</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)			10.2		1	9.0	9.5		10.0	2	13.6					
Floodprone Width (ft)			25.4		1	13	17		20	2	30					
Bankfull Mean Depth (ft)			1.3		1	1.1	1.2		1.2	2	1.2					
Bankfull Max Depth (ft)			1.9		1	1.3	1.4		1.5	2	1.9					
Bankfull Cross-Sectional Area (ft <sup>2</sup> )			12.9		1	10.4	10.6		10.7	2	16.4					
Width/Depth Ratio			8.1		1	8.0	9.0		10.0	2	11.0					
Entrenchment Ratio			2.5		1	1.3	1.8		2.3	2	2.2					
Bank Height Ratio			1.8		1			1.0		2	1.0					
<b>Pattern</b>																
Channel Beltwidth (ft)			21					45			40	70	40	54	70	3
Radius of Curvature (ft)	7			19		13			42		30	40	30	35	40	4
Rc:Bankfull width (ft/ft)	0.7			1.9		1.3			4.4		2.2	3.0				
Meander Wavelength (ft)	90			117		93			136		160	170	160		170	2
Meander Width Ratio			2.0			4.5			5.0		3.0	5.0				
<b>Profile</b>																
Riffle Length (ft)													8	49	86	7
Riffle Slope (ft/ft)	0.0138			0.0427		0.013			0.028		0.010	0.014	0.006	0.012	0.030	7
Pool Length (ft)	13			38		3			25		10	20	16	19	26	6
Pool Spacing (ft)	21			49		30			59		75	100	56	94	152	5
<b>Substrate and Transport Parameters</b>																
SC% / Sa% / G% / C% / B% / Be%	0% / 13% / 87% / 0% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							0% / 34% / 66% / 0% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	6.0 / 9.0 / 11 / 21 / 30					2.0 / 4.2 / 6.9 / 30 / 70							0.6 / 2.1 / 4.5 / 15 / 28			
<b>Additional Reach Parameters</b>																
Channel length (ft)	313					297					324		326			
Drainage Area (SM)	0.60					0.38					0.60		0.60			
Rosgen Classification	E4					B4c					C/B4		C/B4			
Sinuosity	1.10					1.20					1.10		1.10			
Water Surface Slope (ft/ft)	0.0070					0.0130					0.0089		0.0089			

\* This is a short restoration reach, similar to T1-4 and T1-5, and does not have any monitored cross-sections. Therefore there is no as-built dimension data.

<b>Table 6b. T1-4/T1-5 Baseline Stream Summary</b>																
<b>Cane Creek Stream Restoration Site</b>																
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>		<b>As-built</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	10.5	14.1	14.5	17.0	4	9.0	9.5		10.0	2	15.0		15.3	16.4	17.4	2
Floodprone Width (ft)	19	24	20	35	4	13	17		20	1	33		39	41	42	2
Bankfull Mean Depth (ft)	1.0	1.3	1.3	1.5	4	1.1	1.2		1.2	2	1.3		1.1	1.3	1.5	2
Bankfull Max Depth (ft)	1.2	1.8	1.8	2.3	4	1.3	1.4		1.5	2	2.0		1.9	2.0	2.1	2
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	15.3	17.3	16.8	20.1	4	10.4	10.6		10.7	2	20.0		18.9	20.6	22.2	2
Width/Depth Ratio	7.2	11.8	11.4	17.2	4	8.0	9.0		10.0	2	12.0		10.5	13.3	16.0	2
Entrenchment Ratio	1.2	1.8	1.4	3.3	4	1.3	1.8		2.3	1	2.2		2.2	2.5	2.7	2
Bank Height Ratio	1.4	2.0	2.1	2.3	4			1.0		2	1.0		1.0	1.0	1.0	2
<b>Pattern</b>																
Channel Beltwidth (ft)	25			51				45			25	60	25		60	
Radius of Curvature (ft)	12			64		13			42		30	50	30	36	50	14
Rc:Bankfull width (ft/ft)	0.7			5.1		1.3			4.4		2.0	3.3	1.8	2.2	3.0	
Meander Wavelength (ft)	106			230		93			136		115	240	115		240	
Meander Width Ratio	1.5			4.7		4.5			5.0		1.7	4.0	1.5		3.7	
<b>Profile</b>																
Riffle Length (ft)													8	49	86	7
Riffle Slope (ft/ft)	0.0110			0.0407		0.013			0.028		0.005	0.013	0.006	0.012	0.030	7
Pool Length (ft)	11			30		3			25		10	30	16	19	26	6
Pool Spacing (ft)	29			88		30			59		50	150	56	94	152	5
<b>Substrate and Transport Parameters</b>																
SC% / Sa% / G% / C% / B% / Be%	0% / 17% / 63% / 19% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							0% / 7% / 86% / 4% / 0% / 3%			
d16 / d35 / d50 / d84 / d95 (mm)	1.6 / 13 / 22 / 73 / 130					2.0 / 4.2 / 6.9 / 30 / 70							6.9 / 14 / 19 / 41 / 62			
<b>Additional Reach Parameters</b>																
Channel length (ft)	1,290					297					1,290		1,291			
Drainage Area (SM)	0.80					0.38					0.80		0.80			
Rosgen Classification	B/G/F					B4c					C/B4		C/B4			
Sinuosity	1.07 - 1.33					1.20					1.10		1.10			
Water Surface Slope (ft/ft)	0.0072 - 0.0090					0.0130					0.0080		0.0071			

**Table 6c. T2-2 Baseline Stream Summary**

**Cane Creek Stream Restoration Site**

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built*			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)			4.4		1	9.0	9.5		10.0	2	7.4			7.7		1
Floodprone Width (ft)			>40		1	13	17		20	2	19			21		1
Bankfull Mean Depth (ft)			0.8		1	1.1	1.2		1.2	2	0.8			0.7		1
Bankfull Max Depth (ft)			0.9		1	1.3	1.4		1.5	2	1.3			1.2		1
Bankfull Cross-Sectional Area (ft <sup>2</sup> )			3.3		1	10.4	10.6		10.7	2	5.7			5.4		1
Width/Depth Ratio			5.9		1	8.0	9.0		10.0	2	9.3			11.0		1
Entrenchment Ratio			>10		1	1.3	1.8		2.3	2	2.5			2.7		1
Bank Height Ratio			1		1			1.0		2	1.0			1.0		1
<b>Pattern</b>																
Channel Beltwidth (ft)	11			19				45			14	23	14		23	
Radius of Curvature (ft)	5			18		13			42		7	10	7	10	10	6
Rc:Bankfull width (ft/ft)	1.1			4.1		1.3			4.4		1.0	1.4	1.0		1.3	
Meander Wavelength (ft)	39			61		93			136		40	53	40		53	
Meander Width Ratio	2.5			3.3		4.5			5.0		1.9	3.1	1.8		3.0	
<b>Substrate and Transport Parameters</b>																
SC% / Sa% / G% / C% / B% / Be%	0% / 33% / 66% / 1% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							0% / 23% / 76% / 1% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	0.5 / 2.5 / 5.0 / 31 / 48					2.0 / 4.2 / 6.9 / 30 / 70							1.3 / 4.5 / 10 / 30 / 44			
<b>Additional Reach Parameters</b>																
Channel length (ft)	227					297					186		195			
Drainage Area (SM)	0.11					0.38					0.11		0.11			
Rosgen Classification	E4					B4c					C/E4		C/E4			
Sinuosity	1.70					1.20					1.40		1.50			
Water Surface Slope (ft/ft)	0.0179					0.0130					0.0231					

\* This is a short reach and does not have a monitored longitudinal profile.

<b>Table 6d. T3-2 Baseline Stream Summary</b>																
<b>Cane Creek Stream Restoration Site</b>																
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>		<b>As-built</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	3.4	5.8	5.2	10.9	6	9.0	9.5		10.0	2	7.8		7.8	8.1	8.3	2
Floodprone Width (ft)	6	27	8	78	6	13	17		20	2	16		21	23	24	2
Bankfull Mean Depth (ft)	0.5	0.7	0.8	0.9	6	1.1	1.2		1.2	2	0.7		0.5	0.5	0.5	2
Bankfull Max Depth (ft)	1.0	1.2	1.1	1.3	6	1.3	1.4		1.5	2	1.1		0.9	0.9	0.9	2
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	2.5	3.9	4.1	5.1	6	10.4	10.6		10.7	2	5.6		3.9	4.1	4.2	2
Width/Depth Ratio	4.3	9.2	7.0	23.3	6	8.0	9.0		10.0	2	10.9		15.6	16.0	16.4	2
Entrenchment Ratio	1.1	6.5	1.6	16.3	6	1.3	1.8		2.3	2	2.1		2.7	2.8	2.9	2
Bank Height Ratio	1.0	1.9	2.0	3.2	6			1.0		2	1.0		1.0	1.0	1.0	2
<b>Pattern</b>																
Channel Beltwidth (ft)	20			25				45			40	45	25		45	
Radius of Curvature (ft)	8			30		13			42		10	30	10		30	
Rc:Bankfull width (ft/ft)	1.4			7.1		1.3			4.4		1.3	3.8	1.2		3.7	
Meander Wavelength (ft)	80			420		93			136		48	130	45		130	
Meander Width Ratio	3.4			6.0		4.5			5.0		5.1	5.8	3.1		5.6	
Riffle Length (ft)													7	23	56	11
Riffle Slope (ft/ft)	0.0102			0.0640		0.013			0.028		0.014	0.045	0.005	0.022	0.036	11
Pool Length (ft)	6			23		3			25		6	20	4	9	23	13
Pool Spacing (ft)	11			68		30			59		25	90	14	37	55	12
<b>Substrate and Transport Parameters</b>																
SC% / Sa% / G% / C% / B% / Be%	0% / 72% / 27% / 1% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							12% / 25% / 61% / 3% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	0.28 / 0.47 / 0.7 / 9 / 27					2.0 / 4.2 / 6.9 / 30 / 70							0.11 / 1.5 / 11 / 35 / 54			
<b>Additional Reach Parameters</b>																
Channel length (ft)	1,457					297					1,554		1,592			
Drainage Area (SM)	0.08					0.38					0.08		0.08			
Rosgen Classification	G4					B4c					B4		B4			
Sinuosity	1.10					1.20					1.20		1.20			
Water Surface Slope (ft/ft)	0.0202					0.0130					0.0215		0.0174			

<b>Table 6e. T4-1 Baseline Stream Summary</b>																
<b>Cane Creek Stream Restoration Site</b>																
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>		<b>As-built*</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	4.5	5.4	5.1	6.7	3	9.0	9.5		10.0	2	6.2			8.5		1
Floodprone Width (ft)	6	8	8	10	3	13	17		20	2	12			24		1
Bankfull Mean Depth (ft)	1.1	1.2	1.1	1.4	3	1.1	1.2		1.2	2	0.5			0.5		1
Bankfull Max Depth (ft)	1.4	1.5	1.5	1.7	3	1.3	1.4		1.5	2	0.8			1.0		1
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	5.4	6.2	6.1	7.2	3	10.4	10.6		10.7	2	3.0			4.1		1
Width/Depth Ratio	3.3	4.8	4.8	6.2	3	8.0	9.0		10.0	2	12.4			17.6		1
Entrenchment Ratio	1.5	1.5	1.5	1.6	3	1.3	1.8		2.3	2	2.0			2.8		1
Bank Height Ratio	3.1	3.8	4.1	4.2	3			1.0		2	1.0			1.0		1
<b>Pattern</b>																
Channel Beltwidth (ft)	15			58				45			39	50	40		60	
Radius of Curvature (ft)	7			26		13			42		15	20	15	16	20	5
Rc:Bankfull width (ft/ft)	1.0			5.8		1.3			4.4		2.4	3.2	1.8	1.9	2.4	
Meander Wavelength (ft)	35			290		93			136		77	95	70		90	
Meander Width Ratio	2.2			12.9		4.5			5.0		6.3	8.1	4.7		7.1	
<b>Substrate and Transport Parameters</b>																
SC% / Sa% / G% / C% / B% / Be%	0% / 19% / 73% / 7% / 0% / 1%					0% / 15% / 78% / 7% / 0% / 0%							73% / 5% / 22% / 1% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	1.5 / 11 / 17 / 45 / 78					2.0 / 4.2 / 6.9 / 30 / 70							0.1 / 0.1 / 0.1 / 13 / 32			
<b>Additional Reach Parameters</b>																
Channel length (ft)	190					297					266		253			
Drainage Area (SM)	0.06					0.38					0.06		0.06			
Rosgen Classification	G4					B4c					B4		B4			
Sinuosity	1.70					1.20					1.40		1.40			
Water Surface Slope (ft/ft)	0.0179					0.0130					0.0231					

\* The monitored longitudinal profile for T4 is on T4-2.

<b>Table 6f. T4-2 Baseline Stream Summary</b>																	
<b>Cane Creek Stream Restoration Site</b>																	
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>		<b>As-built</b>				
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n	
Bankfull Width (ft)	4.5	5.4	5.1	6.7	3	9.0	9.5		10.0	2	9.2		8.6	8.9	9.1	2	
Floodprone Width (ft)	6	8	8	10	3	13	17		20	2	18		24	25	26	2	
Bankfull Mean Depth (ft)	1.1	1.2	1.1	1.4	3	1.1	1.2		1.2	2	0.8		0.6	0.8	0.9	2	
Bankfull Max Depth (ft)	1.4	1.5	1.5	1.7	3	1.3	1.4		1.5	2	1.2		1.2	1.5	1.7	2	
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	5.4	6.2	6.1	7.2	3	10.4	10.6		10.7	2	7.1		5.9	6.9	7.9	2	
Width/Depth Ratio	3.3	4.8	4.8	6.2	3	8.0	9.0		10.0	2	11.5		9.4	11.7	14.0	2	
Entrenchment Ratio	1.5	1.5	1.5	1.6	3	1.3	1.8		2.3	2	2.0		2.6	2.8	3.0	2	
Bank Height Ratio	3.1	3.8	4.1	4.2	3			1.0		2	1.0		1.0	1.0	1.0	2	
<b>Pattern</b>																	
Channel Beltwidth (ft)	15			58				45			25	60	20		65		
Radius of Curvature (ft)	7			26		13			42		10	30	10		30		
Rc:Bankfull width (ft/ft)	1.0			5.8		1.3			4.4		1.1	3.3	1.1		3.4		
Meander Wavelength (ft)	35			290		93			136		50	130	50		130		
Meander Width Ratio	2.2			12.9		4.5			5.0		2.7	6.5	2.2		7.3		
<b>Profile</b>																	
Riffle Length (ft)													5	23	56	15	
Riffle Slope (ft/ft)	0.0134			0.0381		0.013			0.028		0.009	0.030	0.005	0.025	0.063	15	
Pool Length (ft)	10			35		3			25		5	40	1	11	28	19	
Pool Spacing (ft)	20			80		30			59		30	85	7	46	94	18	
<b>Substrate and Transport Parameters</b>																	
SC% / Sa% / G% / C% / B% / Be%	0% / 19% / 73% / 7% / 0% / 1%					0% / 15% / 78% / 7% / 0% / 0%					1% / 47% / 51% / 1% / 0% / 0%						
d16 / d35 / d50 / d84 / d95 (mm)	1.5 / 11 / 17 / 45 / 78					2.0 / 4.2 / 6.9 / 30 / 70					0.4 / 1.1 / 2.4 / 30 / 52						
<b>Additional Reach Parameters</b>																	
Channel length (ft)	1,789					297					1,967		2,008				
Drainage Area (SM)	0.10					0.38					0.10		0.10				
Rosgen Classification	G4					B4c					B4		B4				
Sinuosity	1.10					1.20					1.20		1.20				
Water Surface Slope (ft/ft)	0.0224					0.0130					0.0181		0.0141				

<b>Table 6g. T5-2 Baseline Stream Summary</b>																	
<b>Cane Creek Stream Restoration Site</b>																	
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>		<b>As-built*</b>				
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n	
Bankfull Width (ft)			3.3		1	9.0	9.5		10.0	2	5.0			5.9		1	
Floodprone Width (ft)			4		1	13	17		20	2	10			21		1	
Bankfull Mean Depth (ft)			0.7		1	1.1	1.2		1.2	2	0.5			0.4		1	
Bankfull Max Depth (ft)			0.9		1	1.3	1.4		1.5	2	0.8			0.8		1	
Bankfull Cross-Sectional Area (ft <sup>2</sup> )			2.3		1	10.4	10.6		10.7	2	2.5			2.4		1	
Width/Depth Ratio			4.7		1	8.0	9.0		10.0	2	10.0			14.5		1	
Entrenchment Ratio			1.3		1	1.3	1.8		2.3	2	2.0			3.6		1	
Bank Height Ratio			2.7		1			1.0		2	1.0			1.0		1	
<b>Pattern</b>																	
Channel Beltwidth (ft)								45			15	30	15		30		
Radius of Curvature (ft)						13			42		15		15				
Rc:Bankfull width (ft/ft)						1.3			4.4		3.0		2.5				
Meander Wavelength (ft)						93			136		45	63	50		60		
Meander Width Ratio						4.5			5.0		3.0	6.0	2.5		5.1		
<b>Substrate and Transport Parameters</b>																	
SC% / Sa% / G% / C% / B% / Be%						0% / 15% / 78% / 7% / 0% / 0%					40% / 41% / 20% / 0% / 0% / 0%						
d16 / d35 / d50 / d84 / d95 (mm)						2.0 / 4.2 / 6.9 / 30 / 70					0.1 / 0.1 / 0.2 / 4.2 / 9.8						
<b>Additional Reach Parameters</b>																	
Channel length (ft)	118					297					121		132				
Drainage Area (SM)	0.02					0.38					0.02		0.02				
Rosgen Classification	G4					B4c					B4		B4				
Sinuosity	1.10					1.20					1.20		1.20				
Water Surface Slope (ft/ft)	0.0590					0.0130					0.0550						

\* This is a short reach and does not have a monitored longitudinal profile.



<b>Table 6f. T6 Baseline Stream Summary</b>																
<b>Cane Creek Stream Restoration Site</b>																
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>		<b>As-built</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	3.4	4.4		5.3	2	9.0	9.5		10.0	2	8.0		6.3	6.7	7.1	2
Floodprone Width (ft)	4	6		8	2	13	17		20	2	16		16.7	17.2	18.6	2
Bankfull Mean Depth (ft)	0.4	0.6		0.8	2	1.1	1.2		1.2	2	0.7		0.5	0.6	0.6	2
Bankfull Max Depth (ft)	0.5	0.8		1.0	2	1.3	1.4		1.5	2	1.1		0.8	0.9	0.9	2
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	1.3	2.7		4.0	2	10.4	10.6		10.7	2	5.7		3.4	3.5	3.6	2
Width/Depth Ratio	7.0	7.9		8.7	2	8.0	9.0		10.0	2	11.4		11.0	12.9	14.8	2
Entrenchment Ratio	1.1	1.3		1.5	2	1.3	1.8		2.3	2	2.0		2.6	2.7	2.7	2
Bank Height Ratio	3.0	4.9		6.8	2			1.0		2	1.0		1.0	1.0	1.0	2
<b>Pattern</b>																
Channel Beltwidth (ft)	16			36				45			36	40	30		40	
Radius of Curvature (ft)	3			16		13			42		10	35	10		35	
Rc:Bankfull width (ft/ft)	0.6			4.7		1.3			4.4		1.3	4.4	1.5		5.2	
Meander Wavelength (ft)	14			116		93			136		72	120	50		120	
Meander Width Ratio	2.6			34.1		4.5			5.0		4.5	5.0	4.5		6.0	
<b>Profile</b>																
Riffle Length (ft)													11	25	49	12
Riffle Slope (ft/ft)	0.009			0.030		0.013			0.028		0.013	0.025	0.010	0.024	0.040	12
Pool Length (ft)	9			13		3			25		6	15	2	6	14	14
Pool Spacing (ft)	26			48		30			59		25	70	5	36	68	13
<b>Substrate and Transport Parameters</b>																
SC% / Sa% / G% / C% / B% / Be%	0% / 52% / 45% / 1% / 1% / 1%					0% / 15% / 78% / 7% / 0% / 0%							1% / 14% / 81% / 3% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	0.5 / 0.9 / 1.7 / 11 / 20					2.0 / 4.2 / 6.9 / 30 / 70							5.6 / 34 / 40 / 56 / 63			
<b>Additional Reach Parameters</b>																
Channel length (ft)	1,275					297					1,230		1,230			
Drainage Area (SM)	0.07					0.38					0.07		0.07			
Rosgen Classification	G					B4c					B4		B4			
Sinuosity	1.20					1.20					1.20		1.20			
Water Surface Slope (ft/ft)	0.0245					0.0130					0.0240		0.0301			

<b>Table 6g. T7-3 Baseline Stream Summary</b>																
<b>Cane Creek Stream Restoration Site</b>																
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>		<b>As-built</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)	5.0	6.1	6.5	6.9	3	9.0	9.5		10.0	2	8.2		9.0	9.1	9.1	2
Floodprone Width (ft)	8	9	9	9	3	13	17		20	2	16		15.4	16.9	18.4	2
Bankfull Mean Depth (ft)	0.9	0.9	0.9	1.0	3	1.1	1.2		1.2	2	0.7		0.7	0.8	0.8	2
Bankfull Max Depth (ft)	1.1	1.2	1.3	1.3	3	1.3	1.4		1.5	2	1.1		0.9	1.1	1.3	2
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	5.0	5.6	5.9	6.0	3	10.4	10.6		10.7	2	6.0		6.4	7.7	9.0	2
Width/Depth Ratio	6.0	7.0	7.2	7.9	3	8.0	9.0		10.0	2	11.2		11.6	12.3	12.9	2
Entrenchment Ratio	1.2	1.3	1.3	1.4	3	1.3	1.8		2.3	2	2.0		1.7	1.9	2.0	2
Bank Height Ratio	2.8	3.3	3.2	3.8	3			1.0		2	1.0		1.0	1.0	1.0	2
<b>Pattern</b>																
Channel Beltwidth (ft)	24			42				45			29	47	30		60	
Radius of Curvature (ft)	22			58		13			42		15	35	15		35	
Rc:Bankfull width (ft/ft)	3.2			9.7		1.3			4.4		1.8	4.3	1.6		3.8	
Meander Wavelength (ft)	52			115		93			136		55	106	50		110	
Meander Width Ratio	3.5			7		4.5			5.0		3.5	5.7	3.3		6.6	
<b>Profile</b>																
Riffle Length (ft)													15	26	40	15
Riffle Slope (ft/ft)	0.007			0.012		0.013			0.028		0.020	0.030	0.002	0.018	0.035	15
Pool Length (ft)	6			12		3			25		7	30	6	16	54	15
Pool Spacing (ft)	17			42		30			59		32	86	38	55	101	14
<b>Substrate and Transport Parameters</b>																
SC% / Sa% / G% / C% / B% / Be%	0% / 37% / 62% / 1% / 0% / 0%					0% / 15% / 78% / 7% / 0% / 0%							6% / 33% / 54% / 6% / 0% / 0%			
d16 / d35 / d50 / d84 / d95 (mm)	0.3 / 1.4 / 5.4 / 15 / 25					2.0 / 4.2 / 6.9 / 30 / 70							0.3 / 1.4 / 6.6 / 45 / 95			
<b>Additional Reach Parameters</b>																
Channel length (ft)	2,023					297					2,088		2,109			
Drainage Area (SM)	0.18					0.38					0.18		0.18			
Rosgen Classification	G4c					B4c					B4c		B4c			
Sinuosity	1.10					1.20					1.10		1.15			
Water Surface Slope (ft/ft)	0.0132					0.0130					0.0128		0.0211			

<b>Table 6h. T7-5 Baseline Stream Summary</b>																
<b>Cane Creek Stream Restoration Site</b>																
<b>Parameter</b>	<b>Pre-Existing Condition</b>					<b>Reference Reach(es) Data</b>					<b>Design</b>		<b>As-built*</b>			
<b>Dimension - Riffle</b>	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Max	n
Bankfull Width (ft)						9.0	9.5		10.0	2	10.4			11.5		1
Floodprone Width (ft)						13	17		20	2	21			21		1
Bankfull Mean Depth (ft)						1.1	1.2		1.2	2	0.9			0.9		1
Bankfull Max Depth (ft)						1.3	1.4		1.5	2	1.2			1.3		1
Bankfull Cross-Sectional Area (ft <sup>2</sup> )						10.4	10.6		10.7	2	9.0			10.7		1
Width/Depth Ratio						8.0	9.0		10.0	2	12.0			12.4		1
Entrenchment Ratio						1.3	1.8		2.3	2	2.0			1.9		1
Bank Height Ratio								1.0		2	1.0			1.0		1
<b>Pattern</b>																
Channel Beltwidth (ft)	28							45			20	25	20		25	
Radius of Curvature (ft)	12					13			42		20	25	20		25	
Rc:Bankfull width (ft/ft)						1.3			4.4		1.9	2.4	1.7		2.2	
Meander Wavelength (ft)	62					93			136		64	68	60		70	
Meander Width Ratio						4.5			5.0		2.0	2.5	1.7		2.2	
<b>Substrate and Transport Parameters</b>																
SC% / Sa% / G% / C% / B% / Be%						0% / 15% / 78% / 7% / 0% / 0%							0% / 23% / 63% / 2% / 0% / 12%			
d16 / d35 / d50 / d84 / d95 (mm)						2.0 / 4.2 / 6.9 / 30 / 70							0.9 / 4.4 / 11 / 34 / 55			
<b>Additional Reach Parameters</b>																
Channel length (ft)	185					297					154		147			
Drainage Area (SM)	0.24					0.38					0.24		0.24			
Rosgen Classification	E4					B4c					B4c/C4		B4c/C4			
Sinuosity	1.20					1.20					1.08		1.05			
Water Surface Slope (ft/ft)	0.0145					0.0130					0.0193					

\* This is a short reach and does not have a monitored longitudinal profile.

<b>Table 7a. Morphology and Hydraulic Monitoring Summary</b>																		
<b>Cane Creek Stream Restoration Site</b>																		
Parameter	Cross-Section 1						Cross-Section 2						Cross-Section 3					
	Pool						Riffle						Pool					
Reach	T1-3						T1-4						T1-4					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	12.6	12.2	13.4				17.4	17.8	18.8				14.2	14.3	14.4			
Floodprone Width (ft)	-	-	-				39	42	42				-	-	-			
Bankfull Mean Depth (ft)	1.6	1.7	2.4				1.1	1.1	1.2				1.5	1.6	1.4			
Bankfull Max Depth (ft)	2.8	2.9	3.5				1.9	2.3	2.9				2.5	2.9	3.0			
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	20.2	20.9	32.2				18.9	19.9	23.3				21.9	23.5	19.7			
Width/Depth Ratio	-	-	-				16.0	15.9	15.2				-	-	-			
Entrenchment Ratio	-	-	-				2.2	2.4	2.2				-	-	-			
Bank Height Ratio	-	-	-				1.0	1.0	1.0				-	-	-			
<b>Substrate</b>																		
d50 (mm)	4.50		1.70				15.00	8.00	8.00				1.80	8.90	8.90			
d84 (mm)	15.00		15.00				40.00	43.00	43.00				12.00	30.00	30.00			

<b>Table 7b. Morphology and Hydraulic Monitoring Summary</b>																		
<b>Cane Creek Stream Restoration Site</b>																		
Parameter	Cross-Section 4						Cross-Section 5						Cross-Section 6					
	Riffle						Riffle						Pool					
Reach	T1-5						T2-2						T3-2					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	15.3	15.0	17.5				7.7	7.5	6.7				12.3	12.6	13.5			
Floodprone Width (ft)	42	37	37				21	21	21				-	-	-			
Bankfull Mean Depth (ft)	1.5	1.5	1.2				0.7	0.6	0.6				1.1	0.9	1.1			
Bankfull Max Depth (ft)	2.1	2.4	2.3				1.2	1.2	1.1				2.2	2.1	2.3			
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	22.2	22.1	21.2				5.4	4.7	4.2				13.3	11.0	13.3			
Width/Depth Ratio	10.5	10.2	14.4				11.0	12.0	10.7				-	-	-			
Entrenchment Ratio	2.7	2.5	2.1				2.7	2.8	3.1				-	-	-			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				-	-	-			
<b>Substrate</b>																		
d50 (mm)	24.00	27.00	17.00				10.00	14.00	14.00				1.10		0.62			
d84 (mm)	44.00	Bdrk	Bdrk				30.00	31.00	41.00				10.00		0.62			

<b>Table 7c. Morphology and Hydraulic Monitoring Summary</b>																		
<b>Cane Creek Stream Restoration Site</b>																		
Parameter	Cross-Section 7						Cross-Section 8						Cross-Section 9					
	Riffle						Riffle						Riffle					
Reach	T3-2						T3-2						T4-1					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	7.8	8.8	9.4				8.3	10.3	9.3				8.5	8.3	10.4			
Floodprone Width (ft)	21	22	22				24	26	26				24	25	25			
Bankfull Mean Depth (ft)	0.5	0.5	0.5				0.5	0.6	0.5				0.5	0.6	0.5			
Bankfull Max Depth (ft)	0.9	0.9	0.9				0.9	1.0	1.0				1.0	1.1	1.3			
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	3.9	4.4	4.7				4.2	5.8	4.7				4.1	4.6	5.3			
Width/Depth Ratio	15.6	17.6	18.8				16.4	18.3	18.4				17.6	15.0	20.4			
Entrenchment Ratio	2.7	2.5	2.3				2.9	2.5	2.8				2.8	3.0	2.4			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0			
<b>Substrate</b>																		
d50 (mm)	0.30	1.30	1.30				26.00	18.00	18.00				0.10	2.00	7.10			
d84 (mm)	6.90	41.00	41.00				42.00	50.00	50.00				13.00	35.00	17.00			

<b>Table 7d. Morphology and Hydraulic Monitoring Summary</b>																		
<b>Cane Creek Stream Restoration Site</b>																		
Parameter	Cross-Section 10						Cross-Section 11						Cross-Section 12					
	Riffle						Riffle						Pool					
Reach	T4-2						T4-2						T5-2					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	9.1	9.5	8.3				8.6	6.7	6.8				10.7	10.3	10.5			
Floodprone Width (ft)	24	21	21				26	22	22				-	-	-			
Bankfull Mean Depth (ft)	0.6	0.5	0.5				0.9	1.0	0.9				1.1	1.1	1.3			
Bankfull Max Depth (ft)	1.2	0.8	0.8				1.7	1.4	1.6				2.5	2.5	2.8			
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	5.9	4.3	4.1				7.9	6.4	6.4				12.3	11.2	13.6			
Width/Depth Ratio	14.0	21.0	16.8				9.4	7.0	7.2				-	-	-			
Entrenchment Ratio	2.6	2.2	2.6				3.0	3.3	3.2				-	-	-			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				-	-	-			
d50 (mm)	8.00	20.00	35.00				1.20	35.00	10.00				0.20	5.20	25.00			
d84 (mm)	39.00	43.00	59.00				16.00	Bdrk	25.00				0.80	22.00	43.00			

<b>Table 7e. Morphology and Hydraulic Monitoring Summary Cane Creek Stream Restoration Site</b>																		
Parameter	Cross-Section 13						Cross-Section 14						Cross-Section 15					
	Riffle						Riffle						Pool					
Reach	T5-2						T6						T6					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	5.9	6.0	6.9				7.1	7.4	7.7				4.1	6.0	5.0			
Floodprone Width (ft)	21	23	23				19	26	26				-	-	-			
Bankfull Mean Depth (ft)	0.4	0.4	0.4				0.5	0.6	0.8				0.8	0.7	0.7			
Bankfull Max Depth (ft)	0.8	0.7	0.9				0.8	1.4	1.8				1.2	1.4	1.4			
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	2.4	2.4	2.6				3.4	4.7	5.9				3.1	3.9	3.6			
Width/Depth Ratio	14.5	15.0	18.3				14.8	11.7	10.0				-	-	-			
Entrenchment Ratio	3.6	3.8	3.3				2.6	3.5	3.4				-	-	-			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				-	-	-			
<b>Substrate</b>																		
d50 (mm)	0.20	0.68	2.80				44.00	6.80	9.90				4.40	9.90	23.00			
d84 (mm)	4.20	2.00	28.00				57.00	30.00	26.00				20.00	35.00	44.00			

<b>Table 7f. Morphology and Hydraulic Monitoring Summary Cane Creek Stream Restoration Site</b>																		
Parameter	Cross-Section 16						Cross-Section 17						Cross-Section 18					
	Riffle						Pool						Riffle					
Reach	T6						T7-3						T7-3					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	6.3	6.0	7.4				7.3	8.8	9.8				9.0	9.2	8.2			
Floodprone Width (ft)	17	18	18				-	-	-				18	19	19			
Bankfull Mean Depth (ft)	0.6	0.7	0.7				1.1	1.2	1.4				0.8	0.8	0.9			
Bankfull Max Depth (ft)	0.9	1.2	1.2				2.0	2.0	2.3				1.3	1.4	1.5			
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	3.6	4.1	5.2				7.7	10.8	13.3				7.2	7.3	7.2			
Width/Depth Ratio	11.0	8.8	10.5				-	-	-				11.6	11.6	9.3			
Entrenchment Ratio	2.7	3.0	2.4				-	-	-				2.0	2.0	2.3			
Bank Height Ratio	1.0	1.0	1.0				-	-	-				1.0	1.0	1.0			
<b>Substrate</b>																		
d50 (mm)	35.00	45.00	22.00				0.30	0.39	0.57				21.00	32.00	7.30			
d84 (mm)	56.00	Bdrk	45.00				0.50	7.00	3.50				58.00	100.00	63.00			

Table 7g. Morphology and Hydraulic Monitoring Summary Cane Creek Stream Restoration Site												
Parameter	Cross-Section 19						Cross-Section 20					
	Riffle						Riffle					
Reach	T7-3						T7-5					
Dimension	MY0	MY1	MY2	MY3	MY4	MY5	MY0	MY1	MY2	MY3	MY4	MY5
Bankfull Width (ft)	9.1	8.7	8.7				11.5	11.9	11.8			
Floodprone Width (ft)	15	15	15				21	21	21			
Bankfull Mean Depth (ft)	0.7	0.6	0.6				0.9	0.8	0.8			
Bankfull Max Depth (ft)	0.9	0.8	0.9				1.3	1.3	1.5			
Bankfull Cross-Sectional Area (ft <sup>2</sup> )	6.4	4.8	5.2				10.7	9.6	8.9			
Width/Depth Ratio	12.9	15.8	14.6				12.4	14.8	15.64			
Entrenchment Ratio	1.7	1.7	1.7				1.9	1.7	1.7			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0			
Substrate												
d50 (mm)	1.90	25.00	33.00				11.00	41.00	33.00			
d84 (mm)	19.00	42.00	74.00				34.00	Bdrk	75.00			

Table 7h. Morphology and Hydraulic Monitoring Summary continued Cane Creek Stream Restoration Site															
Reach T1-1															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	16	30	55	10	30	76									
Riffle Slope (ft/ft)	0.0076	0.0160	0.0229	0.0017	0.0131	0.0395									
Pool Length (ft)	5	10	18	4	12	19									
Pool Spacing (ft)	15	66	134	27	82	222									
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0114			0.0111											
Rosgen Classification	C4/1			C4/1											

\* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

**Table 7i. Morphology and Hydraulic Monitoring Summary continued  
Cane Creek Stream Restoration Site**

<b>Reach T1-2, 3</b>															
<b>Parameter</b>	<b>MY - 01 (2009)</b>			<b>MY - 02 (2010)</b>			<b>MY - 03 (2011)</b>			<b>MY - 04 (2012)</b>			<b>MY - 05 (2013)</b>		
<b>Profile</b>	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	7	14	36	7	30	49									
Riffle Slope (ft/ft)	0.0082	0.0244	0.0421	0.0016	0.0113	0.0223									
Pool Length (ft)	16	23	27	9	18	25									
Pool Spacing (ft)	57	117	169	22	60	107									
<b>Additional Reach Parameters</b>															
Water Surface Slope (ft/ft)	0.0068			0.0063											
Rosgen Classification	C4			C4											

\* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

**Table 7j. Morphology and Hydraulic Monitoring Summary continued  
Cane Creek Stream Restoration Site**

<b>Reach T3-2</b>															
<b>Parameter</b>	<b>MY - 01 (2009)</b>			<b>MY - 02 (2010)</b>			<b>MY - 03 (2011)</b>			<b>MY - 04 (2012)</b>			<b>MY - 05 (2013)</b>		
<b>Profile</b>	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	2	12	43	1	13	30									
Riffle Slope (ft/ft)	0.0128	0.0342	0.0614	0.0148	0.0652	0.1841									
Pool Length (ft)	2	12	23	3	9	28									
Pool Spacing (ft)	14	46	72	15	57	115									
<b>Additional Reach Parameters</b>															
Water Surface Slope (ft/ft)	0.0180			0.0175											
Rosgen Classification	B4			B4											

\* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.



Table 7k. Morphology and Hydraulic Monitoring Summary continued Cane Creek Stream Restoration Site															
Reach T4-2															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	4	19	36	7	20	52									
Riffle Slope (ft/ft)	0.0006	0.0221	0.0519	0.0004	0.0185	0.0496									
Pool Length (ft)	2	10	30	4	14	35									
Pool Spacing (ft)	7	55	99	9	55	110									
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0151			0.014											
Rosgen Classification	B4			B4											

\* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

Table 7l. Morphology and Hydraulic Monitoring Summary continued Cane Creek Stream Restoration Site															
Reach T6															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	6	13	26	2	12	19									
Riffle Slope (ft/ft)	0.0051	0.0229	0.0472	0.0096	0.0261	0.0334									
Pool Length (ft)	3	7	12	2	8	16									
Pool Spacing (ft)	5	38	106	7	48	115									
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0254			0.0273											
Rosgen Classification	B4			B4											

\* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

Table 7m. Morphology and Hydraulic Monitoring Summary continued Cane Creek Stream Restoration Site															
Reach T7-3															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	4	15	37	5	20	39									
Riffle Slope (ft/ft)	0.0045	0.0266	0.0446	0.0025	0.0181	0.0422									
Pool Length (ft)	5	17	41	6	16	44									
Pool Spacing (ft)	27	55	101	27	58	100									
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0103			0.0105											
Rosgen Classification	B4c			B4c											

\* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

Table 7n. Morphology and Hydraulic Monitoring Summary continued Cane Creek Stream Restoration Site															
Reach T7-5															
Parameter	MY - 01 (2009)			MY - 02 (2010)			MY - 03 (2011)			MY - 04 (2012)			MY - 05 (2013)		
Profile	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max	Min	Avg.	Max
Riffle Length (ft)	7	22	44	9	23	40									
Riffle Slope (ft/ft)	0.0081	0.0349	0.0872	0.0074	0.0293	0.0494									
Pool Length (ft)	2	8	17	4	9	17									
Pool Spacing (ft)	42	74	116	28	54	119									
Additional Reach Parameters															
Water Surface Slope (ft/ft)	0.0212			0.0204											
Rosgen Classification	B4c/C4/1			B4c/C4/1											

\* Pattern measurements will only be taken after MY-00 if it is visually apparent that the pattern has changed.

# **Appendix A**

## **Vegetation Data and Photos**

<b>Table A1. Vegetation Plot Density History (stems/acre)</b>						
<b>Cane Creek Stream Restoration Site</b>						
<b>Plot Number</b>	<b>MY-00</b>	<b>MY-01</b>	<b>MY-02</b>	<b>MY-03</b>	<b>MY-04</b>	<b>MY-05</b>
1	1,133	840	526			
2	526	440	364			
3	647	520	526			
4	850	680	607			
5	607	440	243			
6	931	680	486			
7	809	720	647			
8	445	320	202			
9	809	640	486			
10	567	440	405			
11	850	720	526			
12	607	560	526			
13	445	240	202			
14	971	800	688			
15	486	400	364			
16	931	760	769			
17	486	320	243			
18	567	320	324			
19	647	600	324			
20	486	480	324			
<b>Site Average</b>	690	546	439			

**Table A2. Stem Count by Plot and Species**  
**Cane Creek Stream Restoration Site**

Species	Total Planted Stems	# plots	avg # stems	plot CCTS-A-0001	plot CCTS-A-0002	plot CCTS-A-0003	plot CCTS-A-0004	plot CCTS-A-0005	plot CCTS-A-0006	plot CCTS-A-0007	plot CCTS-A-0008	plot CCTS-A-0009	plot CCTS-A-0010	plot CCTS-A-0011	plot CCTS-A-0012	plot CCTS-A-0013	plot CCTS-A-0014	plot CCTS-A-0015	plot CCTS-A-0016	plot CCTS-A-0017	plot CCTS-A-0018	plot CCTS-A-0019	plot CCTS-A-0020
<i>Asimina triloba</i>	4	1	4												4								
<i>Betula nigra</i>	8	3	3	1															6		1		
<i>Callicarpa americana</i>	2	2	1						1	1													
<i>Carya ovata</i>	3	2	2					2														1	
<i>Cornus amomum</i>	70	13	5	3	1	3	5		5	7		7	5	2			15		10	2			5
<i>Diospyros virginiana</i>	23	13	2	2	1	3	1	1		1	2		1	4	3	1	1	2					
<i>Fraxinus pennsylvanica</i>	4	2	2		3	1																	
<i>Juglans nigra</i>	14	8	2		1				2	3		1	3							1		1	2
<i>Liriodendron tulipifera</i>	5	4	1							1		2	1							1			
<i>Platanus occidentalis</i>	8	5	2	1	1	3														1	2		
<i>Quercus</i>	4	3	1		2	1			1														
<i>Quercus falcata</i>	22	8	3	1			1	3		2					6	4						4	1
<i>Quercus michauxii</i>	11	3	4								3							7	1				
<i>Quercus pagoda</i>	1	1	1	1																			
<i>Quercus phellos</i>	6	2	3			2															4		
<i>Salix</i>	1	1	1				1																
<i>Salix nigra</i>	2	2	1				1												1				
<i>Salix sericea</i>	22	8	3	2			5		3			2		7			1		1			1	
<i>Sambucus canadensis</i>	1	1	1																			1	
<i>Unknown</i>	6	5	1.2	2			1			1										1	1		
<b>Total Year 2</b>	<b>217</b>	<b>20</b>		<b>13</b>	<b>9</b>	<b>13</b>	<b>15</b>	<b>6</b>	<b>12</b>	<b>16</b>	<b>5</b>	<b>12</b>	<b>10</b>	<b>13</b>	<b>13</b>	<b>5</b>	<b>17</b>	<b>9</b>	<b>19</b>	<b>6</b>	<b>8</b>	<b>8</b>	<b>8</b>
<b>Average Density (Stems/acre)</b>				<b>526</b>	<b>364.2</b>	<b>526</b>	<b>607</b>	<b>242.8</b>	<b>486</b>	<b>647</b>	<b>202</b>	<b>486</b>	<b>405</b>	<b>526</b>	<b>526</b>	<b>202</b>	<b>688</b>	<b>364</b>	<b>769</b>	<b>243</b>	<b>324</b>	<b>324</b>	<b>324</b>
														<b>Total Density (Stems/Acre)</b>						<b>439</b>			

Table A3.  
 EEP Project Code 92325. Project Name: Cane Creek Tributary Site

Scientific Name	Common Name	Species Type	Current Plot Data (MY2 2010)																																						
			92325-A-0001			92325-A-0002			92325-A-0003			92325-A-0004			92325-A-0005			92325-A-0006			92325-A-0007			92325-A-0008			92325-A-0009			92325-A-0010			92325-A-0011			92325-A-0012					
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T						
Acer rubrum	red maple	Tree																														2								5	
Ailanthus altissima	tree of heaven	Tree																																							
Alnus serrulata	hazel alder	Shrub Tree																																							
Asimina triloba	pawpaw	Shrub Tree																																				4	4	4	
Baccharis	baccharis	Shrub Tree																																							
Betula nigra	river birch	Tree	1	1	1																																				
Callicarpa americana	American beautyberry	Shrub																	1	1	1	1	1	1																	
Carya	hickory	Tree																																							
Carya ovata	shagbark hickory	Tree																2	2	2																					
Celtis laevigata	sugarberry	Shrub Tree																																							
Cornus amomum	silky dogwood	Shrub	1	3	3	1	1	1	3	3	3	3	5	5				3	5	5	7	7	7				6	7	7	5	5	5		2	2						
Diospyros virginiana	common persimmon	Tree	2	2	2	1	1	1	3	3	3	1	1	1	1	1	1				1	1	1	2	2	2				1	1	1	4	4	4	3	3	3			
Fraxinus pennsylvanica	green ash	Tree				3	3	4	1	1	1																														
Juglans nigra	black walnut	Tree				1	1	1																																	
Juniperus virginiana	eastern redcedar	Tree																																							
Liquidambar styraciflua	sweetgum	Tree				3																																			
Liriodendron tulipifera	tuliptree	Tree										51																													
Platanus occidentalis	American sycamore	Tree	1	1	2	1	1	16	3	3	13																														
Quercus	oak	Shrub Tree				2	2	2	1	1	1																														
Quercus falcata	southern red oak	Tree	1	1	1																																				
Quercus michauxii	swamp chestnut oak	Tree																																							
Quercus pagoda	cherrybark oak	Tree	1	1	1																																				
Quercus phellos	willow oak	Tree										2	2	4																											
Rhus	sumac																																								
Salix	willow	Shrub Tree																																							
Salix nigra	black willow	Tree																																							
Salix sericea	silky willow	Shrub Tree																																							
Sambucus canadensis	Common Elderberry	Shrub Tree																																							
Ulmus	elm	Tree																																							
Ulmus alata	winged elm	Tree																																							
Ulmus americana	American elm	Tree																																							
Ulmus rubra	slippery elm	Tree																																							
Unknown	unknown		2	2	2																																				
	Stem count		9	13	19	9	9	36	13	13	76	6	15	90	6	6	8	7	12	15	16	16	39	5	5	8	9	12	18	10	10	12	4	13	16	13	13	19			
	size (ares)		1			1			1			1			1			1			1			1			1			1			1			1					
	size (ACRES)		0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02					
	Species count		7	8	10	6	6	7	6	6	7	4	7	9	3	3	5	4	5	7	7	7	11	2	2	3	3	4	6	4	4	5	1	3	5	3	3	5			
	Stems per ACRE		364.2	526.1	768.9	364.2	364.2	1457	526.1	526.1	3076	242.8	607	3642	242.8	242.8	323.7	283.3	485.6	607	647.5	647.5	1578	202.3	202.3	323.7	364.2	485.6	728.4	404.7	404.7	485.6	161.9	526.1	647.5	526.1	526.1	768.9			

Table A3. continued  
EEP Project Code 92325. Project Name: Cane Creek Tributary Site

		Current Plot Data (MY2 2010)																								Annual Means																				
Scientific Name	Common Name	Species Type	92325-A-0013			92325-A-0014			92325-A-0015			92325-A-0016			92325-A-0017			92325-A-0018			92325-A-0019			92325-A-0020			MY2 (2010)			MY1 (2009)			MY0 (2008)													
			PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T	PnoLS	P-all	T											
Acer rubrum	red maple	Tree							24																								31			5										
Ailanthus altissima	tree of heaven	Tree																																			3									
Alnus serrulata	hazel alder	Shrub Tree																																		1										
Asimina triloba	pawpaw	Shrub Tree																								4	4	4		8	8	8														
Baccharis	baccharis	Shrub Tree																																												
Betula nigra	river birch	Tree										6	6	6					1	1	1																8	8	8	10	10	10	10	10	10	
Callicarpa americana	American beautyberry	Shrub																																												
Carya	hickory	Tree																																												
Carya ovata	shagbark hickory	Tree																							1	1	1														5	5	10			
Celtis laevigata	sugarberry	Shrub Tree																																								1	1	1		
Cornus amomum	silky dogwood	Shrub				8	15	15				3	10	10	2	2	2							5	5	5	47	70	70	48	81	81	53	98	98											
Diospyros virginiana	common persimmon	Tree	1	1	1	1	1	6	2	2	2															23	23	28	34	34	41	3	3	3												
Fraxinus pennsylvanica	green ash	Tree																							4	4	5	4	4	33	13	13	13													
Juglans nigra	black walnut	Tree												1	1	1								1	1	1	2	2	2	14	14	14	17	17	20											
Juniperus virginiana	eastern redcedar	Tree														4																														
Liquidambar styraciflua	sweetgum	Tree					39				5			7			4																													
Liriodendron tulipifera	tuliptree	Tree						1						1	1	1											5	5	8	15	15	39	5	5	5											
Platanus occidentalis	American sycamore	Tree			1			5			14			2	1	1	1	2	2	2											6	8	8	130	10	10	181	12	12	12						
Quercus	oak	Shrub Tree																									4	4	4	5	5	5	46	46	46											
Quercus falcata	southern red oak	Tree	4	4	4																																									
Quercus michauxii	swamp chestnut oak	Tree								7	7	7	1	1	1											11	11	11	12	12	12	13	13	13												
Quercus pagoda	cherrybark oak	Tree																																												
Quercus phellos	willow oak	Tree																	4	4	4																									
Rhus	sumac				1																																									
Salix	willow	Shrub Tree																																												
Salix nigra	black willow	Tree												1	1																															
Salix sericea	silky willow	Shrub Tree						1	1																																					
Sambucus canadensis	Common Elderberry	Shrub Tree																																												
Ulmus	elm	Tree																																												
Ulmus alata	winged elm	Tree																																												
Ulmus americana	American elm	Tree																																												
Ulmus rubra	slippery elm	Tree																																												
Unknown		unknown															1	1	1	1	1	1	1				6	6	6	7	7	7	103	103	103											
Stem count			5	5	7	9	17	67	9	9	52	10	19	28	6	6	14	8	8	14	6	8	8	8	8	8	19	168	217	565	212	273	758	266	341	341										
size (ares)			1					1			1			1						1				1																						
size (ACRES)			0.02					0.02			0.02			0.02						0.02				0.02				0.49																		
Species count			2	2	4	2	3	6	2	2	5	3	5	7	5	5	7	4	4	6	3	5	5	3	3	6	16	20	27	17	21	30	12	16	16											
Stems per ACRE			202.3	202.3	283.3	364.2	688	2711	364.2	364.2	2104	404.7	768.9	1133	242.8	242.8	566.6	323.7	323.7	566.6	242.8	323.7	323.7	323.7	323.7	768.9	339.94	439.08	1143.2	428.97	552.4	1533.8	538.23	689.99	689.99											



Vegetation Plot 1: View looking toward plot center from origin corner. 11/1/10 – MY-02



Vegetation Plot 2: View looking toward plot center from origin corner. 11/1/10 – MY-02





Vegetation Plot 3: View looking toward plot center from origin corner. 11/1/10 – MY-02



Vegetation Plot 4: View looking toward plot center from origin corner. 11/1/10 – MY-02



Vegetation Plot 5: View looking toward plot center from origin corner. 11/2/10 – MY-02



Vegetation Plot 6: View looking toward plot center from origin corner. 11/2/10 – MY-02



Vegetation Plot 7: View looking toward plot center from origin corner. 11/2/10 – MY-02



Vegetation Plot 8: View looking toward plot center from origin corner. 11/1/10 – MY-02



Vegetation Plot 9: View looking toward plot center from origin corner. 11/1/10 – MY-02



Vegetation Plot 10: View looking toward plot center from origin corner. 11/1/10 – MY-02



Vegetation Plot 11: View looking toward plot center from origin corner. 11/1/10 – MY-02



Vegetation Plot 12: View looking toward plot center from origin corner. 11/1/10 – MY-02



Vegetation Plot 13: View looking toward plot center from origin corner. 11/1/10 – MY-02



Vegetation Plot 14: View looking toward plot center from origin corner. 11/2/10 – MY-02



Vegetation Plot 15: View looking toward plot center from origin corner. 9/10/10 – MY-02



Vegetation Plot 16: View looking toward plot center from origin corner. 9/10/10 – MY-02



Vegetation Plot 17: View looking toward plot center from origin corner. 9/10/10 – MY-02



Vegetation Plot 18: View looking toward plot center from origin corner. 9/10/10 – MY-02





Vegetation Plot 19: View looking toward plot center from origin corner. 9/10/10 – MY-02



Vegetation Plot 20: View looking toward plot center from origin corner. 11/2/10 – MY-02

# **Appendix B**

## **Geomorphologic Data**

## Cross-Section Plots

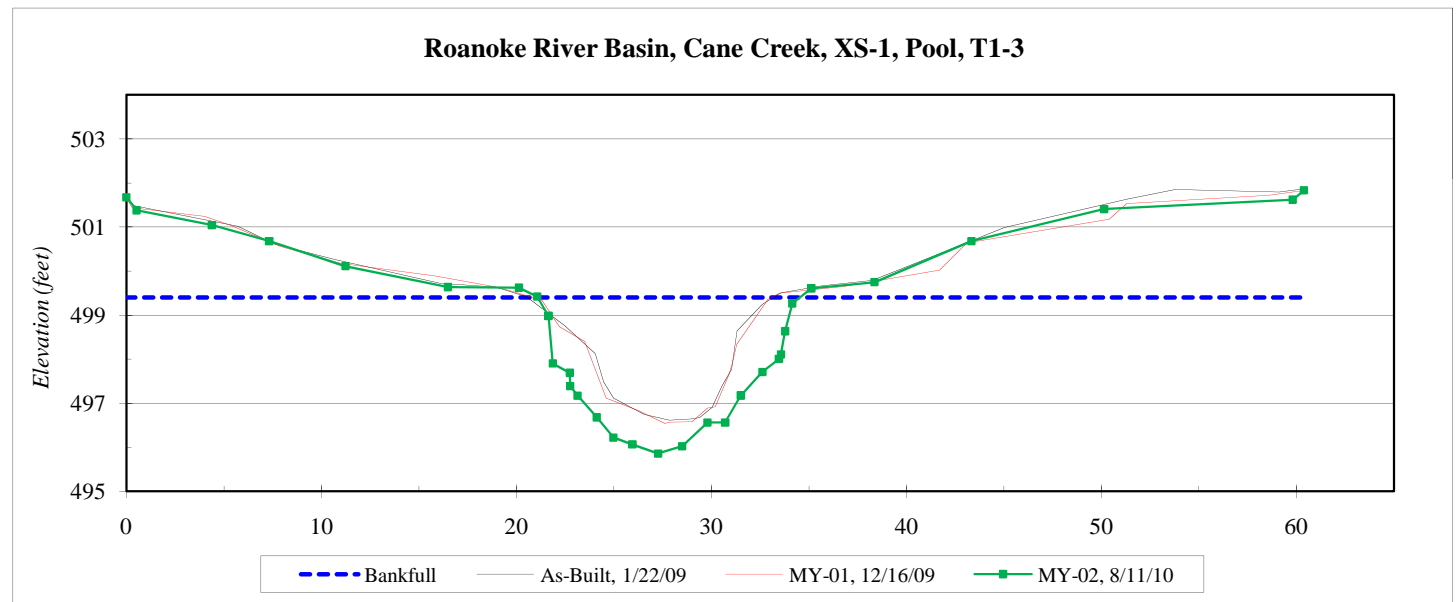
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-1, Pool, T1-3
<b>Drainage Area (sq mi):</b>	0.49
<b>Date:</b>	8/11/2010
<b>Field Crew:</b>	A. French, A. Helms

Station	Elevation
0.0	501.68
0.5	501.38
4.4	501.04
7.3	500.68
11.2	500.11
16.5	499.64
20.1	499.62
21.1	499.42
21.6	498.98
21.9	497.90
22.7	497.69
22.8	497.39
23.1	497.17
24.1	496.68
25.0	496.22
25.9	496.07
27.3	495.86
28.5	496.02
29.8	496.56
30.7	496.56
31.5	497.18
32.6	497.71
33.5	498.00
33.6	498.11
33.8	498.64
34.2	499.27
35.1	499.61
38.4	499.75
43.3	500.68
50.1	501.41
59.8	501.62
60.4	501.83

SUMMARY DATA	
<b>Bankfull Elevation:</b>	499.4
<b>Bankfull Cross-Sectional Area:</b>	32.2
<b>Bankfull Width:</b>	13.4
<b>Flood Prone Area Elevation:</b>	-
<b>Flood Prone Width:</b>	-
<b>Max Depth at Bankfull:</b>	3.5
<b>Mean Depth at Bankfull:</b>	2.4
<b>W / D Ratio:</b>	-
<b>Entrenchment Ratio:</b>	-
<b>Bank Height Ratio:</b>	-



<b>Stream Type</b>	C/B4
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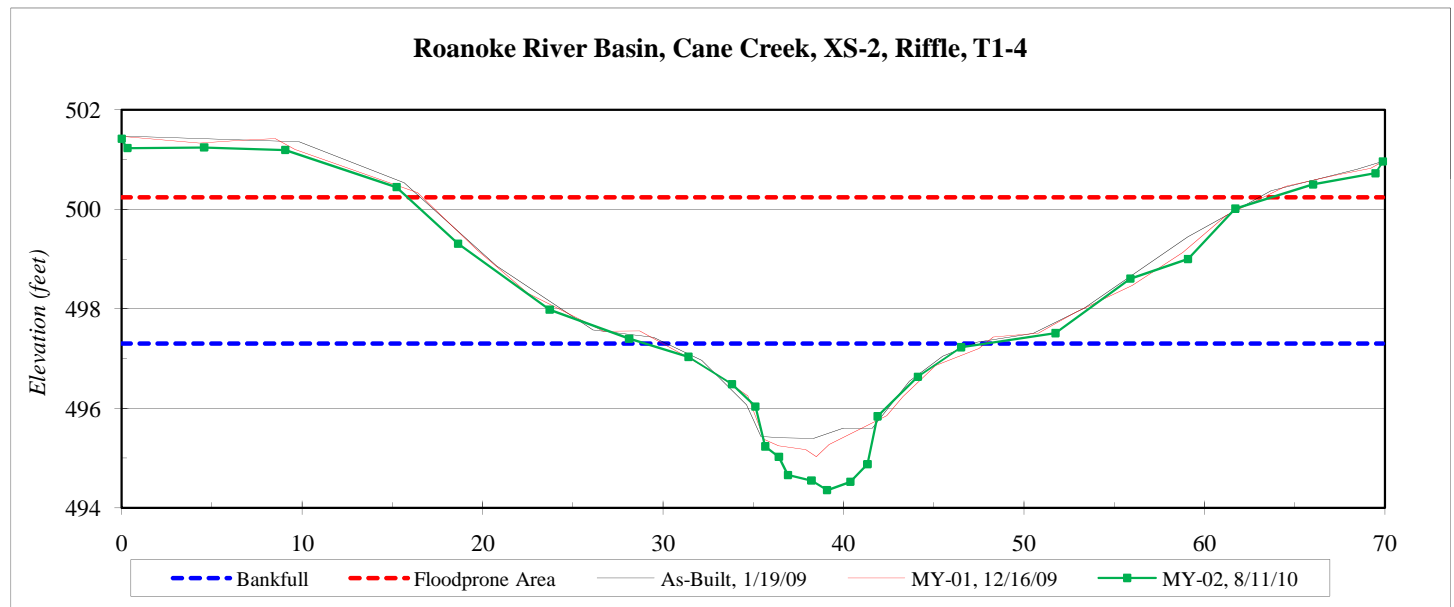
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-2, Riffle, T1-4
<b>Drainage Area (sq mi):</b>	0.62
<b>Date:</b>	8/11/2010
<b>Field Crew:</b>	A. French, A. Helms

Station	Elevation
0.0	501.42
0.3	501.23
4.6	501.25
9.1	501.19
15.2	500.45
18.6	499.31
23.7	497.98
28.1	497.40
31.4	497.04
33.8	496.49
35.1	496.04
35.7	495.23
36.4	495.02
36.9	494.66
38.2	494.55
39.1	494.35
40.4	494.52
41.3	494.88
41.9	495.84
44.1	496.63
46.5	497.23
51.7	497.51
55.9	498.61
59.1	499.00
61.7	500.01
66.0	500.50
69.5	500.73
69.9	500.96

SUMMARY DATA	
<b>Bankfull Elevation:</b>	497.3
<b>Bankfull Cross-Sectional Area:</b>	23.3
<b>Bankfull Width:</b>	18.8
<b>Flood Prone Area Elevation:</b>	500.2
<b>Flood Prone Width:</b>	42
<b>Max Depth at Bankfull:</b>	2.9
<b>Mean Depth at Bankfull:</b>	1.2
<b>W / D Ratio:</b>	15.2
<b>Entrenchment Ratio:</b>	2.2
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	C/B4
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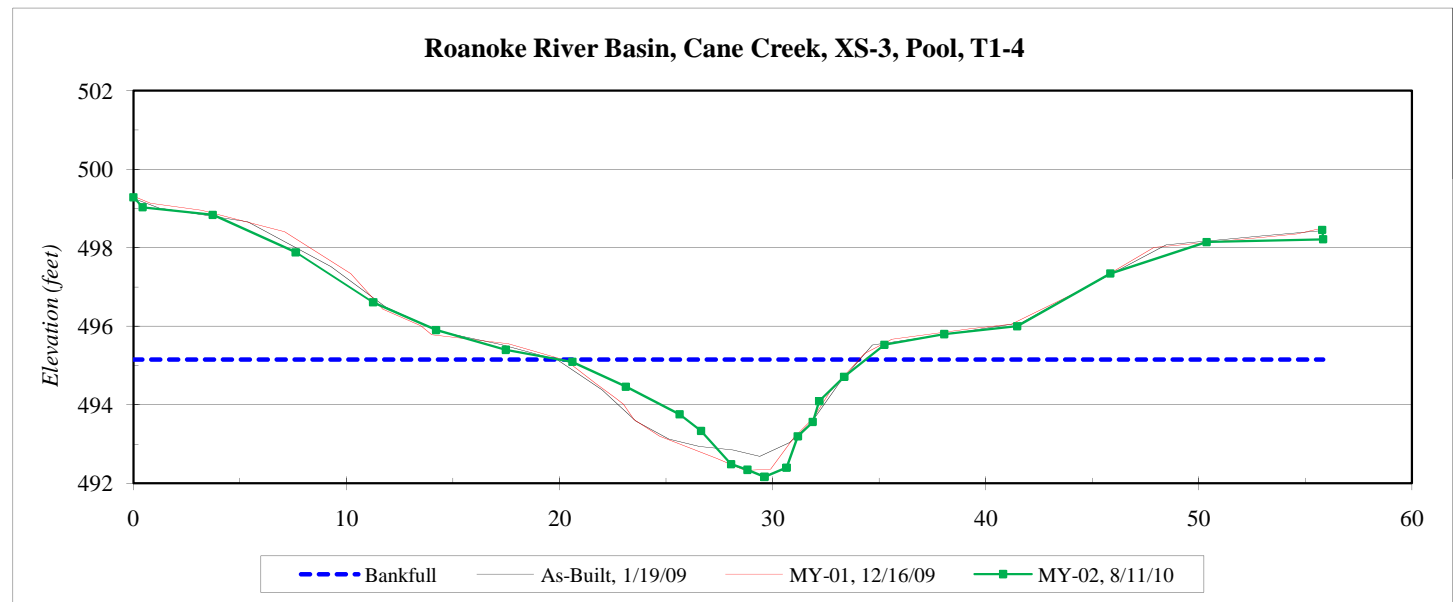
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-3, Pool, T1-4
<b>Drainage Area (sq mi):</b>	0.62
<b>Date:</b>	8/11/2010
<b>Field Crew:</b>	A. French, A. Helms

Station	Elevation
0.0	499.28
0.4	499.03
3.7	498.84
7.6	497.88
11.3	496.61
14.2	495.90
17.5	495.40
20.6	495.09
23.1	494.46
25.6	493.76
26.6	493.34
28.1	492.49
28.8	492.34
29.6	492.16
30.7	492.40
31.2	493.20
31.9	493.56
32.2	494.09
33.4	494.71
35.2	495.53
38.1	495.80
41.5	496.00
45.8	497.34
50.4	498.14
55.8	498.22
55.8	498.45

SUMMARY DATA	
<b>Bankfull Elevation:</b>	495.2
<b>Bankfull Cross-Sectional Area:</b>	19.7
<b>Bankfull Width:</b>	14.4
<b>Flood Prone Area Elevation:</b>	-
<b>Flood Prone Width:</b>	-
<b>Max Depth at Bankfull:</b>	3.0
<b>Mean Depth at Bankfull:</b>	1.4
<b>W / D Ratio:</b>	-
<b>Entrenchment Ratio:</b>	-
<b>Bank Height Ratio:</b>	-



<b>Stream Type</b>	C/B4
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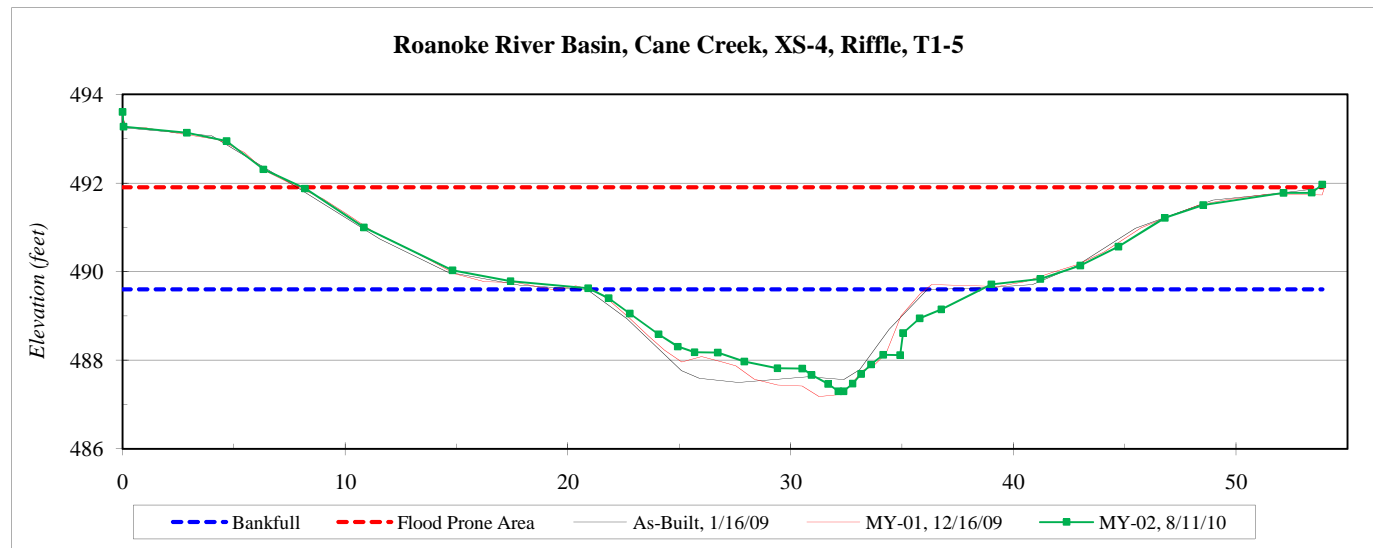
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-4, Riffle, T1-5
<b>Drainage Area (sq mi):</b>	0.70
<b>Date:</b>	8/11/2010
<b>Field Crew:</b>	A. French, A. Helms



Stream Type C/B4

Station	Elevation
0.0	493.61
0.05	493.27
2.9	493.14
4.7	492.95
6.3	492.31
8.2	491.88
10.8	490.99
14.8	490.03
17.4	489.79
20.9	489.63
21.8	489.40
22.8	489.06
24.1	488.59
24.9	488.31
25.7	488.18
26.7	488.17
27.9	487.97
29.4	487.82
30.5	487.81
30.9	487.66
31.7	487.46
32.1	487.30
32.4	487.30
32.8	487.47
33.2	487.69
33.6	487.90
34.2	488.12
34.9	488.12
35.0	488.62
35.8	488.94
36.8	489.15
39.0	489.71
41.2	489.83
43.0	490.14
44.7	490.57
46.8	491.22
48.5	491.50
52.1	491.78
53.4	491.78
53.9	491.97

SUMMARY DATA	
<b>Bankfull Elevation:</b>	489.6
<b>Bankfull Cross-Sectional Area:</b>	21.2
<b>Bankfull Width:</b>	17.5
<b>Flood Prone Area Elevation:</b>	491.9
<b>Flood Prone Width:</b>	37
<b>Max Depth at Bankfull:</b>	2.3
<b>Mean Depth at Bankfull:</b>	1.2
<b>W / D Ratio:</b>	14.4
<b>Entrenchment Ratio:</b>	2.1
<b>Bank Height Ratio:</b>	1.0



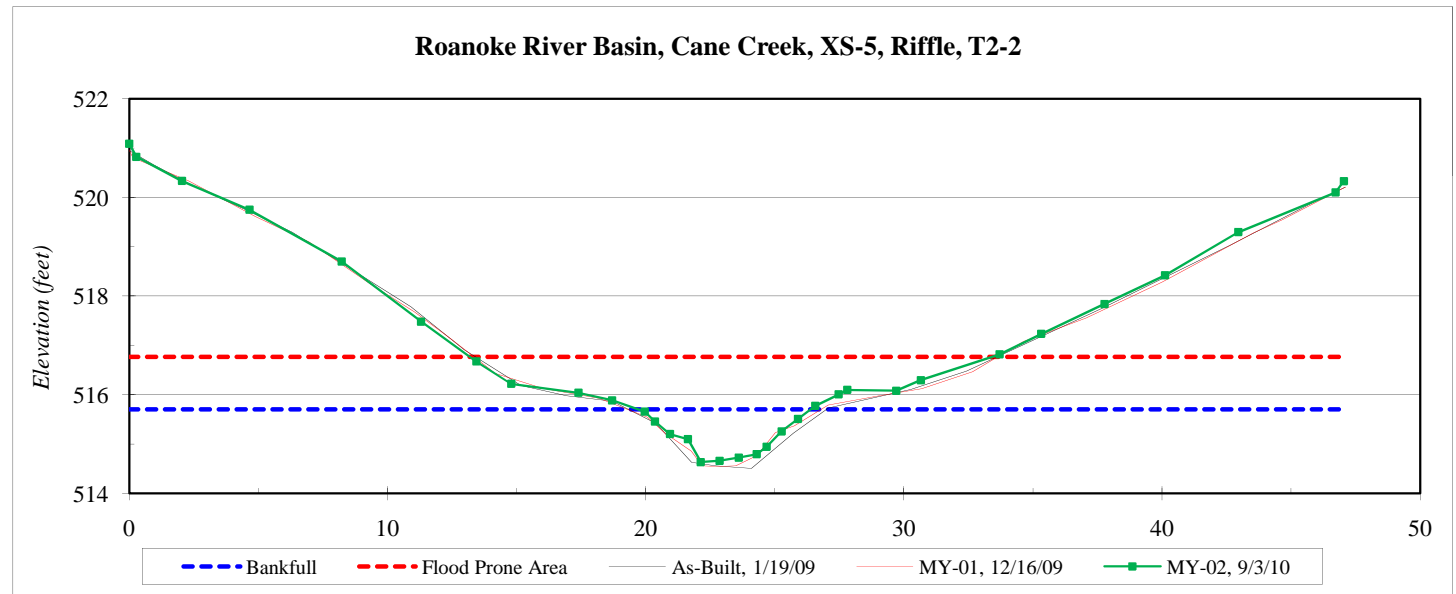
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-5, Riffle, T2-2
<b>Drainage Area (sq mi):</b>	0.11
<b>Date:</b>	9/3/2010
<b>Field Crew:</b>	A. French, M. Koss

Station	Elevation
0.0	521.08
0.3	520.82
2.0	520.33
4.7	519.75
8.2	518.70
11.3	517.48
13.4	516.67
14.8	516.22
17.4	516.04
18.7	515.89
20.0	515.66
20.4	515.45
20.9	515.20
21.6	515.10
22.1	514.63
22.9	514.66
23.6	514.72
24.3	514.79
24.7	514.95
25.3	515.26
25.9	515.51
26.6	515.77
27.5	516.01
27.8	516.10
29.7	516.08
30.7	516.30
33.7	516.81
35.3	517.23
37.8	517.84
40.1	518.42
43.0	519.29
46.7	520.10
47.0	520.33

SUMMARY DATA	
<b>Bankfull Elevation:</b>	515.7
<b>Bankfull Cross-Sectional Area:</b>	4.2
<b>Bankfull Width:</b>	6.7
<b>Flood Prone Area Elevation:</b>	516.8
<b>Flood Prone Width:</b>	21
<b>Max Depth at Bankfull:</b>	1.1
<b>Mean Depth at Bankfull:</b>	0.6
<b>W / D Ratio:</b>	10.7
<b>Entrenchment Ratio:</b>	3.1
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	C/E4
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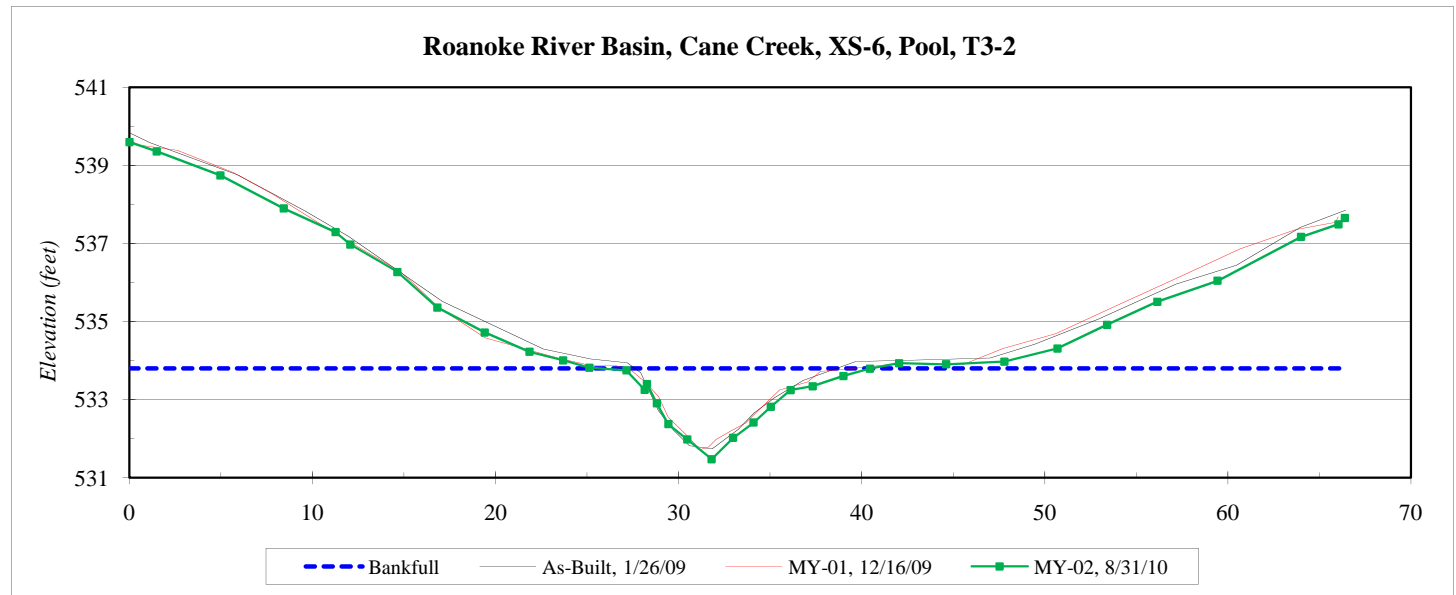
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-6, Pool, T3-2
<b>Drainage Area (sq mi):</b>	0.08
<b>Date:</b>	8/31/2010
<b>Field Crew:</b>	A. French, M. Koss



Stream Type B4

Station	Elevation
0.0	539.60
1.5	539.36
5.0	538.74
8.4	537.89
11.3	537.29
12.1	536.97
14.6	536.27
16.8	535.36
19.4	534.72
21.9	534.22
23.7	534.01
25.1	533.82
27.1	533.75
28.2	533.25
28.3	533.40
28.8	532.91
29.4	532.37
30.5	531.98
31.8	531.47
33.0	532.02
34.1	532.41
35.0	532.81
36.1	533.24
37.3	533.34
39.0	533.61
40.4	533.79
42.0	533.93
44.6	533.90
47.8	533.97
50.7	534.31
53.4	534.91
56.1	535.50
59.4	536.04
64.0	537.16
66.0	537.49
66.4	537.65

SUMMARY DATA	
<b>Bankfull Elevation:</b>	533.8
<b>Bankfull Cross-Sectional Area:</b>	13.3
<b>Bankfull Width:</b>	13.5
<b>Flood Prone Area Elevation:</b>	-
<b>Flood Prone Width:</b>	-
<b>Max Depth at Bankfull:</b>	2.3
<b>Mean Depth at Bankfull:</b>	1.0
<b>W / D Ratio:</b>	-
<b>Entrenchment Ratio:</b>	-
<b>Bank Height Ratio:</b>	-





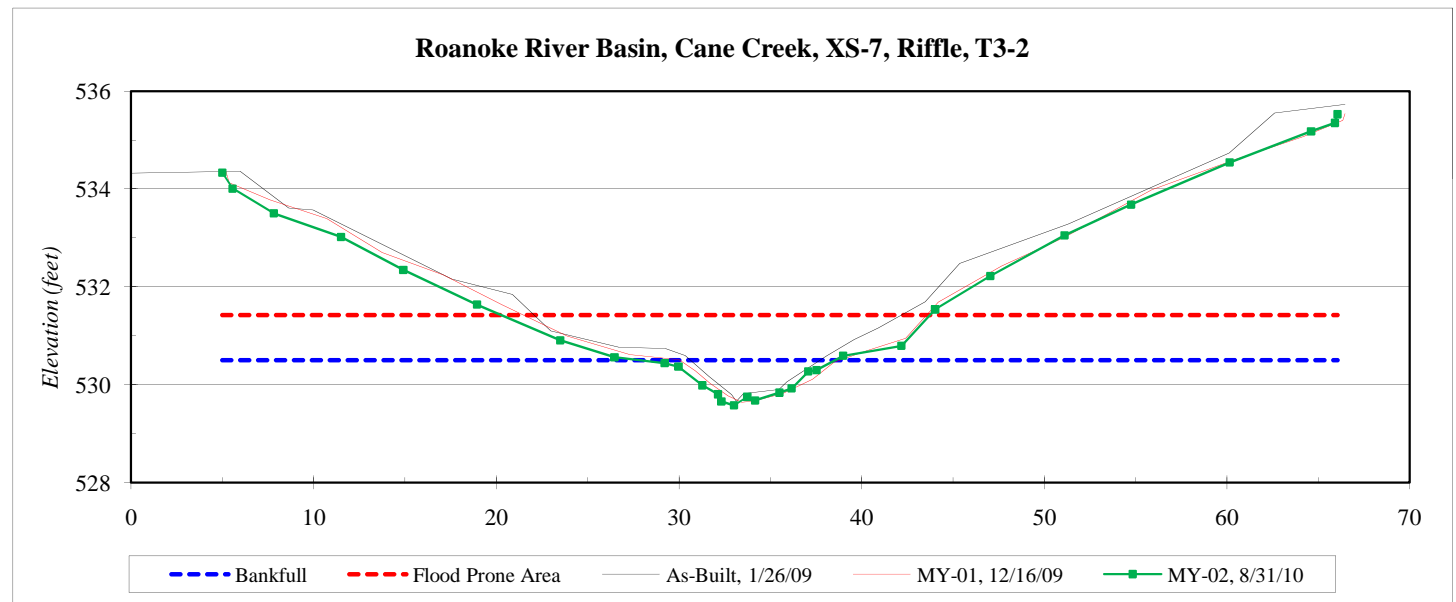
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-7, Riffle, T3-2
<b>Drainage Area (sq mi):</b>	0.08
<b>Date:</b>	8/31/2010
<b>Field Crew:</b>	A. French, M. Koss

Station	Elevation
5.0	534.33
5.6	534.01
7.8	533.50
11.5	533.02
14.9	532.35
18.9	531.64
23.5	530.91
26.5	530.56
29.2	530.44
30.0	530.37
31.3	529.99
32.1	529.80
32.3	529.66
33.0	529.58
33.7	529.75
34.2	529.68
35.5	529.84
36.2	529.92
37.1	530.27
37.5	530.30
39.0	530.59
42.2	530.79
44.0	531.54
47.0	532.22
51.1	533.05
54.8	533.68
60.1	534.54
64.6	535.18
65.9	535.35
66.0	535.53

SUMMARY DATA	
<b>Bankfull Elevation:</b>	530.5
<b>Bankfull Cross-Sectional Area:</b>	4.7
<b>Bankfull Width:</b>	9.4
<b>Flood Prone Area Elevation:</b>	531.4
<b>Flood Prone Width:</b>	22
<b>Max Depth at Bankfull:</b>	0.9
<b>Mean Depth at Bankfull:</b>	0.5
<b>W / D Ratio:</b>	18.8
<b>Entrenchment Ratio:</b>	2.3
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	B4
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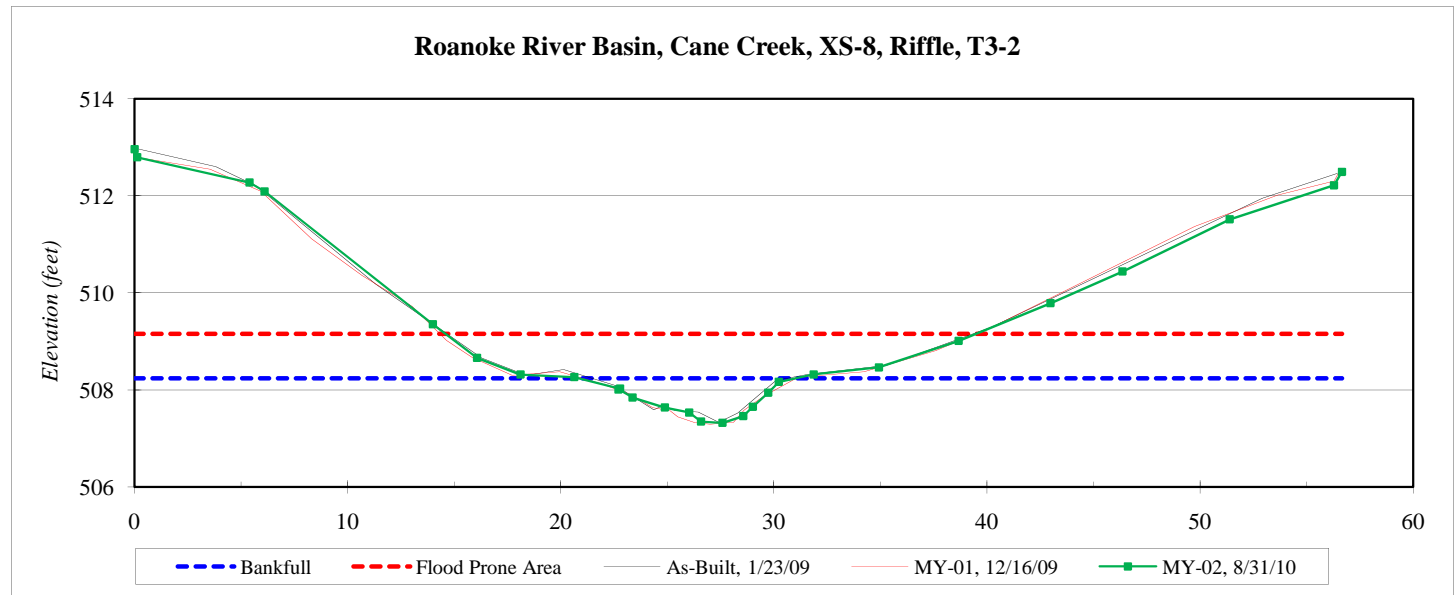
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-8, Riffle, T3-2
<b>Drainage Area (sq mi):</b>	0.08
<b>Date:</b>	8/31/2010
<b>Field Crew:</b>	A. French, M. Koss



Stream Type B4

Station	Elevation
0.0	513.24
0.1	513.06
5.4	512.51
6.1	512.31
14.0	509.39
16.1	508.65
18.1	508.28
20.6	508.23
22.8	507.97
22.7	507.96
23.4	507.77
24.9	507.56
26.0	507.45
26.6	507.25
27.6	507.22
28.6	507.37
29.0	507.58
29.7	507.88
30.2	508.12
31.9	508.29
34.9	508.44
38.7	509.02
43.0	509.85
46.4	510.55
51.4	511.70
56.3	512.44
56.7	512.74

SUMMARY DATA	
<b>Bankfull Elevation:</b>	508.2
<b>Bankfull Cross-Sectional Area:</b>	4.7
<b>Bankfull Width:</b>	9.3
<b>Flood Prone Area Elevation:</b>	509.2
<b>Flood Prone Width:</b>	26
<b>Max Depth at Bankfull:</b>	1.0
<b>Mean Depth at Bankfull:</b>	0.5
<b>W / D Ratio:</b>	18.4
<b>Entrenchment Ratio:</b>	2.8
<b>Bank Height Ratio:</b>	1.0



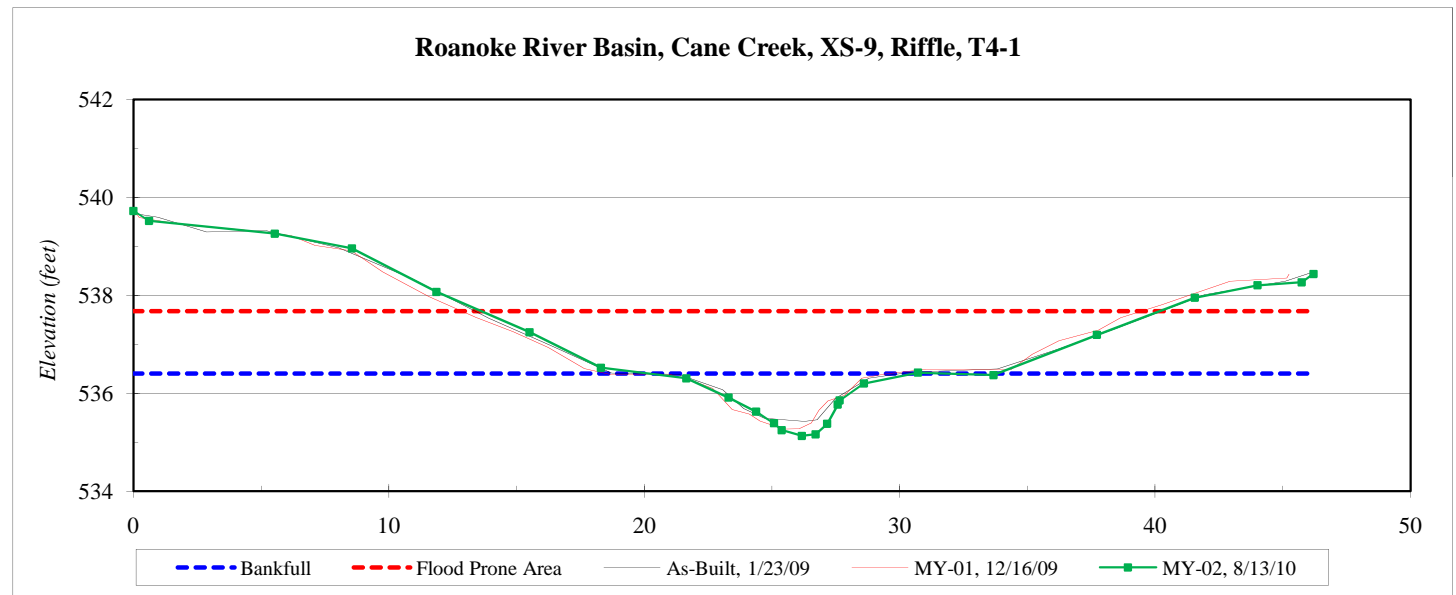
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-9, Riffle, T4-1
<b>Drainage Area (sq mi):</b>	0.10
<b>Date:</b>	8/13/2010
<b>Field Crew:</b>	A. French, A. Helms

Station	Elevation
0.0	539.72
0.6	539.52
5.5	539.26
8.6	538.96
11.9	538.07
15.5	537.24
18.3	536.52
21.6	536.30
23.3	535.91
24.4	535.62
25.1	535.39
25.4	535.25
26.2	535.13
26.7	535.16
27.2	535.37
27.6	535.76
27.7	535.85
28.6	536.20
30.7	536.42
33.7	536.37
37.7	537.19
41.6	537.95
44.0	538.20
45.7	538.26
46.2	538.44

SUMMARY DATA	
<b>Bankfull Elevation:</b>	536.4
<b>Bankfull Cross-Sectional Area:</b>	5.3
<b>Bankfull Width:</b>	10.4
<b>Flood Prone Area Elevation:</b>	537.7
<b>Flood Prone Width:</b>	25
<b>Max Depth at Bankfull:</b>	1.3
<b>Mean Depth at Bankfull:</b>	0.5
<b>W / D Ratio:</b>	20.4
<b>Entrenchment Ratio:</b>	2.4
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	B4
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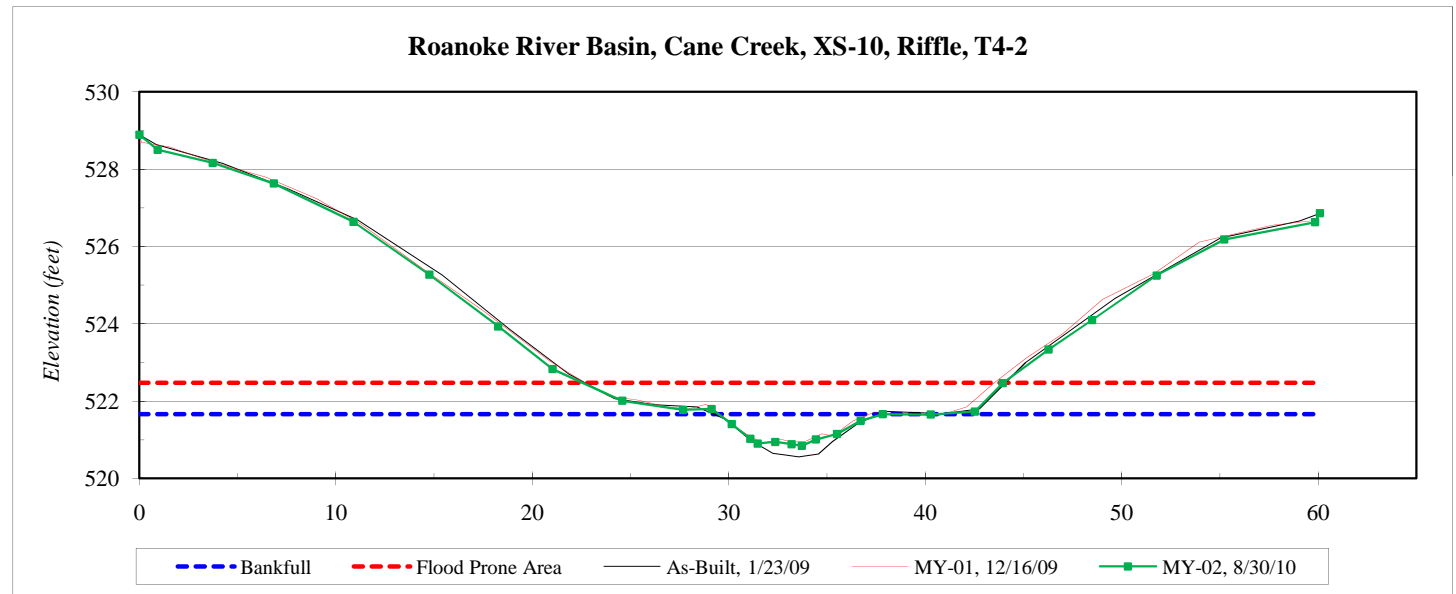
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-10, Riffle, T4-2
<b>Drainage Area (sq mi):</b>	0.10
<b>Date:</b>	8/30/2010
<b>Field Crew:</b>	A. French, M. Koss

Station	Elevation
0.0	528.89
0.9	528.50
3.7	528.16
6.9	527.63
10.9	526.64
14.8	525.28
18.3	523.94
21.0	522.83
24.6	522.01
27.7	521.77
29.1	521.80
30.2	521.40
31.1	521.02
31.5	520.90
32.4	520.95
33.2	520.89
33.7	520.85
34.4	521.01
35.5	521.15
36.7	521.49
37.8	521.66
40.3	521.65
42.5	521.73
44.0	522.47
46.3	523.33
48.5	524.10
51.8	525.25
55.2	526.18
59.8	526.63
60.1	526.86

SUMMARY DATA	
<b>Bankfull Elevation:</b>	521.7
<b>Bankfull Cross-Sectional Area:</b>	4.1
<b>Bankfull Width:</b>	8.3
<b>Flood Prone Area Elevation:</b>	522.5
<b>Flood Prone Width:</b>	21
<b>Max Depth at Bankfull:</b>	0.8
<b>Mean Depth at Bankfull:</b>	0.5
<b>W / D Ratio:</b>	16.8
<b>Entrenchment Ratio:</b>	2.6
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	B4
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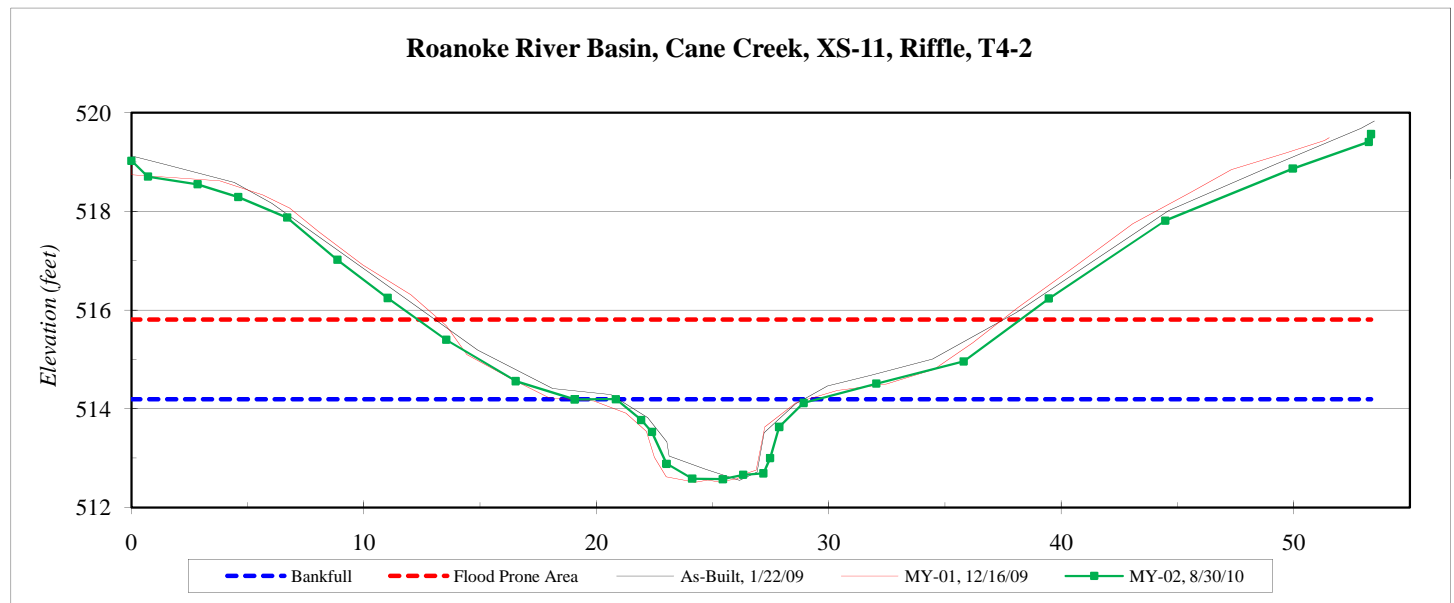
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-11, Riffle, T4-2
<b>Drainage Area (sq mi):</b>	0.10
<b>Date:</b>	8/30/2010
<b>Field Crew:</b>	A. French, M. Koss

Station	Elevation
0.0	519.02
0.7	518.70
2.8	518.55
4.6	518.29
6.7	517.87
8.9	517.02
11.0	516.24
13.5	515.40
16.5	514.56
19.1	514.19
20.8	514.19
21.9	513.77
22.4	513.53
23.0	512.88
24.1	512.58
25.4	512.57
26.3	512.66
27.2	512.69
27.5	513.00
27.9	513.63
28.9	514.12
32.1	514.51
35.8	514.96
39.5	516.23
44.5	517.81
50.0	518.87
53.2	519.41
53.3	519.56

SUMMARY DATA	
<b>Bankfull Elevation:</b>	514.2
<b>Bankfull Cross-Sectional Area:</b>	6.4
<b>Bankfull Width:</b>	6.8
<b>Flood Prone Area Elevation:</b>	515.8
<b>Flood Prone Width:</b>	22
<b>Max Depth at Bankfull:</b>	1.6
<b>Mean Depth at Bankfull:</b>	0.9
<b>W / D Ratio:</b>	7.2
<b>Entrenchment Ratio:</b>	3.2
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	B4
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<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-12, Pool, T4-2
<b>Drainage Area (sq mi):</b>	0.10
<b>Date:</b>	8/13/2010
<b>Field Crew:</b>	A. French, A. Helms

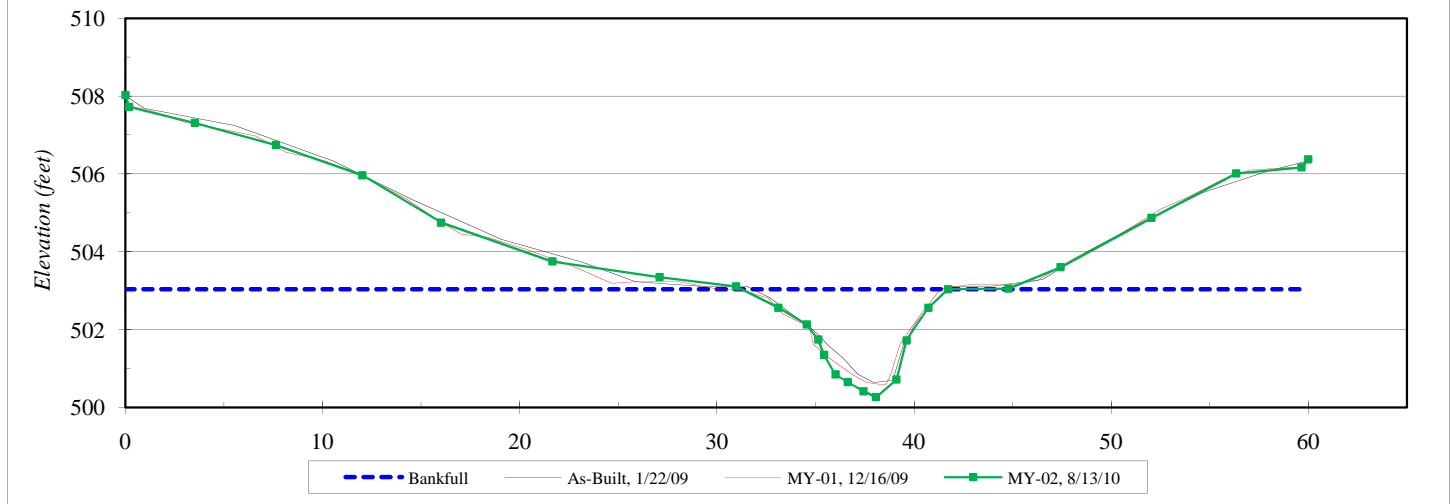


<b>Stream Type</b>	B4
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Station	Elevation
0.0	508.03
0.2	507.72
3.5	507.31
7.6	506.74
12.0	505.97
16.0	504.75
21.7	503.75
27.1	503.34
31.0	503.11
33.1	502.56
34.6	502.13
35.1	501.74
35.4	501.35
36.0	500.85
36.6	500.65
37.4	500.42
38.1	500.26
39.1	500.72
39.6	501.72
40.7	502.56
41.7	503.04
44.8	503.05
47.4	503.60
52.1	504.87
56.3	506.01
59.7	506.17
60.0	506.37

SUMMARY DATA	
<b>Bankfull Elevation:</b>	503.0
<b>Bankfull Cross-Sectional Area:</b>	13.6
<b>Bankfull Width:</b>	10.5
<b>Flood Prone Area Elevation:</b>	-
<b>Flood Prone Width:</b>	-
<b>Max Depth at Bankfull:</b>	2.8
<b>Mean Depth at Bankfull:</b>	1.3
<b>W / D Ratio:</b>	-
<b>Entrenchment Ratio:</b>	-
<b>Bank Height Ratio:</b>	-

Roanoke River Basin, Cane Creek, XS-12, Pool, T4-2



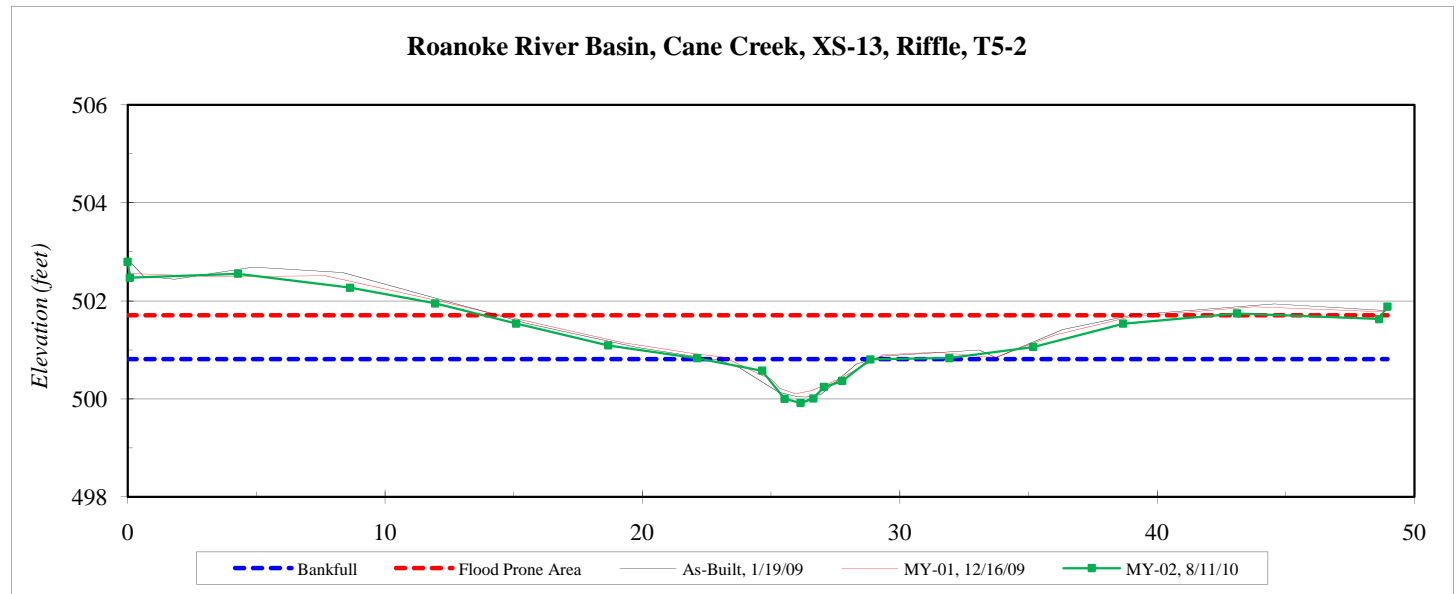
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-13, Riffle, T5-2
<b>Drainage Area (sq mi):</b>	0.02
<b>Date:</b>	8/11/2010
<b>Field Crew:</b>	A. French, A. Helms



<b>Stream Type</b>	B4
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Station	Elevation
0.0	502.80
0.1	502.47
4.3	502.55
8.6	502.27
11.9	501.95
15.1	501.54
18.7	501.09
22.1	500.83
24.7	500.58
25.5	500.00
26.1	499.92
26.6	500.01
27.1	500.24
27.8	500.37
28.9	500.81
31.9	500.83
35.2	501.06
38.7	501.53
43.1	501.74
48.6	501.63
48.9	501.88

SUMMARY DATA	
<b>Bankfull Elevation:</b>	500.8
<b>Bankfull Cross-Sectional Area:</b>	2.6
<b>Bankfull Width:</b>	6.9
<b>Flood Prone Area Elevation:</b>	501.7
<b>Flood Prone Width:</b>	23
<b>Max Depth at Bankfull:</b>	0.9
<b>Mean Depth at Bankfull:</b>	0.4
<b>W / D Ratio:</b>	18.3
<b>Entrenchment Ratio:</b>	3.3
<b>Bank Height Ratio:</b>	1.0



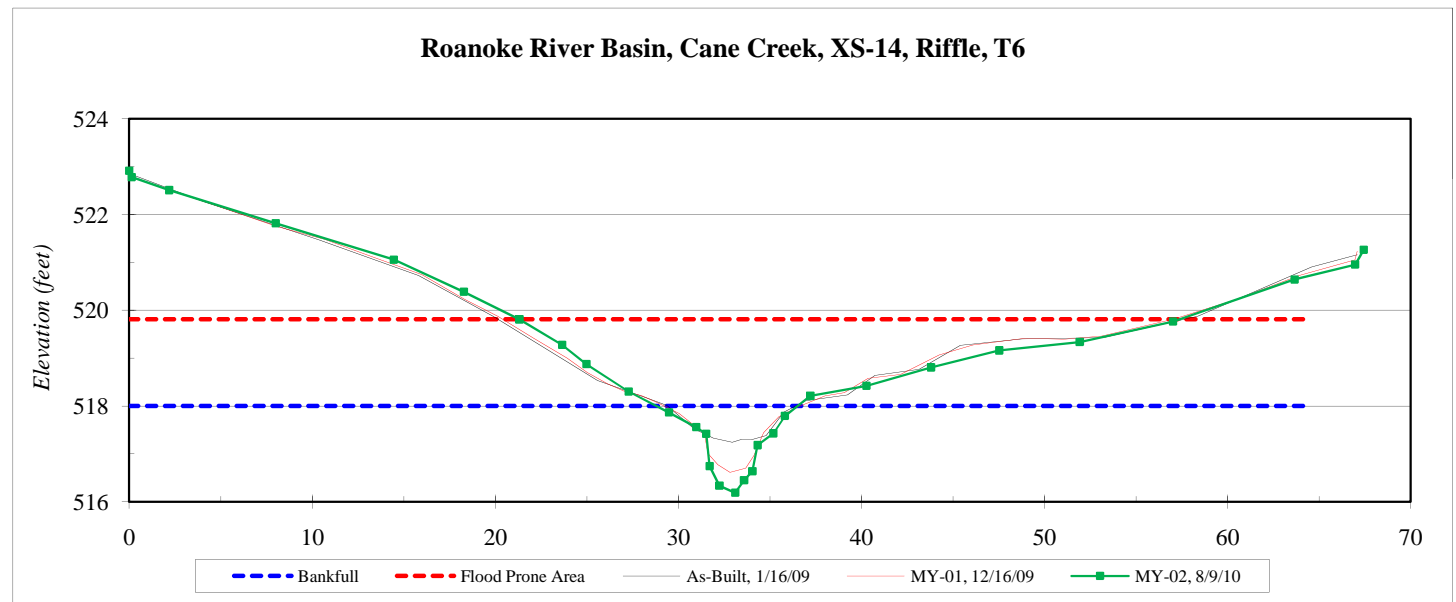
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-14, Riffle, T6
<b>Drainage Area (sq mi):</b>	0.07
<b>Date:</b>	8/9/2010
<b>Field Crew:</b>	A. French, A. Helms

Station	Elevation
0.0	522.39
4.0	521.82
10.5	521.06
14.3	520.38
17.3	519.81
19.6	519.27
22.0	518.88
24.3	518.30
26.5	517.87
28.0	517.56
28.5	517.42
28.7	516.75
29.2	516.34
30.1	516.19
30.6	516.45
31.0	516.64
31.3	517.18
32.2	517.43
32.8	517.79
34.2	518.21
37.3	518.42
40.8	518.81
44.5	519.16
48.9	519.34
54.0	519.76
60.7	520.64
64.0	520.95
64.4	521.26

SUMMARY DATA	
<b>Bankfull Elevation:</b>	518.0
<b>Bankfull Cross-Sectional Area:</b>	5.9
<b>Bankfull Width:</b>	7.7
<b>Flood Prone Area Elevation:</b>	519.8
<b>Flood Prone Width:</b>	26
<b>Max Depth at Bankfull:</b>	1.8
<b>Mean Depth at Bankfull:</b>	0.8
<b>W / D Ratio:</b>	10.0
<b>Entrenchment Ratio:</b>	3.4
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	B4
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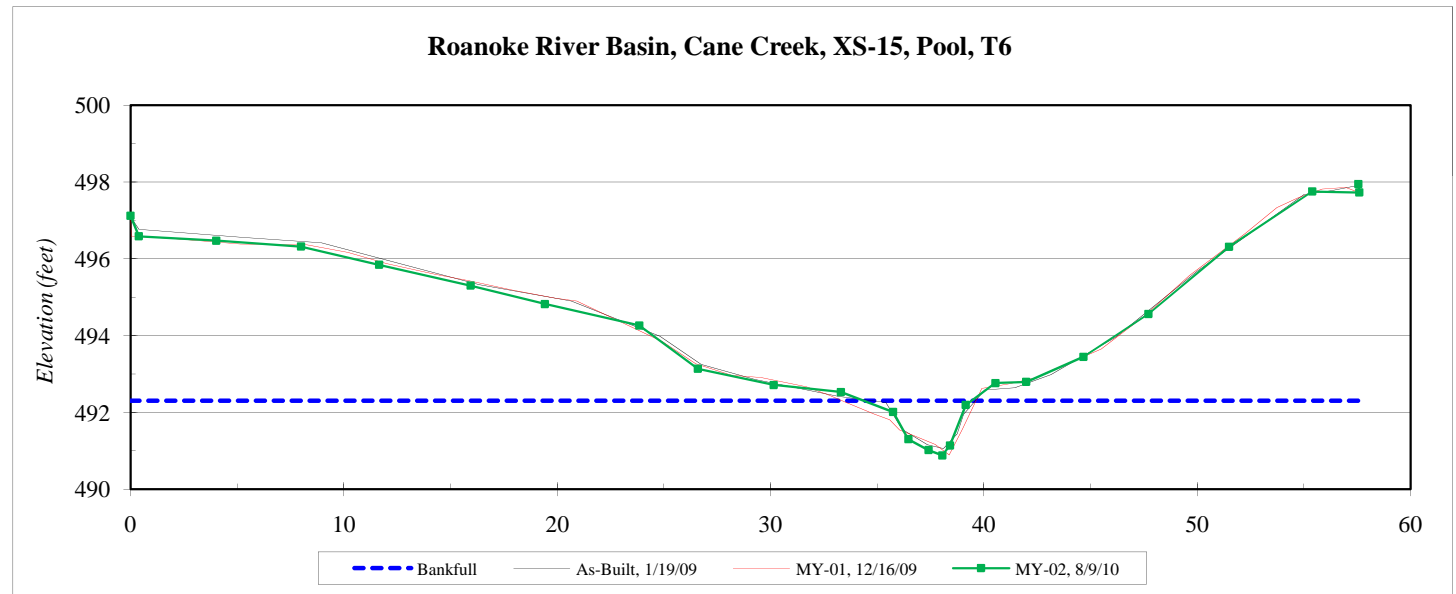
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-15, Pool, T6
<b>Drainage Area (sq mi):</b>	0.07
<b>Date:</b>	8/9/2010
<b>Field Crew:</b>	A. French, A. Helms

Station	Elevation
0.0	497.12
0.4	496.58
4.0	496.47
8.0	496.32
11.6	495.84
15.9	495.30
19.4	494.82
23.8	494.26
26.6	493.13
30.1	492.71
33.3	492.53
35.7	492.01
36.5	491.30
37.4	491.02
38.1	490.88
38.4	491.13
39.2	492.19
40.5	492.76
42.0	492.79
44.7	493.45
47.7	494.56
51.5	496.31
55.4	497.75
57.6	497.73
57.6	497.95

SUMMARY DATA	
<b>Bankfull Elevation:</b>	492.3
<b>Bankfull Cross-Sectional Area:</b>	3.6
<b>Bankfull Width:</b>	5.0
<b>Flood Prone Area Elevation:</b>	-
<b>Flood Prone Width:</b>	-
<b>Max Depth at Bankfull:</b>	1.4
<b>Mean Depth at Bankfull:</b>	0.7
<b>W / D Ratio:</b>	-
<b>Entrenchment Ratio:</b>	-
<b>Bank Height Ratio:</b>	-



<b>Stream Type</b>	B4
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<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-16, Riffle, T6
<b>Drainage Area (sq mi):</b>	0.07
<b>Date:</b>	8/9/2010
<b>Field Crew:</b>	A. French, A. Helms

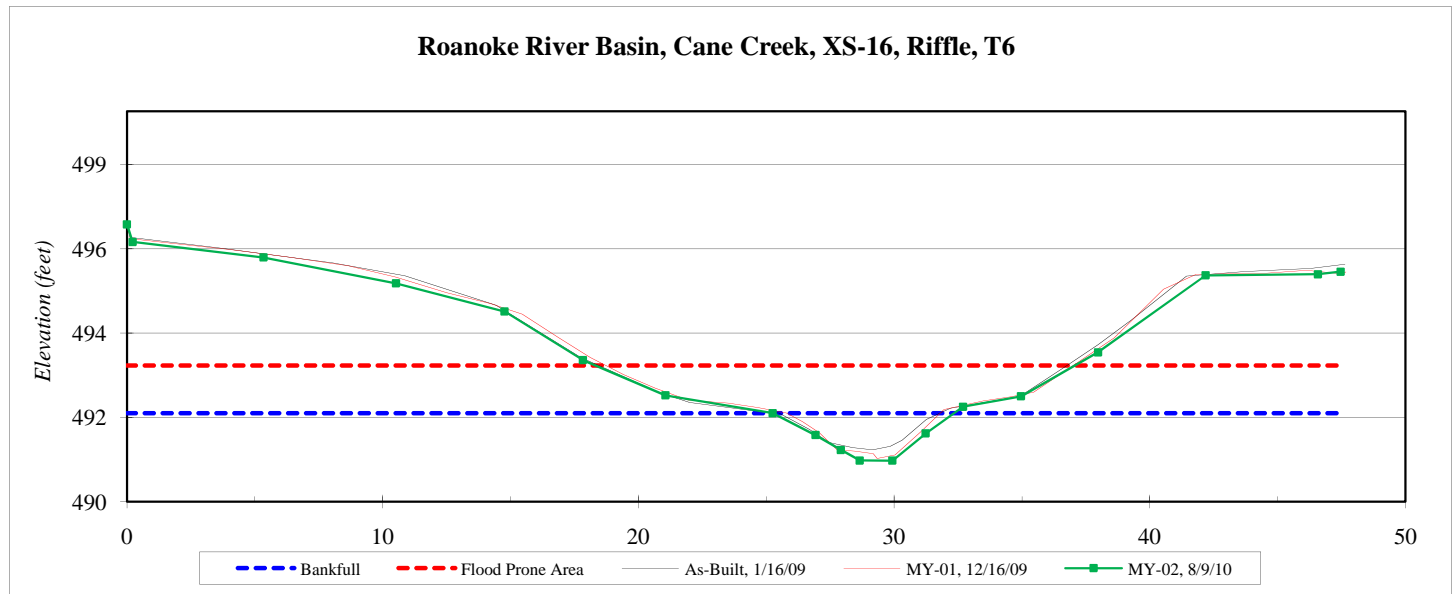
Station	Elevation
0.0	497.11
0.2	496.65
5.3	496.26
10.5	495.59
14.8	494.87
17.8	493.62
21.1	492.73
25.2	492.27
26.9	491.71
27.9	491.33
28.7	491.06
29.9	491.05
31.2	491.75
32.7	492.44
35.0	492.70
38.0	493.83
42.2	495.80
46.6	495.83
47.5	495.89

SUMMARY DATA	
<b>Bankfull Elevation:</b>	492.3
<b>Bankfull Cross-Sectional Area:</b>	5.2
<b>Bankfull Width:</b>	7.4
<b>Flood Prone Area Elevation:</b>	493.5
<b>Flood Prone Width:</b>	18
<b>Max Depth at Bankfull:</b>	1.2
<b>Mean Depth at Bankfull:</b>	0.7
<b>W / D Ratio:</b>	10.5
<b>Entrenchment Ratio:</b>	2.4
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	B4
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Roanoke River Basin, Cane Creek, XS-16, Riffle, T6



<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-17, Pool, T7-3
<b>Drainage Area (sq mi):</b>	0.18
<b>Date:</b>	9/2/2010
<b>Field Crew:</b>	A. French, M. Koss

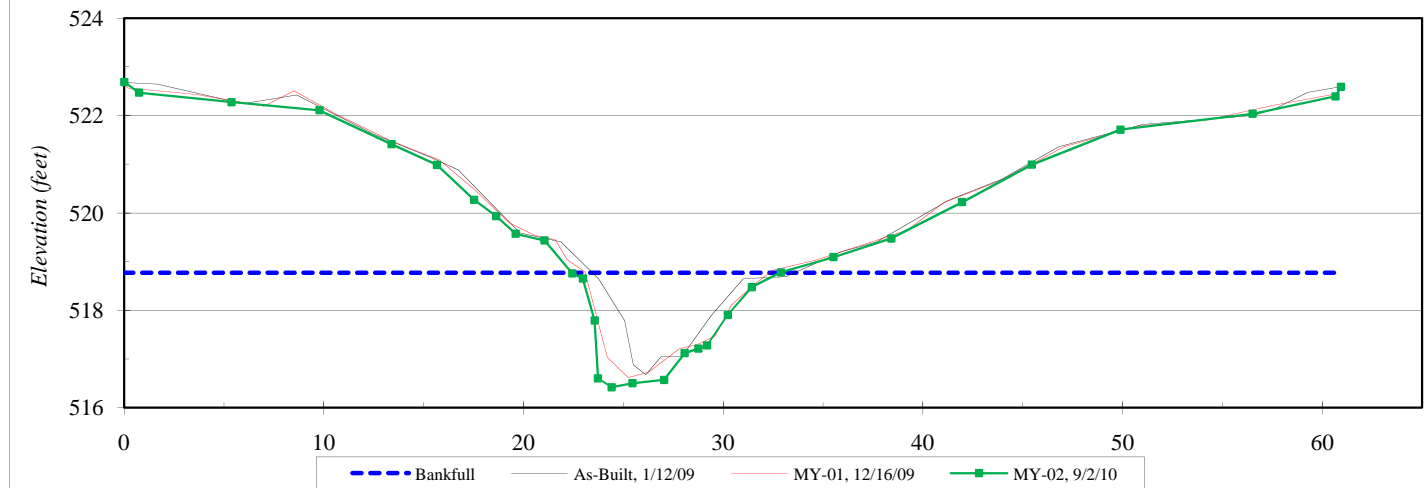


**Stream Type** B4c

Station	Elevation
0.0	522.69
0.7	522.47
5.4	522.28
9.8	522.11
13.4	521.41
15.7	520.99
17.5	520.27
18.6	519.94
19.6	519.57
21.1	519.43
22.4	518.76
23.0	518.65
23.6	517.79
23.7	516.60
24.4	516.42
25.4	516.50
27.0	516.57
28.1	517.12
28.8	517.21
29.2	517.28
30.2	517.91
31.4	518.48
32.9	518.78
35.5	519.09
38.4	519.48
42.0	520.22
45.4	520.99
49.9	521.71
56.5	522.04
60.7	522.40
60.9	522.59

SUMMARY DATA	
<b>Bankfull Elevation:</b>	518.8
<b>Bankfull Cross-Sectional Area:</b>	13.3
<b>Bankfull Width:</b>	9.8
<b>Flood Prone Area Elevation:</b>	-
<b>Flood Prone Width:</b>	-
<b>Max Depth at Bankfull:</b>	2.3
<b>Mean Depth at Bankfull:</b>	1.4
<b>W / D Ratio:</b>	-
<b>Entrenchment Ratio:</b>	-
<b>Bank Height Ratio:</b>	-

**Roanoke River Basin, Cane Creek, XS-17, Pool, T7-3**



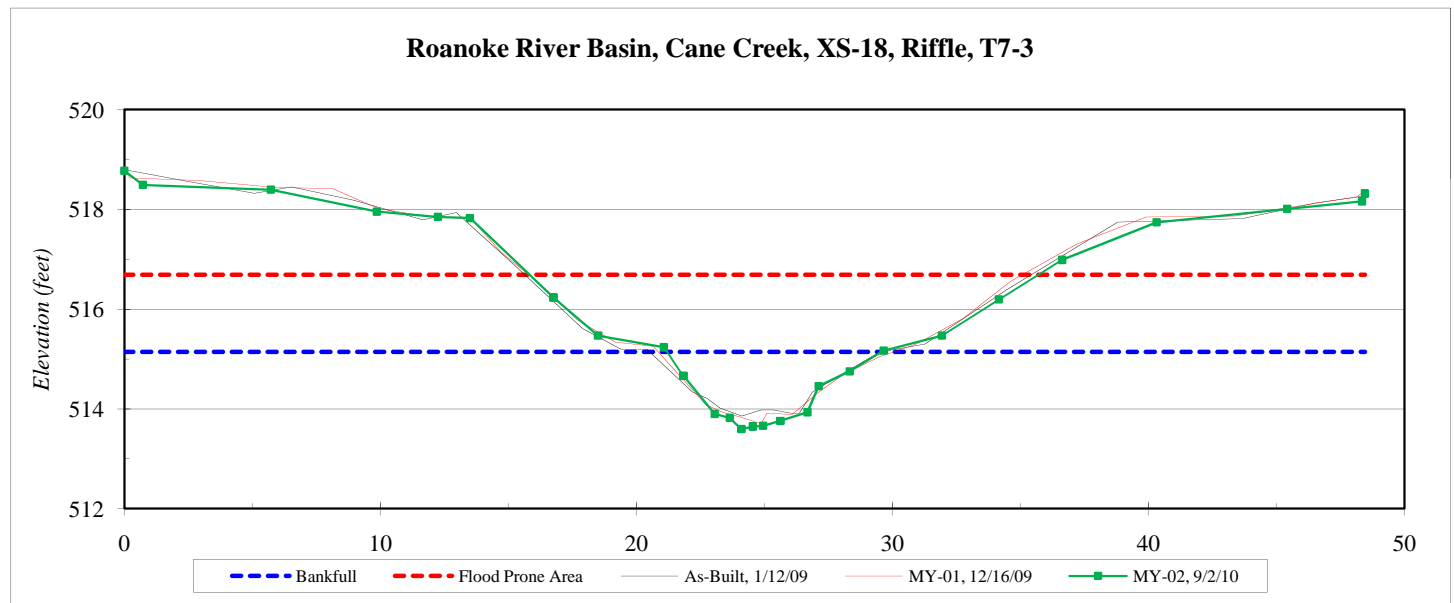
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-18, Riffle, T7-3
<b>Drainage Area (sq mi):</b>	0.18
<b>Date:</b>	9/2/2010
<b>Field Crew:</b>	A. French, M. Koss

Station	Elevation
0.0	518.77
0.7	518.49
5.7	518.39
9.9	517.95
12.2	517.85
13.5	517.82
16.8	516.23
18.5	515.47
21.1	515.23
21.8	514.66
21.8	514.66
23.1	513.90
23.6	513.82
24.1	513.60
24.5	513.64
24.9	513.66
25.6	513.76
26.7	513.93
27.1	514.45
28.3	514.75
29.7	515.17
31.9	515.47
34.2	516.19
36.6	516.99
40.3	517.74
45.4	518.01
48.4	518.16
48.5	518.31

SUMMARY DATA	
<b>Bankfull Elevation:</b>	515.1
<b>Bankfull Cross-Sectional Area:</b>	7.2
<b>Bankfull Width:</b>	8.2
<b>Flood Prone Area Elevation:</b>	516.7
<b>Flood Prone Width:</b>	19
<b>Max Depth at Bankfull:</b>	1.5
<b>Mean Depth at Bankfull:</b>	0.9
<b>W / D Ratio:</b>	9.3
<b>Entrenchment Ratio:</b>	2.3
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	B4c
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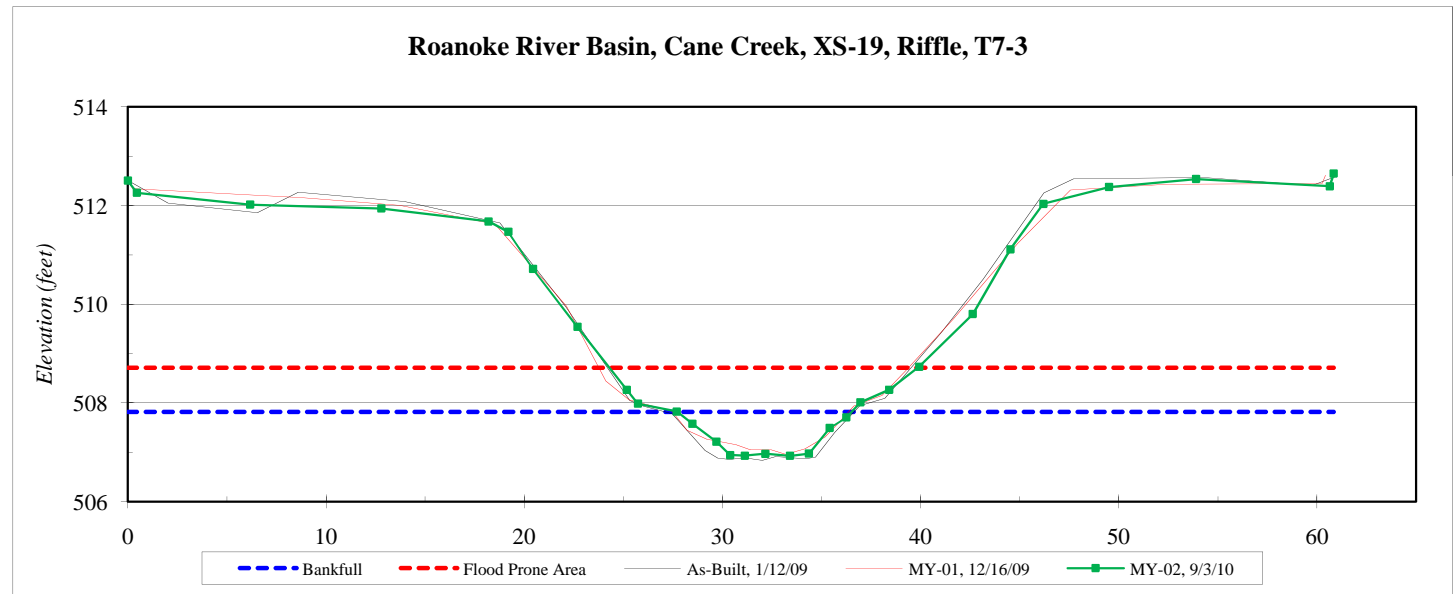
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-19, Riffle, T7-3
<b>Drainage Area (sq mi):</b>	0.18
<b>Date:</b>	9/3/2010
<b>Field Crew:</b>	A. French, M. Koss

Station	Elevation
0.0	512.51
0.5	512.26
6.2	512.02
12.8	511.94
18.2	511.68
19.2	511.47
20.4	510.72
22.7	509.54
25.2	508.26
25.7	507.99
27.7	507.83
28.5	507.58
29.7	507.21
30.4	506.94
31.1	506.93
32.2	506.97
33.4	506.93
34.4	506.97
35.4	507.49
36.3	507.71
37.0	508.01
38.4	508.27
39.9	508.73
42.6	509.80
44.5	511.12
46.2	512.04
49.5	512.38
53.9	512.54
60.6	512.39
60.8	512.65

SUMMARY DATA	
<b>Bankfull Elevation:</b>	507.8
<b>Bankfull Cross-Sectional Area:</b>	5.2
<b>Bankfull Width:</b>	8.7
<b>Flood Prone Area Elevation:</b>	508.7
<b>Flood Prone Width:</b>	15
<b>Max Depth at Bankfull:</b>	0.9
<b>Mean Depth at Bankfull:</b>	0.6
<b>W / D Ratio:</b>	14.6
<b>Entrenchment Ratio:</b>	1.7
<b>Bank Height Ratio:</b>	1.0



<b>Stream Type</b>	B4c
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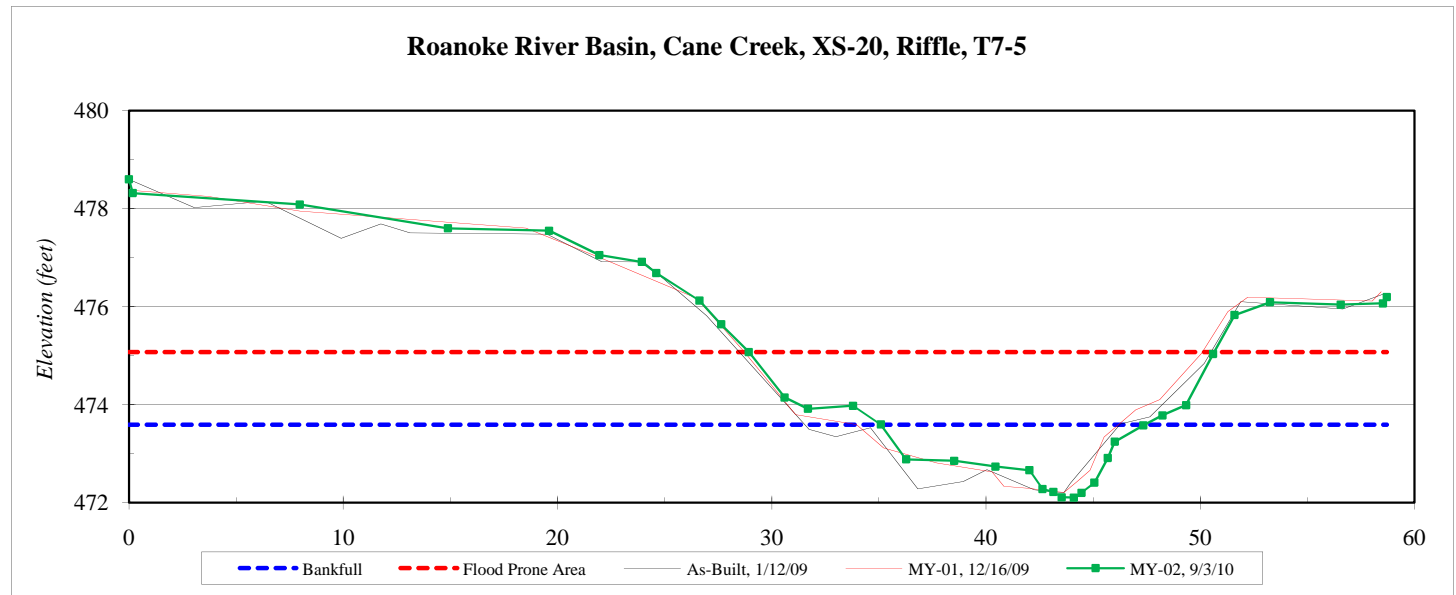
<b>River Basin:</b>	Roanoke
<b>Watershed:</b>	Cane Creek
<b>XS ID</b>	XS-20, Riffle, T7-5
<b>Drainage Area (sq mi):</b>	0.26
<b>Date:</b>	9/3/2010
<b>Field Crew:</b>	A. French, M. Koss



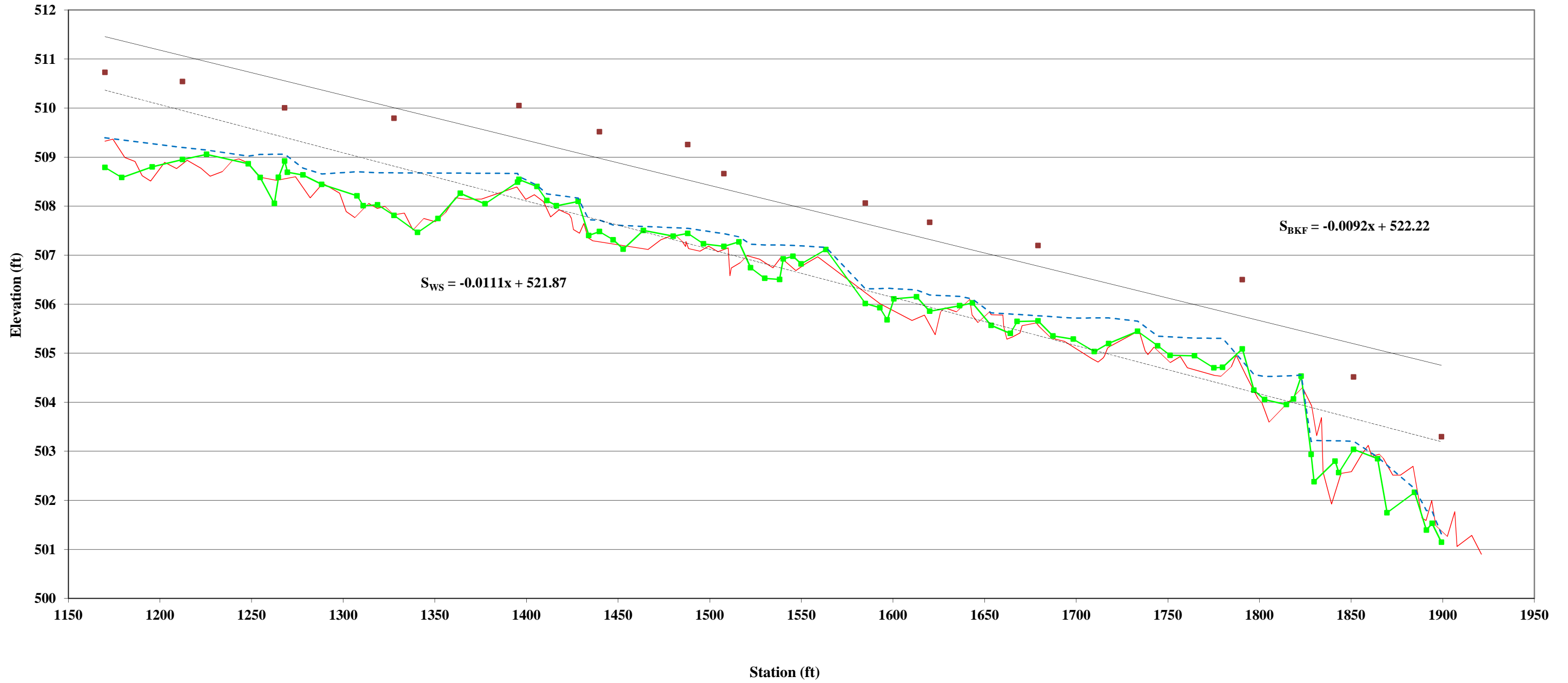
**Stream Type** B4c/C4

Station	Elevation
0.0	478.60
0.2	478.32
8.0	478.08
14.9	477.60
19.6	477.55
21.9	477.05
23.9	476.91
24.6	476.69
26.6	476.12
27.6	475.64
28.9	475.08
30.6	474.15
31.7	473.92
33.8	473.98
35.1	473.60
36.3	472.88
38.5	472.85
40.4	472.74
42.0	472.66
42.6	472.28
43.1	472.22
43.5	472.11
44.1	472.10
44.5	472.20
45.1	472.41
45.7	472.91
46.0	473.24
47.3	473.58
48.2	473.78
49.3	473.99
50.6	475.03
51.6	475.83
53.3	476.09
56.6	476.04
58.5	476.07
58.7	476.19

SUMMARY DATA	
<b>Bankfull Elevation:</b>	473.6
<b>Bankfull Cross-Sectional Area:</b>	8.9
<b>Bankfull Width:</b>	11.8
<b>Flood Prone Area Elevation:</b>	475.1
<b>Flood Prone Width:</b>	20.5
<b>Max Depth at Bankfull:</b>	1.5
<b>Mean Depth at Bankfull:</b>	0.8
<b>W / D Ratio:</b>	15.6
<b>Entrenchment Ratio:</b>	1.7
<b>Bank Height Ratio:</b>	1.0

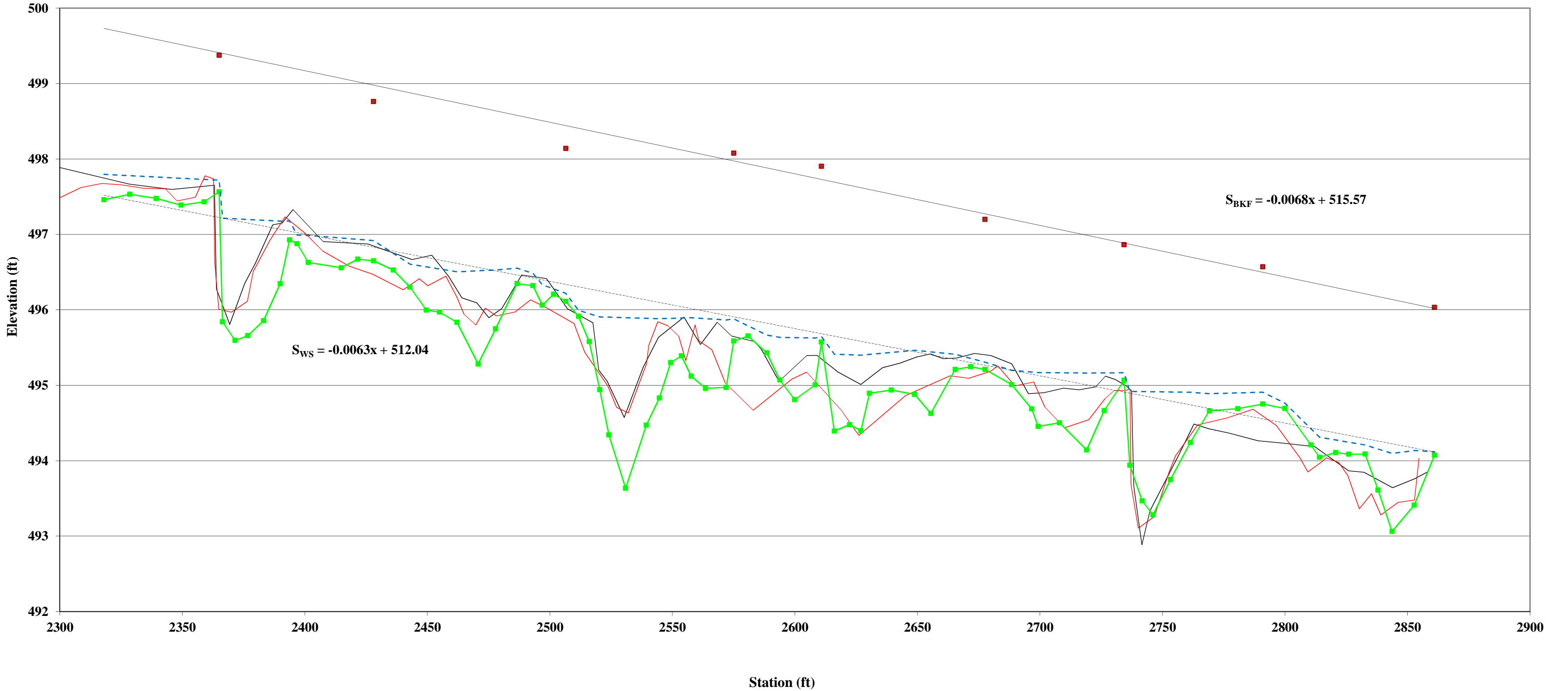


**Cane Creek Tributary Site  
 Longitudinal Profile  
 Tributary 1, MY-02  
 Stations 11+50 - 19+00**



\*Profile added during MY-01

**Cane Creek Tributary Site  
 Longitudinal Profile 2  
 Tributary 1, MY-02  
 Stations 23+00 - 28+58**

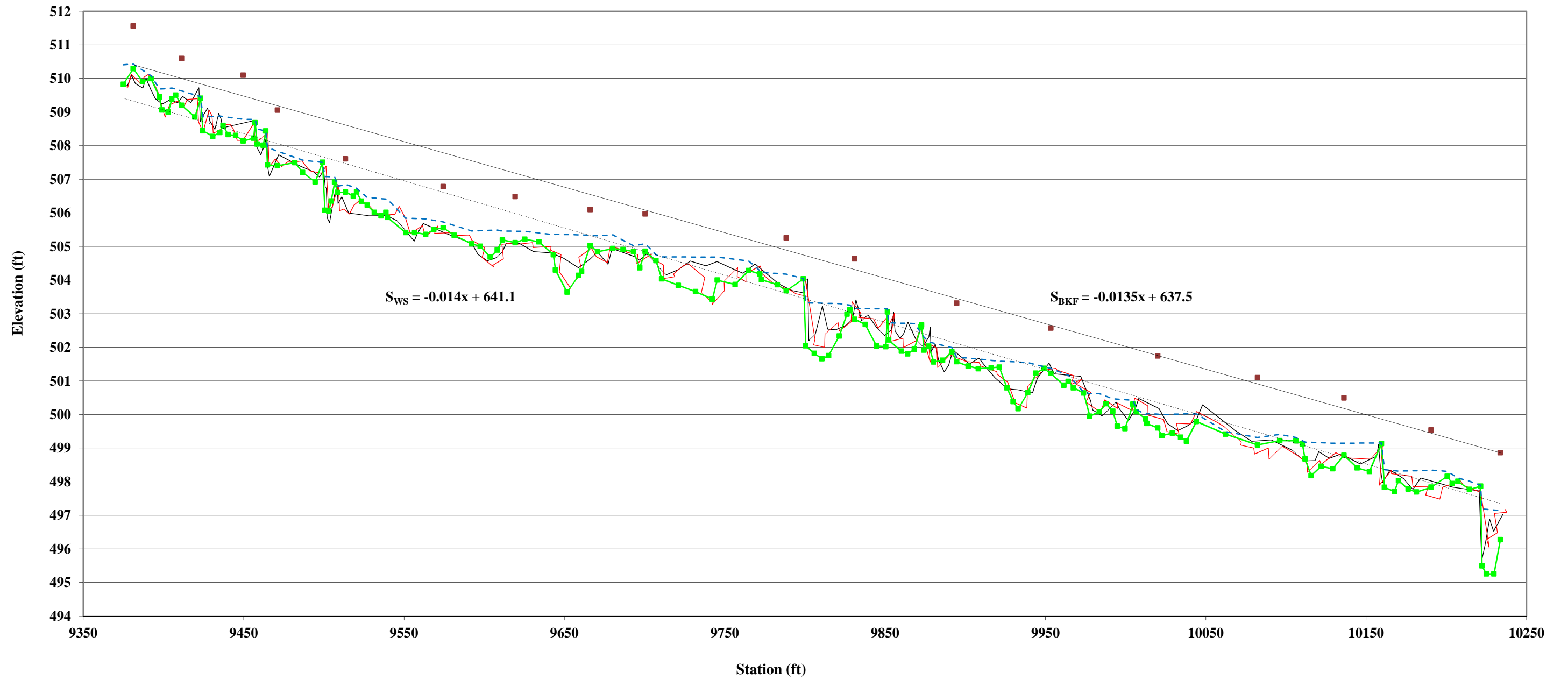




**Cane Creek Tributary Site  
 Longitudinal Profile  
 Tributary 3, MY-02  
 Stations 71+15 - 76+51**



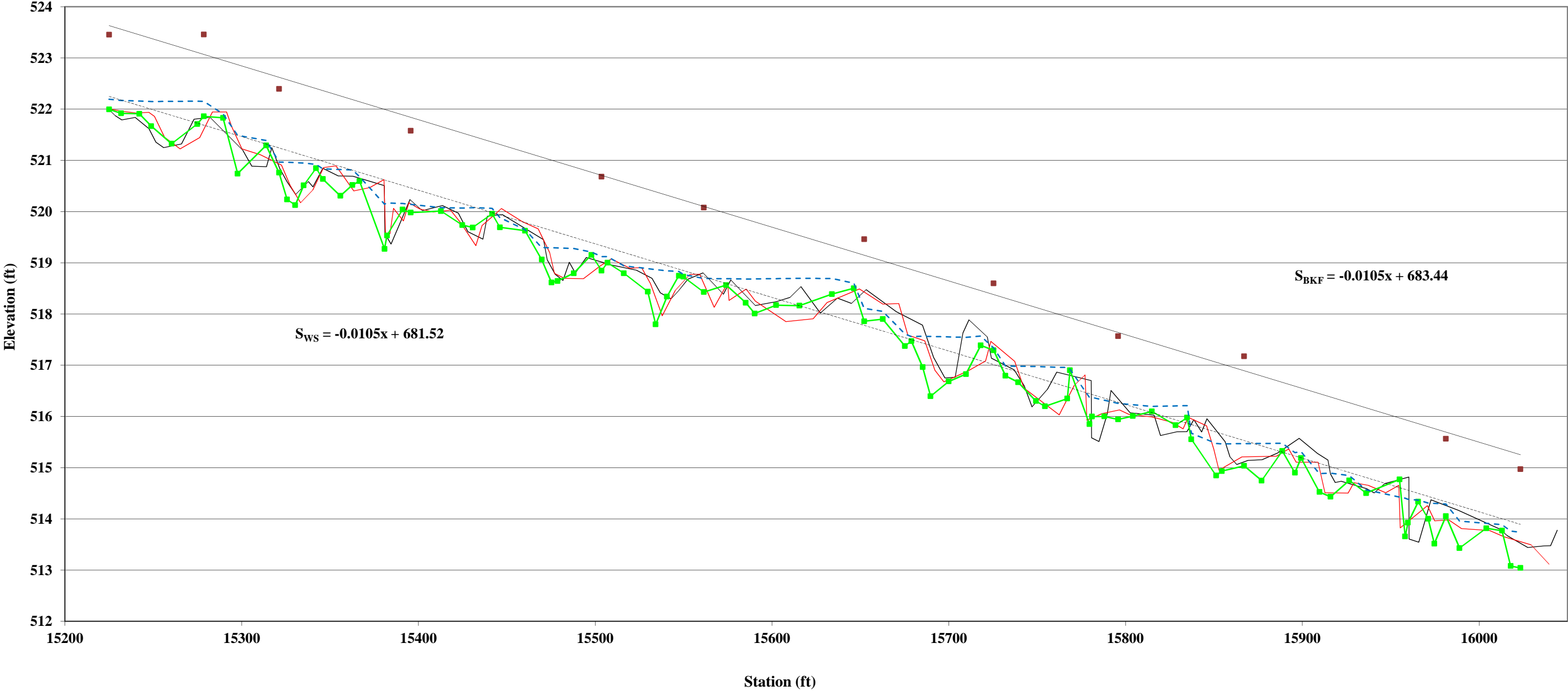
**Cane Creek Tributary Site  
Longitudinal Profile  
Tributary 4, MY-02  
Stations 93+75 - 102+35**



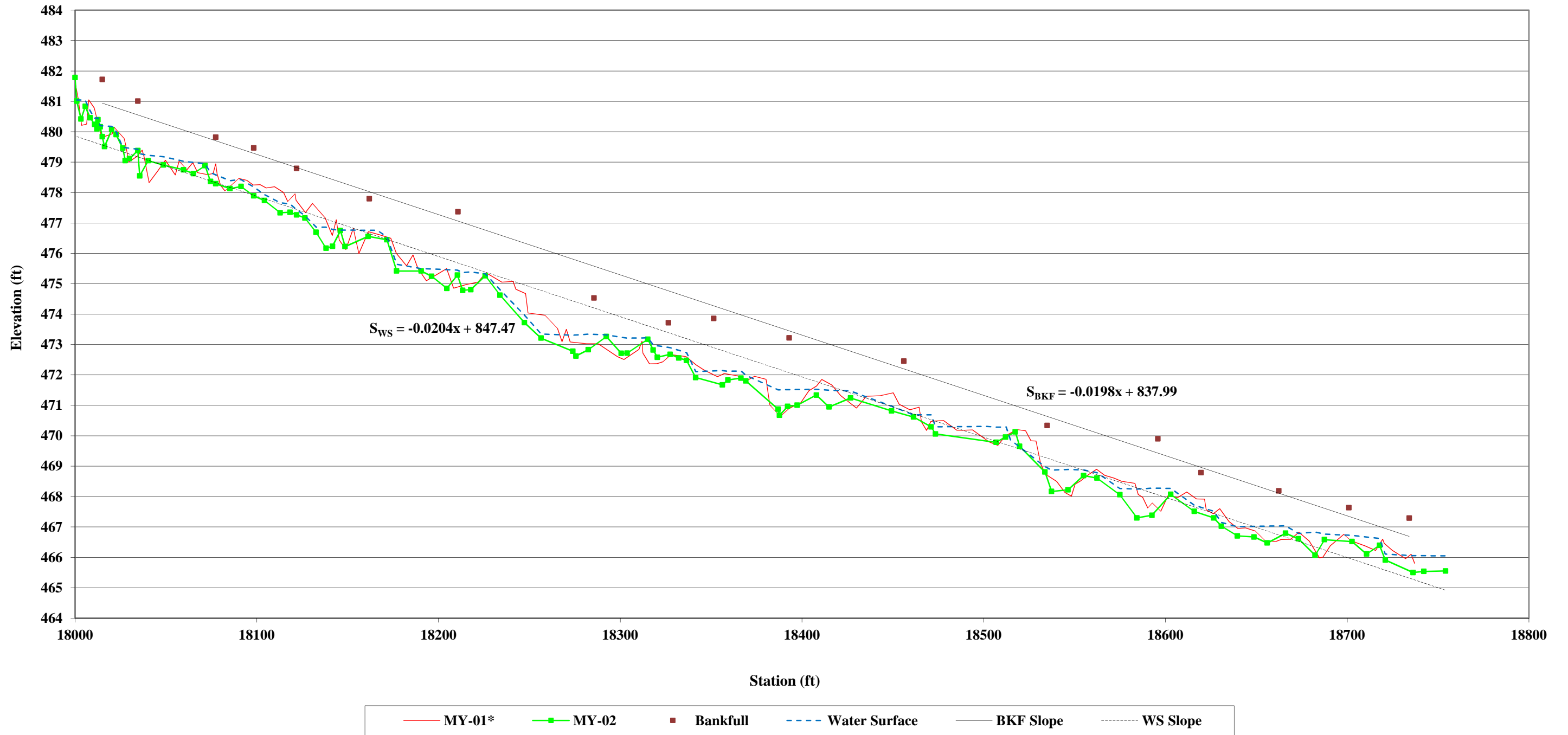
**Cane Creek Tributary Site  
 Longitudinal Profile  
 Tributary 6, MY-02  
 Stations 125+75 - 131+21**



**Cane Creek Tributary Site  
 Longitudinal Profile  
 Tributary 7, MY-02  
 Stations 152+25 - 160+44**



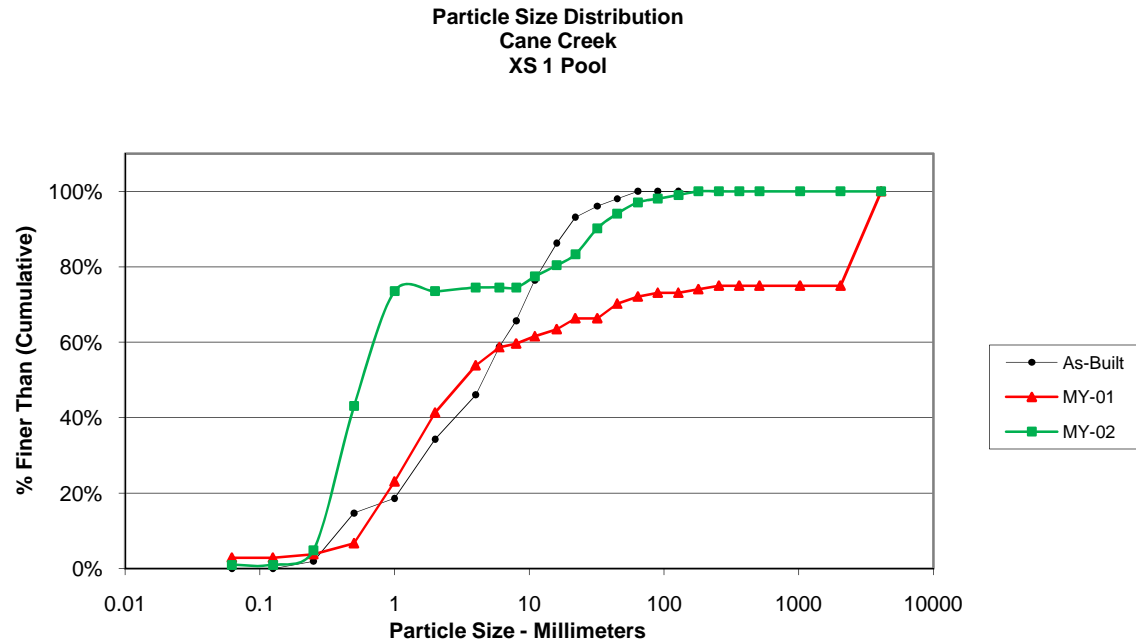
**Cane Creek Tributary Site  
 Longitudinal Profile 2  
 Tributary 7, MY-02  
 Stations 180+00 - 187+37**



\*Profile added during MY-01

# Pebble Count Plots

Cross-Section 1 Pool - MY02, Trib 1			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	1
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	4
Medium	.25 - .50	N	39
Coarse	.50 - 1	D	31
Very Coarse	1 - 2	S	
Very Fine	2 - 4		1
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	3
Coarse	22.6 - 32	L	7
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		3
Small	64 - 90	C	1
Small	90 - 128	O	1
Large	128 - 180	B	1
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	102
Note:			

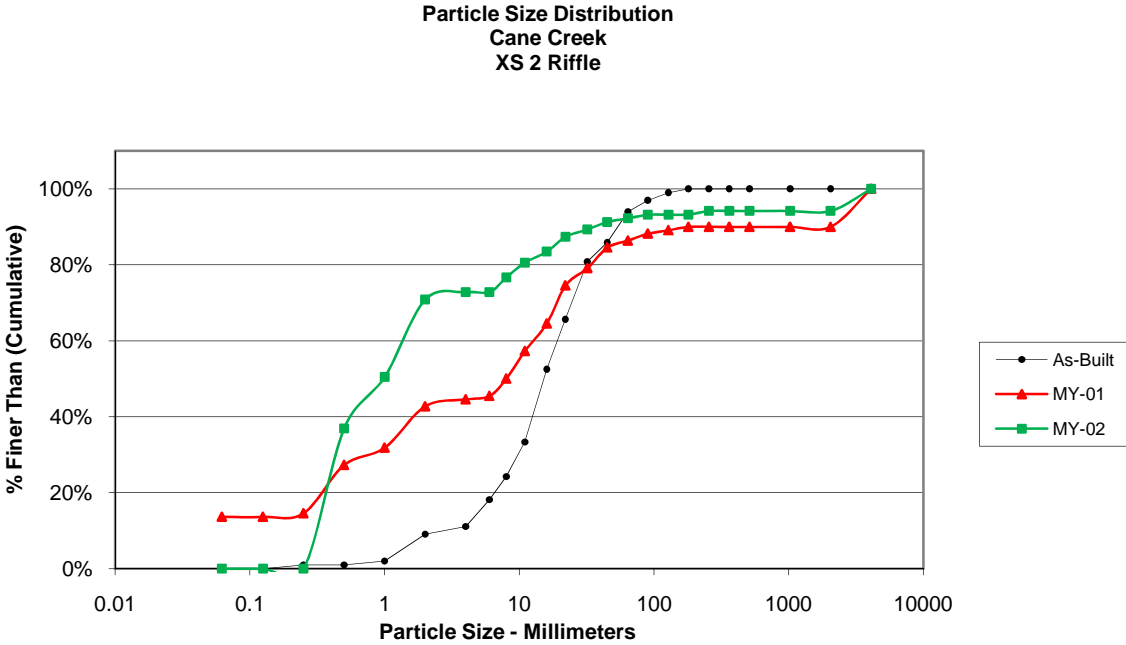


Size (mm)	
D16	0.63
D35	1.1
D50	1.7
D65	3
D84	15
D95	55

Size Distribution	
mean	3.1
dispersion	5.8
skewness	0.22

Type	
silt/clay	3%
sand	38%
gravel	31%
cobble	3%
boulder	0%
bedrock	26%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 2 Riffle - MY02, Trib 1			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	38
Coarse	.50 - 1	D	14
Very Coarse	1 - 2	S	21
Very Fine	2 - 4		2
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	2
Very Coarse	32 - 45	S	2
Very Coarse	45 - 64		1
Small	64 - 90	C	1
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	6
		<b>Total</b>	<b>102</b>
Note:			

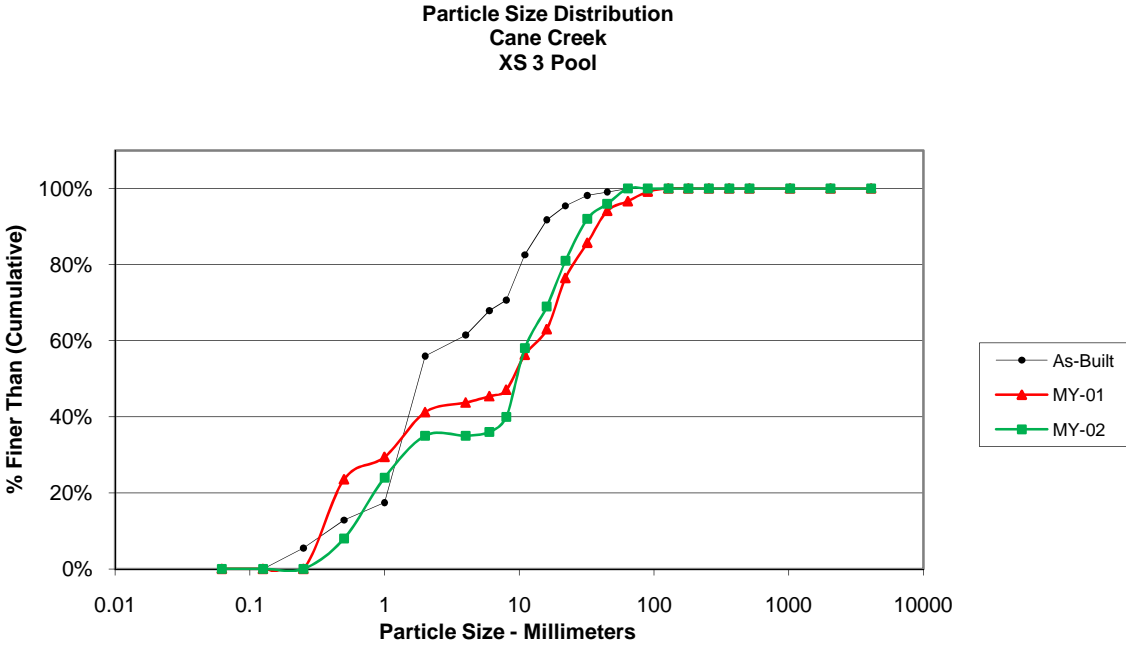


Size (mm)	
D16	0.27
D35	1.2
D50	8
D65	16
D84	43
D95	2900

Size Distribution	
mean	3.4
dispersion	17.5
skewness	-0.25

Type	
silt/clay	14%
sand	29%
gravel	44%
cobble	4%
boulder	0%
bedrock	10%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 3 Pool - MY02, Trib 1			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	16
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	18
Medium	11.3 - 16	V	11
Coarse	16 - 22.6	E	12
Coarse	22.6 - 32	L	11
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		4
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	100



Size (mm)	
D16	0.4
D35	1.4
D50	8.9
D65	17
D84	30
D95	51

Size Distribution	
mean	3.5
dispersion	12.8
skewness	-0.30

Type	
silt/clay	0%
sand	41%
gravel	55%
cobble	3%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

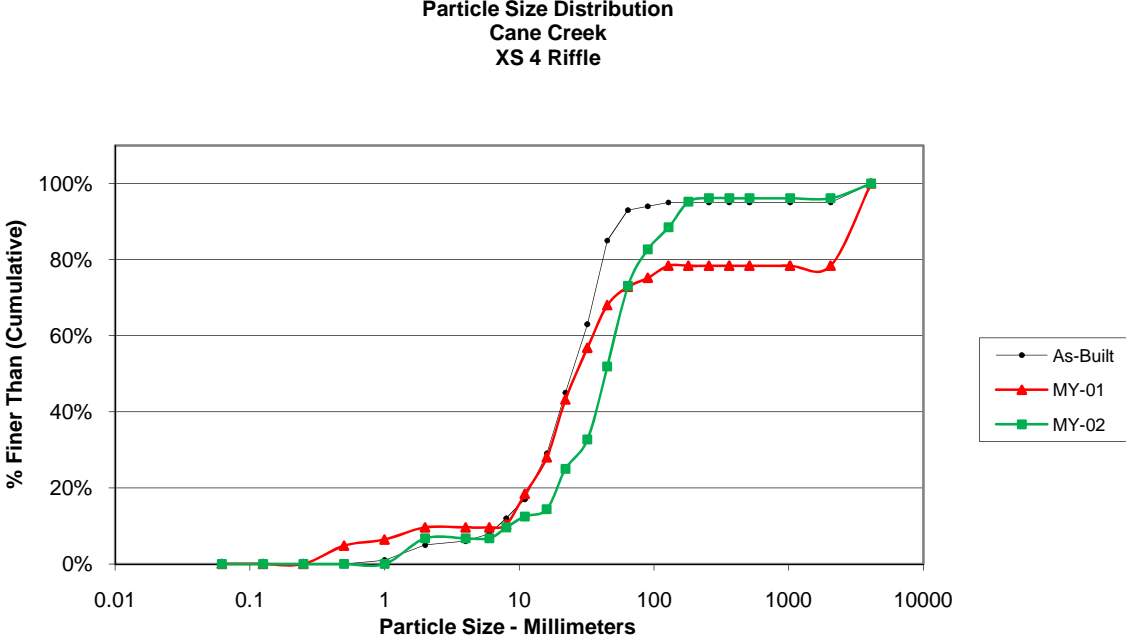
Note:



**Cross-Section 4 Riffle - MY02, Trib 1**

Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	7
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	2
Coarse	16 - 22.6	E	11
Coarse	22.6 - 32	L	8
Very Coarse	32 - 45	S	20
Very Coarse	45 - 64		22
Small	64 - 90	C	10
Small	90 - 128	O	6
Large	128 - 180	B	7
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	4
		<b>Total</b>	104

Note:

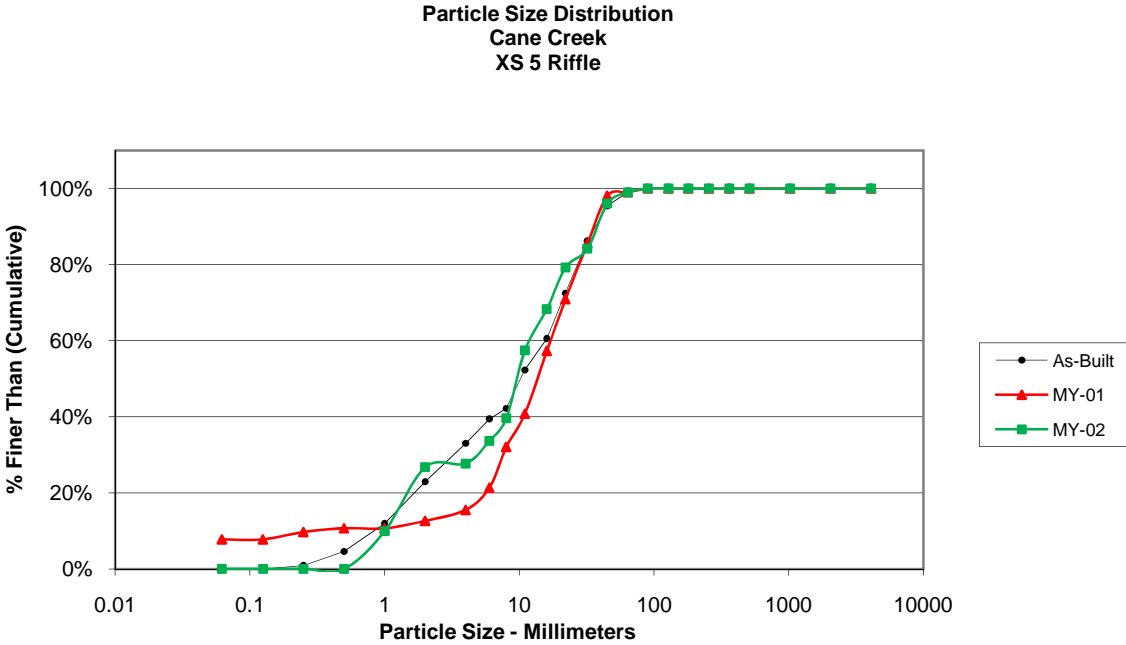


Size (mm)	
D16	10
D35	19
D50	27
D65	41
D84	2500
D95	3500

Size Distribution	
mean	158.1
dispersion	47.6
skewness	0.50

Type	
silt/clay	0%
sand	10%
gravel	63%
cobble	6%
boulder	0%
bedrock	22%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 5 Riffle - MY02, Trib 2			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	10
Very Coarse	1 - 2	S	17
Very Fine	2 - 4		1
Fine	4 - 5.7	G	6
Fine	5.7 - 8	R	6
Medium	8 - 11.3	A	18
Medium	11.3 - 16	V	11
Coarse	16 - 22.6	E	11
Coarse	22.6 - 32	L	5
Very Coarse	32 - 45	S	12
Very Coarse	45 - 64		3
Small	64 - 90	C	1
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	101
Note:			



Size (mm)	
D16	4.1
D35	8.9
D50	14
D65	19
D84	31
D95	41

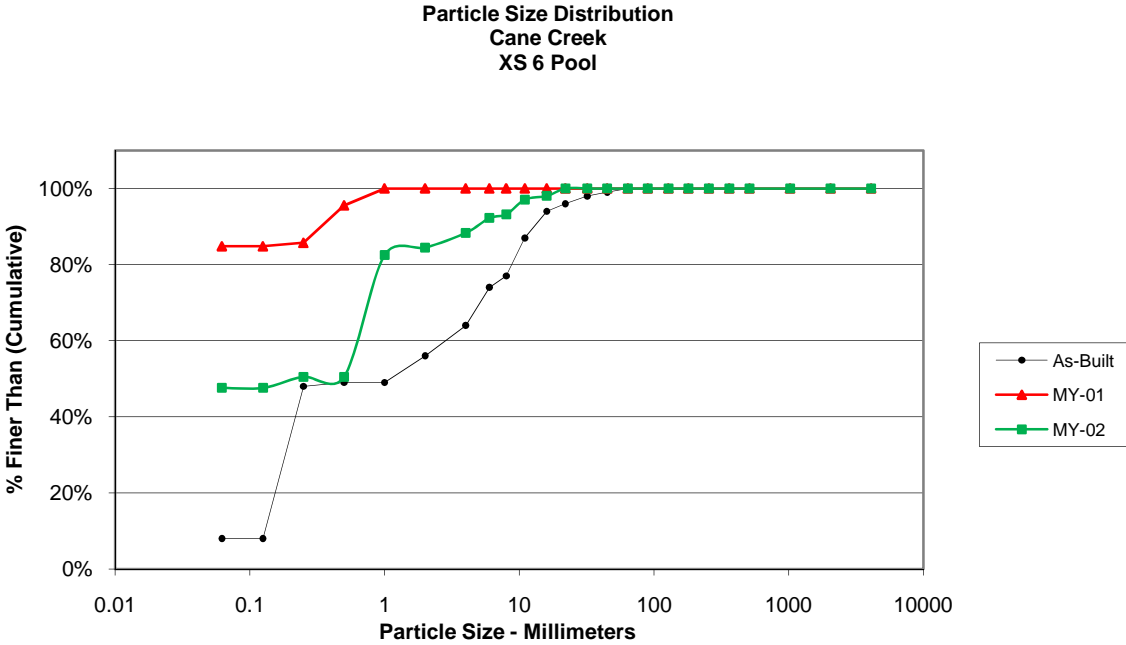
Size Distribution	
mean	11.3
dispersion	2.8
skewness	-0.10

Type	
silt/clay	8%
sand	5%
gravel	86%
cobble	1%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

**Cross-Section 6 Pool - MY02, Trib 3**

Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	49
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	3
Medium	.25 - .50	N	
Coarse	.50 - 1	D	33
Very Coarse	1 - 2	S	2
Very Fine	2 - 4		4
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	4
Medium	11.3 - 16	V	1
Coarse	16 - 22.6	E	2
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	103

Note:

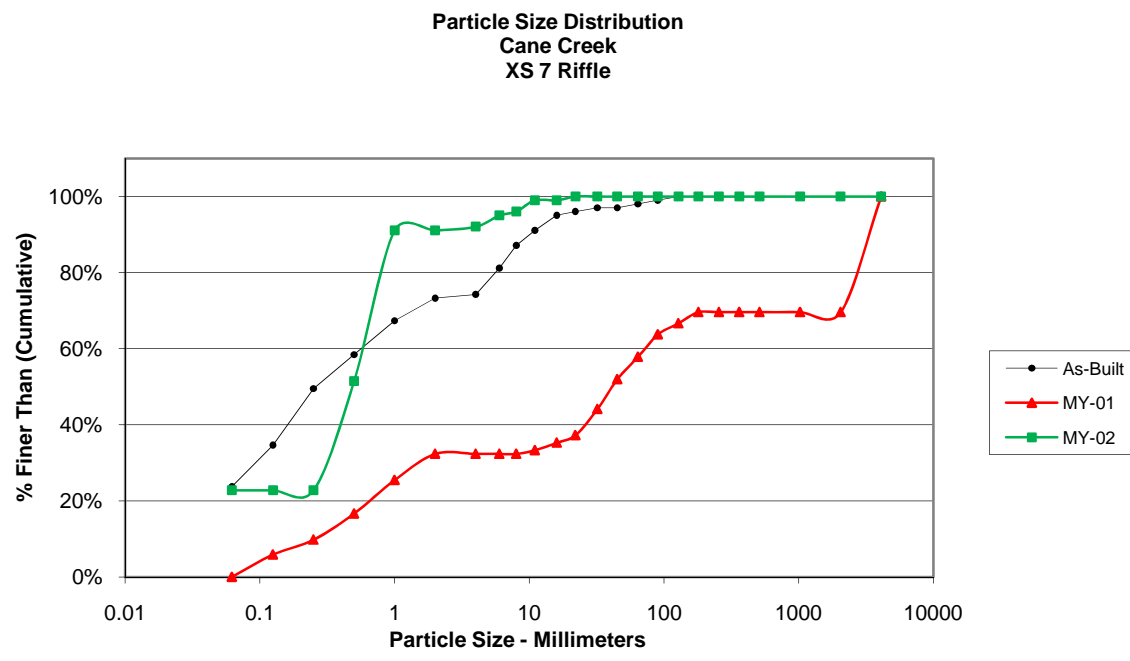


Size (mm)	
D16	0.062
D35	0.062
D50	0.062
D65	0.062
D84	0.062
D95	0.48

Size Distribution	
mean	0.1
dispersion	1.0
skewness	---

Type	
silt/clay	85%
sand	15%
gravel	0%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 7 Riffle - MY02, Trib 3			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	23
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	29
Coarse	.50 - 1	D	40
Very Coarse	1 - 2	S	
Very Fine	2 - 4		1
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	101
Note:			

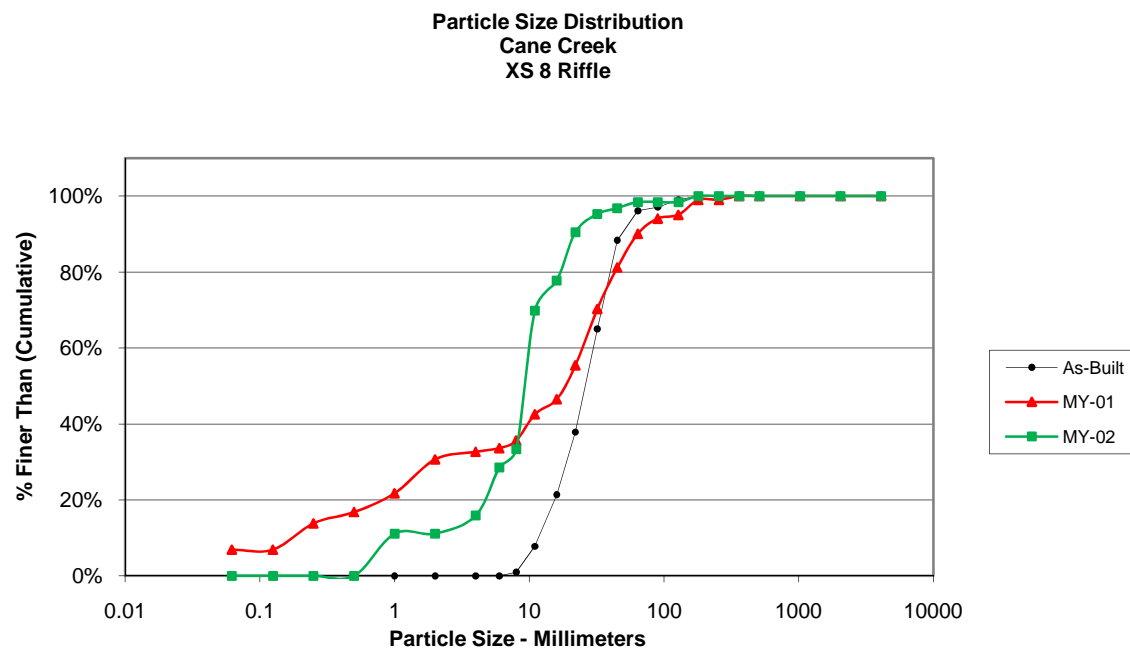


Size (mm)	
D16	0.42
D35	0.76
D50	1.3
D65	23
D84	41
D95	61

Size Distribution	
mean	4.1
dispersion	17.3
skewness	0.36

Type	
silt/clay	8%
sand	49%
gravel	40%
cobble	4%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 8 Riffle - MY02, Trib 3			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	7
Very Coarse	1 - 2	S	
Very Fine	2 - 4		3
Fine	4 - 5.7	G	8
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	23
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	8
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		1
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	1
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	37
		<b>Total</b>	<b>100</b>
Note:			



Size (mm)	
D16	0.41
D35	7.3
D50	18
D65	28
D84	50
D95	130

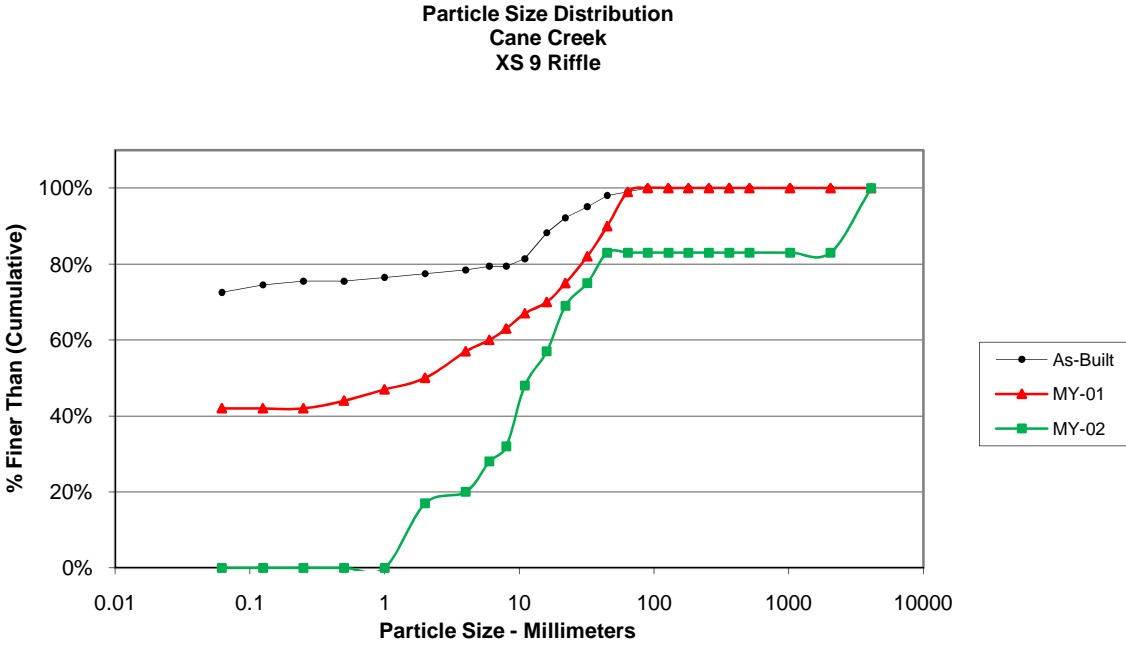
Size Distribution	
mean	4.5
dispersion	23.3
skewness	-0.41

Type	
silt/clay	7%
sand	24%
gravel	59%
cobble	9%
boulder	0%
bedrock	1%
hardpan	0%
wood/det	0%
artificial	0%

**Cross-Section 9 Riffle - MY02, Trib 4**

Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	17
Very Fine	2 - 4		3
Fine	4 - 5.7	G	8
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	16
Medium	11.3 - 16	V	9
Coarse	16 - 22.6	E	12
Coarse	22.6 - 32	L	6
Very Coarse	32 - 45	S	8
Very Coarse	45 - 64		
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	17
		<b>Total</b>	<b>100</b>

Note:

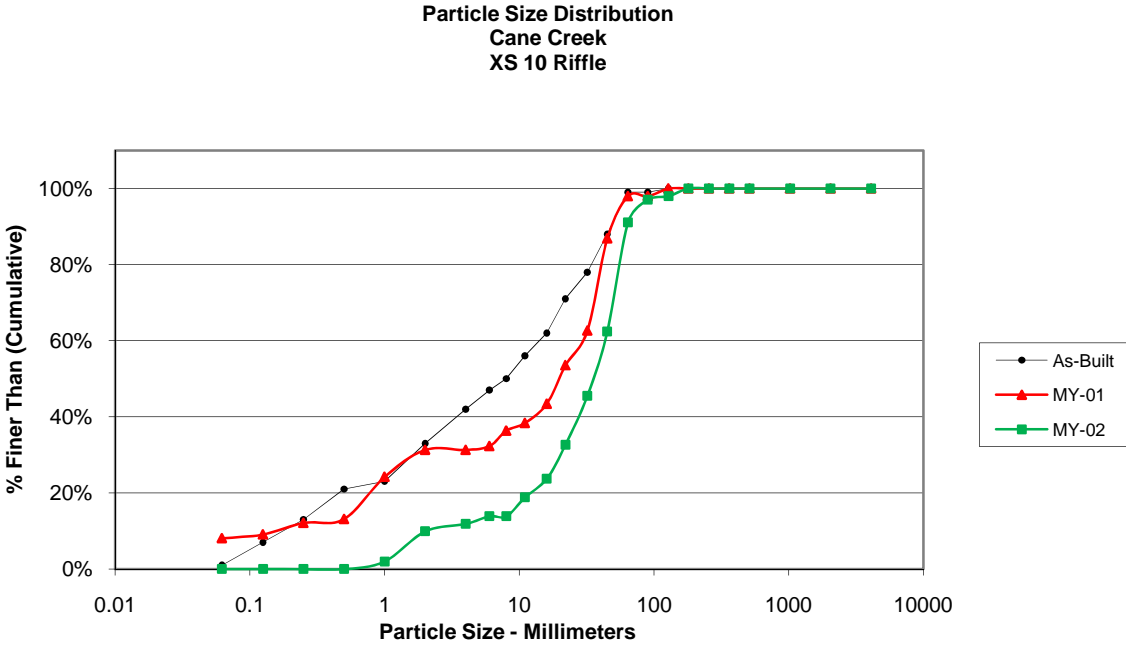


Size (mm)	
D16	0.86
D35	4.4
D50	7.1
D65	9.9
D84	17
D95	26

Size Distribution	
mean	3.8
dispersion	5.3
skewness	-0.24

Type	
silt/clay	0%
sand	20%
gravel	63%
cobble	0%
boulder	0%
bedrock	17%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 10 Riffle - MY02, Trib 4			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	8
Very Fine	2 - 4		2
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	9
Coarse	22.6 - 32	L	13
Very Coarse	32 - 45	S	17
Very Coarse	45 - 64		29
Small	64 - 90	C	6
Small	90 - 128	O	1
Large	128 - 180	B	2
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	101



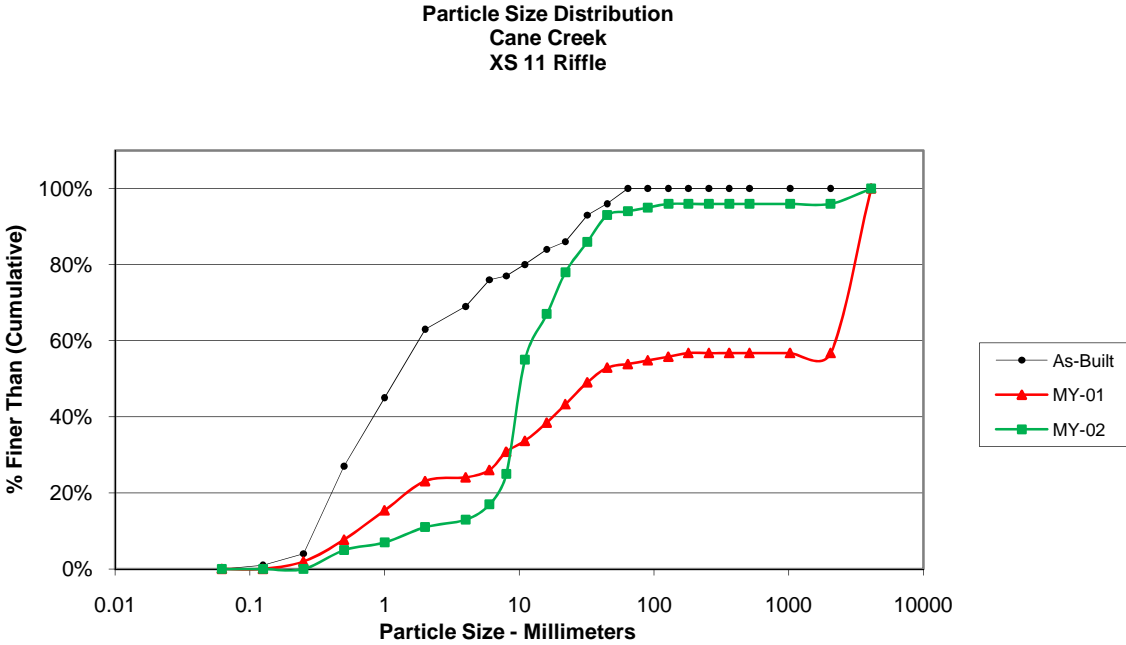
Note:

Size (mm)	
D16	9.2
D35	24
D50	35
D65	46
D84	59
D95	80

Size Distribution	
mean	23.3
dispersion	2.7
skewness	-0.20

Type	
silt/clay	8%
sand	23%
gravel	67%
cobble	2%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 11 Riffle - MY02, Trib 4			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	5
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	4
Very Fine	2 - 4		2
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	8
Medium	8 - 11.3	A	30
Medium	11.3 - 16	V	12
Coarse	16 - 22.6	E	11
Coarse	22.6 - 32	L	8
Very Coarse	32 - 45	S	7
Very Coarse	45 - 64		1
Small	64 - 90	C	1
Small	90 - 128	O	1
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	4
		<b>Total</b>	100



Note:

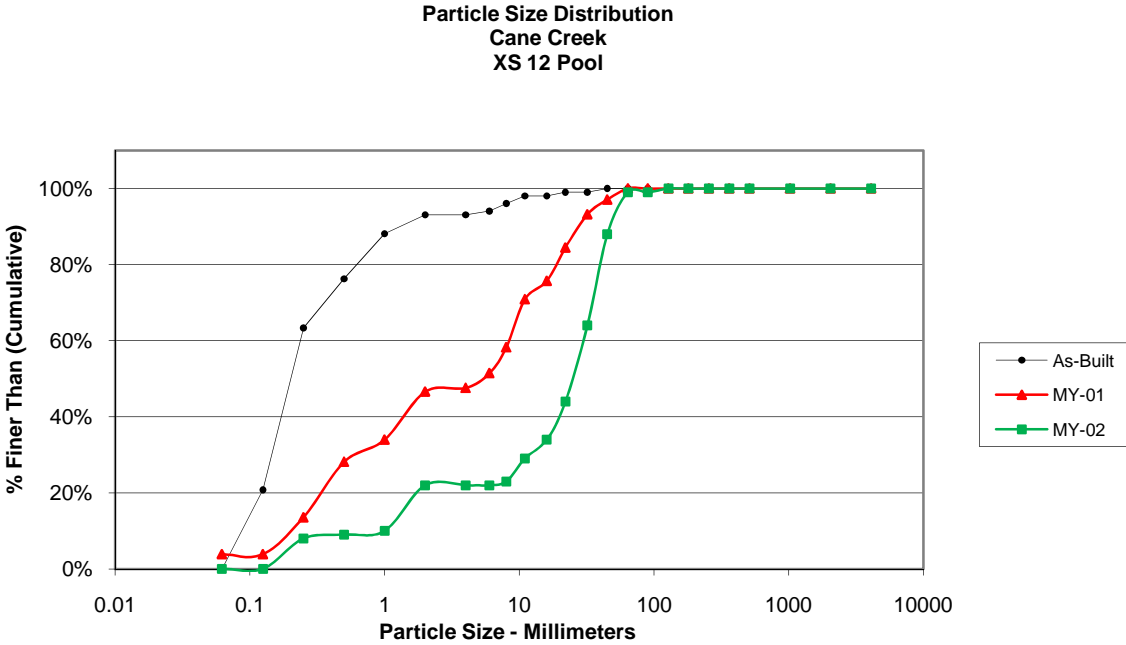
Size (mm)	
D16	5.1
D35	8.8
D50	10
D65	14
D84	25
D95	41

Size Distribution	
mean	11.3
dispersion	2.2
skewness	0.06

Type	
silt/clay	0%
sand	11%
gravel	83%
cobble	2%
boulder	0%
bedrock	4%
hardpan	0%
wood/det	0%
artificial	0%



Cross-Section 12 Pool - MY02, Trib 4			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	8
Medium	.25 - .50	N	1
Coarse	.50 - 1	D	1
Very Coarse	1 - 2	S	12
Very Fine	2 - 4		
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	6
Medium	11.3 - 16	V	5
Coarse	16 - 22.6	E	10
Coarse	22.6 - 32	L	20
Very Coarse	32 - 45	S	24
Very Coarse	45 - 64		11
Small	64 - 90	C	
Small	90 - 128	O	1
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	100



Note:

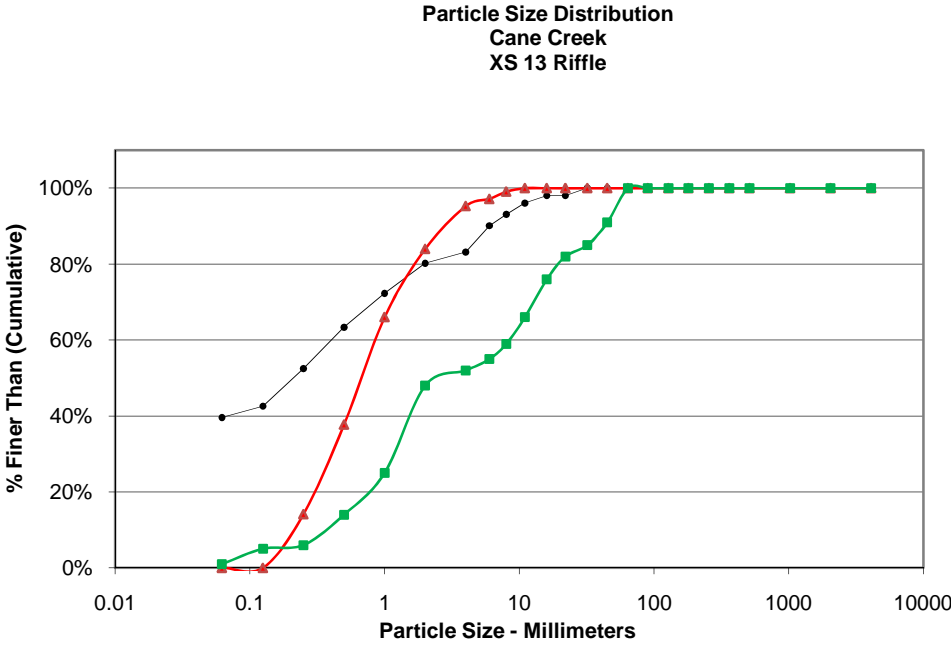
Size (mm)	
D16	1.4
D35	17
D50	25
D65	32
D84	43
D95	56

Size Distribution	
mean	7.8
dispersion	9.8
skewness	-0.42

Type	
silt/clay	0%
sand	22%
gravel	77%
cobble	1%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 13 Riffle - MY02, Trib 5			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	1
Very Fine	.062 - .125	S	4
Fine	.125 - .25	A	1
Medium	.25 - .50	N	8
Coarse	.50 - 1	D	11
Very Coarse	1 - 2	S	23
Very Fine	2 - 4		4
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	4
Medium	8 - 11.3	A	7
Medium	11.3 - 16	V	10
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	6
Very Coarse	45 - 64		9
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	100

Note:

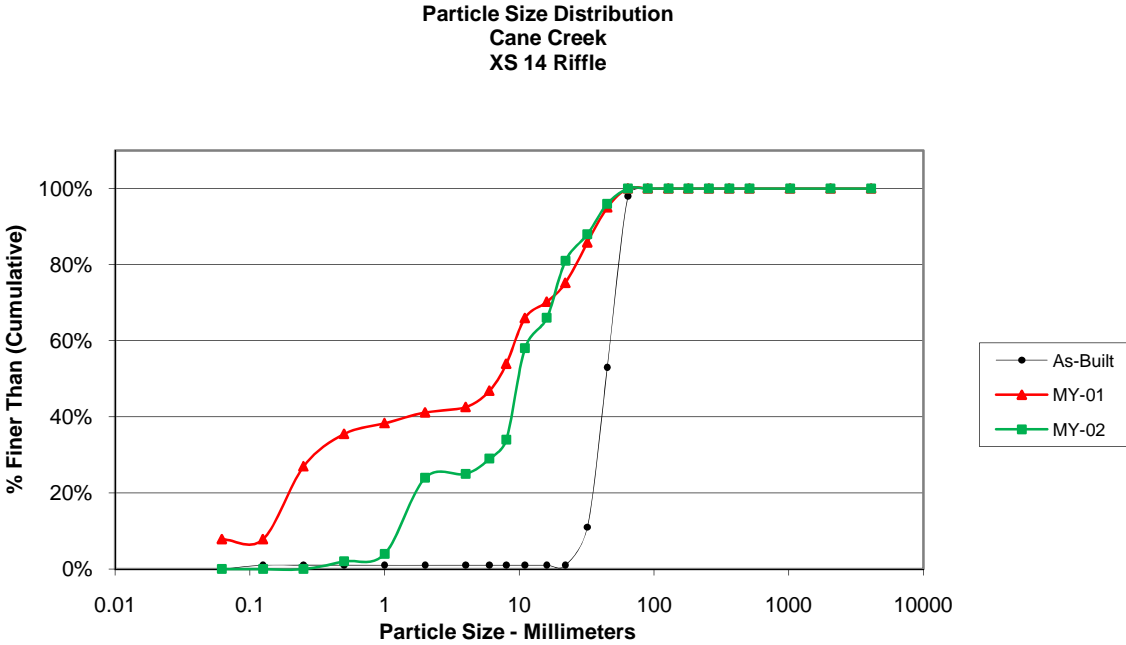


Size (mm)	
D16	0.57
D35	1.4
D50	2.8
D65	11
D84	28
D95	53

Size Distribution	
mean	4.0
dispersion	7.5
skewness	0.12

Type	
silt/clay	1%
sand	47%
gravel	52%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 14 Riffle - MY02, Trib 6			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	2
Coarse	.50 - 1	D	2
Very Coarse	1 - 2	S	20
Very Fine	2 - 4		1
Fine	4 - 5.7	G	4
Fine	5.7 - 8	R	5
Medium	8 - 11.3	A	24
Medium	11.3 - 16	V	8
Coarse	16 - 22.6	E	15
Coarse	22.6 - 32	L	7
Very Coarse	32 - 45	S	8
Very Coarse	45 - 64		4
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	100



Note:

Size (mm)	
D16	1.5
D35	8.1
D50	9.9
D65	15
D84	26
D95	43

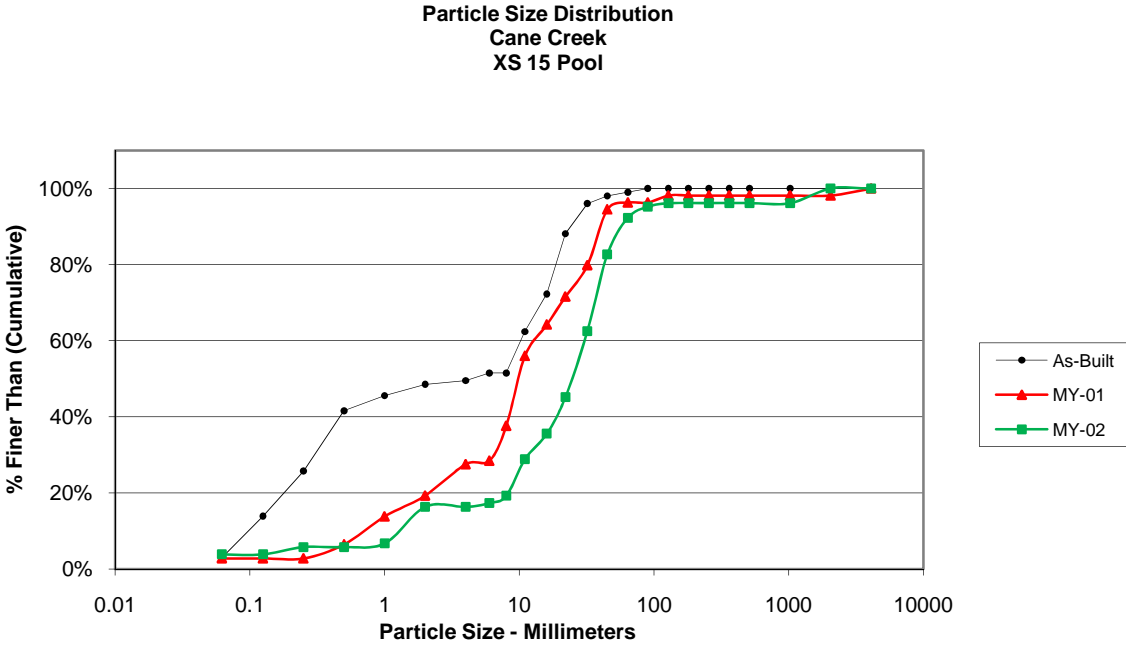
Size Distribution	
mean	6.2
dispersion	4.6
skewness	-0.18

Type	
silt/clay	0%
sand	24%
gravel	76%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

**Cross-Section 15 Pool - MY02, Trib 6**

Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	4
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	2
Medium	.25 - .50	N	
Coarse	.50 - 1	D	1
Very Coarse	1 - 2	S	10
Very Fine	2 - 4		
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	10
Medium	11.3 - 16	V	7
Coarse	16 - 22.6	E	10
Coarse	22.6 - 32	L	18
Very Coarse	32 - 45	S	21
Very Coarse	45 - 64		10
Small	64 - 90	C	3
Small	90 - 128	O	1
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	4
Bedrock	>2048	BDRK	
		<b>Total</b>	104

Note:

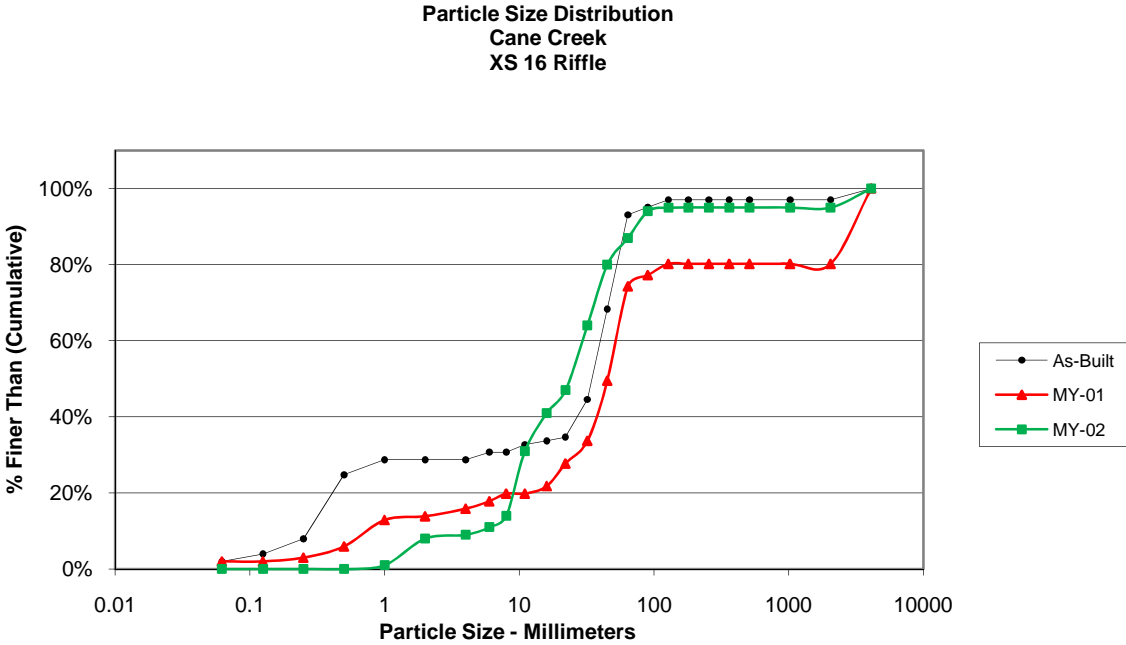


Size (mm)	
D16	1.9
D35	14
D50	23
D65	32
D84	44
D95	62

Size Distribution	
mean	9.1
dispersion	7.0
skewness	-0.34

Type	
silt/clay	4%
sand	13%
gravel	76%
cobble	4%
boulder	4%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 16 Riffle - MY02, Trib 6			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	1
Very Coarse	1 - 2	S	7
Very Fine	2 - 4		1
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	17
Medium	11.3 - 16	V	10
Coarse	16 - 22.6	E	6
Coarse	22.6 - 32	L	17
Very Coarse	32 - 45	S	16
Very Coarse	45 - 64		7
Small	64 - 90	C	7
Small	90 - 128	O	1
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	5
		<b>Total</b>	<b>100</b>



Note:

Size (mm)	
D16	8.2
D35	12
D50	22
D65	30
D84	45
D95	75

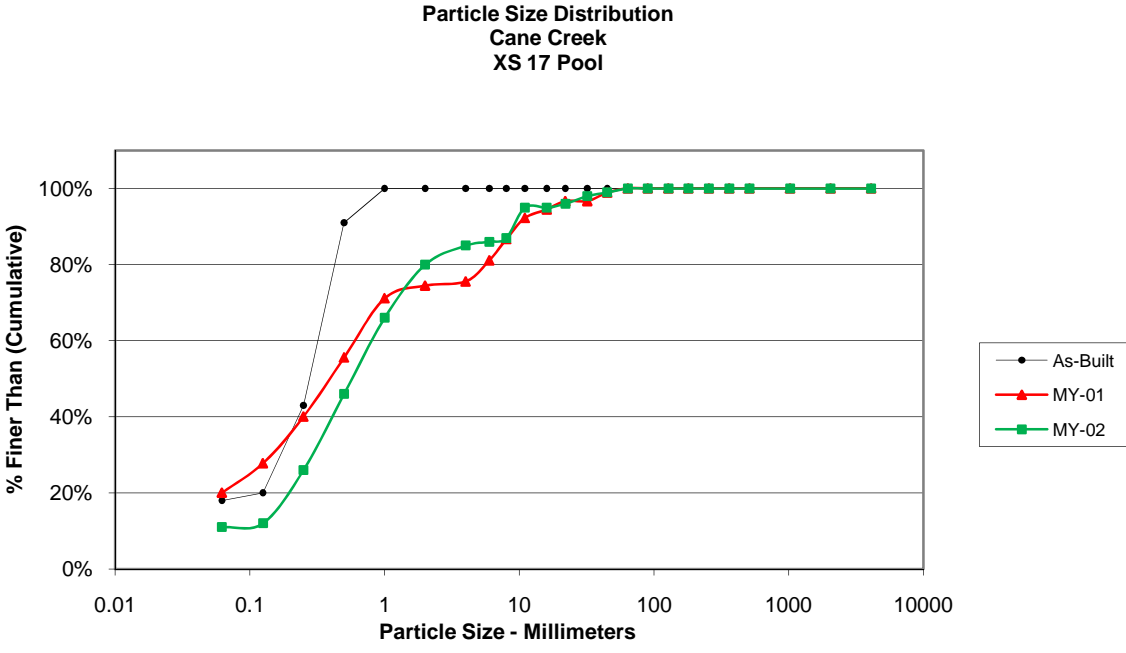
Size Distribution	
mean	19.2
dispersion	2.4
skewness	-0.07

Type	
silt/clay	0%
sand	8%
gravel	79%
cobble	8%
boulder	0%
bedrock	5%
hardpan	0%
wood/det	0%
artificial	0%

**Cross-Section 17 Pool - MY02, Trib 7**

Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	11
Very Fine	.062 - .125	S	1
Fine	.125 - .25	A	14
Medium	.25 - .50	N	20
Coarse	.50 - 1	D	20
Very Coarse	1 - 2	S	14
Very Fine	2 - 4		5
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	8
Medium	11.3 - 16	V	
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	2
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		1
Small	64 - 90	C	
Small	90 - 128	O	
Large	128 - 180	B	
Large	180 - 256	L	
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	100

Note:

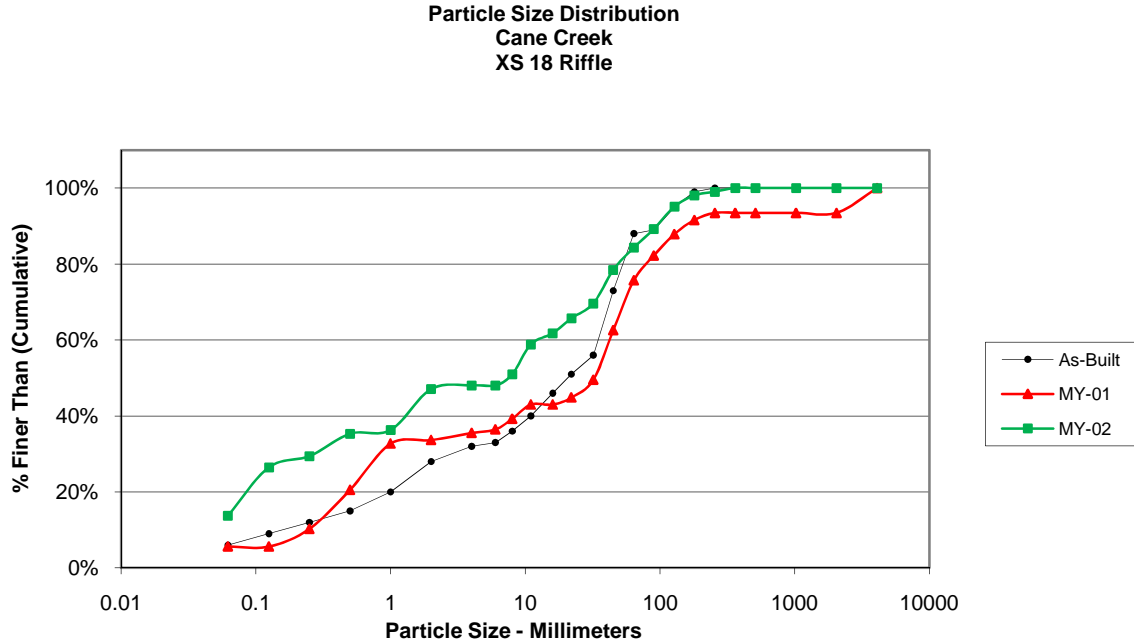


Size (mm)	
D16	0.15
D35	0.34
D50	0.57
D65	0.97
D84	3.5
D95	0

Size Distribution	
mean	0.7
dispersion	12.1
skewness	0.16

Type	
silt/clay	11%
sand	69%
gravel	20%
cobble	0%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 18 Riffle - MY02, Trib 7			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	14
Very Fine	.062 - .125	S	13
Fine	.125 - .25	A	3
Medium	.25 - .50	N	6
Coarse	.50 - 1	D	1
Very Coarse	1 - 2	S	11
Very Fine	2 - 4		1
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	8
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	4
Very Coarse	32 - 45	S	9
Very Coarse	45 - 64		6
Small	64 - 90	C	5
Small	90 - 128	O	6
Large	128 - 180	B	3
Large	180 - 256	L	1
Small	256 - 362	B	1
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	102
Note:			

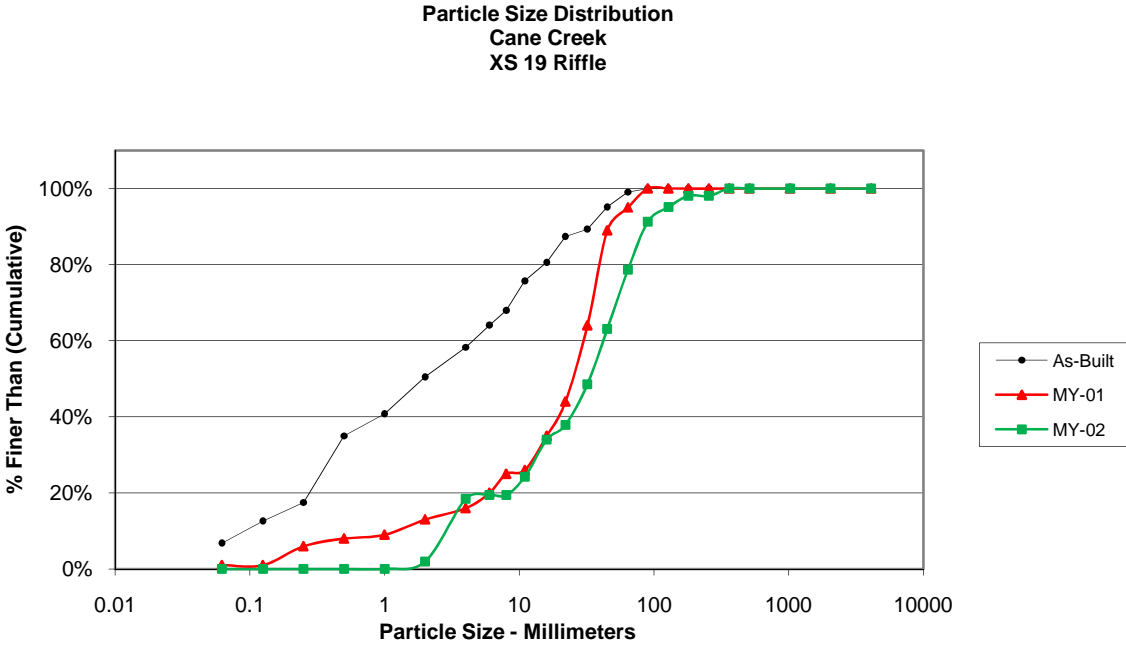


Size (mm)	
D16	0.07
D35	0.48
D50	7.3
D65	21
D84	63
D95	130

Size Distribution	
mean	2.1
dispersion	56.5
skewness	-0.31

Type	
silt/clay	14%
sand	33%
gravel	37%
cobble	15%
boulder	1%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross-Section 19 Riffle - MY02, Trib 7			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	2
Very Fine	2 - 4		17
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	10
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	11
Very Coarse	32 - 45	S	15
Very Coarse	45 - 64		16
Small	64 - 90	C	13
Small	90 - 128	O	4
Large	128 - 180	B	3
Large	180 - 256	L	
Small	256 - 362	B	2
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		<b>Total</b>	103



Note:

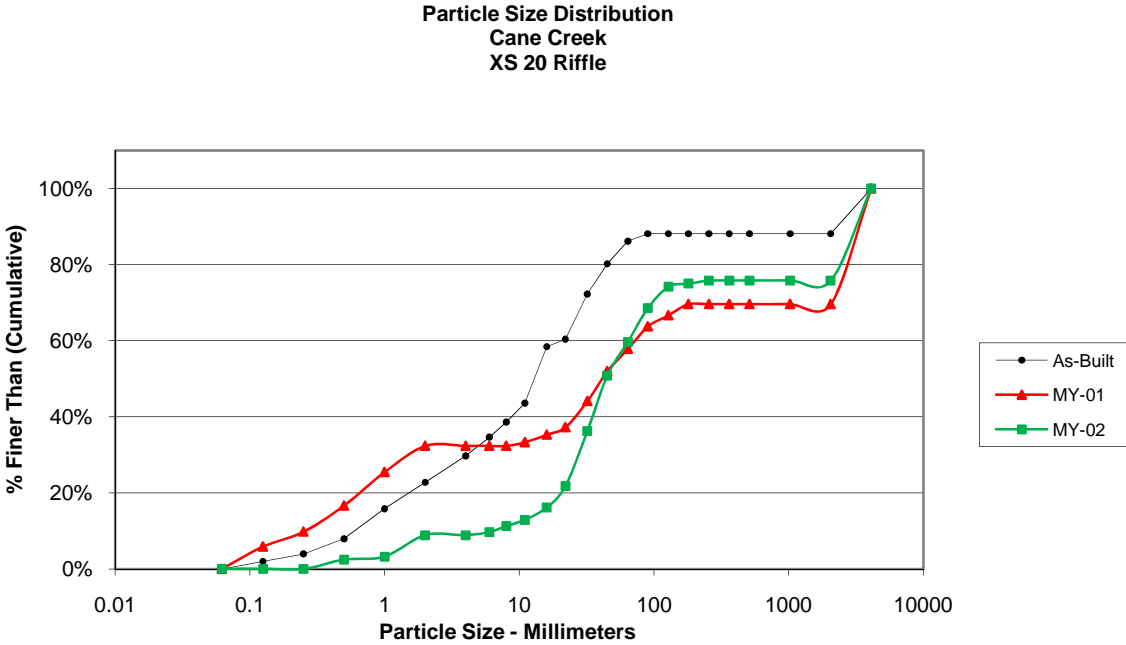
Size (mm)	
D16	3.6
D35	17
D50	33
D65	47
D84	74
D95	130

Size Distribution	
mean	16.3
dispersion	5.7
skewness	-0.27

Type	
silt/clay	0%
sand	2%
gravel	77%
cobble	19%
boulder	2%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%



Cross-Section 20 Riffle - MY02, Trib 7			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	3
Coarse	.50 - 1	D	1
Very Coarse	1 - 2	S	7
Very Fine	2 - 4		
Fine	4 - 5.7	G	1
Fine	5.7 - 8	R	2
Medium	8 - 11.3	A	2
Medium	11.3 - 16	V	4
Coarse	16 - 22.6	E	7
Coarse	22.6 - 32	L	18
Very Coarse	32 - 45	S	18
Very Coarse	45 - 64		11
Small	64 - 90	C	11
Small	90 - 128	O	7
Large	128 - 180	B	1
Large	180 - 256	L	1
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	10
		<b>Total</b>	<b>104</b>



Note:

Size (mm)	
D16	9.4
D35	25
D50	33
D65	43
D84	75
D95	110

Size Distribution	
mean	26.6
dispersion	2.9
skewness	-0.10

Type	
silt/clay	0%
sand	11%
gravel	61%
cobble	19%
boulder	0%
bedrock	10%
hardpan	0%
wood/det	0%
artificial	0%

# **Appendix C**

## **Stream Photos**



PP#1U – MY02 – 1/26/11



PP#1D – MY02 – 1/26/11



PP#2U – MY02 – 1/26/11



PP#2D – MY02 – 1/26/11



PP#3U – MY02 – 1/26/11



PP#3D – MY02 – 1/26/11



PP#4U – MY02 – 1/26/11



PP#4D – MY02 – 1/26/11



PP#5U – MY02 – 1/26/11



PP#5D – MY02 – 1/26/11



PP#6U – MY02 – 1/26/11



PP#6D – MY02 – 1/26/11



PP#7 – MY02 – 1/26/11



PP#8U – MY02 – 1/26/11



PP#8D – MY02 – 1/26/11



PP#9U – MY02 – 1/26/11



PP#9D – MY02 – 1/26/11



PP#10U – MY02 – 1/26/11



PP#10D – MY02 – 1/26/11



PP#11 – MY02 – 1/26/11



PP#12U – MY02 – 1/26/11



PP#12D – MY02 – 1/26/11



PP#13U – MY02 – 1/26/11



PP#13D – MY02 – 1/26/11



PP#14U – MY02 – 1/26/11



PP#14D – MY02 – 1/26/11



PP#15U – MY02 – 1/26/11



PP#15D – MY02 – 1/26/11



PP#16U – MY02 – 1/26/11



PP#16D – MY02 – 1/26/11



PP#17U – MY02 – 1/26/11



PP#17D – MY02 – 1/26/11



PP#18U – MY02 – 1/26/11



PP#18D – MY02 – 1/26/11



PP#19U – MY02 – 1/26/11



PP#19D – MY02 – 1/26/11





PP#20U – MY02 – 1/26/11



PP#20D – MY02 – 1/26/11



PP#21U – MY02 – 1/26/11



PP#21D – MY02 – 1/26/11



PP#22U – MY02 – 1/26/11



PP#22D – MY02 – 1/26/11



PP#23U – MY02 – 1/26/11



PP#23D – MY02 – 1/26/11



PP#24U – MY02 – 1/26/11



PP#24D – MY02 – 1/26/11



PP#25 – MY02 – 1/26/11



PP#26U – MY02 – 1/26/11



PP#26D – MY02 – 1/26/11



PP#27UL – MY02 – 1/26/11



PP#27UR – MY02 – 1/26/11



PP#27D – MY02 – 1/26/11



PP#28U – MY02 – 1/26/11



PP#28D – MY02 – 1/26/11



PP#29U – MY02 – 1/26/11



PP#29D – MY02 – 1/26/11



PP#30UL – MY02 – 1/26/11



PP#30UR – MY02 – 1/26/11



PP#30D – MY02 – 1/26/11



PP#31U – MY02 – 1/26/11



PP#31D – MY02 – 1/26/11



PP#32U – MY02 – 1/26/11



PP#32D – MY02 – 1/26/11



PP#33U – MY02 – 1/26/11



PP#33D – MY02 – 1/26/11



PP#34U – MY02 – 1/26/11



PP#34D – MY02 – 1/26/11



PP#35U – MY02 – 1/26/11



PP#35D – MY02 – 1/26/11



PP#36U – MY02 – 1/26/11



PP#36D – MY02 – 1/26/11



PP#37U – MY02 – 1/26/11



PP#37D – MY02 – 1/26/11



PP#38U – MY02 – 1/26/11



PP#38D – MY02 – 1/26/11



PP#39U – MY02 – 1/26/11



PP#39D – MY02 – 1/26/11



PP#40U – MY02 – 1/26/11



PP#40D – MY02 – 1/26/11



PP#41U – MY02 – 1/26/11



PP#41D – MY02 – 1/26/11

**Photo not available for MY-02**

PP#42U



PP#42D – MY02 – 1/26/11



PP#43U – MY02 – 1/26/11





PP#43D – MY02 – 1/26/11



PP#44U – MY02 – 1/26/11



PP#44D – MY02 – 1/26/11



PP#45U – MY02 – 1/26/11



PP#45D – MY02 – 1/26/11



PP#46 – MY02 – 1/26/11



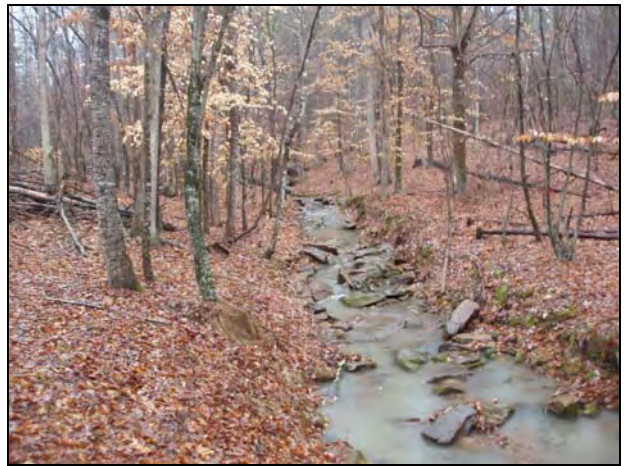
PP#47 – MY02 – 1/26/11



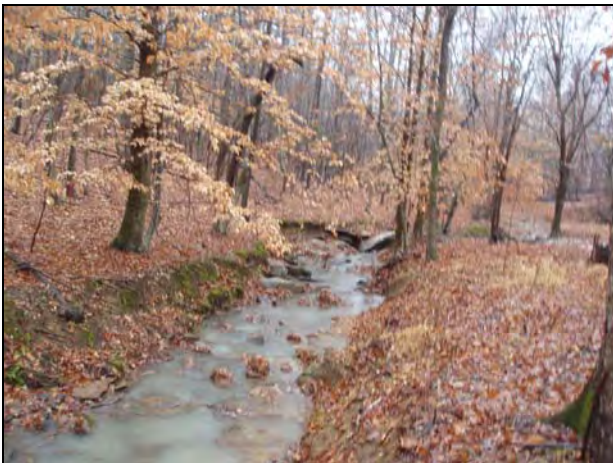
PP#48U – MY02 – 1/26/11



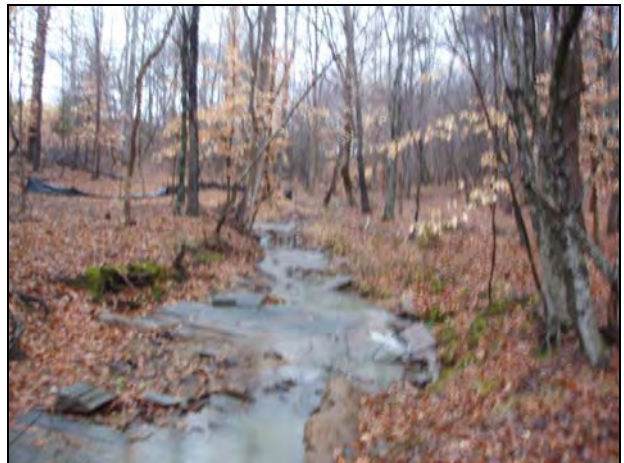
PP#48D – MY02 – 1/26/11



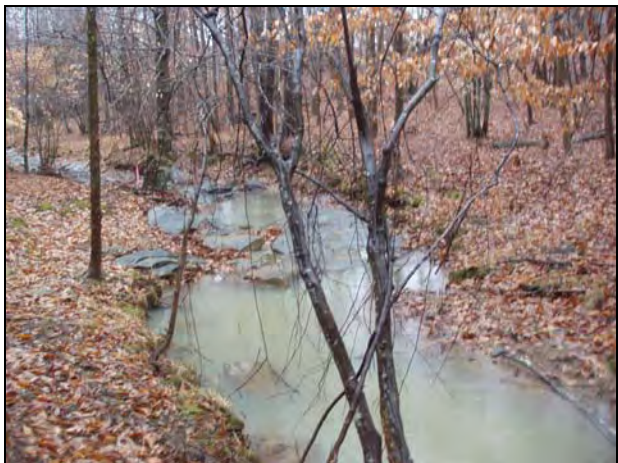
PP#49U – MY02 – 1/26/11



PP#49D – MY02 – 1/26/11



PP#50U – MY02 – 1/26/11



PP#50D – MY02 – 1/26/11



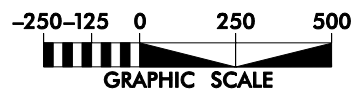
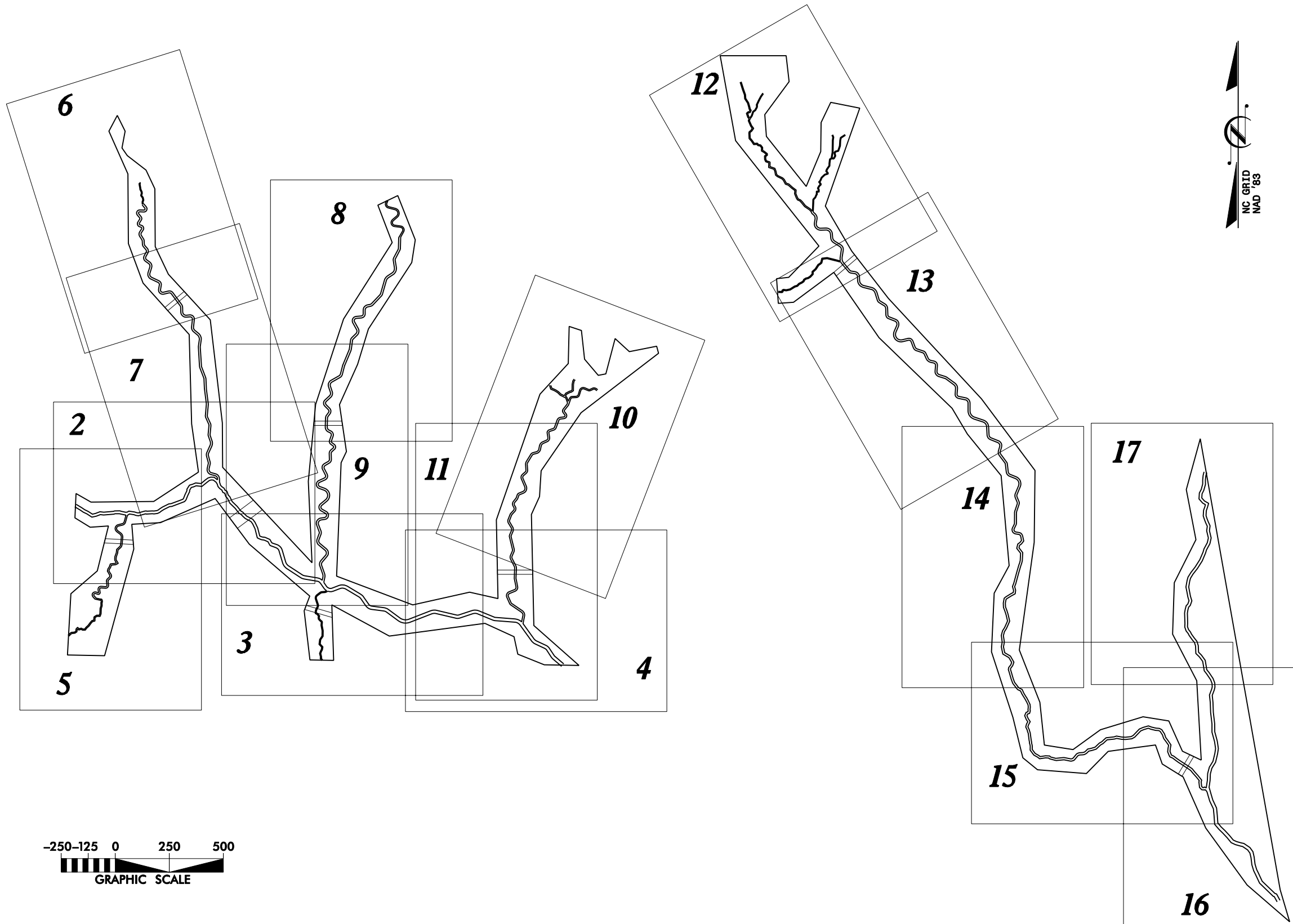
PP#51U – MY02 – 1/26/11



PP#51D – MY02 – 1/26/11

# **Appendix D**

## **Current Condition Plan View**



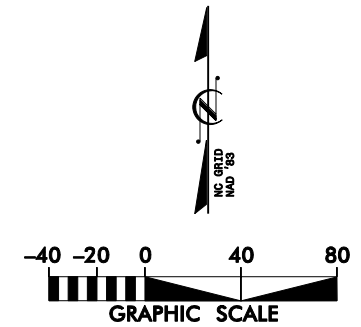
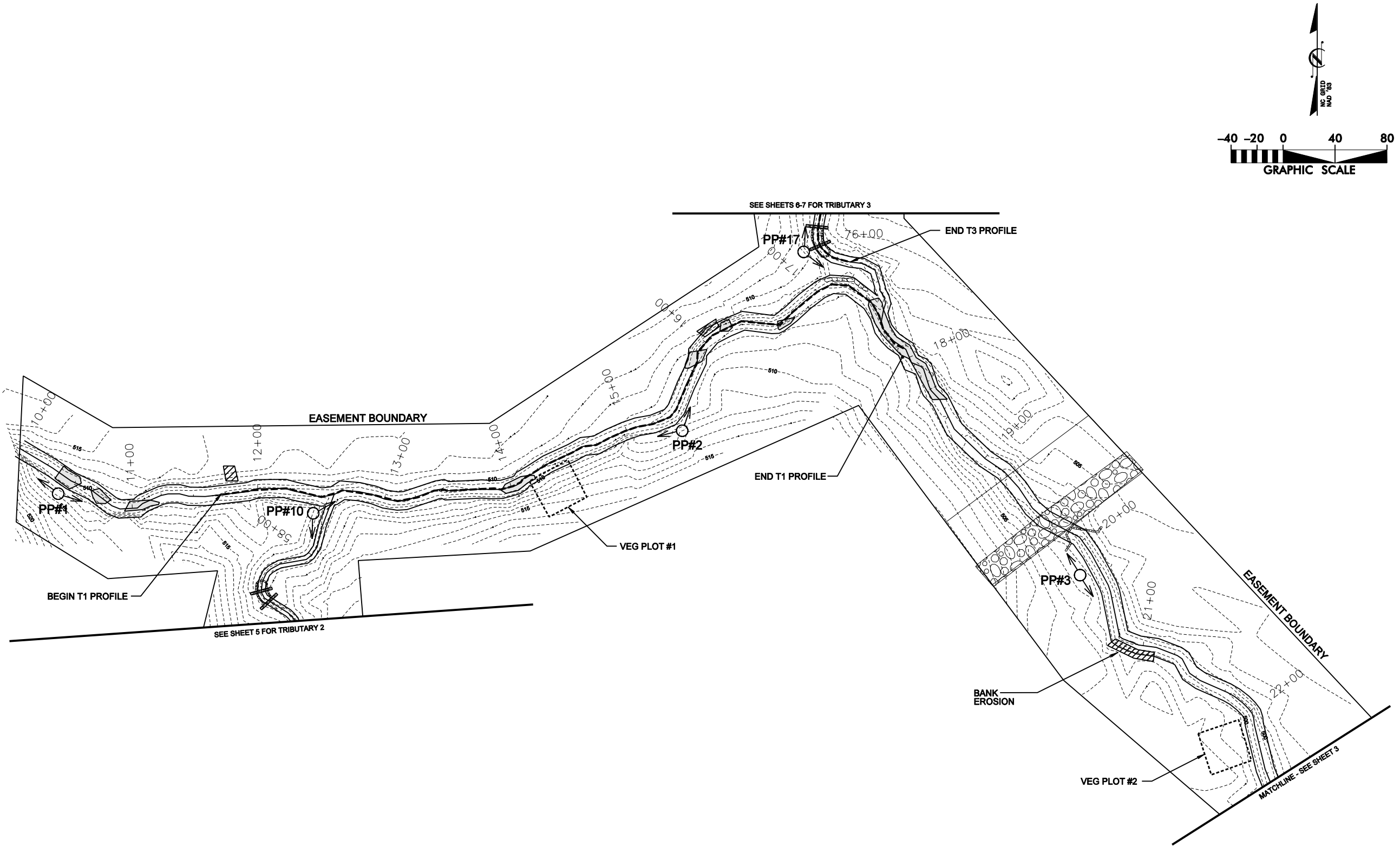
REVISIONS			
SYL.	DESCRIPTION	DATE	APPROVED



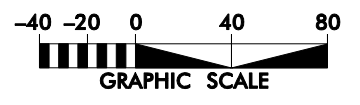
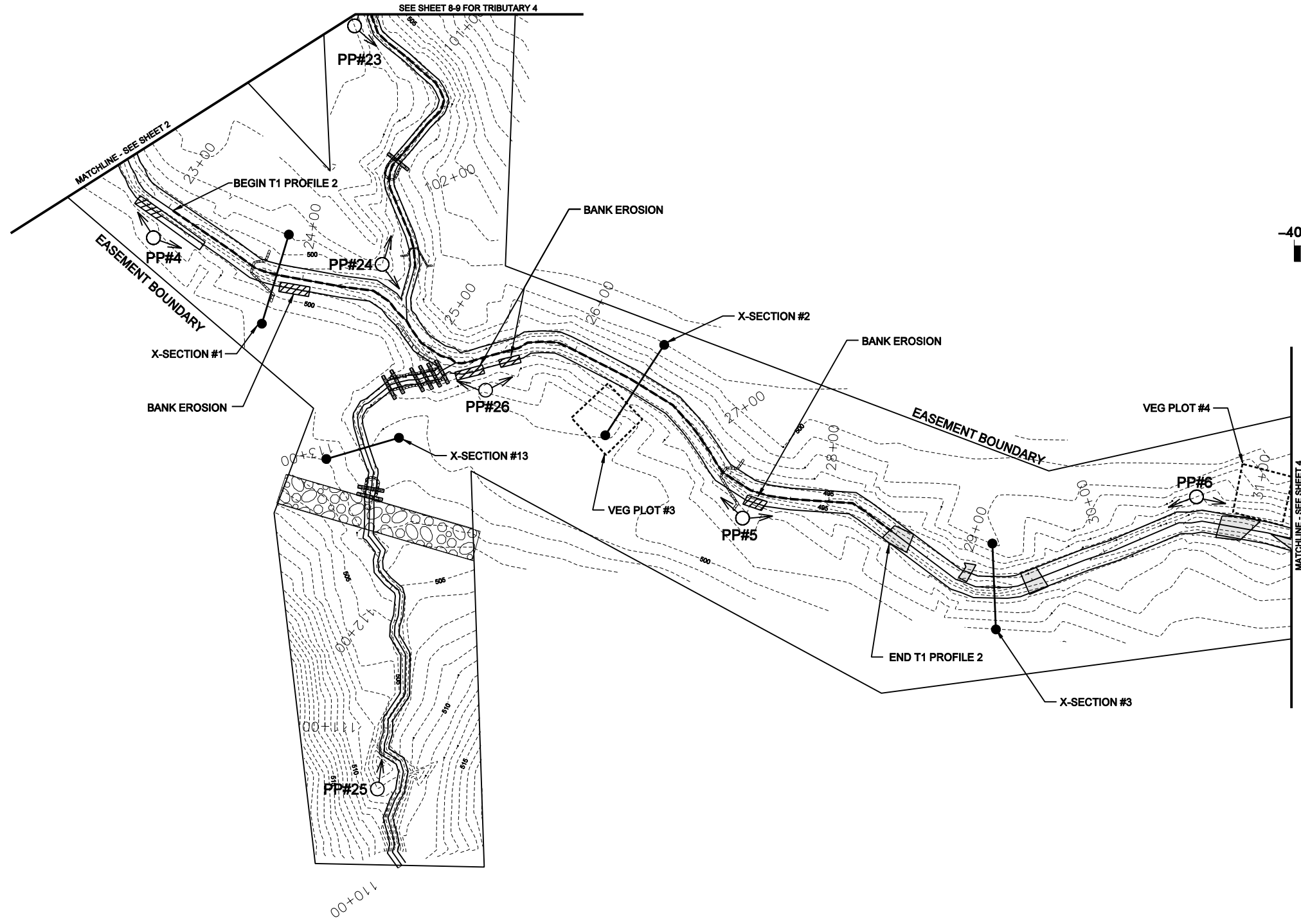

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**CANE CREEK  
 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA

DATE: JAN 2011  
 SCALE: 1"=500'  
**CURRENT  
 CONDITION  
 PLAN VIEW**  
 SHEET 1 OF 17



				<b>REVISIONS</b> <small>SYMBOL</small> <small>DESCRIPTION</small> <small>DATE</small> <small>APPROVED</small>
 <small>ENGINEERS • PLANNERS • SCIENTISTS</small> <small>4601 SIX FORKS ROAD</small> <small>RALEIGH, NORTH CAROLINA 27609</small>				
<b>CANE CREEK</b> <b>STREAM RESTORATION PROJECT</b> <b>SEMORA, PERSON COUNTY, NORTH CAROLINA</b> <b>T1-1, T1-2, T1-3: STATION 10+00 TO STATION 22+57</b>				
<small>DATE: JAN 2011</small>				
<small>SCALE: 1"=80'</small>				
<b>CURRENT</b> <b>CONDITION</b> <b>PLAN VIEW</b>				
<small>SHEET 2 OF 17</small>				



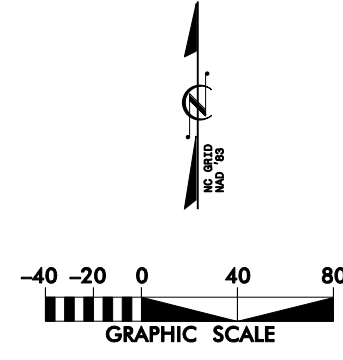
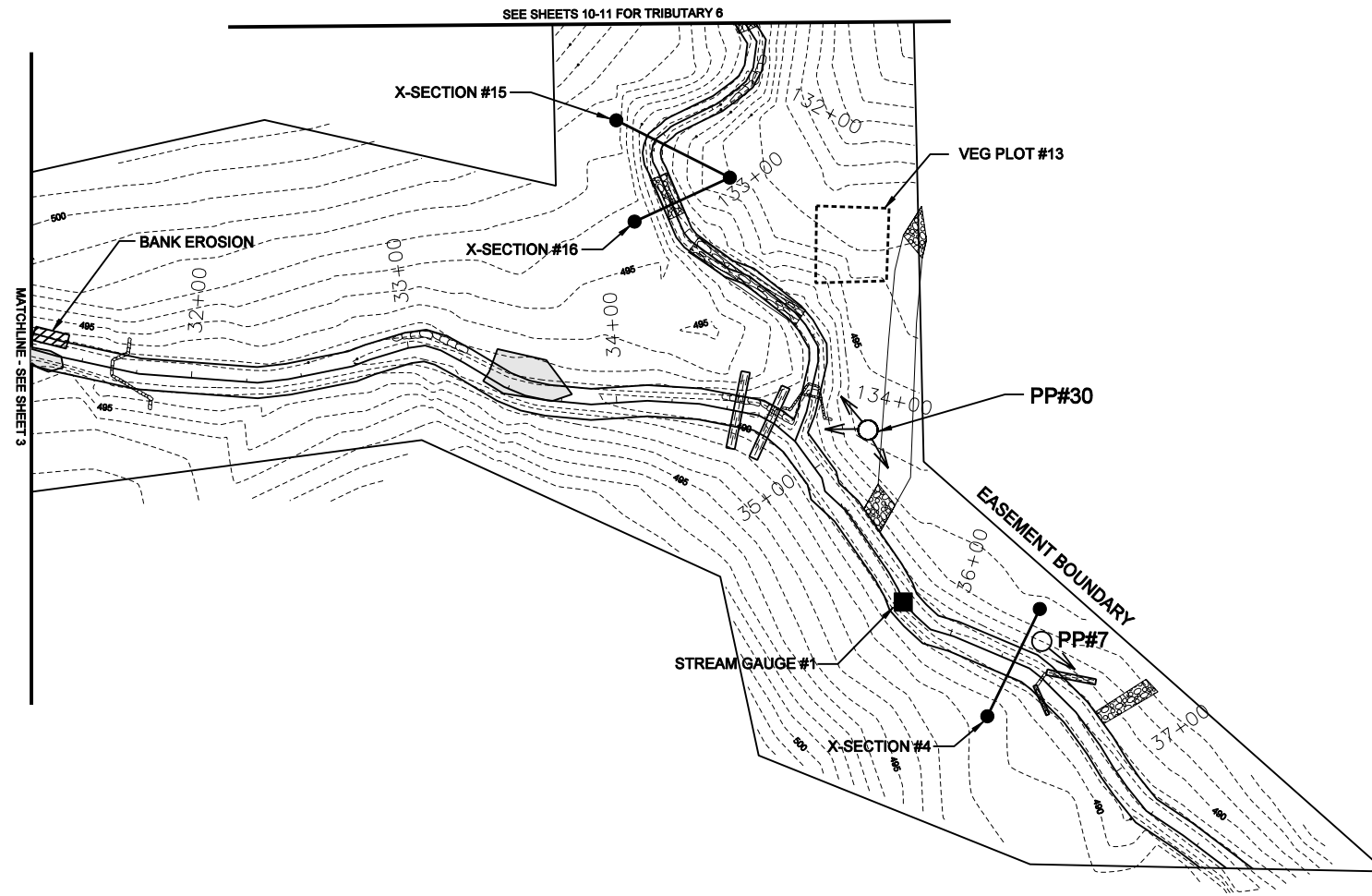
SYMBOL	DESCRIPTION	DATE	APPROVED



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 T1-3, T1-4, T5: STA 22+57 TO 31+26 AND STA 110+00 TO 113+85

DATE: JAN 2011
SCALE: 1"=80'
<b>CURRENT    CONDITION    PLAN VIEW</b>
SHEET 3 OF 17



SYMBOL	DESCRIPTION	DATE	APPROVED

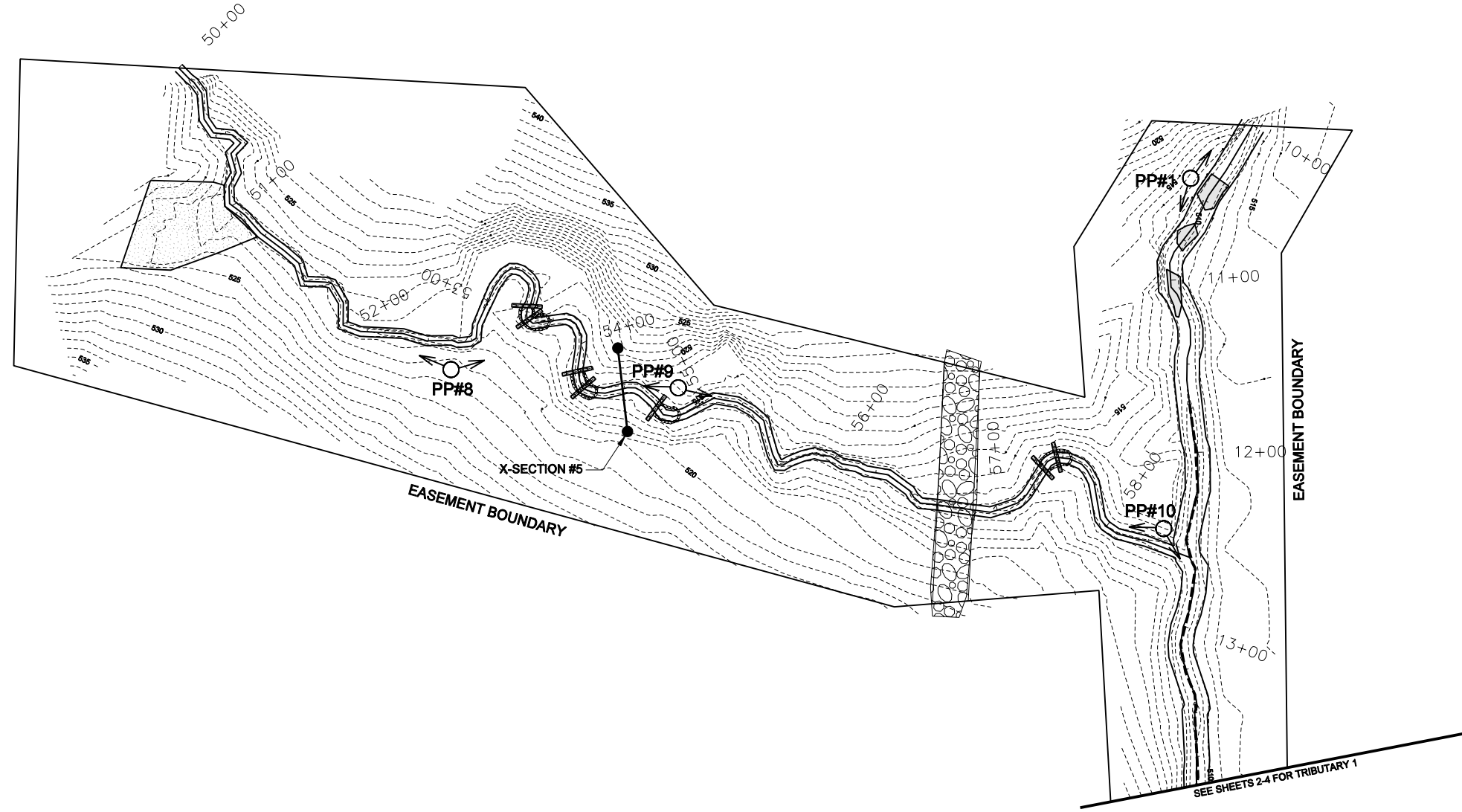
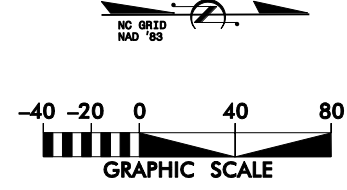


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 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA  
 T1-4, T1-5: STATION 31+26 TO STATION 37+67

DATE: JAN 2011  
 SCALE: 1"=80'  
**CURRENT  
 CONDITION  
 PLAN VIEW**  
 SHEET 4 OF 17





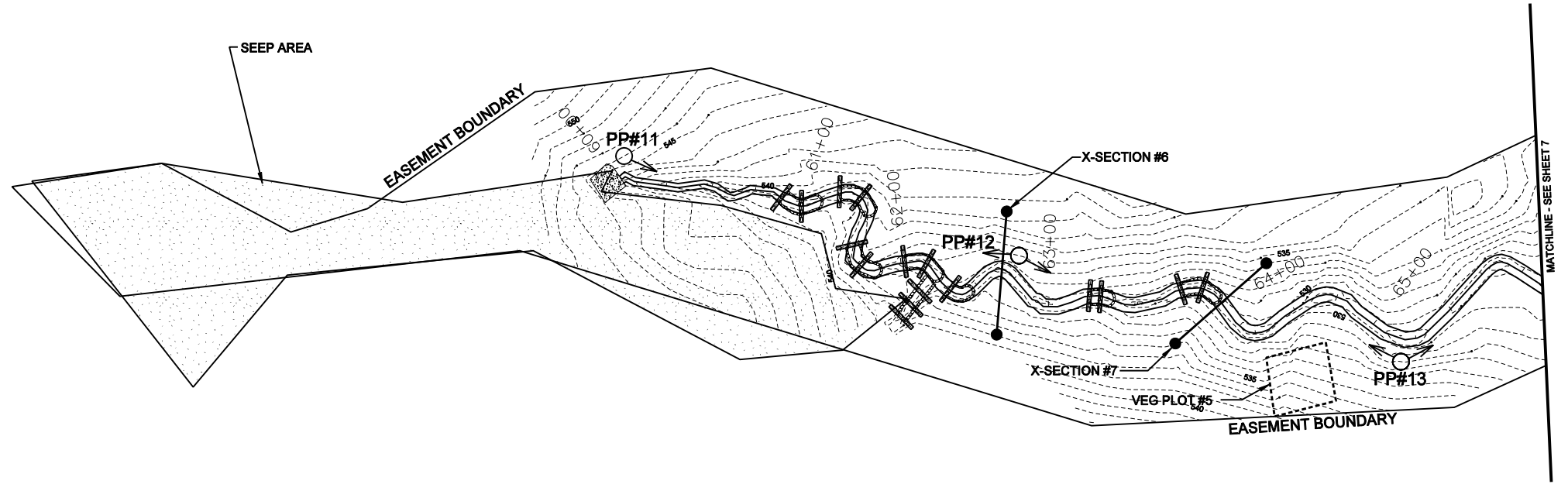
SYL	DESCRIPTION	DATE	APPROVED



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 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA  
 T2-1, T2-2, T2-3, T2-4: STATION 50+00 TO STATION 58+50

DATE: JAN 2011  
 SCALE: 1"=80'  
 CURRENT  
 CONDITION  
 PLAN VIEW  
 SHEET 5 OF 17



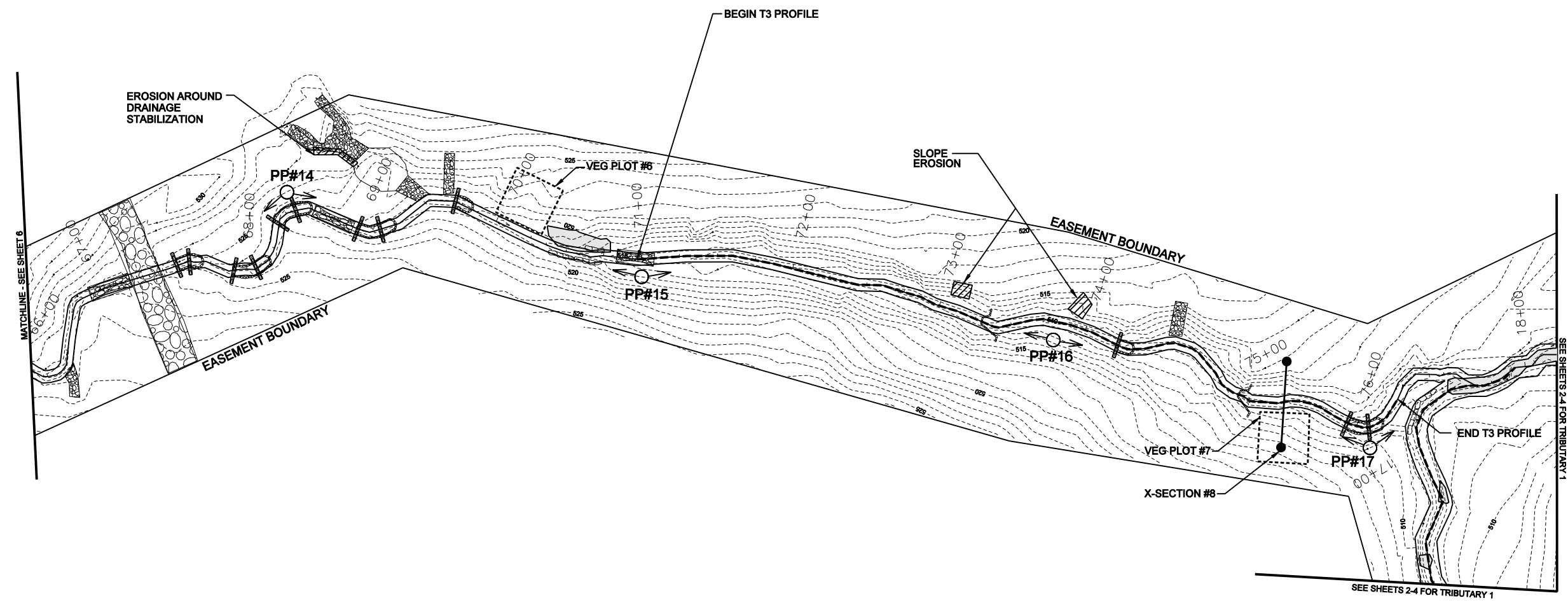
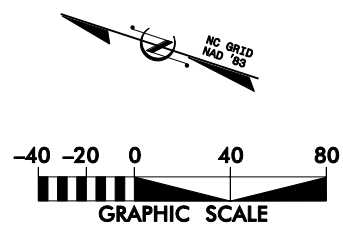
SYD	DESCRIPTION	DATE	APPROVED



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**CANE CREEK  
 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA  
 T3-1, T3-2: STATION 60+00 TO STATION 66+13

DATE: JAN 2011  
 SCALE: 1"=80'  
**CURRENT  
 CONDITIONS  
 PLAN VIEW**  
 SHEET 6 OF 17



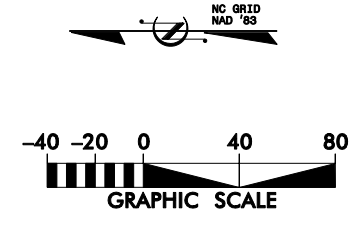
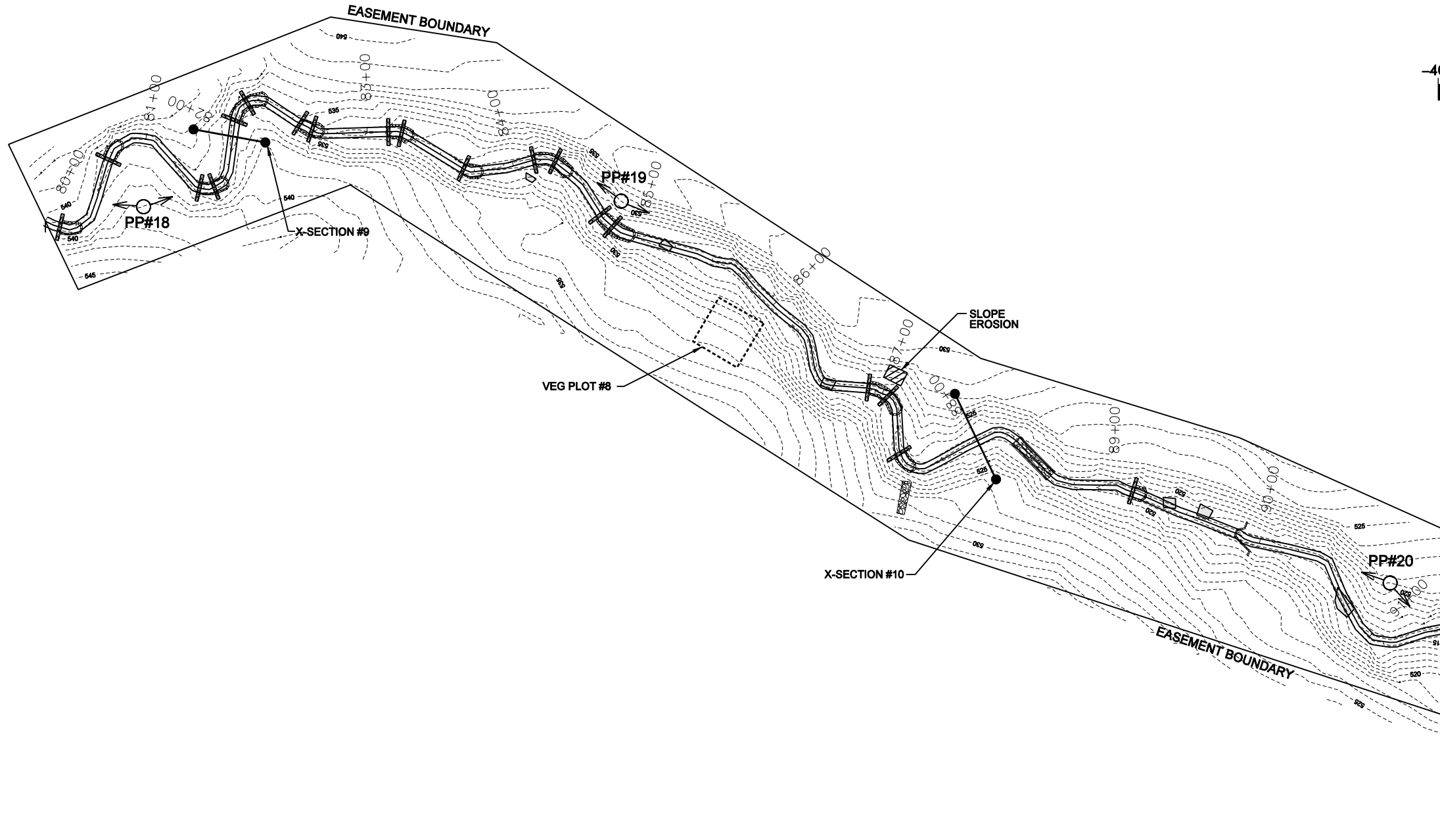
SYMBOL	DESCRIPTION	DATE	APPROVED



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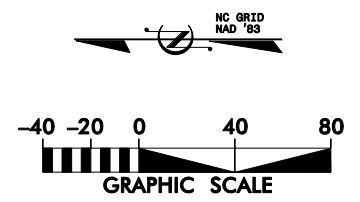
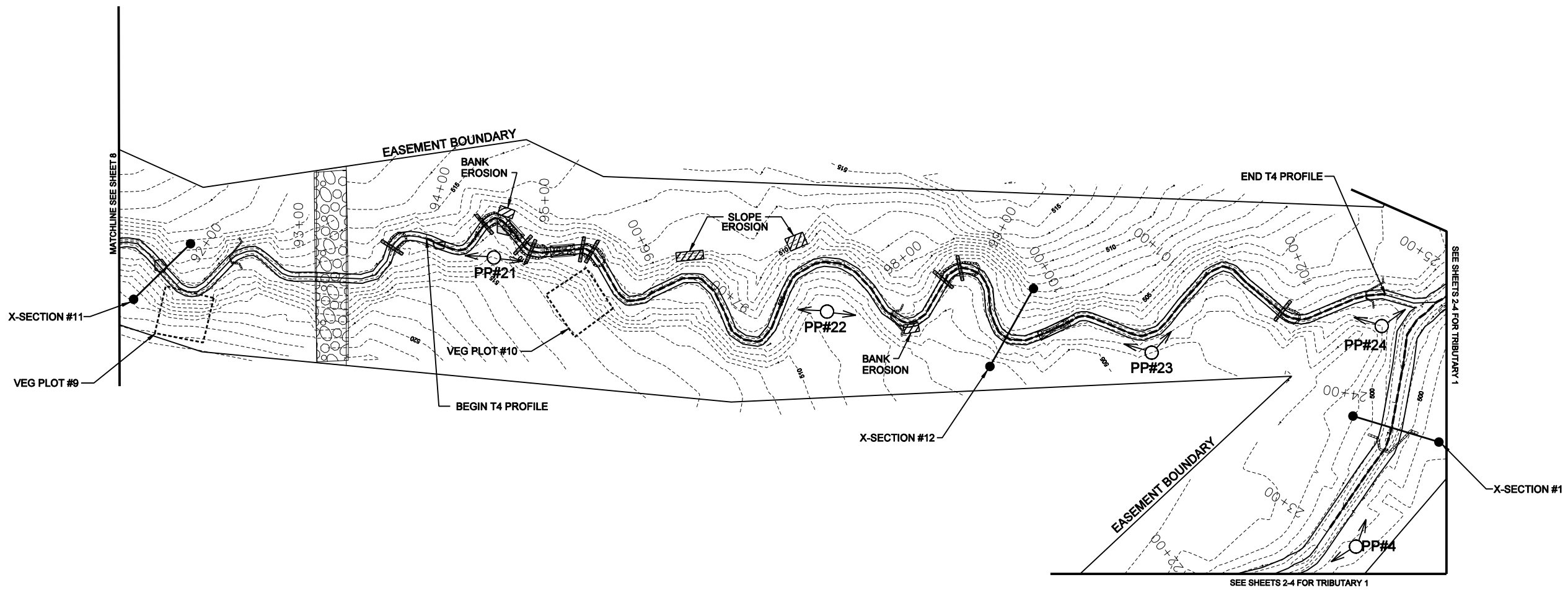
**CANE CREEK  
 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA  
 T3-2: STATION 66+13 TO STATION 76+98

DATE: JAN 2011  
 SCALE: 1"=80'  
 CURRENT  
 CONDITION  
 PLAN VIEW  
 SHEET 7 OF 17



<b>KCI</b> TECHNOLOGIES ENGINEERS • PLANNERS • SCIENTISTS 4601 SIX FORKS ROAD RALEIGH, NORTH CAROLINA 27609		REVISIONS	
		SYMBOL	DATE
<b>CANE CREEK          STREAM RESTORATION PROJECT</b> SEMORA, PERSON COUNTY, NORTH CAROLINA T4-1, T4-2: STATION 80+00 TO STATION 91+49		DATE: JAN 2011	
		SCALE: 1"=80'	
<b>CURRENT          CONDITION          PLAN VIEW</b>		SHEET 8 OF 17	





SYMBOL	DESCRIPTION	DATE	APPROVED



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STREAM RESTORATION PROJECT**

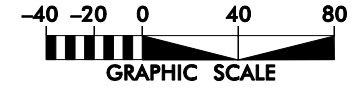
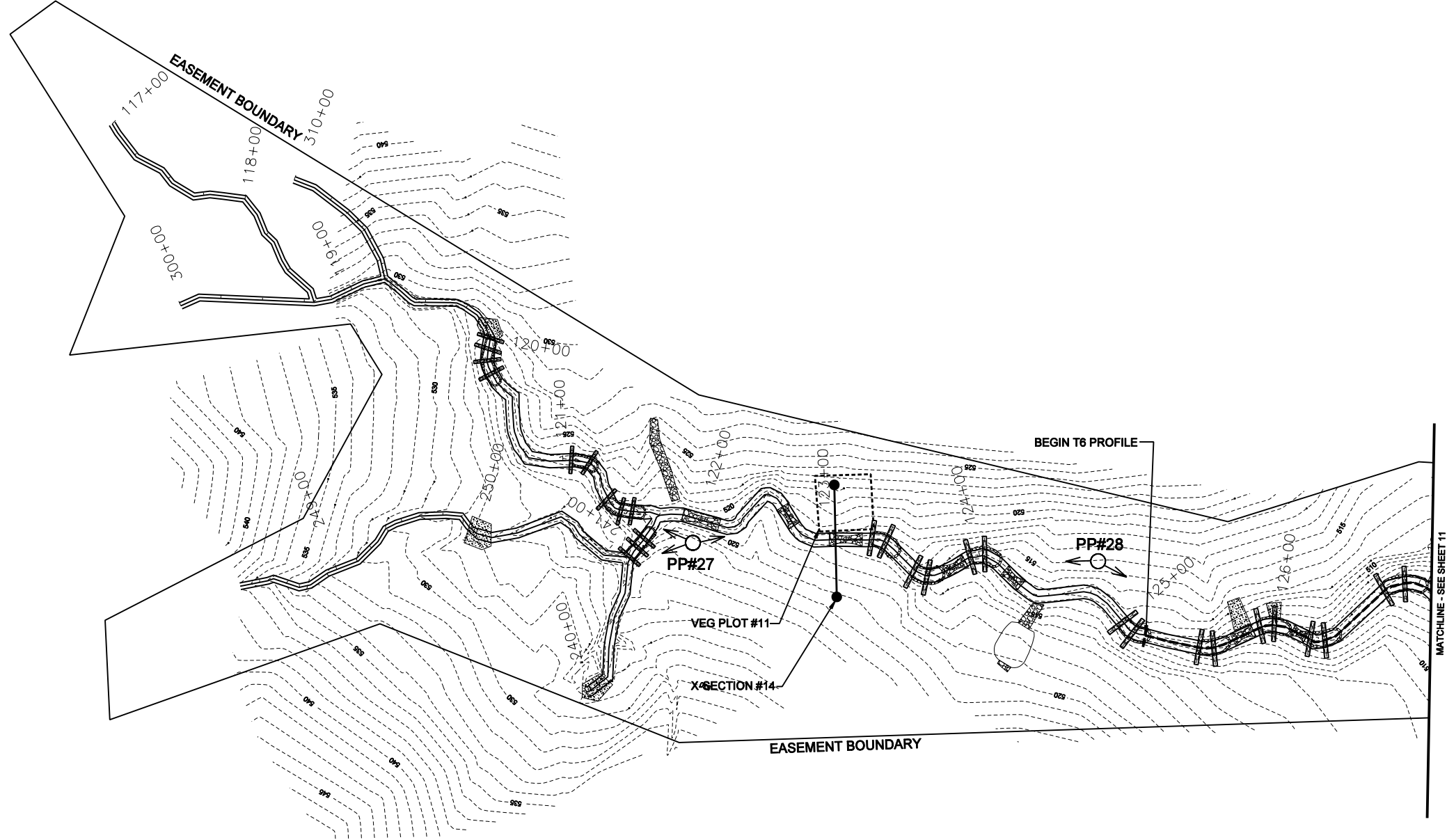
SEMORA, PERSON COUNTY, NORTH CAROLINA

T4-2: STATION 91+49 TO STATION 102+81

DATE: JAN 2011  
SCALE: 1"=80'

**CURRENT  
CONDITION  
PLAN VIEW**

SHEET 9 OF 17



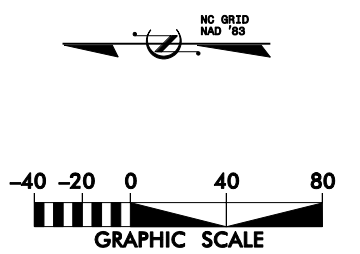
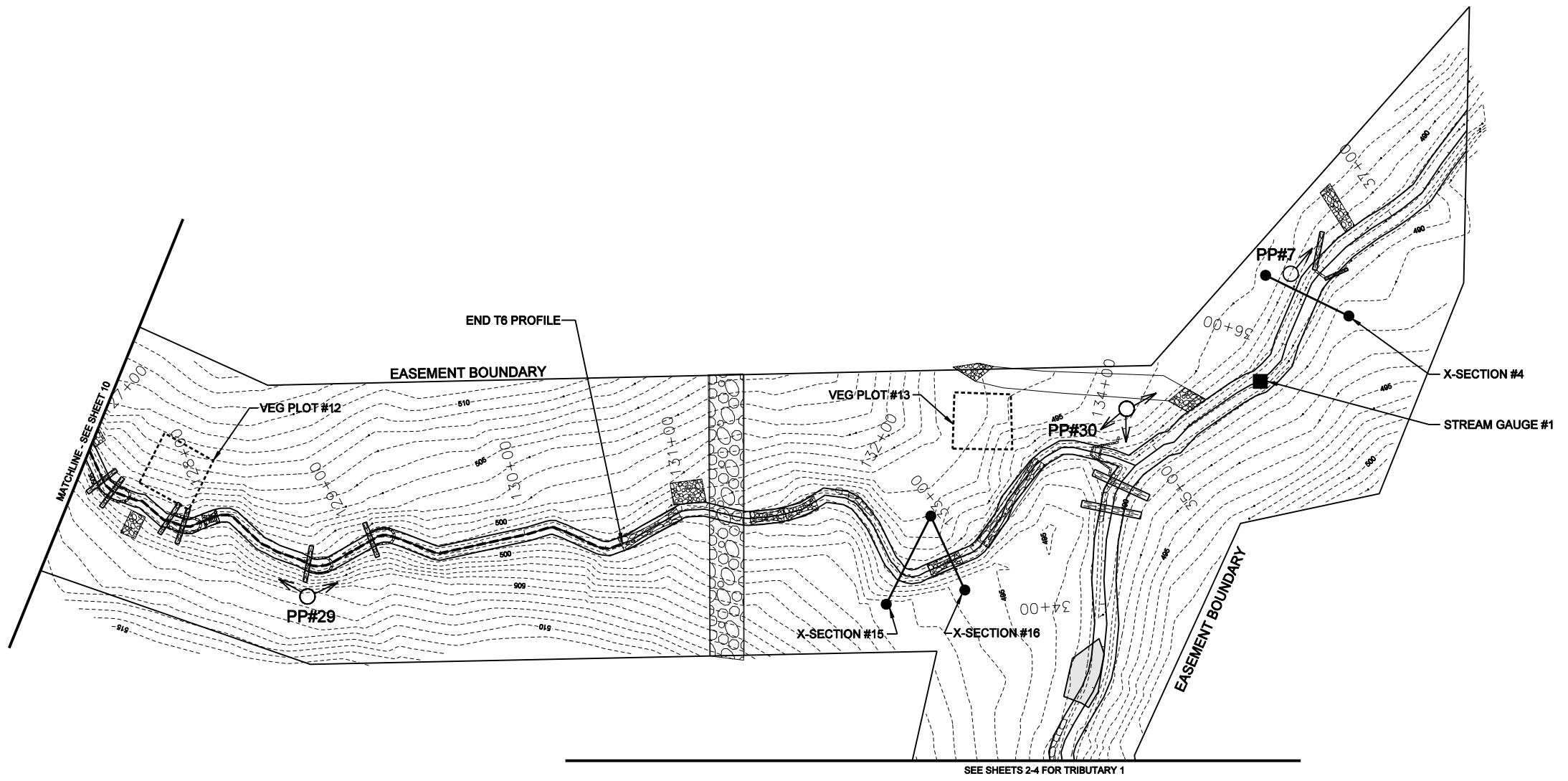
SYL	DESCRIPTION	DATE	APPROVED



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**CANE CREEK  
STREAM RESTORATION PROJECT**  
SEMORA, PERSON COUNTY, NORTH CAROLINA  
T6A, T6B, T6B-1, T6C-1, T6C-2, T6C-3, T6AB, T6C, T6: STA 300+00  
TO 300+80, STA 310+00 TO 310+82, STA 240+00 TO 241+21,  
STA 248+38 TO 251+04, AND STA 117+02 TO 127+10

DATE: JAN 2011  
SCALE: 1"=80'  
**CURRENT  
CONDITION  
PLAN VIEW**  
SHEET 10 OF 17



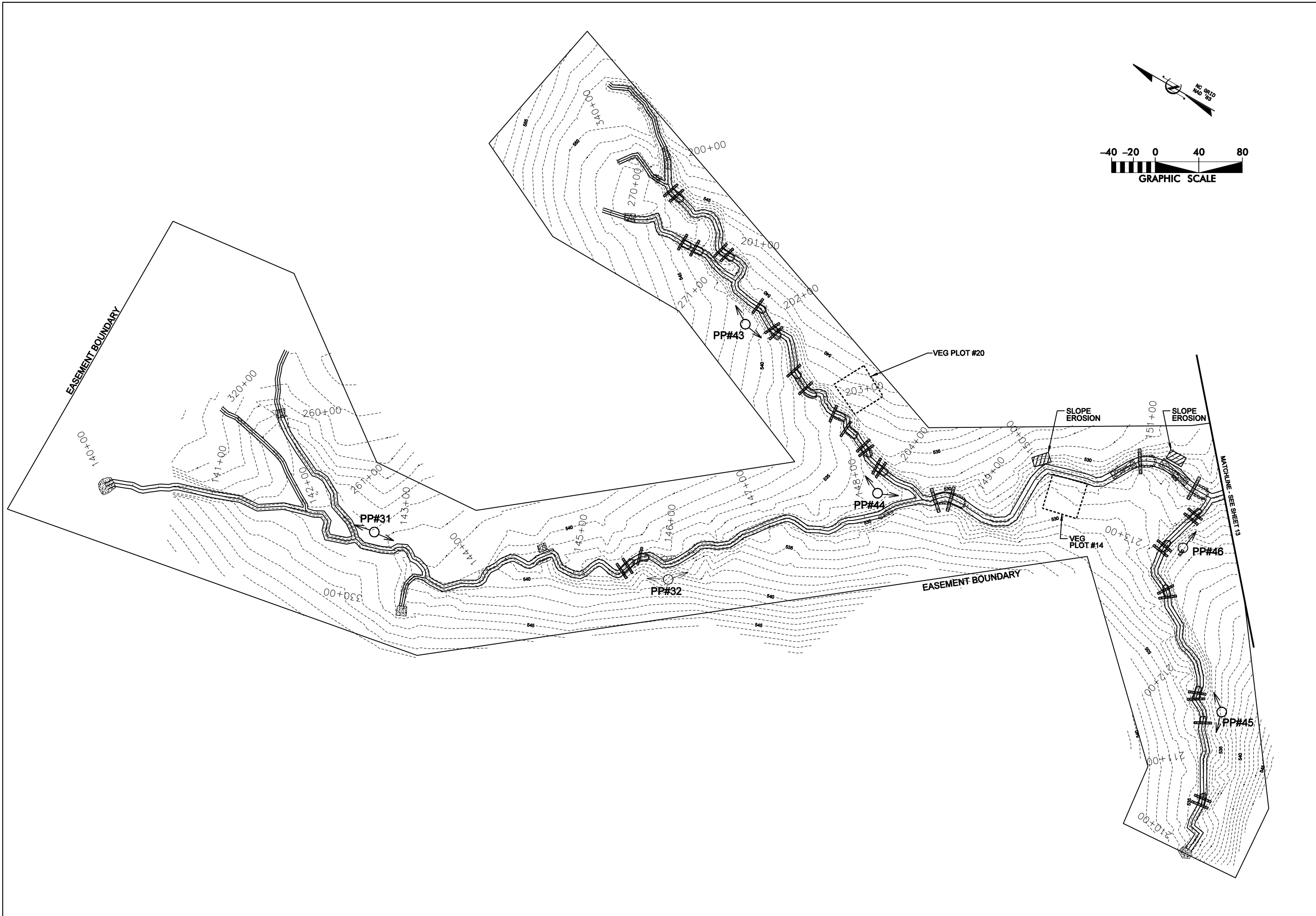
SYMBOL	DESCRIPTION	DATE	APPROVED



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STREAM RESTORATION PROJECT**  
SEMORA, PERSON COUNTY, NORTH CAROLINA  
T6: STATION 127+10 TO STATION 134+25

DATE: JAN 2011  
SCALE: 1"=80'  
**CURRENT  
CONDITION  
PLAN VIEW**  
SHEET 11 OF 17



SYMBOL	DESCRIPTION	DATE	APPROVED

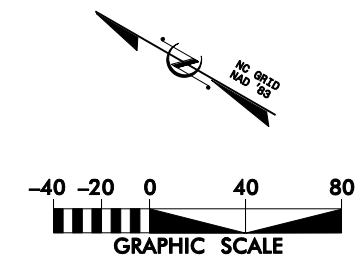
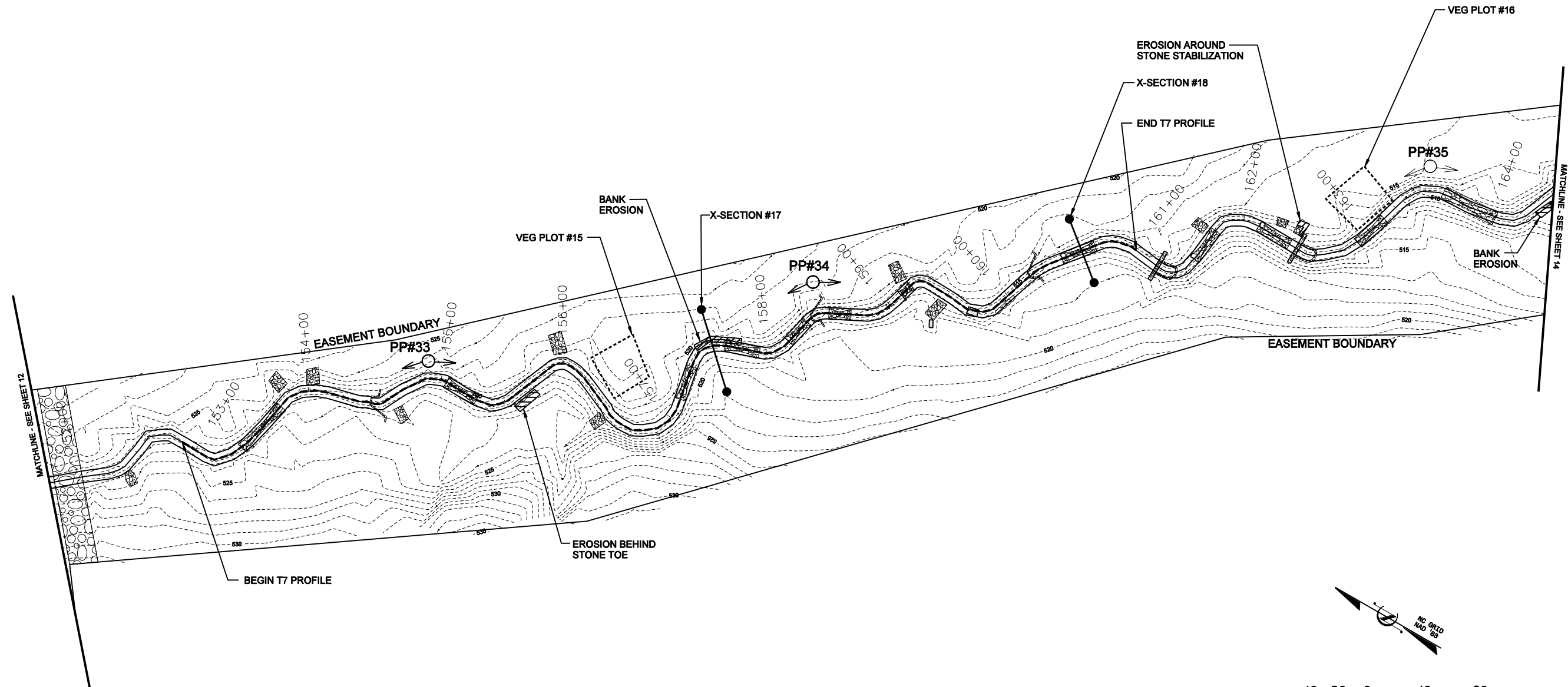


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**CANE CREEK  
 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA  
 T7A, T7A-1, T7B, T7C, T7-1, T7-2, T7-3, T8, T8A, T8A-1, T8-1, T8B, T8-1,  
 STA 260+00 TO 281+38, STA 140+00 TO 151+57, STA 270+00 TO 271+23,  
 STA 200+00 TO 204+38, AND STA 210+00 TO 213+68

DATE: JAN 2011  
 SCALE: 1"=80'  
**CURRENT  
 CONDITION  
 PLAN VIEW**  
 SHEET 12 OF 17





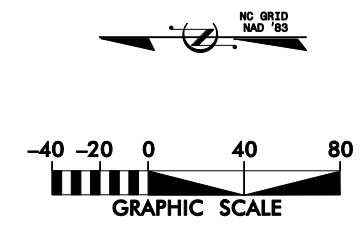
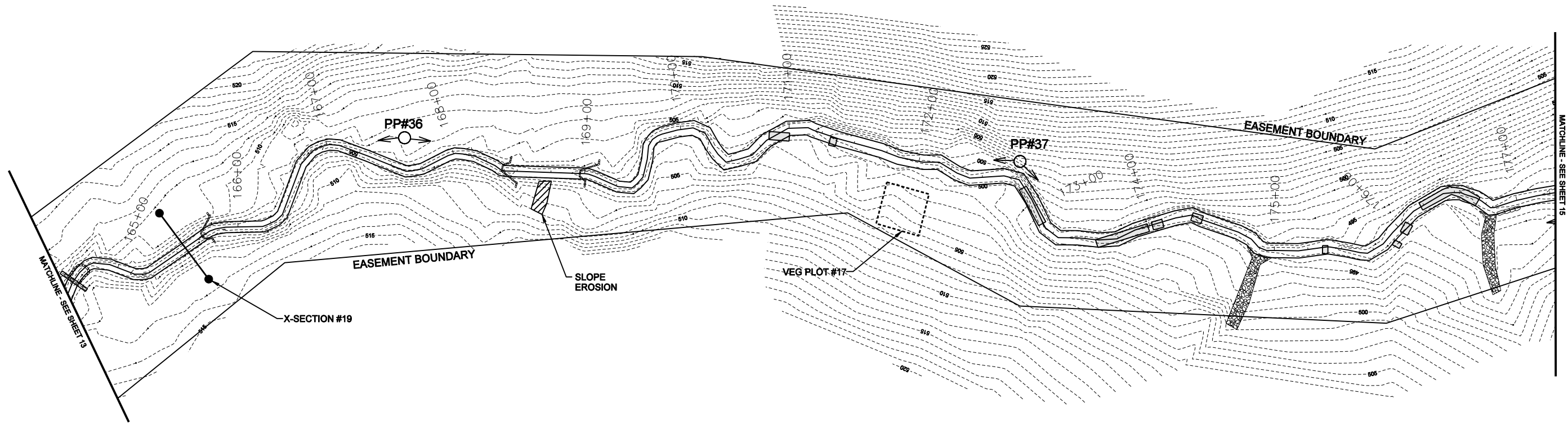
SYMBOL	DESCRIPTION	DATE	APPROVED



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**CANE CREEK  
 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA  
 T7-3: STATION 151+57 TO STATION 164+50

DATE: JAN 2011  
 SCALE: 1"=80'  
**CURRENT  
 CONDITION  
 PLAN VIEW**  
 SHEET 13 OF 17



REV	DESCRIPTION	DATE	APPROVED

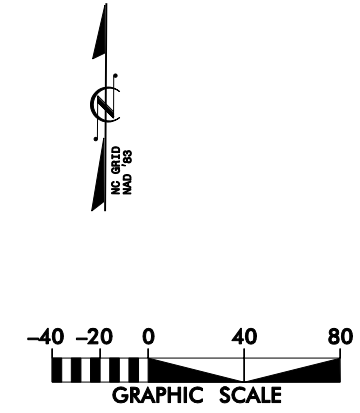
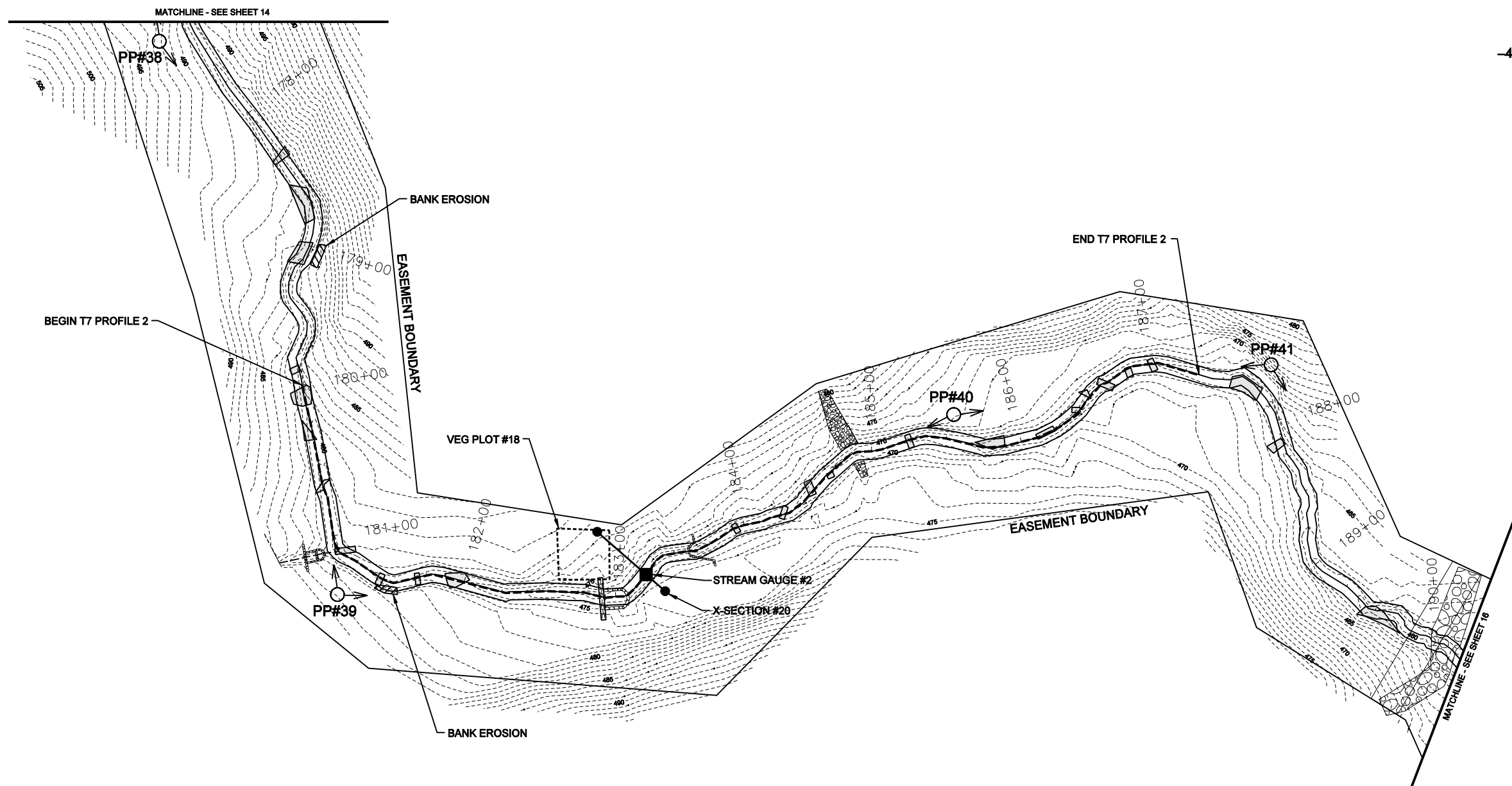



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**CANE CREEK  
 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA  
 T7-3, T7-4: STATION 16+50 TO STATION 177+29

DATE: JAN 2011  
 SCALE: 1"=80'

**CURRENT  
 CONDITION  
 PLAN VIEW**



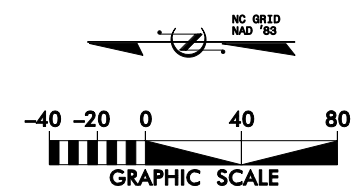
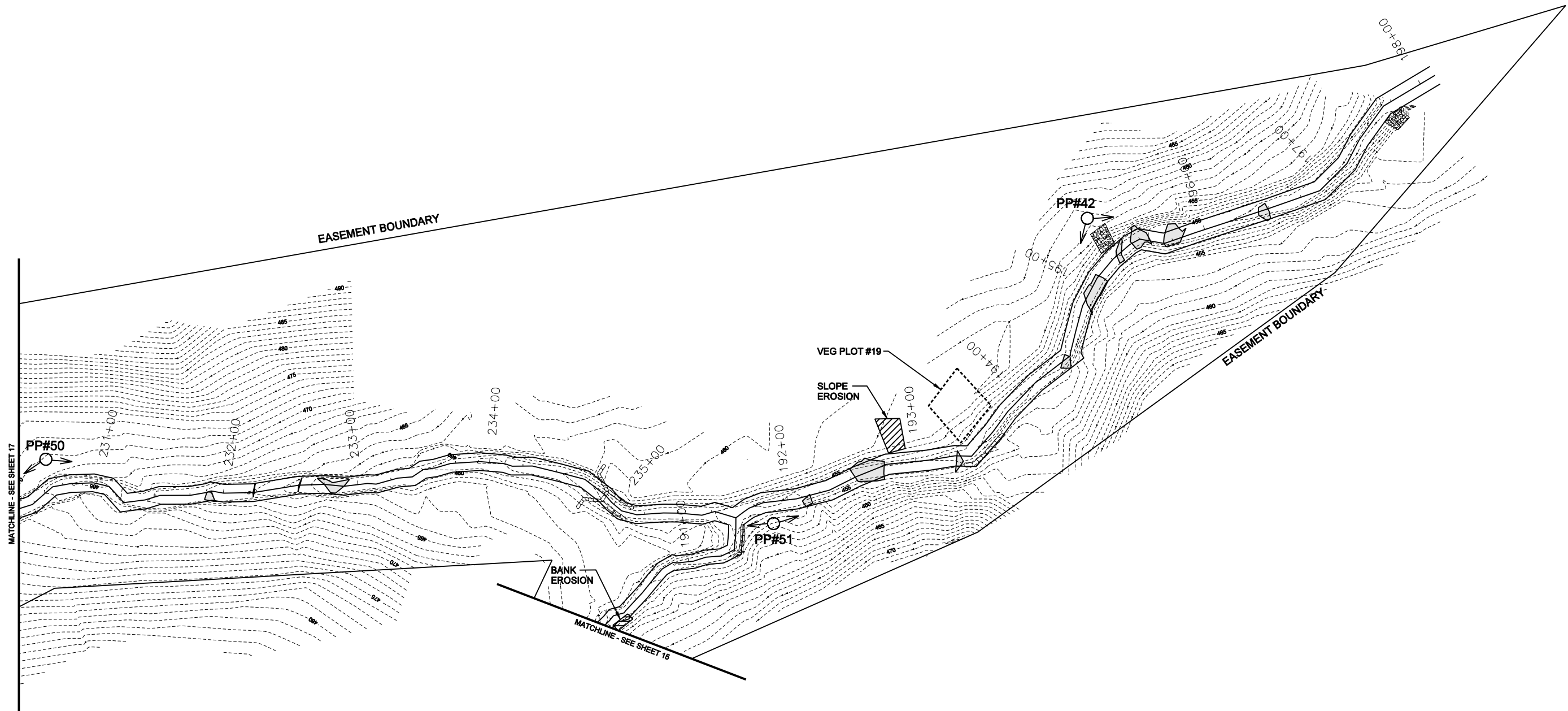
SYMBOL	DESCRIPTION	DATE	APPROVED



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**CANE CREEK  
 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA  
 T7-4, T7-5, T7-6: STATION 177+29 TO STATION 190+18

DATE: JAN 2011  
 SCALE: 1"=80'  
**CURRENT  
 CONDITION  
 PLAN VIEW**  
 SHEET 16 OF 17



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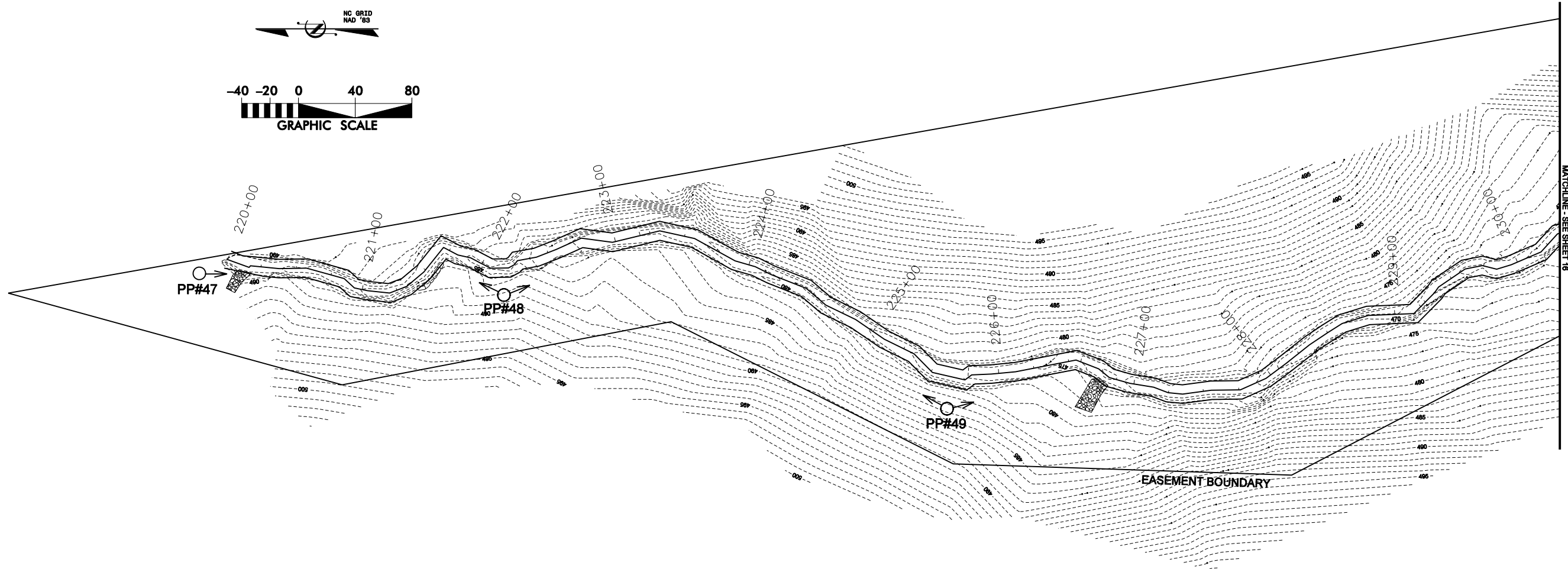
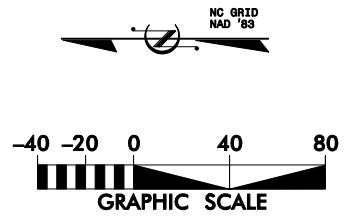
4601 SIX FORKS ROAD  
RALEIGH, NORTH CAROLINA 27609

**CANE CREEK  
STREAM RESTORATION PROJECT**  
SEMORA, PERSON COUNTY, NORTH CAROLINA  
T7-6, T7-7, AND T10: STA 190+18 TO 198+13  
AND STA 230+37 TO 235+91

DATE: JAN 2011  
SCALE: 1"=80'

**CURRENT  
CONDITION  
PLAN VIEW**

SHEET 16 OF 17



SYL	DESCRIPTION	DATE	APPROVED



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 RALEIGH, NORTH CAROLINA 27609

**CANE CREEK  
 STREAM RESTORATION PROJECT**  
 SEMORA, PERSON COUNTY, NORTH CAROLINA  
 T10: STATION 220+00 TO STATION 230+37

DATE: JAN 2011  
 SCALE: 1"=80'  
**CURRENT  
 CONDITION  
 PLAN VIEW**  
 SHEET 17 OF 17