Benbow Park
Stream Restoration Monitoring Report
EEP Project # 29
Monitoring Year – 03
2007

Submitted to:

Ecosystem Enhancement PROGRAM

NCDENR-EEP, 1652 Mail Service Center, Raleigh, NC 27699-1652

February 2008

Monitoring Firm

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Project Contact: Adam Spiller
Email: aspiller@kci.com

Design Firm

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EXECUTIVE SUMMARY

In 2004, the North Carolina Ecosystem Enhancement Program (EEP) conducted stream restoration at Benbow Park within the Buffalo Creek Watershed in Greensboro, North Carolina. The 0.7 mi^2 watershed is located within the USGS 14-digit HUC 03030002020050 and the NCDWQ Sub-basin 03-06-02 of the Cape Fear River Basin. The project restored approximately 2,060 linear feet of channel, 780 feet upstream of South Benbow Road and 1,280 feet downstream of South Benbow Road. The design was developed to address vertical instability problems and a lack of bed variability. The restoration plan called for correcting these problems by stabilizing stream banks, installing in-stream structures, adjusting stream planform, and replanting the riparian areas with native vegetation. Project construction occurred in 2004. This report describes the findings of the third year monitoring that took place in 2007.

The riparian buffer was planted with seven different species of bare root trees and four different species of live stakes. Three vegetation monitoring plots were established during the as-built survey, two buffer plots and one live stake plot. These plots were monitored during the first year monitoring period. The EEP requested that the site be monitored using the new vegetation protocol. Five new plots were established for the second monitoring year, and the previous monitoring plots were discontinued. The five plots were surveyed and the corners marked with metal conduit for future monitoring. The third year monitoring counted an average of 647 stems per acre. The buffer along Reach 1 has numerous mimosa (*Albizia julibrissin*) and ornamental pear (*Pyrus calleryana*) volunteers. These trees should be removed from the riparian buffer to control the immediate seed source of these invasive species. The third year monitoring found the vegetation component of the project to be meeting the success criteria.

The stream assessment completed during the third year monitoring found the stream to be functioning for the majority of the project. Channel dimensions have not changed drastically from the as-built conditions over the course of the stream. The stream has experienced localized erosion, but many of these eroding banks have stabilized. Some channel narrowing has remained from the previous monitoring year where the stream aggraded, specifically between Stations 21+30 to 21+80 and 22+50 to 22+80. These aggradation/bank erosion issues are detailed in the following report and should be monitored to determine if repairs are warranted. The majority of the in-stream structures are functioning with minimal problems.

1.0 PROJECT BACKGROUND

1.1 Project Objectives

- Restore unstable stream channels to natural stable forms by modifying dimension, pattern, and/or profile, based on reference reach parameters.
- Improve floodplain functionality by matching bankfull stage with floodplain elevation.
- Establish native floodplain vegetation through a forested riparian buffer.
- Improve the natural aesthetics of the stream corridor.
- Obtain mitigation credits for unavoidable impacts to streams within the same Hydrologic Unit Code (HUC).

1.2 Project Structure, Restoration Type, and Approach

A previously incised channel through Benbow Park was restored using channel dimension, pattern, and profile modifications and the establishment of a vegetated riparian zone adjacent to the creek. Channel profile is maintained through the use of rock cross vanes and constructed riffles. Channel pattern is maintained through the use of cross vanes, single vanes, root wads, J-hooks, and vegetation along the channel banks.

1.3 Location and Setting

Benbow Park is located within the city limits of Greensboro, North Carolina. The landuse of the 0.7-mi^2 watershed is urban residential with small pockets of industrial/commercial development. The watershed is completely built out with little potential for future development.

1.4 Project History and Background

Table 1. Project Restoration Components
Project Number and Name: 29 - Benbow Park

Segment/ Reach ID	Existing Linear Feet	Type	Approach	Linear Feet	Stationing	Comment
Reach 1	780	EI	P2/3	780	10+00 - 17+80	
Reach 2	972	R	P1	1,280	18+50 - 31+30	

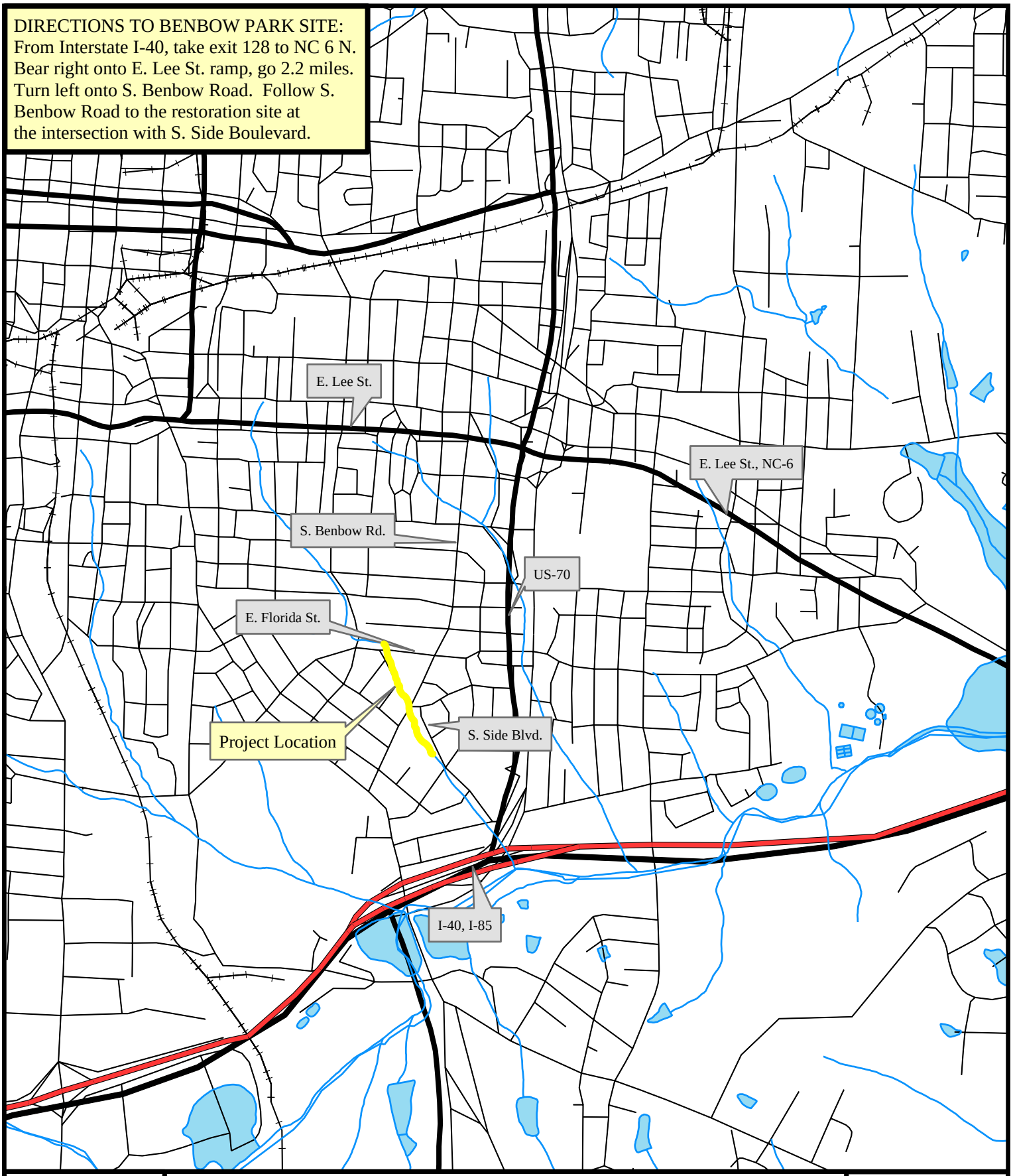


Figure 1. Site Vicinity Map
Benbow Park, Guilford County, EEP Project # 29 - MY03

0.25 0.125 0 0.25 0.5 Miles

N

Date: 01/02/07

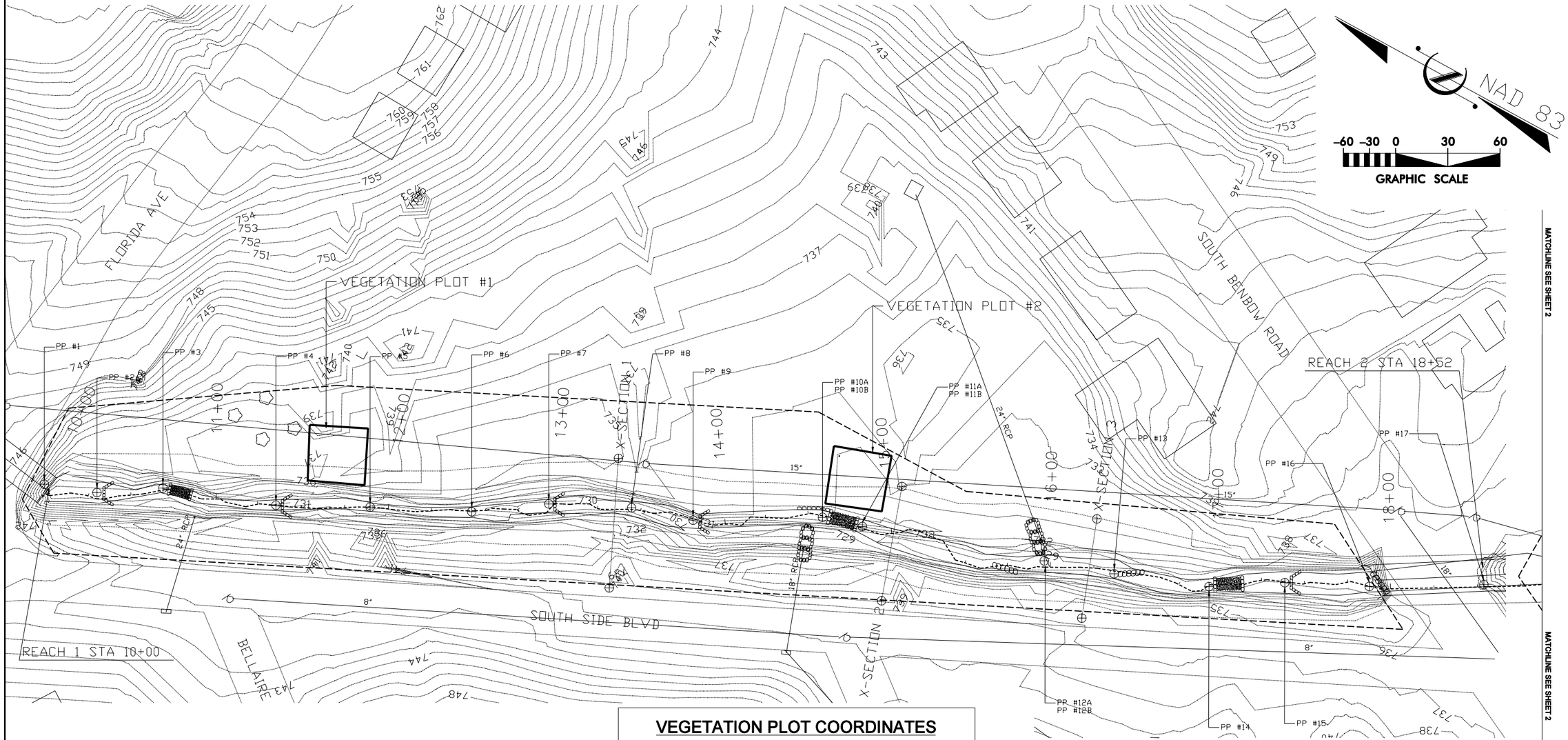
Ecosystem Enhancement Program

KCI Associates of NC

Table 2. Project Activity and Reporting History Project Number and Name: 29 - Benbow Park		
Activity or Report	**Data Collection Complete**	**Actual Completion or Delivery**
Restoration Plan		
Final Design - 90%		
Construction	N/A	Aug 04
Stream Repair and Maintenance Seeding	N/A	Apr 05
As-Built Report	2005	Jun 05
Year 1 Monitoring	Nov 05	Jan 06
Adjustments to the Location of the Conservation Easement	N/A	Oct 06
Year 2 Monitoring	Sep 06	Jan 07
Year 3 Monitoring	Sep 07	Jan 08

Table 3. Project Contact Table Project Number and Name: 29 - Benbow Park	
Design Firm	Buck Engineering 8000 Regency Parkway, Suite 200 Cary, North Carolina 27511 Contact: Mr. Mike Rooney Phone: (919) 463-5488 Fax: (919) 463-5490
Construction Contractor	Shamrock Construction P.O. Box 14987 Greensboro, North Carolina 27415 Contact: Mr. Bill Wright Phone: (336) 375-1989 Fax: (336) 375-1801
Monitoring Performers	
MY-01	Buck Engineering 8000 Regency Parkway, Suite 200 Cary, North Carolina 27511 Contact: Mr. Mike Rooney Phone: (919) 463-5488 Fax: (919) 463-5490
MY-02, 03	KCI Associates of NC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 783-9214 Fax: (919) 783-9266

Table 4. Project Background Table **Project Number and Name: 29 – Benbow Park**	
Project County	Guilford County
Drainage Area	0.7 mi^2
Drainage Impervious Cover Estimate (%)	N/A
Stream Order	Second Order
Physiographic Region	Piedmont
Ecoregion	Southern Outer Piedmont
Rosgen Classification of As-built	B5c (Reach 1) E5 (Reach 2)
Dominant Soil Types	Enon - Urban Land Complex (Benbow Stream)
Reference Site ID	N/A
USGS HUC for Project and Reference	03030002020050 (Benbow Stream)
NCDWQ Sub-basin for Project and Reference	03-06-02 (Benbow Stream)
NCDWQ Classification for Project and Reference	N/A (Benbow Stream)
Any portion of the project segment 303d listed?	No - not rated
Any portion of the project segment upstream of a 303d listed segment?	Project stream is approx. 0.4 miles upstream of the listed stream, S. Buffalo Creek.
Reasons for 303d Listing or Stressor	S. Buffalo Creek listed for impaired biological integrity and turbidity violation.
% of Project Easement Fenced	0%
% of Project Easement Demarcated with Bollards	approx. 75% - many bollards have been knocked over and are no longer in the proper positions



CROSS SECTION COORDINATES

	NORTHING	EASTING	ELEVATION
CROSS SECTION 1 LB	839329.34	1771033.91	736.61
RB	839298.26	1770966.16	740.00
CROSS SECTION 2 LB	839178.72	1771097.96	734.05
RB	839157.49	1771034.75	738.95
CROSS SECTION 3 LB	839071.52	1771135.40	733.47
RB	839051.78	1771081.27	737.82
CROSS SECTION 4 LB	838397.44	1771299.45	728.30
RB	838425.07	1771246.95	729.70
CROSS SECTION 5 LB	838314.09	1771418.26	732.10
RB	838288.35	1771353.07	727.80
CROSS SECTION 6 LB	838180.94	1771418.13	727.84
RB	838133.24	1771409.06	728.95

VEGETATION PLOT COORDINATES

	NORTHING	EASTING
VEGETATION PLOT #1	839494.17	1770965.66
	839463.78	1770979.87
	839449.92	1770950.34
	839479.83	1770937.07
VEGETATION PLOT #2	839224.18	1771099.58
	839192.34	1771110.54
	839182.02	1771079.85
	839212.61	1771068.29
VEGETATION PLOT #3	838517.75	1771228.98
	838457.49	1771256.77
	838452.01	1771240.74
	838513.04	1771214.85
VEGETATION PLOT #4	838320.18	1771302.21
	838296.75	1771363.84
	838282.01	1771356.20
	838305.37	1771294.46
VEGETATION PLOT #5	838188.65	1771391.60
	838180.41	1771458.03
	838172.03	1771389.36
	838164.44	1771454.45

LEGEND

- PHOTO POINT
- THALWEG
- AS-BUILT VEGETATIVE BUFFER BOUNDARY
- CROSS SECTION
- ROOT WAD
- ROCK CROSS VANE
- CONSTRUCTED RIFFLE
- STEP POOL STRUCTURE
- DOUBLE DROP CROSS VANE
- J-HOOK

REVISIONS

KCI ASSOCIATES OF NC
ENGINEERS • PLANNERS • SCIENTISTS
4601 SIX FORKS ROAD
RALEIGH, NORTH CAROLINA 27609

BENBOW PARK
GUILFORD COUNTY
EEP PROJECT NUMBER 29 - MY03

STATION 10+00 TO STATION 18+87

DATE: NOVEMBER 2007
SCALE: SEE SHEET

MONITORING PLAN VIEW

SHEET 1 OF 2

LEGEND

- PHOTO POINT
- THALWEG
- AS-BUILT VEGETATIVE BUFFER BOUNDARY
- CROSS SECTION
- ROOT WAD
- ROCK CROSS VANE
- CONSTRUCTED RIFFLE
- STEP POOL STRUCTURE
- DOUBLE DROP CROSS VANE
- J-HOOK

NAD 83

–60 –30 0 30 60

GRAPHIC SCALE

MATCHLINE SEE SHEET 1

PP #20 PP #21 PP #22 PP #23A PP #23B PP #24 PP #25 PP #26 PP #27 PP #28 PP #29 PP #30 PP #31 PP #32 PP #33 PP #34 PP #35 PP #36A PP #36B PP #37 PP #38 PP #39 PP #40 PP #41 PP #42 PP #43 PP #44 PP #18A PP #18B PP #19

19+00 20+00 21+00 22+00 23+00 24+00 25+00 26+00 27+00 28+00 29+00

X-SECTION 1 X-SECTION 2 X-SECTION 3 X-SECTION 4 X-SECTION 5 X-SECTION 6

FOOT BRIDGE

BASKETBALL COURT

PLAY GROUND EQUIPMENT

SWALE

BERM

FENCE

WALL

VEGETATION PLOT #3 VEGETATION PLOT #4 VEGETATION PLOT #5

SOUTH SIDE BLVD

FINLEY STREE

BELCREST RD

END REACH 2 STA 29+85

18" RCP 24" RCP 36" RCP

737 738 739 740 741 742 743 744 735 736 733 734 731 732 729 730 727 728 723 724 725 726

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BENBOW PARK
GUILFORD COUNTY
EEP PROJECT NUMBER 29 - MY03
STATION 18+87 TO STATION 29+85

DATE: NOVEMBER 2007
SCALE: SEE SHEET

MONITORING PLAN VIEW

2.0 PROJECT CONDITIONS AND MONITORING RESULTS

2.1 Vegetation Assessment

See vegetation assessment in Appendix A and Current Conditions Plan View in Appendix C.

2.2 Stream Assessment

See stream assessment in Appendix B and Current Conditions Plan View in Appendix C

2.2.1 Bankfull Event and Stability Assessment

2.2.1.a Verification of Bankfull Events Table

Table 5. Verification of Bankfull Events
Project Number and Name: 29 - Benbow Park

Date of Data Collection	Date of Occurence	Method	Photo Number
9/19/2006	9/18/2006	Site visit to evaluate indicators of stage after storm events	N/A

2.2.1.b BEHI and Sediment Export Table

Table 6. BEHI and Sediment Export Estimates
Project Number and Name: 29 - Benbow Park

To Be Conducted During Monitoring Year 05

2.2.2 Stability Assessment Table

Table 7a. Categorical Stream Feature Visual Stability Assessment
Project Number and Name: 29 – Benbow Park
Segment/Reach: Reach 1 (780 ft.)

Feature	Initial	MY - 01	MY - 02	MY - 03	MY - 04	MY - 05
A. Riffles	100%	N/A	109%	109%		
B. Pools	100%	N/A	120%	120%		
C. Thalweg*	N/A	N/A	N/A	N/A		
D. Meanders*	N/A	N/A	N/A	N/A		
E. Bed General	100%	N/A	96%	100%		
F. Bank Condition	100%	N/A	98%	98%		
G. Vanes / J Hooks etc.	100%	N/A	100%	100%		

*Reach 1 is not a meandering channel

Table 7b. Categorical Stream Feature Visual Stability Assessment
Project Number and Name: 29 – Benbow Park
Segment/Reach: Reach 2 (1,135 ft.)

Feature	Initial	MY - 01	MY - 02	MY - 03	MY - 04	MY - 05
A. Riffles	100%	N/A	80%	80%		
B. Pools	100%	N/A	102%	121%		
C. Thalweg	100%	N/A	67%	67%		
D. Meanders	100%	N/A	53%	53%		
E. Bed General	100%	N/A	96%	98%		
F. Bank Condition	100%	N/A	96%	99%		
G. Vanes / J Hooks etc.	100%	N/A	100%	100%		
H. Wads and Boulders	100%	N/A	92%	84%		

2.2.3 Quantitative Measures Summary Tables

Table 8a. Baseline Morphology and Hydraulic Summary
Project Number and Name: 29 – Benbow Park
Segment Reach: Reach 1 (780 ft.)

Parameter	USGS Gage Data			Regional Curve Interval			Pre-Existing Condition			Project Reference Stream			Design			As-built		
Dimension	Min	Max	Mean	Min	Max	Med	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Bankfull Width (ft)																16.4	20.3	18.4
Floodprone Width (ft)																35	38	37
Bankfull Cross Sectional Area (ft^2)																20.3	20.5	20.4
Bankfull Mean Depth (ft)																1.2	1.3	1.3
Bankfull Maximum Depth (ft)																2.0	1.7	1.9
Width/Depth Ratio																13.1	15.1	14.1
Entrenchment Ratio																2.2	2.2	2.2
Bank Height Ratio																1.0	1.0	1.0
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Pattern																		
Channel Beltwidth (ft)																		
Radius of Curvature (ft)																		
Meander Wavelength (ft)																		
Meander Width Ratio																		
Profile																		
Riffle Length (ft)																		
Riffle Slope (ft/ft)																		
Pool Length (ft)																		
Pool Spacing (ft)																		
Substrate																		
d50 (mm)																		
d84 (mm)																		
Additional Reach Parameters																		
Valley Length (ft)																		
Channel Length (ft)																		
Sinuosity																		
Water Surface Slope (ft/ft)																		
BF Slope (ft/ft)																		
Rosgen Classification																B5c		

Table 8b. Baseline Morphology and Hydraulic Summary
Project Number and Name: 29 – Benbow Park
Segment Reach: Reach 2 (1,135 ft.)

Parameter	USGS Gage Data			Regional Curve Interval			Pre-Existing Condition			Project Reference Stream			Design			As-built		
Dimension	Min	Max	Mean	Min	Max	Med	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean	Min	Max	Mean
Bankfull Width (ft)																18.5	20	19.3
Floodprone Width (ft)																49	59	54
Bankfull Cross Sectional Area (ft^2)																33.2	38.1	35.7
Bankfull Mean Depth (ft)																1.8	1.9	1.9
Bankfull Maximum Depth (ft)																2.7	3.0	2.9
Width/Depth Ratio																10.3	10.4	10.4
Entrenchment Ratio																2.7	3.0	2.9
Bank Height Ratio																1.0	1.0	1.0
Wetted Perimeter (ft)																		
Hydraulic Radius (ft)																		
Pattern																		
Channel Beltwidth (ft)																		
Radius of Curvature (ft)																		
Meander Wavelength (ft)																		
Meander Width Ratio																		
Profile																		
Riffle Length (ft)																		
Riffle Slope (ft/ft)																		
Pool Length (ft)																		
Pool Spacing (ft)																		
Substrate																		
d50 (mm)																		
d84 (mm)																		
Additional Reach Parameters																		
Valley Length (ft)																		
Channel Length (ft)																		
Sinuosity																		
Water Surface Slope (ft/ft)																		
BF Slope (ft/ft)																		
Rosgen Classification																E5		

Table 9a. Morphology and Hydraulic Monitoring Summary
Project Number and Name: 29 – Benbow Park
Segment Reach: Reach 1 (780 ft.)

Parameter	Cross Section 1 Riffle						Cross Section 2 Pool						Cross Section 3 Riffle					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	15.4	12.9	13.2				18.7	18.9	19.3				20	16.8	17.1			
Floodprone Width (ft)	35	34	35				49	48	48				39	41	39			
Bankfull Cross Sectional Area (ft^2)	16.7	13.6	16.6				47.4	49.8	49.0				26.9	18.4	17.1			
Bankfull Mean Depth (ft)	1.1	1.1	1.3				2.5	2.6	2.5				1.3	1.1	1.1			
Bankfull Maximum Depth (ft)	1.8	1.9	2.1				3.8	3.6	3.6				2.2	1.9	1.9			
Width/Depth Ratio	14.1	12.2	10.5				7.4	7.2	7.6				14.9	15.3	15.6			
Entrenchment Ratio	2.1	2.6	2.7				2.6	2.5	2.5				2.1	2.4	2.3			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.2				1.0	1.0	1.0			
Wetted Perimeter (ft)		13.8	15.0					21.8	22.1					15.4	17.8			
Hydraulic Radius (ft)		1.0	1.1					2.3	2.2					1.0	1.1			
Substrate																		
d50 (mm)		9.8	17.0					2.4	1.1					16.6	16.0			
d84 (mm)		29.0	29.0					15.0	3.8					45	56			

Table 9b. Morphology and Hydraulic Monitoring Summary
Project Number and Name: 29 – Benbow Park
Segment Reach: Reach 2 (1,135 ft.)

Parameter	Cross Section 4 Riffle						Cross Section 5 Pool						Cross Section 6 Riffle					
Dimension	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+	MY1	MY2	MY3	MY4	MY5	MY+
Bankfull Width (ft)	20.0	20.9	18.5				18.9	17.2	17.1				18.5	17.9	18.7			
Floodprone Width (ft)	59	60	60				59	59	60				49	48	50			
Bankfull Cross Sectional Area (ft^2)	36.1	29.9	30.0				40.0	36.4	37.8				35.0	32.2	32.4			
Bankfull Mean Depth (ft)	1.9	1.4	1.6				2.1	2.1	2.2				1.9	1.8	1.7			
Bankfull Maximum Depth (ft)	2.9	2.8	3.1				3.9	3.6	3.7				3.3	2.6	2.6			
Width/Depth Ratio	10.4	14.6	11.4				8.9	8.1	7.7				9.3	10.0	1.7			
Entrenchment Ratio	3.1	2.8	3				3.3	3.4	3				2.7	2.7	2.5			
Bank Height Ratio	1.0	1.0	1.0				1.0	1.0	1.0				1.0	1.0	1.0			
Wetted Perimeter (ft)		22.3	20.7					19.6	19.7					19.9	20.9			
Hydraulic Radius (ft)		1.3	1.4					1.9	1.9					1.6	1.5			
Substrate																		
d50 (mm)		19.4	22.0					3.2	1.4					73.4	15.0			
d84 (mm)		67	41					15.0	6.3					123	140			

Table 9c. Morphology and Hydraulic Monitoring Summary continued
Project Number and Name: 29 - Benbow Park
Segment Reach: Reach 1 (780 ft.)

Parameter	MY - 01 (2005)			MY - 02 (2006)			MY - 03 (2007)			MY - 04 (2008)			MY - 05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)				17	37	25	17	37	25						
Radius of Curvature (ft)				-	-	-	-	-	-						
Meander Wavelength (ft)				-	-	-	-	-	-						
Meander Width Ratio				1.1	2.5	1.7	1.1	2.4	1.6						
Profile															
Riffle Length (ft)				9	53	19	13	48	19						
Riffle Slope (ft/ft)				0.001	0.030	0.014	0.000	0.034	0.015						
Pool Length (ft)				12	55	19	8	32	14						
Pool Spacing (ft)				28	117	47	19	160	68						
Additional Reach Parameters															
Valley Length (ft)				772			772								
Channel Length (ft)				800			800								
Sinuosity				1.01			1.01								
Water Surface Slope (ft/ft)				0.006			0.005								
Rosgen Classification	B5c			B4c			B4c								

Table 9d. Morphology and Hydraulic Monitoring Summary continued
Project Number and Name: 29 - Benbow Park
Segment Reach: Reach 2 (1,135 ft.)

Parameter	MY - 01 (2005)			MY - 02 (2006)			MY - 03 (2007)			MY - 04 (2008)			MY - 05 (2009)		
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)				36	111	82	36	111	82						
Radius of Curvature (ft)				36	120	47	36	120	47						
Meander Wavelength (ft)				151	228	183	151	228	183						
Meander Width Ratio				1.8	5.6	4.1	1.9	6.0	4.4						
Profile															
Riffle Length (ft)				9	23	13	5	24	20						
Riffle Slope (ft/ft)				0.001	0.033	0.018	0.004	0.033	0.013						
Pool Length (ft)				3	118	25	4	45	11						
Pool Spacing (ft)				10	187	43	10	146	30						
Additional Reach Parameters															
Valley Length (ft)				934			934								
Channel Length (ft)				1,150			1,150								
Sinuosity				1.23			1.23								
Water Surface Slope (ft/ft)				0.006			0.006								
Rosgen Classification	E5			E4			E4								

Appendix A
Vegetation Data

A1 –Vegetation Data Tables

Table A1. Vegetation Metadata
Project Number and Name: 29 – Benbow Park

Report Prepared By	Brian Roberts
Date Prepared	11/14/2007 8:46
Database Name	CVS_EEP_EntryTool_v220.mdb
Database Location	M:\2005\12053743_EEP_OpenEnd_Design\F_EEPMon0607\Vegetation database

PROJECT SUMMARY----------

Project Code	Project Name	Description	Length (ft)	Stream-to-Edge Width (ft)	Area (sq m)	Required Plots (calculated)	Sampled Plots
29	Benbow Park	Stream restoration site in Greensboro, NC.	2000	40	14,863	5	5

Table A2. Vegetation Vigor by Species
Project Number and Name: 29 – Benbow Park

	Species	4	3	2	1	0	Missing
	Betula nigra	1	2				
	Cornus amomum		13				
	Fraxinus pennsylvanica	7	8	1			
	Nyssa sylvatica		8				
	Quercus phellos		1				
	Salix nigra	2	2	1			
	Salix sericea	2	15				
	Hamamelis virginiana	2	12				
	Platanus occidentalis		4				
TOT:	**9**	**14**	**65**	**2**			

Table A3. Damage by Species
Project Number and Name: 29 – Benbow Park

	Species	All Damage Categories	No Damage	Insects
	Betula nigra	3	2	1
	Cornus amomum	13	11	2
	Fraxinus pennsylvanica	16	12	1
	Hamamelis virginiana	14	10	3
	Nyssa sylvatica	8	8	
	Platanus occidentalis	4	1	3
	Quercus phellos	1		1
	Salix nigra	5	3	2
	Salix sericea	17	15	2
TOT:	**9**	**81**	**66**	**15**

Table A4. Damage by Plot Project Number and Name: 29 – Benbow Park				
	Plot	All Damage Categories	No Damage	Insects
	029-01-0001; year 3	10	4	5
	029-01-0002; year 3	12	9	1
	029-01-0003; year 3	10	8	2
	029-01-0004; year 3	20	17	3
	029-01-0005; year 3	29	25	4
TOT:	**5**	**81**	**63**	**15**

Table A5. Stem Count by Plot and Species Project Number and Name: 29 – Benbow Park									
	Species	Total Stems	# Plots	Avg # Stems	Plot 029-01-0001; year 3	Plot 029-01-0002; year 3	Plot 029-01-0003; year 3	Plot 029-01-0004; year 3	Plot 029-01-0005; year 3
	Betula nigra	3	3	1	1		1		1
	Cornus amomum	13	4	3.25		2	1	4	6
	Fraxinus pennsylvanica	16	4	4	6	3		6	1
	Hamamelis virginiana	14	4	3.5	2	4	2		6
	Nyssa sylvatica	8	3	2.67			2	4	2
	Platanus occidentalis	4	2	2			2		2
	Quercus phellos	1	1	1	1				
	Salix nigra	5	3	1.67			1	1	3
	Salix sericea	17	4	4.25		3	1	5	8
TOT:	**9**	**81**	**9**		**10**	**12**	**10**	**20**	**29**

The third year of monitoring assessed the new vegetation monitoring plots established in year two of monitoring. The third year of monitoring showed one hundred percent survivability among all plots and species. Two *Cornus amomum* were corrected to *Salix sericea.* However, there was a greater percentage of plants affected by insect damage. There is a high potential for invasive species to become more plentiful at this site due to the urban setting. As mentioned previously Mimosa (*Albizzia julibrissin*) and Bradford pear (*Pyrus calleryana*) are present in the riparian buffer. These trees should be removed to control the immediate seed source of these invasive species. The other invasive species noted on site include white malberry (*Morus alba*), Japanese honeysuckle (*Lonicera japonica*), Japanese hops (*Humulus japonicus)*, multiflora rose (*Rosa multiflora*), and lespedeza (*Lespedeza cuneata).* Some of the larger invasive shrubs should also be removed.

A2 – Representative Vegetation Problem Area Photos

VP1 - Mowed vegetative buffer north of Benbow Ave. Photo taken near Station 17+75. 11/16/07 - MY 03

VP2 - Bare bank with coir matting exposed. Photo taken near Station 17+75. 11/16/07 - MY 03

VP3 – Japanese honeysuckle enveloping multiflora rose taken near Station 16+50. 11/16/07 - MY 03

A3 - Vegetation Monitoring Plot Photos

Plot 1 Photo – Taken looking south from the north corner. 7/23/07 - MY 03.

Plot 2 Photo – Taken looking south from the north corner. 7/23/07 - MY 03.

Plot 3 Photo – Taken looking north from the south corner. 7/23/07 - MY 03.

Plot 4 Photo – Taken looking northwest from the southeast corner. 7/23/07 - MY 03.

Plot 5 Photo – Taken looking east from the west corner. 7/23/07 - MY 03.

Appendix B
Geomorphologic Data

B1 – Representative Stream Problem Area Photos

SP1 - Bank erosion. Photo taken near Station 11+15. 11/16/07 - MY 03

SP2 - Step pool structure failed, de-stabilizing stormwater drain outlet. Photo taken near Station 19+00. 11/16/07 - MY 03

SP3 - Bank erosion has occurred behind coir matting. Photo taken near Station 19+50. 11/16/07 - MY 03

SP4 - Aggradation narrowing channel. Photo taken near Station 20+15. 11/16/07 - MY 03

SP5 - Stream aggradation over constructed riffle causing narrowing of the channel. Photo taken near Station 21+60. 11/16/07 - MY 03

B2 - Stream Photo Station Photos

PP#1 – MY03 – 11/27/07

PP#2 – MY03 – 11/27/07

PP#3 – MY03 – 11/27/07

PP#4 – MY03 – 11/27/07

PP#5 – MY03 – 11/27/07

PP#6 – MY03 – 11/27/07

PP#7 – MY03 – 11/27/07

PP#8 – MY03 – 11/27/07

PP#9 – MY03 – 11/27/07

PP#10A – MY03 – 11/27/07

PP#10B – MY03 – 11/27/07

PP#11A – MY03 – 11/27/07

PP#11B – MY03 – 11/27/07

PP#12A – MY03 – 11/27/07

PP#12B – MY03 – 11/27/07

PP#13 – MY03 – 11/27/07

PP#14 – MY03 – 11/27/07

PP#15 – MY03 – 11/27/07

PP#16 – MY03 – 11/27/07

PP#17 – MY03 – 11/27/07

PP#18A – MY03 – 11/27/07

PP#18B – MY03 – 11/27/07

PP#19 – MY03 – 11/27/07

PP#20 – MY03 – 11/27/07

PP#21 – MY03 – 11/27/07

PP#22 – MY03 – 11/27/07

PP#23A – MY03 – 11/27/07

PP#23B – MY03 – 11/27/07

PP#24 – MY03 – 11/27/07

PP#25 – MY03 – 11/27/07

PP#26 – MY03 – 11/27/07

PP#27 – MY03 – 11/27/07

PP#28 – MY03 – 11/27/07

PP#29 – MY03 – 11/27/07

PP#30 – MY03– 11/27/07

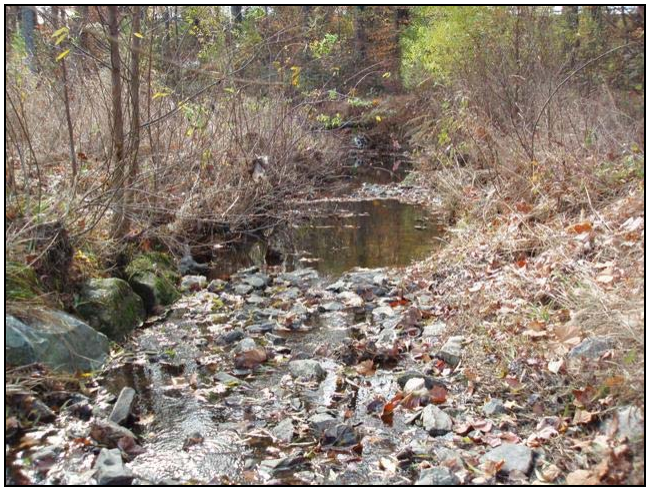
PP#31A – MY03 – 11/27/07

PP#31B – MY03 – 11/27/07

PP#32 – MY03 – 11/27/07

PP#33 – MY03 – 11/27/07

PP#34 – MY03 – 11/27/07



PP#35 – MY03 – 11/27/07

PP#36A – MY03 – 11/27/07

PP#36B – MY03 – 11/27/07

PP#37 – MY03 – 11/27/07

PP#38 – MY03 – 11/27/07

PP#39 – MY03 – 11/27/07

PP#40 – MY03 – 11/27/07

PP#41 – MY03 – 11/27/07

PP#42 – MY03 – 11/27/07

PP#43 – MY03 – 11/27/07

PP#44 – MY03 – 11/27/07

B3 - Qualitative Visual Stability Assessment

Table B2a. Qualitative Visual Stability Assessment
Project Number and Name: 29 – Benbow Park
Segment/Reach: Reach 1 (780 ft.)

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total Number per As-built *	Total Number / feet in unstable state	% Perform. in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present?	9	7	N/A	129%	
	2. Armor stable (e.g. no displacement)?	7	7	N/A	100%	
	3. Facet grade appears stable?	6	7	N/A	86%	
	4. Minimal evidence of embedding/fining?	8	7	N/A	114%	
	5. Length appropriate?	8	7	N/A	114%	**109%****
B. Pools	1. Present? (e.g. no severe aggradation)	12	10	N/A	120%	
	2. Sufficiently deep (Dmax pool:Mean Bkf > 1.6?)	12	10	N/A	120%	
	3. Length appropriate?	12	10	N/A	120%	**120%****
C. Thalweg #	1. Upstream of meander bend centering?			N/A		
	2. Downstream of meander centering?			N/A		
D. Meanders #	1. Outer bend in state of limited/controlled erosion?			N/A		
	2. Of those eroding, # w/ concomitant point bar formation?			N/A		
	3. Apparent Rc within spec?			N/A		
	4. Sufficient floodplain access and relief?			N/A		
E. Bed General	1.General channel bed aggradation areas (bar formation)	N/A	N/A	N/A	N/A	
	or head cutting?	N/A	N/A	N/A	N/A	**100%**
F. Bank	1.Actively eroding, wasting, or slumping bank	N/A	N/A	2/35	98%	**98%**
G. Vanes	1. Free of back or arm scour?	6	6	N/A	100%	
	2. Height appropriate?	6	6	N/A	100%	
	3. Angle and geometry appear appropriate?	6	6	N/A	100%	
	4. Free of piping or other structural failures?	6	6	N/A	100%	**100%**

*Total number of features per as-built estimated from as-built profile and planview sheets.

** The total number of features for monitoring year 3 is greater than the number of features in the as-built profile.

Reach 1 is not a meandering channel.

Table B2b. Qualitative Visual Stability Assessment
Project Number and Name: 29 – Benbow Park
Segment/Reach: Reach 2 (1,135 ft.)

Feature Category	Metric (per As-built and reference baselines)	(# Stable) Number Performing as Intended	Total Number per As-built *	Total Number / feet in unstable state	% Perform. in Stable Condition	Feature Perform. Mean or Total
A. Riffles	1. Present?	7	7	N/A	100%	
	2. Armor stable (e.g. no displacement)?	7	7	N/A	100%	
	3. Facet grade appears stable?	4	7	N/A	57%	
	4. Minimal evidence of embedding/fining?	4	7	N/A	57%	
	5. Length appropriate?	7	7	N/A	100%	**80%**
B. Pools**	1. Present? (e.g. no severe aggradation)	17	14	N/A	121%	
	2. Sufficiently deep (Dmax pool:Mean Bkf > 1.6?)	17	14	N/A	121%	
	3. Length appropriate?	17	14	N/A	121%	**121%**
C. Thalweg	1. Upstream of meander bend centering?	4	6	N/A	67%	
	2. Downstream of meander centering?	4	6	N/A	67%	**67%**
D. Meanders	1. Outer bend in state of limited/controlled erosion?	5	7	N/A	71%	
	2. Of those eroding, # w/ concomitant point bar formation?	0	2	N/A	0%	
	3. Apparent Rc within spec?[#]	N/A	7	N/A	N/A	
	4. Sufficient floodplain access and relief?	6	7	N/A	86%	**53%**
E. Bed General	1.General channel bed aggradation areas (bar formation)	N/A	N/A	1/40	96%	
	2. Channel bed degradation - areas of increasing down cutting or head cutting?	N/A	N/A	0/0	100%	**98%**
F. Bank	1.Actively eroding, wasting, or slumping bank	N/A	N/A	2/30	99%	**99%**
G. Vanes	1. Free of back or arm scour?	16	16	N/A	100%	
	2. Height appropriate?	16	16	N/A	100%	
	3. Angle and geometry appear appropriate?	16	16	N/A	100%	
	4. Free of piping or other structural failures?	16	16	N/A	100%	**100%**
H. Wads / Boulders	1. Free of scour?	4	6	N/A	67%	
	2. Footing stable?	6	6	N/A	100%	**84%**

*Total number of features per as-built estimated from as-built profile and planview sheets.

** The total number of features for monitoring year 3 is greater than the number of features in the as-built profile.

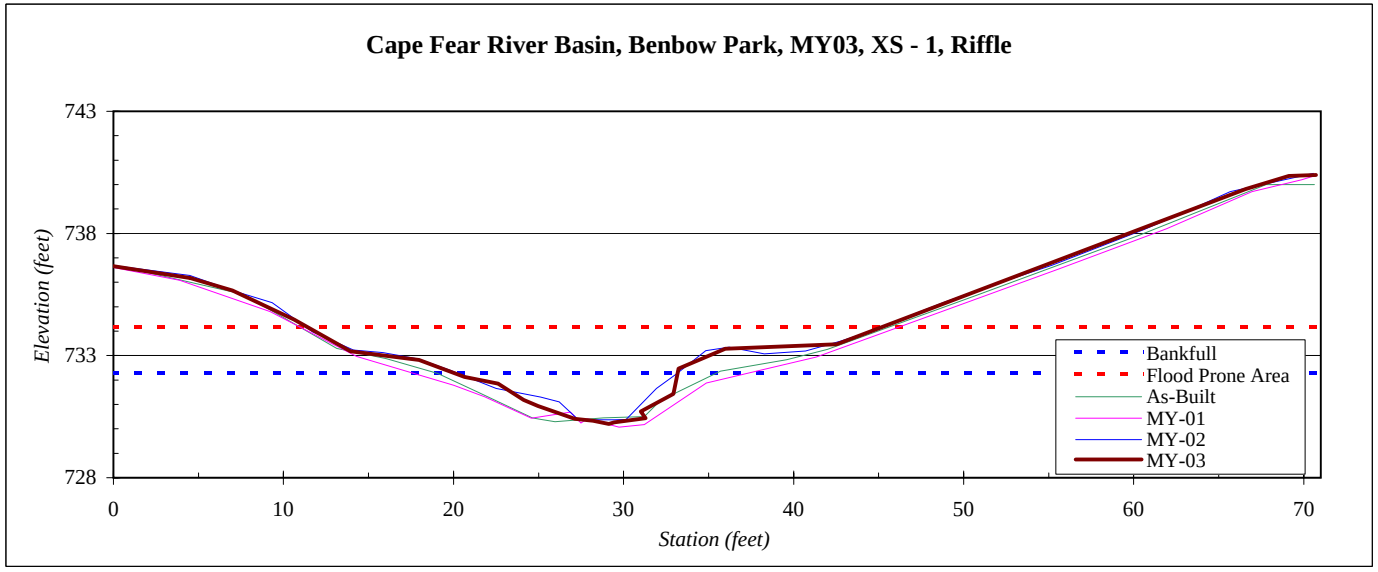
No design data is available to compare to current values.

B4 - Cross Section Plots

River Basin:	Cape Fear
Watershed:	Benbow Park, MY03
XS ID	XS - 1, Riffle
Drainage Area (sq mi):	0.7
Date:	8/13/2007
Field Crew:	B. Roberts, J. Costante

Station	Elevation
0.0	736.66
4.5	736.18
7.0	735.67
10.6	734.47
13.9	733.17
18.0	732.82
20.6	732.12
22.6	731.85
24.1	731.18
25.0	730.93
27.1	730.41
28.2	730.34
29.1	730.20
29.4	730.27
31.3	730.43
31.0	730.71
32.9	731.44
33.2	732.47
36.0	733.28
42.5	733.47
66.6	739.81
69.1	740.35
70.7	740.39

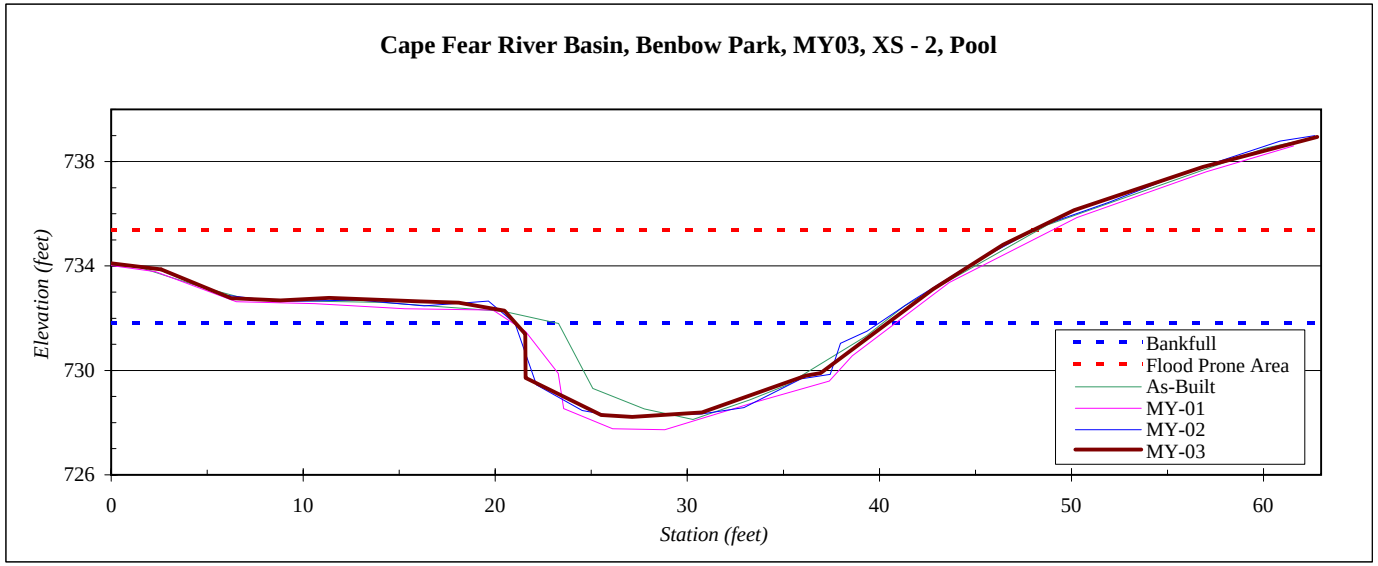
SUMMARY DATA	
Bankfull Elevation:	732.3
Bankfull Cross Sectional Area:	16.6
Bankfull Width:	13.2
Flood Prone Area Elevation:	734.2
Flood Prone Width:	35.2
Max Depth at Bankfull:	2.1
Mean Depth at Bankfull:	1.3
W / D Ratio:	10.5
Entrenchment Ratio:	2.7
Bank Height Ratio:	1.0



River Basin:	Cape Fear
Watershed:	Benbow Park, MY03
XS ID	XS - 2, Pool
Drainage Area (sq mi):	0.7
Date:	8/14/2007
Field Crew:	B. Roberts, J. Costante

Station	Elevation
0.0	734.10
2.6	733.87
6.3	732.77
8.8	732.68
11.3	732.78
16.1	732.65
18.1	732.59
20.5	732.29
21.6	731.39
21.6	729.71
25.5	728.29
27.1	728.21
30.8	728.39
36.2	729.80
36.9	729.90
42.8	733.11
46.4	734.81
50.1	736.13
56.8	737.79
62.8	738.95

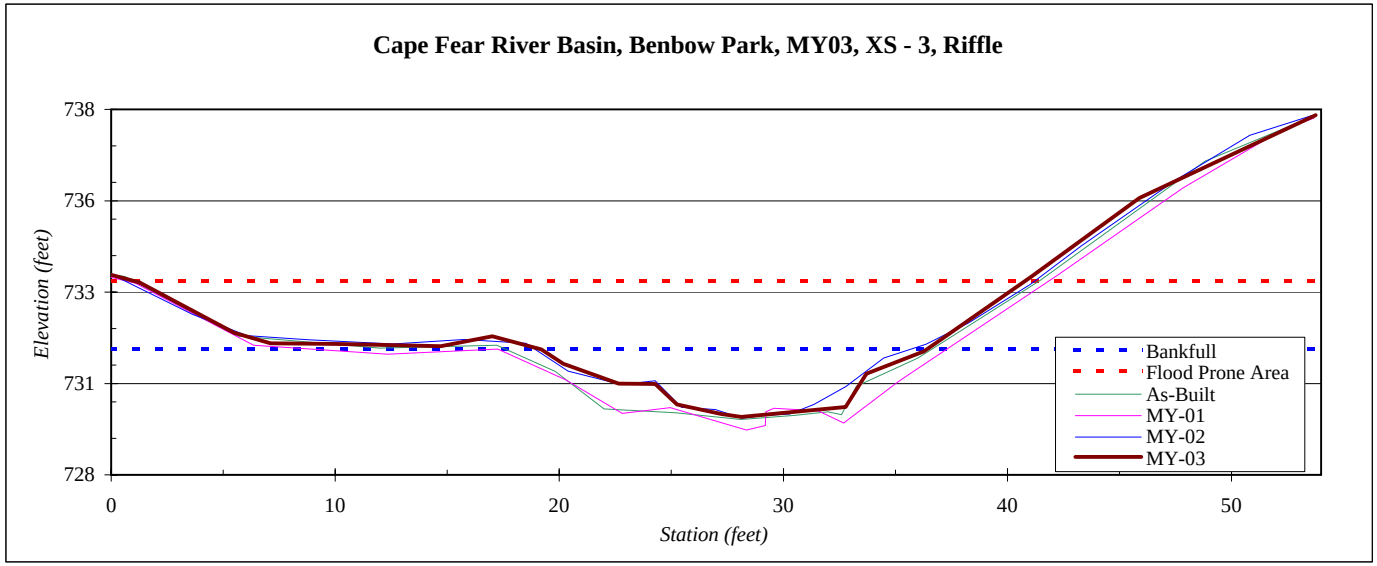
SUMMARY DATA	
Bankfull Elevation:	731.8
Bankfull Cross Sectional Area:	49.0
Bankfull Width:	19.3
Flood Prone Area Elevation:	735.4
Flood Prone Width:	>50
Max Depth at Bankfull:	3.6
Mean Depth at Bankfull:	2.5
W / D Ratio:	7.6
Entrenchment Ratio:	>2.5
Bank Height Ratio:	1.2



River Basin:	Cape Fear
Watershed:	Benbow Park, MY03
XS ID	XS - 3, Riffle
Drainage Area (sq mi):	0.7
Date:	8/14/2007
Field Crew:	B. Roberts, J. Costante

Station	Elevation
0.0	733.47
1.3	733.27
5.5	731.89
7.1	731.60
10.1	731.58
14.7	731.52
17.0	731.79
19.2	731.43
20.2	731.04
22.7	730.50
24.3	730.48
25.2	729.93
27.2	729.67
28.1	729.59
32.8	729.85
33.7	730.77
36.3	731.38
41.1	733.42
45.9	735.57
53.8	737.84

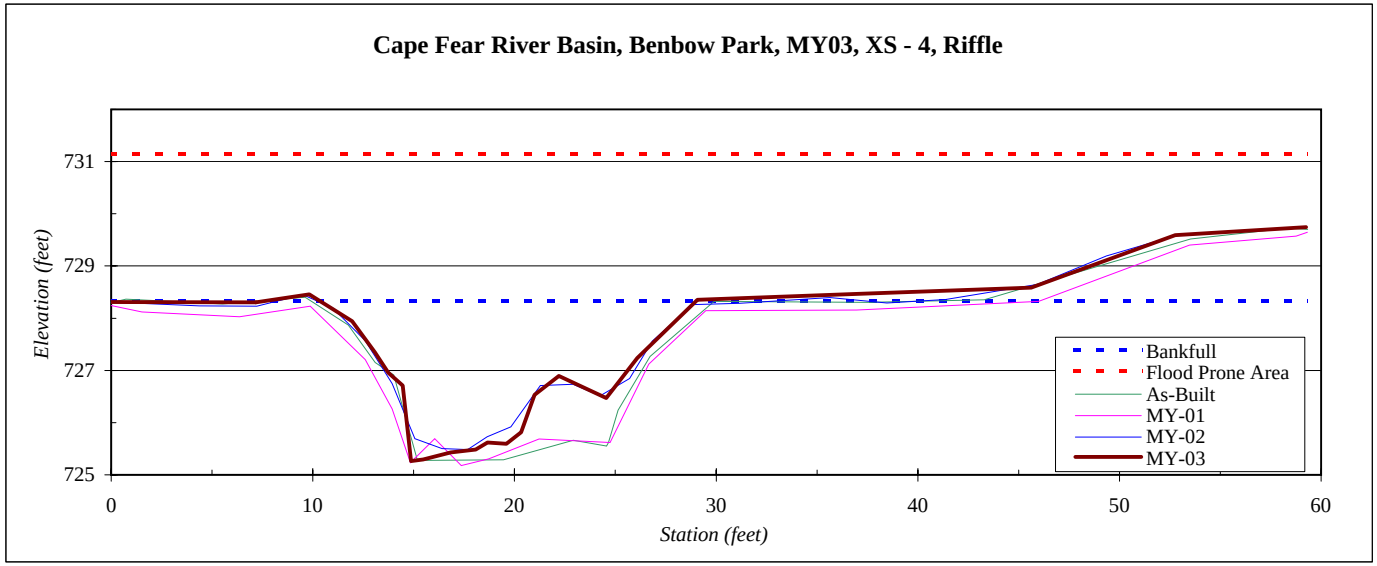
SUMMARY DATA	
Bankfull Elevation:	731.4
Bankfull Cross Sectional Area:	18.8
Bankfull Width:	17.1
Flood Prone Area Elevation:	733.3
Flood Prone Width:	39
Max Depth at Bankfull:	1.9
Mean Depth at Bankfull:	1.1
W / D Ratio:	15.6
Entrenchment Ratio:	2.3
Bank Height Ratio:	1.0



River Basin:	Cape Fear
Watershed:	Benbow Park, MY03
XS ID	XS - 4, Riffle
Drainage Area (sq mi):	0.7
Date:	8/15/2007
Field Crew:	B. Roberts, J. Costante

Station	Elevation
0.0	728.31
7.2	728.30
9.8	728.46
11.9	727.94
13.1	727.35
13.7	726.95
14.5	726.71
14.9	725.26
15.5	725.29
16.8	725.43
18.1	725.48
18.7	725.62
19.6	725.59
20.3	725.82
21.0	726.53
22.2	726.90
24.6	726.47
26.1	727.24
29.1	728.36
36.8	728.47
45.6	728.59
52.8	729.59
59.3	729.74

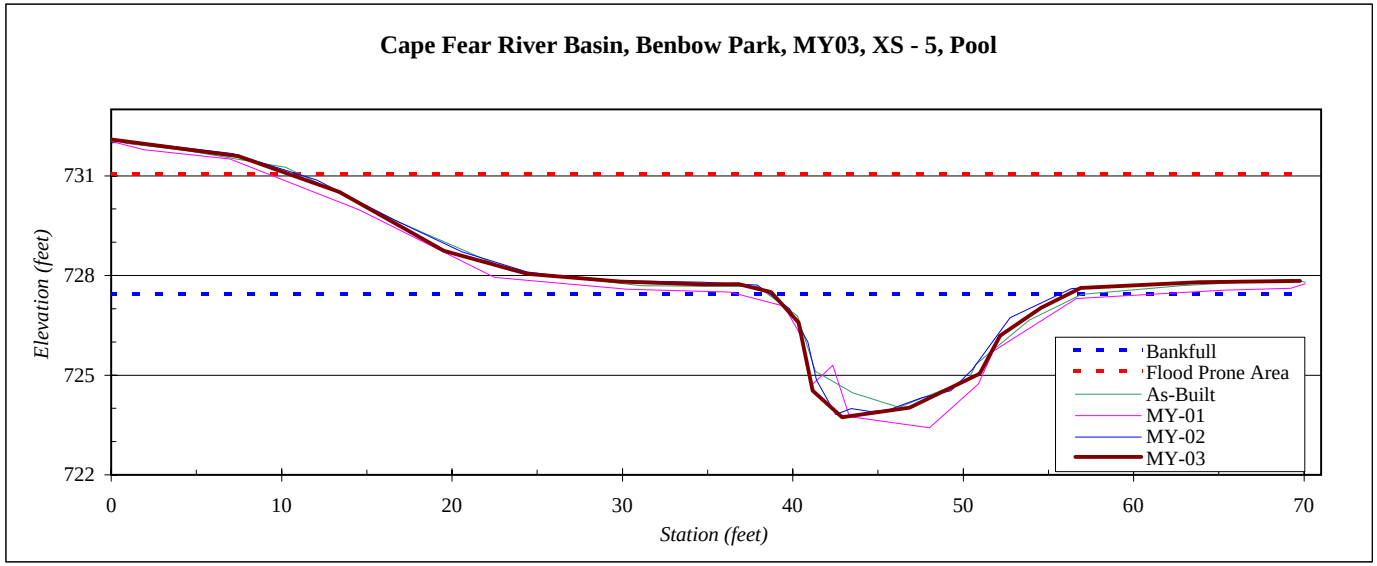
SUMMARY DATA	
Bankfull Elevation:	728.3
Bankfull Cross Sectional Area:	30.0
Bankfull Width:	18.5
Flood Prone Area Elevation:	731.2
Flood Prone Width:	>60
Max Depth at Bankfull:	3.1
Mean Depth at Bankfull:	1.6
W / D Ratio:	11.4
Entrenchment Ratio:	>3
Bank Height Ratio:	1.0



River Basin:	Cape Fear
Watershed:	Benbow Park, MY03
XS ID	XS - 5, Pool
Drainage Area (sq mi):	0.7
Date:	8/15/2007
Field Crew:	B. Roberts, J. Costante

Station	Elevation
0.0	732.10
7.4	731.59
13.4	730.51
19.5	728.75
24.4	728.05
29.9	727.82
34.8	727.73
36.8	727.74
38.7	727.50
40.3	726.59
41.2	724.53
42.9	723.73
46.9	724.02
51.0	725.05
52.2	726.19
54.6	727.03
56.9	727.63
63.8	727.80
69.8	727.84

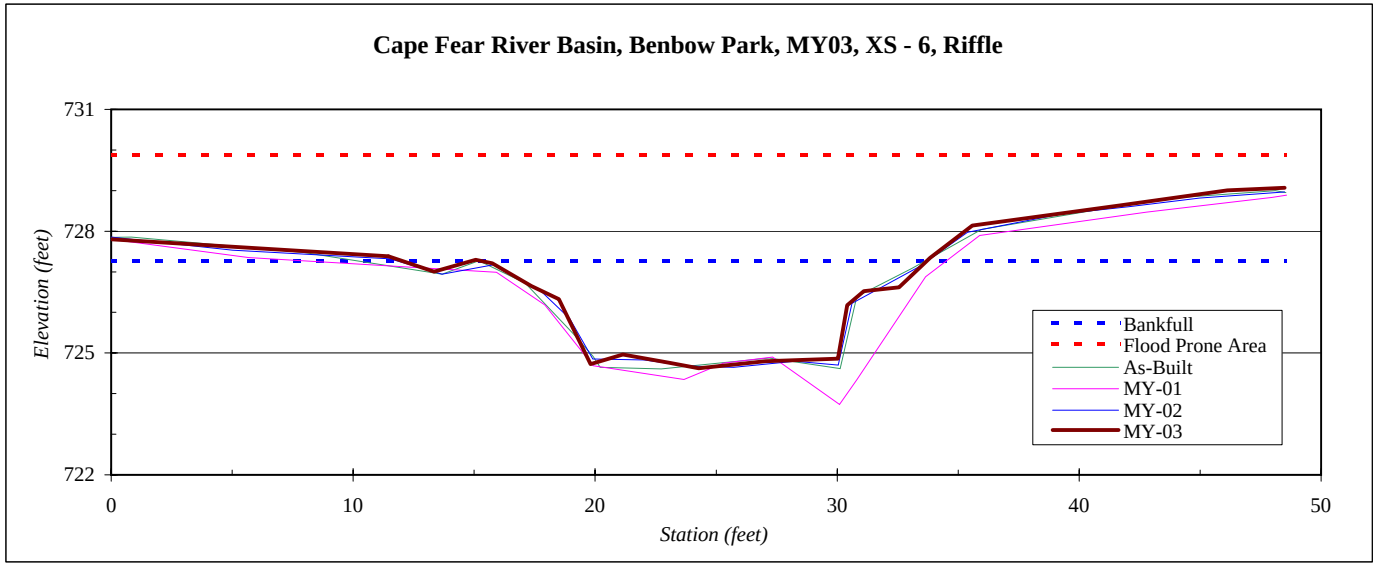
SUMMARY DATA	
Bankfull Elevation:	727.4
Bankfull Cross Sectional Area:	37.8
Bankfull Width:	17.1
Flood Prone Area Elevation:	731.1
Flood Prone Width:	>60
Max Depth at Bankfull:	3.7
Mean Depth at Bankfull:	2.2
W / D Ratio:	7.7
Entrenchment Ratio:	>3
Bank Height Ratio:	1.0



River Basin:	Cape Fear
Watershed:	Benbow Park, MY03
XS ID	XS - 6, Riffle
Drainage Area (sq mi):	0.7
Date:	8/15/2007
Field Crew:	B. Roberts, J. Costante

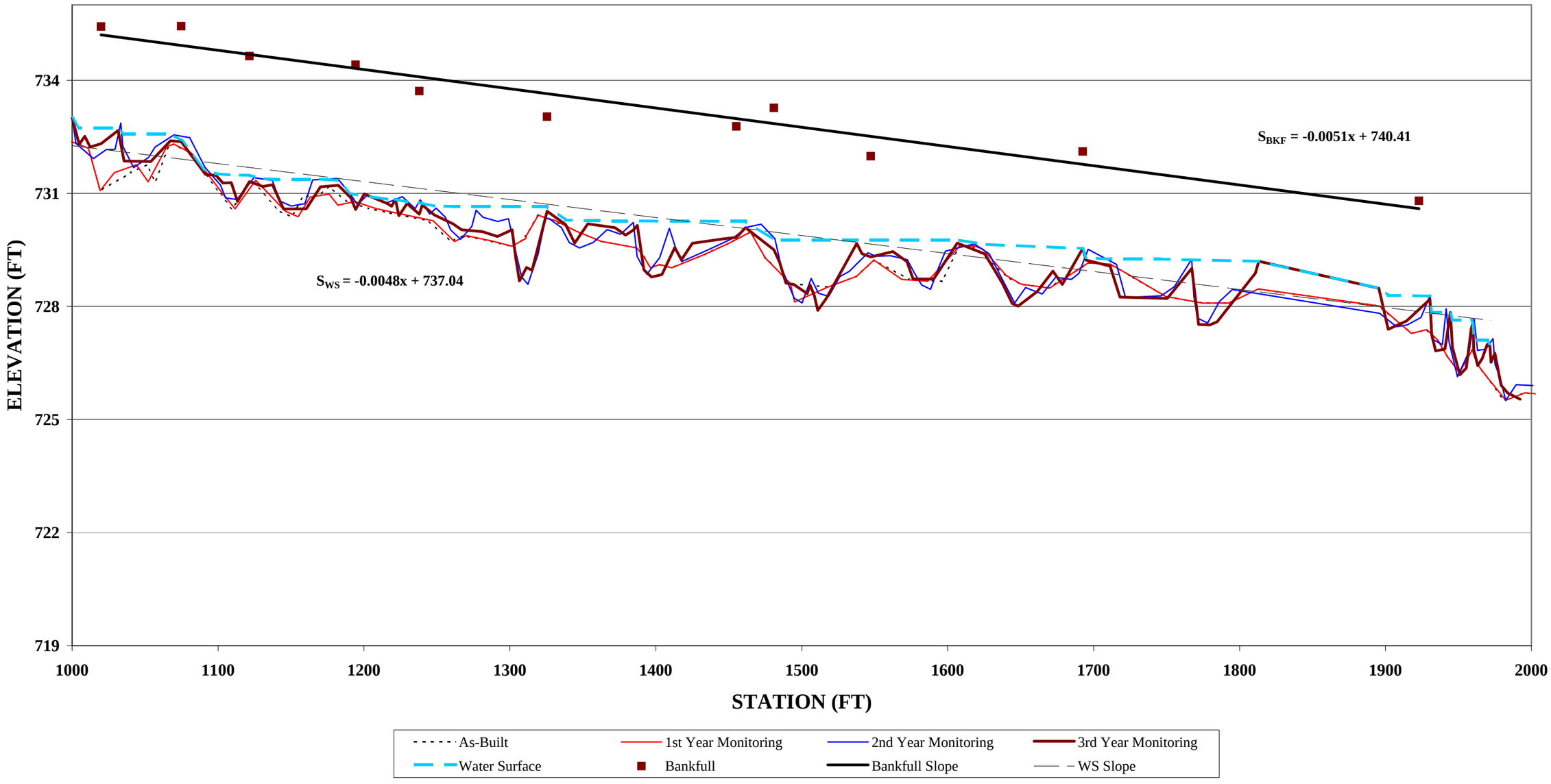
Station	Elevation
0.0	727.60
11.7	727.38
13.6	727.01
15.3	727.29
16.0	727.21
17.6	726.65
18.8	726.33
20.1	724.72
21.4	724.96
23.3	724.76
24.5	724.62
27.3	724.79
30.3	724.86
30.7	726.18
31.4	726.53
32.8	726.62
34.1	727.35
35.8	728.14
38.1	728.32
41.9	728.63
45.0	729.00
48.5	729.07

SUMMARY DATA	
Bankfull Elevation:	727.3
Bankfull Cross Sectional Area:	32.4
Bankfull Width:	18.7
Flood Prone Area Elevation:	729.9
Flood Prone Width:	>50
Max Depth at Bankfull:	2.6
Mean Depth at Bankfull:	1.7
W / D Ratio:	10.8
Entrenchment Ratio:	>2.5
Bank Height Ratio:	1.0

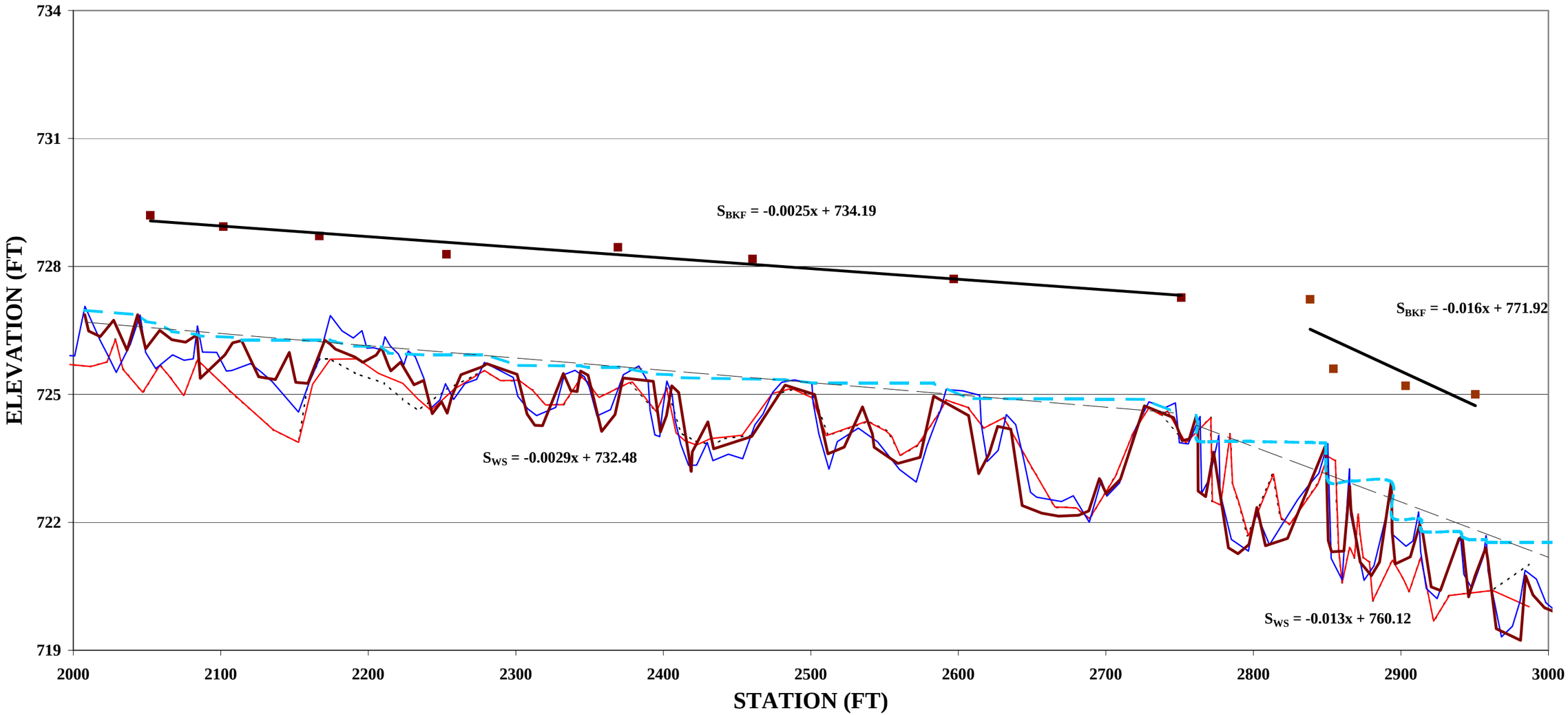


B5 - Longitudinal Plots

Longitudinal Profile
Benbow Park
EEP Project Number 29 - MY03
Stations 10+00 - 20+00



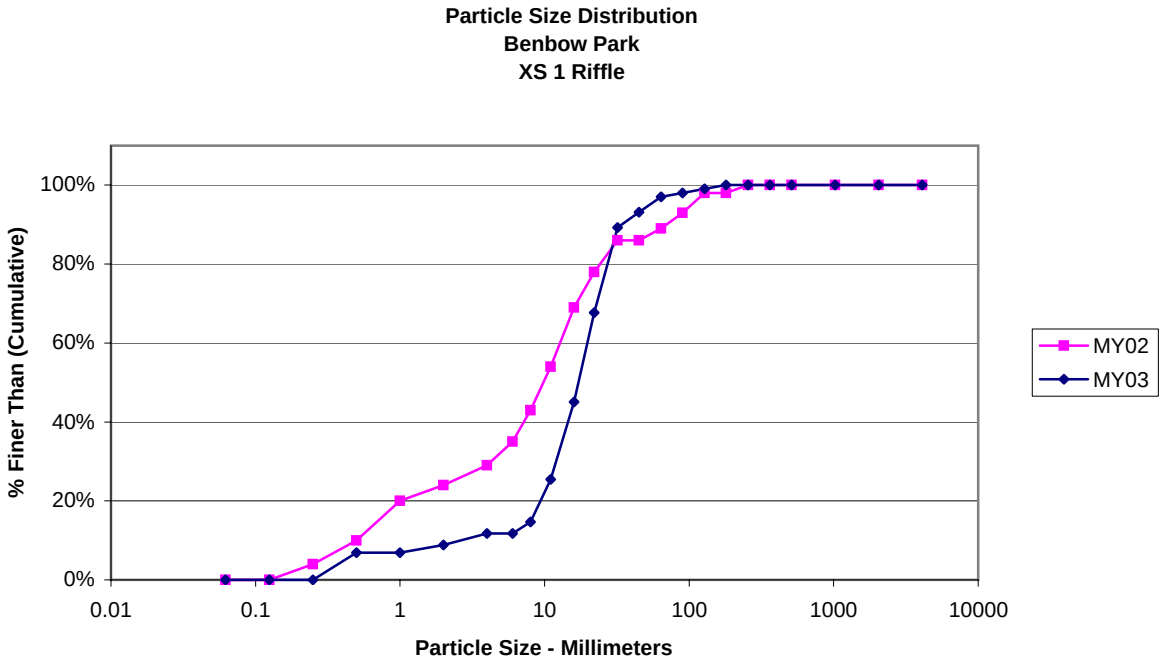
Longitudinal Profile
Benbow Park
EEP Project Number 29 - MY03
Stations 20+00 - 30+00



B6 - Pebble Count Plots

Cross Section 1 Riffle - MY03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	7
Coarse	.50 - 1	D	
Very Coarse	1 - 2	S	2
Very Fine	2 - 4		3
Fine	4 - 5.7	G	
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	11
Medium	11.3 - 16	V	20
Coarse	16 - 22.6	E	23
Coarse	22.6 - 32	L	22
Very Coarse	32 - 45	S	4
Very Coarse	45 - 64		4
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	
		Total	102

Note:



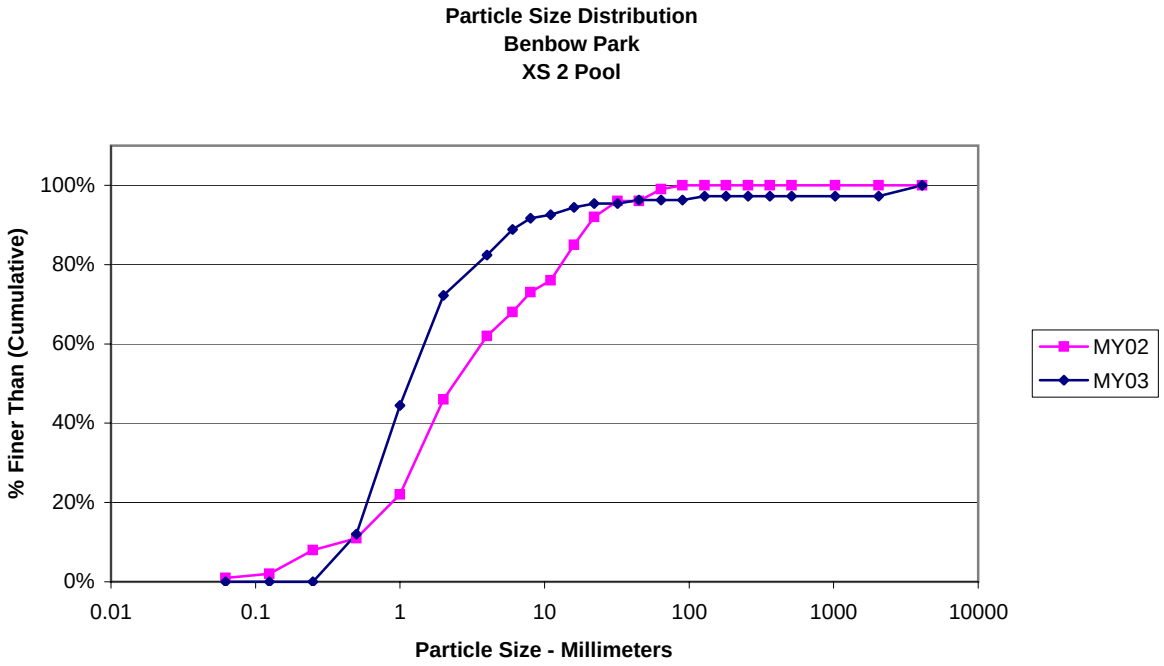
Size (mm)	
D16	8.3
D35	13
D50	17
D65	21
D84	29
D95	53

Size Distribution	
mean	15.5
dispersion	1.9
skewness	-0.05

Type	
silt/clay	0%
sand	9%
gravel	88%
cobble	3%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross Section 2 Pool - MY03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	13
Coarse	.50 - 1	D	35
Very Coarse	1 - 2	S	30
Very Fine	2 - 4		11
Fine	4 - 5.7	G	7
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	1
Medium	11.3 - 16	V	2
Coarse	16 - 22.6	E	1
Coarse	22.6 - 32	L	
Very Coarse	32 - 45	S	1
Very Coarse	45 - 64		
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	3
		Total	108

Note:



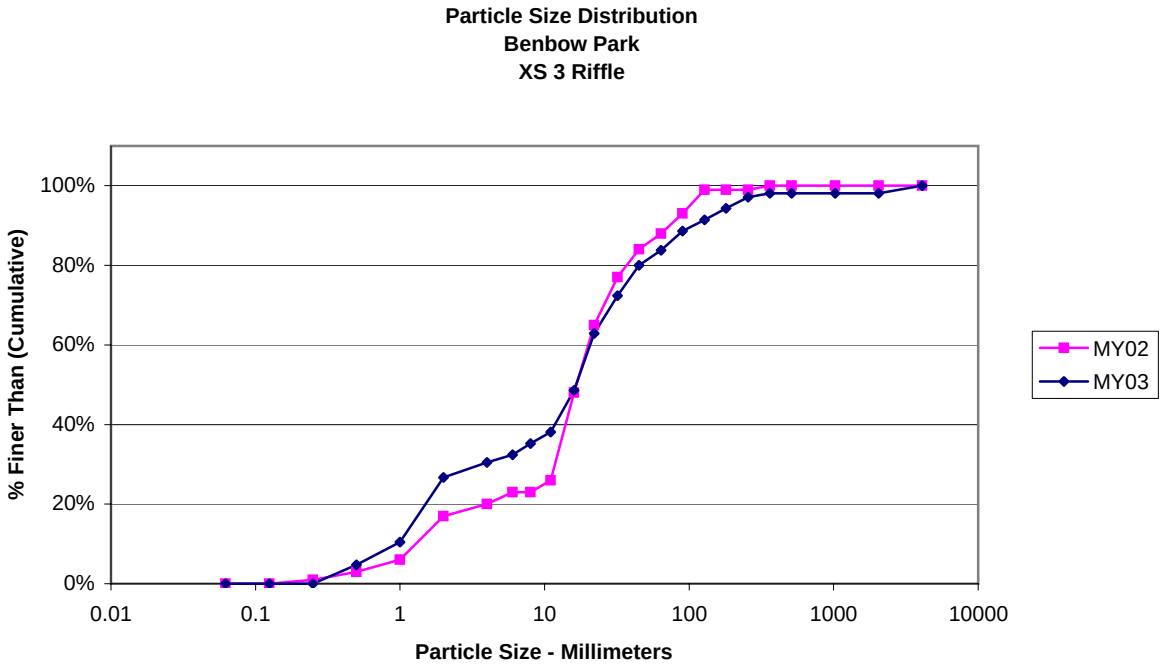
Size (mm)	
D16	0.54
D35	0.8
D50	1.1
D65	1.6
D84	3.8
D95	10

Size Distribution	
mean	1.4
dispersion	2.7
skewness	0.12

Type	
silt/clay	0%
sand	72%
gravel	24%
cobble	1%
boulder	0%
bedrock	3%
hardpan	0%
wood/det	0%
artificial	0%

Cross Section 3 Riffle - MY03			
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	6
Very Coarse	1 - 2	S	17
Very Fine	2 - 4		4
Fine	4 - 5.7	G	2
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	3
Medium	11.3 - 16	V	11
Coarse	16 - 22.6	E	15
Coarse	22.6 - 32	L	10
Very Coarse	32 - 45	S	8
Very Coarse	45 - 64		4
Small	64 - 90	C	5
Small	90 - 128	O	3
Large	128 - 180	B	3
Large	180 - 256	L	3
Small	256 - 362	B	1
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	2
		Total	105

Note:



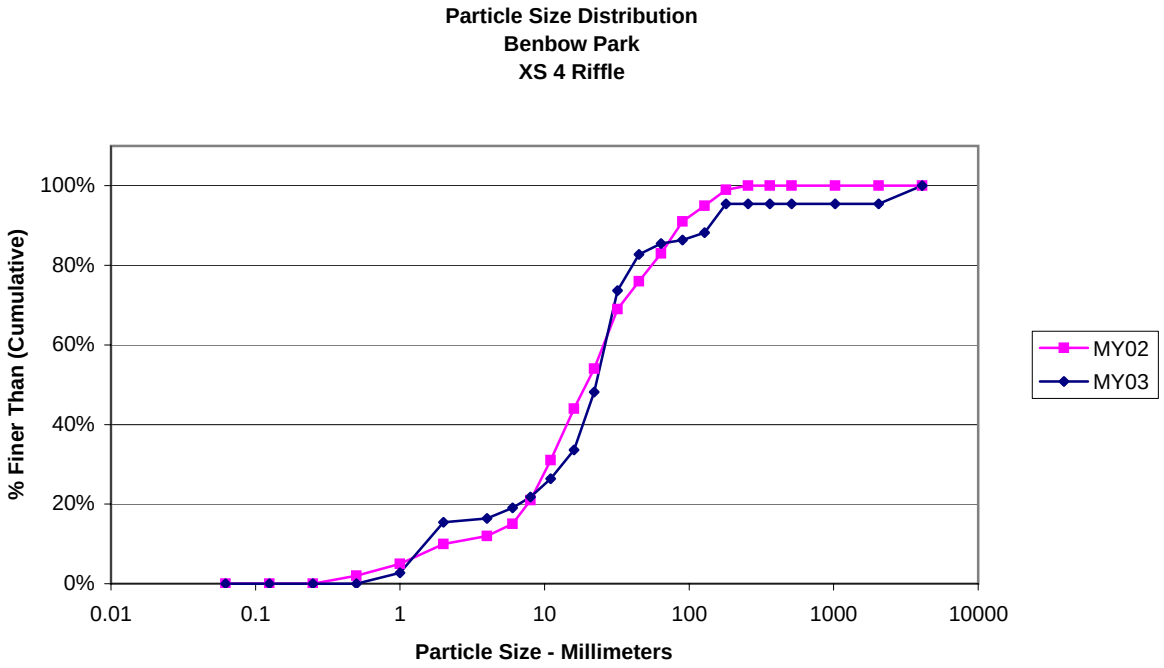
Size (mm)	
D16	1.3
D35	7.3
D50	16
D65	23
D84	56
D95	160

Size Distribution	
mean	8.5
dispersion	7.9
skewness	-0.21

Type	
silt/clay	0%
sand	27%
gravel	57%
cobble	13%
boulder	1%
bedrock	2%
hardpan	0%
wood/det	0%
artificial	0%

Cross Section 4 Riffle - MY03			
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	3
Very Coarse	1 - 2	S	14
Very Fine	2 - 4		1
Fine	4 - 5.7	G	3
Fine	5.7 - 8	R	3
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	8
Coarse	16 - 22.6	E	16
Coarse	22.6 - 32	L	28
Very Coarse	32 - 45	S	10
Very Coarse	45 - 64		3
Small	64 - 90	C	1
Small	90 - 128	O	2
Large	128 - 180	B	8
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
		Total	110

Note:



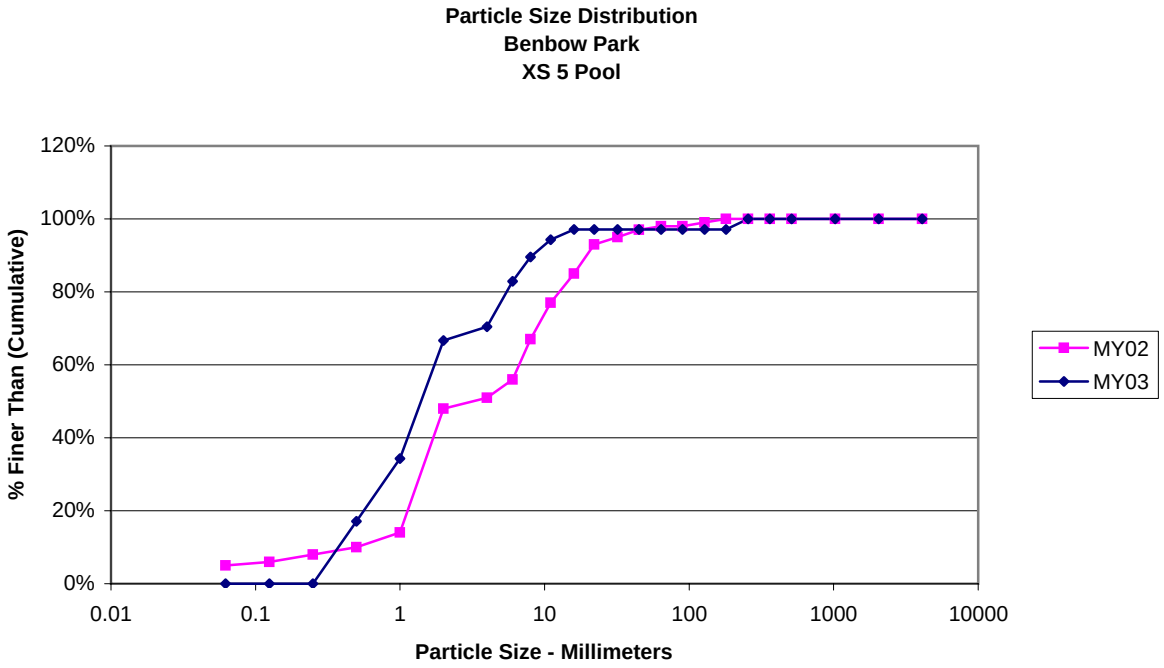
Size (mm)	
D16	2
D35	16
D50	22
D65	27
D84	41
D95	140

Size Distribution	
mean	9.1
dispersion	6.4
skewness	-0.34

Type	
silt/clay	0%
sand	15%
gravel	70%
cobble	10%
boulder	0%
bedrock	5%
hardpan	0%
wood/det	0%
artificial	0%

Cross Section 5 Pool - MY03			
Particle	Millimeter		Count
Silt/Clay	< 0.062	S/C	
Very Fine	.062 - .125	S	
Fine	.125 - .25	A	
Medium	.25 - .50	N	18
Coarse	.50 - 1	D	18
Very Coarse	1 - 2	S	34
Very Fine	2 - 4		4
Fine	4 - 5.7	G	13
Fine	5.7 - 8	R	7
Medium	8 - 11.3	A	5
Medium	11.3 - 16	V	3
Coarse	16 - 22.6	E	
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	3
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	
		Total	105

Note:



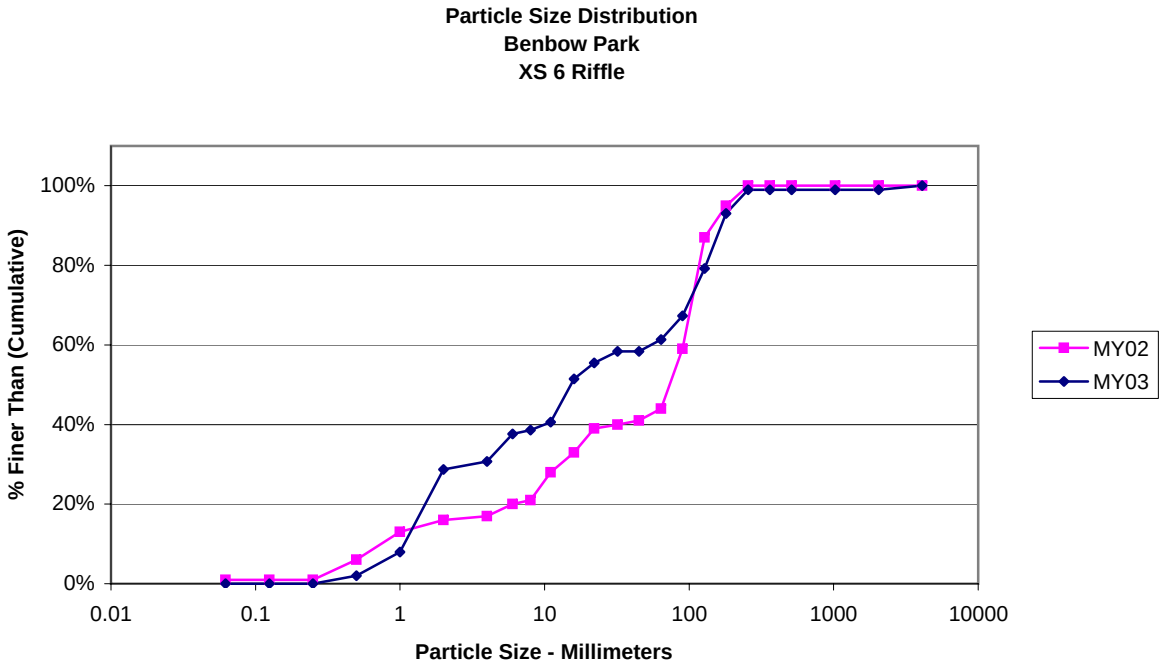
Size (mm)	
D16	0.48
D35	1
D50	1.4
D65	1.9
D84	6.3
D95	12

Size Distribution	
mean	1.7
dispersion	3.7
skewness	0.09

Type	
silt/clay	0%
sand	67%
gravel	30%
cobble	3%
boulder	0%
bedrock	0%
hardpan	0%
wood/det	0%
artificial	0%

Cross Section 6 Riffle - MY03			
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	6
Very Coarse	1 - 2	S	21
Very Fine	2 - 4		2
Fine	4 - 5.7	G	7
Fine	5.7 - 8	R	1
Medium	8 - 11.3	A	2
Medium	11.3 - 16	V	11
Coarse	16 - 22.6	E	4
Coarse	22.6 - 32	L	3
Very Coarse	32 - 45	S	
Very Coarse	45 - 64		3
Small	64 - 90	C	6
Small	90 - 128	O	12
Large	128 - 180	B	14
Large	180 - 256	L	6
Small	256 - 362	B	
Small	362 - 512	L	
Medium	512 - 1024	D	
Lrg- Very Lrg	1024 - 2048	R	
Bedrock	>2048	BDRK	1
		Total	101

Note:

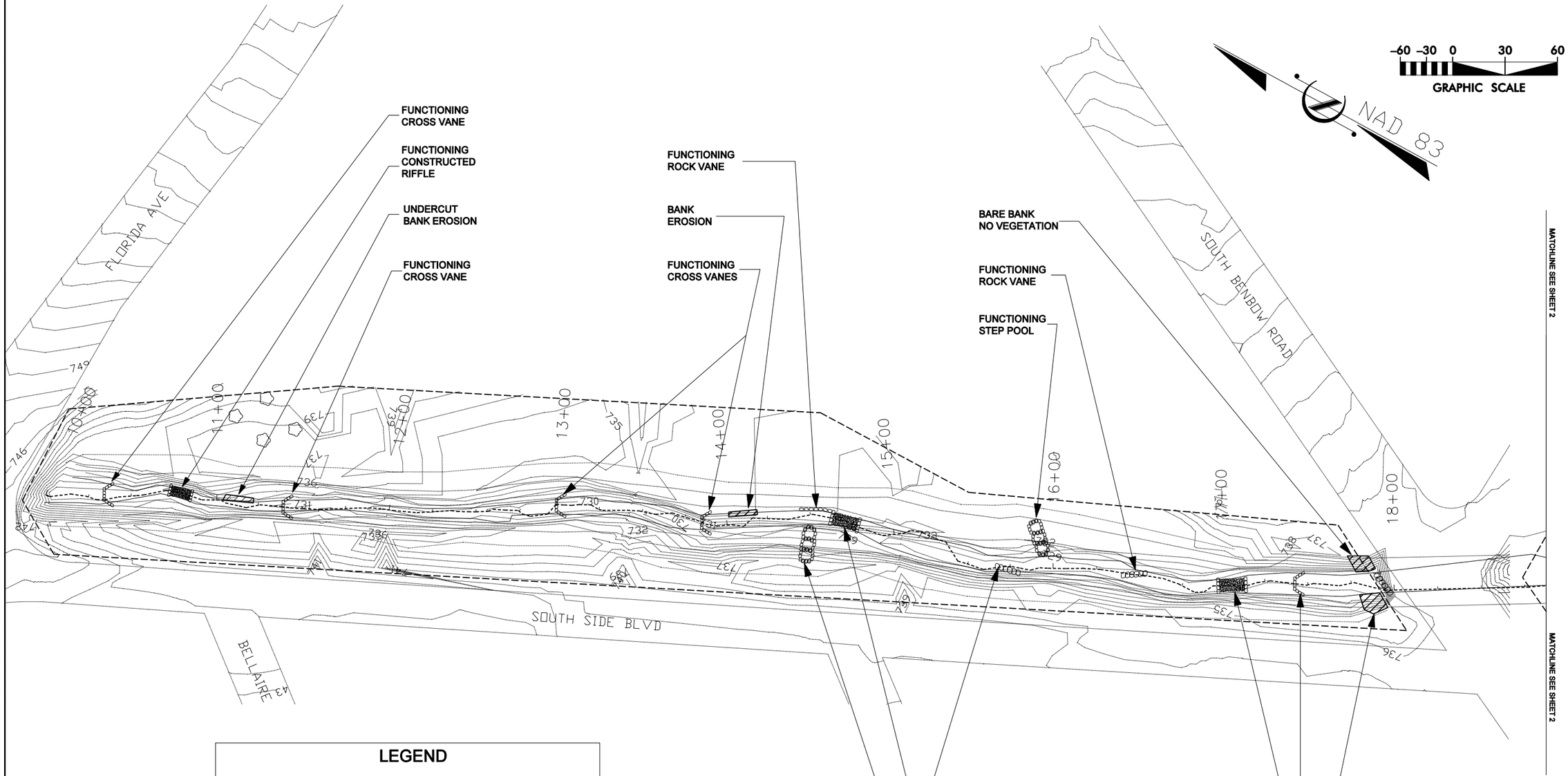


Size (mm)	
D16	1.3
D35	5
D50	15
D65	76
D84	140
D95	190

Size Distribution	
mean	13.5
dispersion	10.4
skewness	-0.03

Type	
silt/clay	0%
sand	29%
gravel	33%
cobble	38%
boulder	0%
bedrock	1%
hardpan	0%
wood/det	0%
artificial	0%

Appendix C
Current Conditions Plan View



LEGEND

- THALWEG
- AS-BUILT VEGETATIVE BUFFER BOUNDARY
- ROOT WAD
- ROCK CROSS VANE
- CONSTRUCTED RIFFLE
- STEP POOL STRUCTURE
- DOUBLE DROP CROSS VANE
- J-HOOK

REVISIONS

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4601 SIX FORKS ROAD
RALEIGH, NORTH CAROLINA 27609

BENBOW PARK

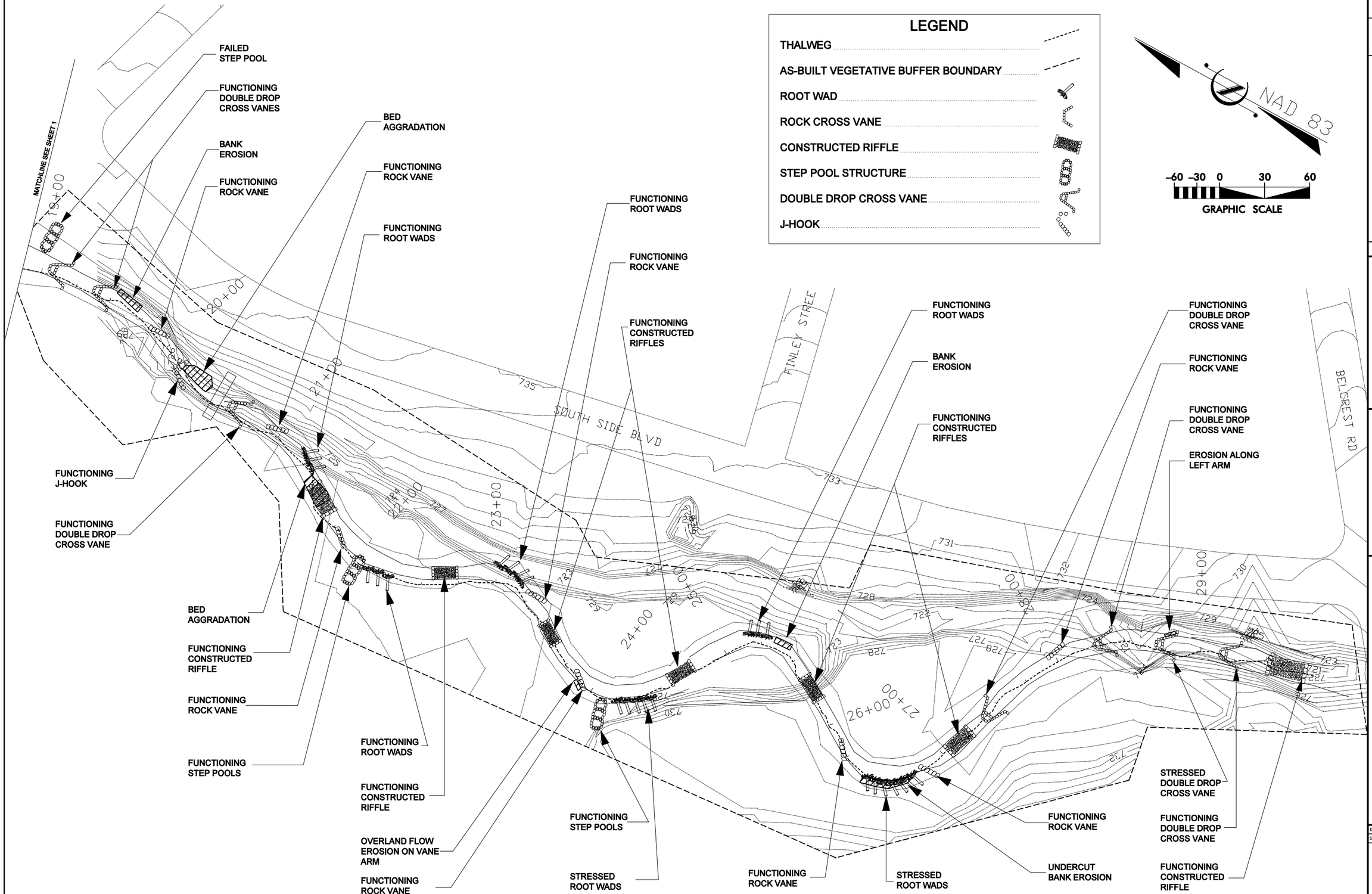
GUILFORD COUNTY
EEP PROJECT NUMBER 29 - MY03

STATION 10+00 TO STATION 18+87

DATE: NOVEMBER 2007
SCALE: SEE SHEET

CURRENT CONDITIONS PLAN VIEW

SHEET 1 OF 2



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GUILFORD COUNTY
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STATION 18+87 TO STATION 29+85

DATE: NOVEMBER 2007
SCALE: SEE SHEET

CURRENT CONDITIONS PLAN VIEW

SHEET 2 OF 2