Smith and Austin Stream Restoration
Annual Monitoring Report

Monitoring Year: 2005
Measurement Year: 3
As-built Date: 2002
NCEEP Project Number: 343

Delivered to: NCDENR-Ecosystem Enhancement Program
1619 Mail Service Center
Raleigh, NC 27699-1619

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Raleigh, NC 27695

Project Designed By: Buck Engineering

Submitted: February, 2006

Ecosystem Enhancement PROGRAM

NCDENR

SMITH AND AUSTIN STREAM RESTORATION
2005 MONITORING REPORT

CONDUCTED FOR THE NORTH CAROLINA DEPARTMENT OF ENVIRONMENT AND NATURAL RESOURCES

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TABLES

I. Executive Summary/Project Abstract

The stream restoration project is mostly stable with some local areas of concern. Monitoring results are summarized in Table XI. The restored stream is classified as a low-slope sand-bed C5 channel with some constructed riffles and rock cross vanes to hold grade and provide streambank protection. The channel is maintaining the design form with strong indications of aggradation. In most of this project, the stream bed has transitioned to predominantly runs with some shallow pools.

The monitored channel pattern is very similar to as-built conditions with minor streambank erosion occurring along the outsides of some meander bends that do not have well-established deep-rooted vegetation. The monitored channel dimensions at the locations of permanent cross-sections are mostly similar to as-built conditions, with several areas having reduced bankfull areas due to aggradation and bar formation.

Riparian vegetation is generally successful, with local problem areas due to poor soil conditions and recent removal of beaver dams. There are also some impacts of deer browsing. Some areas of streambank erosion are partly due to the lack of live woody vegetation along the outsides of meander bends. Invasive plants should be controlled to allow native plants to flourish.

II. Project Background

The following information is copied from the Smith and Austin Stream Restoration Plan dated 2001.

> Project planning was initiated for the Smith and Austin Creek Stream Restoration in 2001 for the implementation of a developing watershed stream restoration project in Wake Forest, North Carolina (Figure 1).
>
> The project consisted of the analysis of the 12.6 square mile portion of the Smith and Austin Creek watersheds (located within USGS Hydrologic Unit Code 030202030, NCDWQ Sub-basin 03-04-02 of the Neuse River Basin) that contribute drainage to the project site. The watershed analysis, including the assessment of stream channel, was conducted for the purpose of developing a clear understanding of existing system characteristics. The resulting Restoration Plan identified opportunities to improve water quality and overall system functions including targeted strategies such as wetland/riparian buffer preservation, stormwater BMP development/retrofitting, stream restoration, and community education. Since construction of this project there has been ongoing development and construction of the Heritage sub-division and golf course that is adjacent to the restoration project.
>
> Following coordination with local leaders, the Wetlands Restoration Program and citizens groups, the project was initiated and focused on the restoration of approximately 11,000 linear feet of degraded stream. Detailed environmental assessments and engineering studies were conducted and design plans and documents were prepared to facilitate the stream and riparian buffer restoration. Implementation of the project was completed by August 2002. Due to large storms after construction, the project was repaired in January of 2003.
>
> The restoration of these portions of Smith and Austin Creek, located in Wake Forest near Heritage Development, was conducted to correct identified system deficiencies including severe bank erosion, channel widening, and the loss of aquatic habitat resulting from stream channelization, the loss of riparian

vegetation, and watershed development. The goal of the project was to develop a stable stream channel with reduced bank erosion, efficient sediment transport, enhanced warm water fisheries, and improved overall stream habitat and site aesthetics. Implementation of the project was completed by August 2002.

Table I and II list project structure and objectives. Figure 1 shows a map with detailed directions to the project site. Activities and reporting history for the project are listed in Table III. Table IV lists project contacts and Table V list background information for the project.

Table I. Project Structure

Project Number and Name:343 (Smith and Austin Creeks)

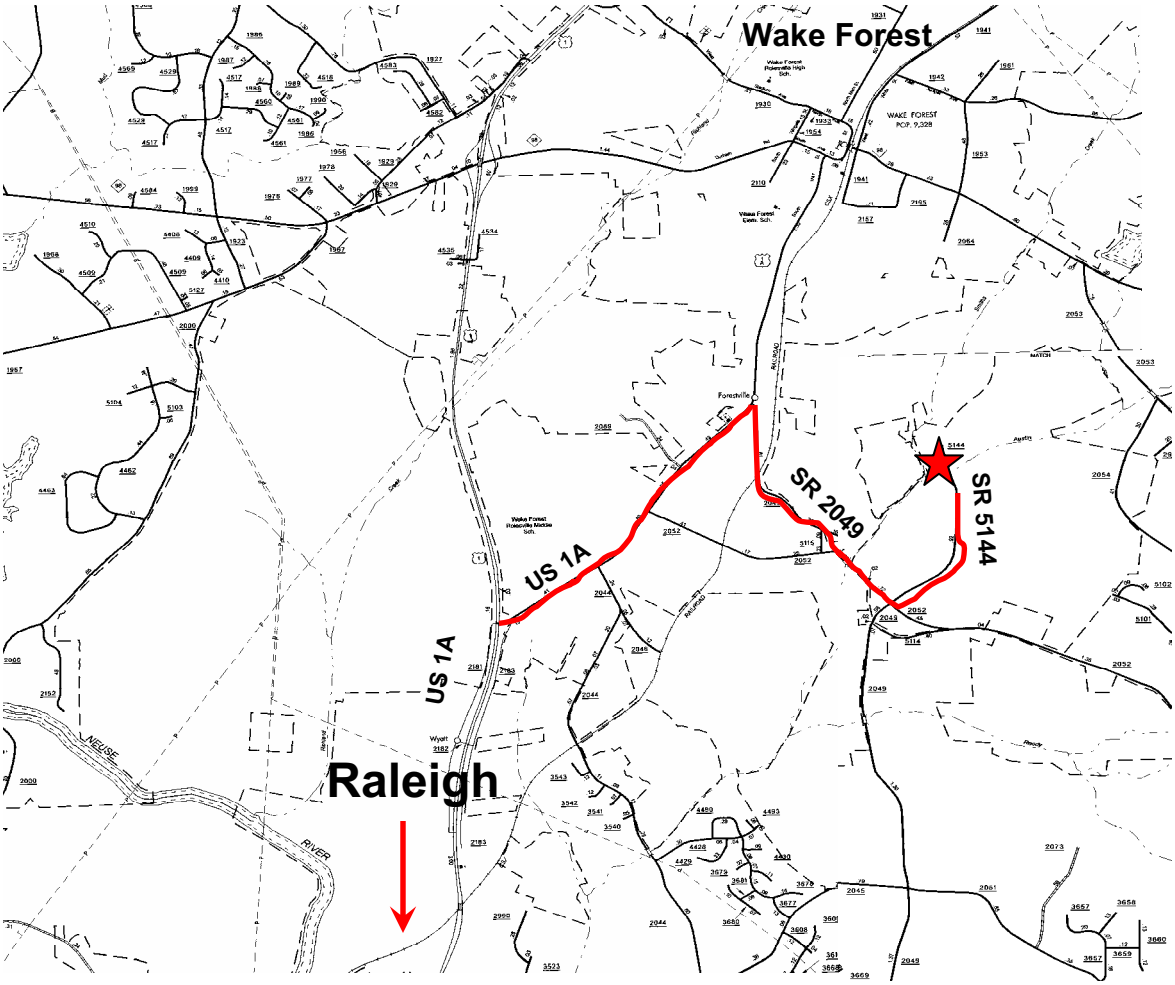
Segment/Reach ID	Linear Feet or Acreage
Smith Creek	5,370 linear feet
Austin Creek	5,550 linear feet

Table II. Project Objectives Table

Project Number and Name:343 (Smith and Austin Creeks)

Segment/Reach ID	Objectives	Linear Feet or Acreage	Comment
Smith Creek Reach 1 (SR1)	Full Restoration	2,000 linear feet	Priority 1 Approach
Smith Creek Reach 2 (SR2)	Full Restoration	2,550 linear feet	Priority 1 Approach
Smith Creek Reach 3 (SR3)	Full Restoration	820 linear feet	Priority 3 Approach
Austin Creek Reach 1 (AR1)	Full Restoration	2,620 linear feet	Priority 1 Approach
Austin Creek Reach 2 (AR2)	Full Restoration	480 linear feet	Priority 1 Approach
Austin Creek Reach 3 (AR3)	Full Restoration	2450 linear feet	Priority 1 Approach

Figure 1. Project Location



Directions from US-1 and I-440 intersection at Capital Blvd.:

The Smith and Austin Creek stream restoration project is located in Wake County, NC at Heritage Development and Golf course south of Wake Forest. From Raleigh NC take US 1 / Capital Boulevard North to right on US 1-A at Wake Forest. Go approximately 3/4 mile. Turn right on Rogers Road (SR 2049). The end of the project is located ¼ before the Forestville Road intersection where Smith Creek is curveted under Rogers Road. At the Forestville Road intersect with Rogers Road the Heritage Wake Forest's main entrance is located to the west (left) on Heritage Lake Road (SR 5144). Follow Heritage Lake Road to parking area at Soccer fields on the left.

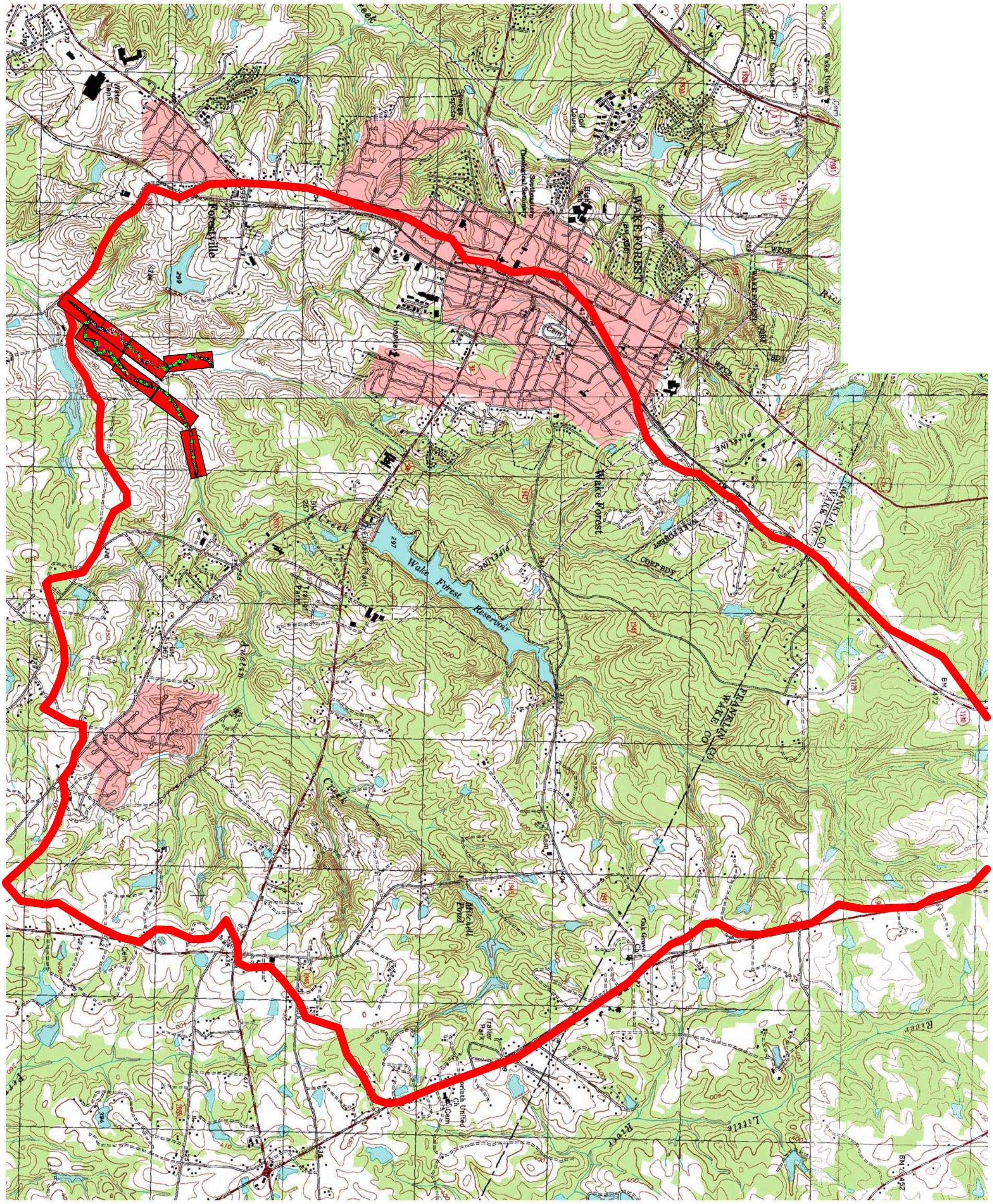
Table III. Project Activity and Reporting History		
Project Number and Name:343 (Smith and Austin Creeks)		
Activity or Report	**Calendar Year of Completion or Planned Completion**	**Actual Completion Date**
Restoration Plan	N/A*	N/A*
Mitigation Plan	N/A*	N/A*
Construction	N/A*	N/A*
Temporary S&E mix applied to entire project area	N/A*	N/A*
As-Built report	2002	2002
Permanent seed mix applied to reach	2002	2002
Structural maintenance (bank repair)		2005 - Beaver Removal
Initial – Year 1 monitoring	2003	2003
Year 2 Monitoring	2004	2004
Year 3 Monitoring	2005	2005
Year 4 Monitoring	2006	-
Year 5 Monitoring	2007	-

Table IV. Project Contact Table Project Number and Name:343 (Smith and Austin Creeks)	
Designer Primary project design POC	Buck Engineering Raleigh, NC
Construction Contractor Construction contractor POC	N/A
Planting Contractor Planting contractor POC	N/A
Seeding Contractor Planting contractor point of contact	N/A
Seed Mix Sources	N/A
Nursery Stock Suppliers	N/A
Monitoring Performers	Biological & Agricultural Engineering North Carolina State University Campus Box 7625 Raleigh, NC 27695
Stream Monitoring POC	Dan Clinton (919) 515-6771
Vegetation Monitoring POC	Dan Clinton (919) 515-6771

Table V. Project Background Table Project Number and Name:343 (Smith and Austin Creeks)	
Project County	Wake
Drainage Area	12.6 sq miles (8.7 sq mi - Austin Creek 3.9 sq mile - Smith Creek)
Drainage impervious cover estimate (%)	Estimated at >30%
Stream Order	1st order
Physiographic Region	Piedmont
Ecoregion	Northern Outer Piedmont (45f)
Rosgen Classification of As-built	E-Stream Type
Cowardin Classification	N/A*
Dominant soil types	N/A*
Reference site ID	N/A*
USGS HUC for Project and Reference	030202030
NCDWQ Sub-basin for Project and Reference	03-04-02 Neuse
NCDWQ classification for Project and Reference	C
Any portion of any project segment 303d listed?	No
Any portion of any project segment upstream of a 303d listed segment?	No
Reasons for 303d listing or stressor	N/A
% of project easement fenced	0%

SCALE 1" = 25000'

12500 0 12500 25000



DRAWING NO.				
SHEET NO.				
FILENAME	SMITH AND AUSTIN.DWG			
PROJECT NO.				
DATE	02/20/2006			

SMITH AND AUSTIN
WAKE FOREST
WAKE COUNTY, N.C.

12.9 SQUARE MILES
WATERSHED WITH USGS OVERLAY

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NO	REVISIONS	DRN	CHK	DATE
1	YEAR 2 MONITORING OF SMITH AND AUSTIN	GAT	DAB	02/20/06

BEGINNING OF AUSTIN REACH-1

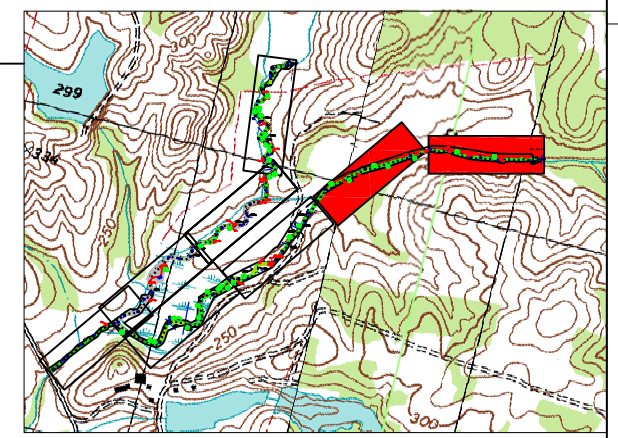
STA: 4+35
XS#2 RIFFLE AR-1

STA: -0+40
XS#1 RIFFLE AR-1

STA: 13+70
XS#3 RIFFLE AR-1

LEGEND

- ROCK VANE
- PHOTO POINTS
- BEAVER DAM AND BACKWATER
- TOP OF BANK
- BANKFULL
- PROBLEM AREAS & VEGATATION PROBLEM AREAS
- VEGATATION MONITORING PLOTS



SCALE 1" = 80'

40 0 40 80

NO	REVISIONS	DRN	CHK	DATE
1	YEAR 2 MONITORING OF SMITH AND AUSTIN	GAT	DAB	02/20/06

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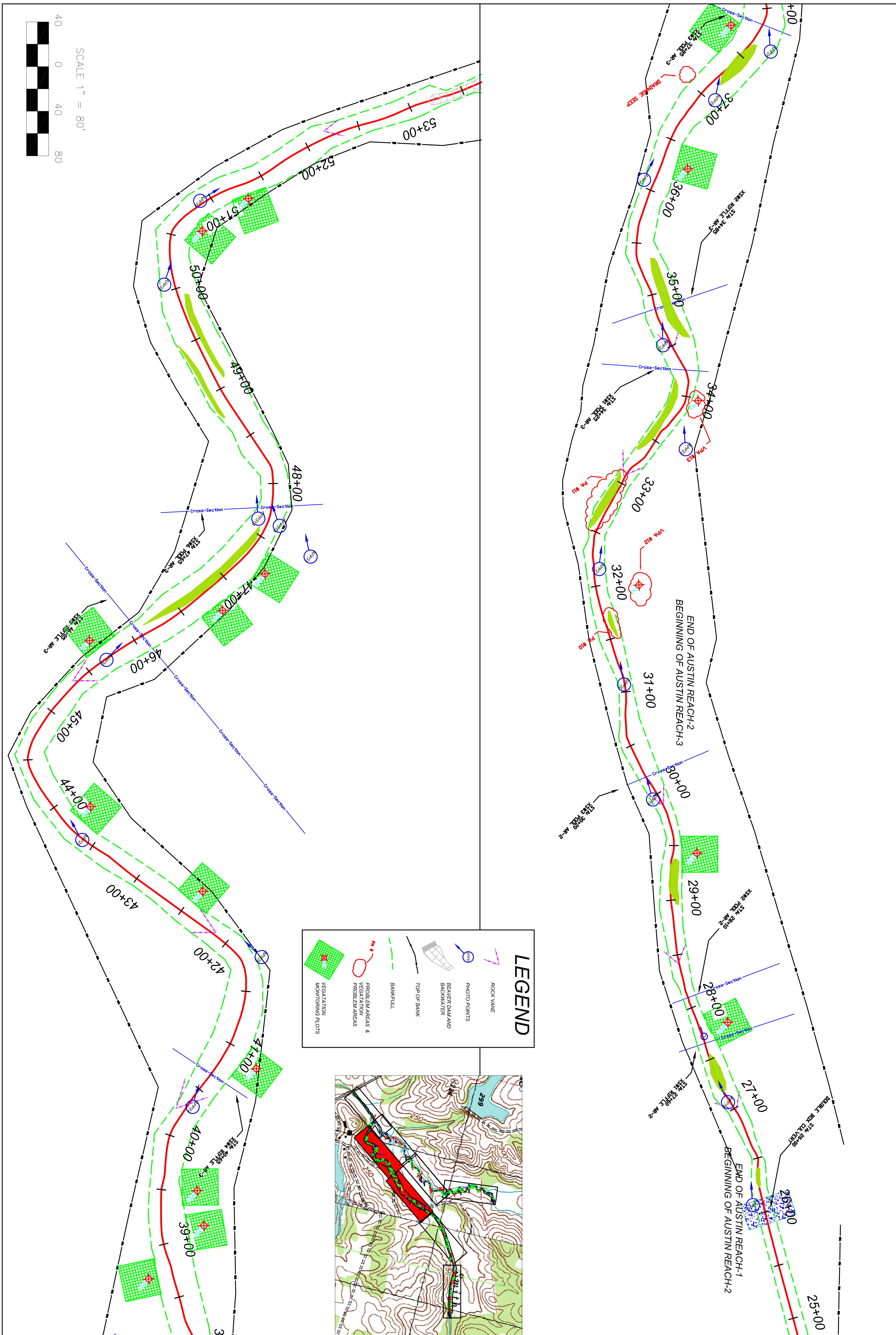
SMITH AND AUSTIN
WAKE FOREST
WAKE COUNTY, N.C.

SMITH AND AUSTIN
PLAN SHEET AUSTIN CREEK-1

DATE	02/20/2006
PROJECT NO.	
FILENAME	SMITH AND AUSTIN.DWG
SHEET NO.	
DRAWING NO.	


LEGEND
ROCK VANE
PHOTO POINTS
BEAVER DAM AND BACKWATER
TOP OF BANK
BANKFULL
PROBLEM AREAS & VEGATATION PROBLEM AREAS
VEGATATION MONITORING PLOTS
SCALE 1" = 80'
40 0 40 80
END OF AUSTIN REACH-2
BEGINNING OF AUSTIN REACH-3
END OF AUSTIN REACH-1
BEGINNING OF AUSTIN REACH-2
DOUBLE BOX CULVERT
DRAINAGE SEEP
Cross-Section
25+00
26+00
27+00
28+00
29+00
30+00
31+00
32+00
33+00
34+00
35+00
36+00
37+00
39+00
40+00
41+00
42+00
43+00
44+00
45+00
46+00
47+00
48+00
49+00
50+00
51+00
52+00
53+00

1	YEAR 2 MONITORING OF SMITH AND AUSTIN	GAT	DAB	02/20/06
NO	REVISIONS	DRN	CHK	DATE

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SMITH AND AUSTIN
WAKE FOREST
WAKE COUNTY, N.C.

SMITH AND AUSTIN
PLAN SHEET AUSTIN CREEK-2

DATE 02/20/2006
PROJECT NO.
FILENAME SMITH AND AUSTIN.DWG
SHEET NO.
DRAWING NO.

SCALE 1" = 80'

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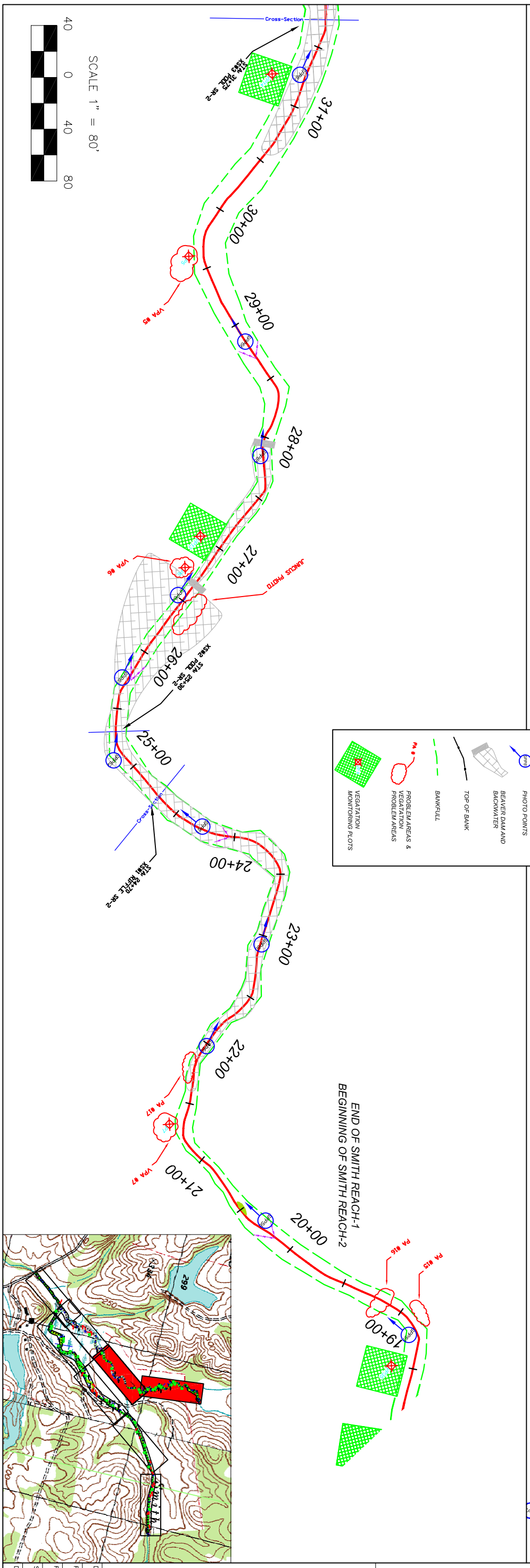

LEGEND

- ROCK VANE
- PHOTO POINTS
- BEAVER DAM AND BACKWATER
- TOP OF BANK
- BANKFULL
- PROBLEM AREAS & VEGATATION PROBLEM AREAS
- VEGATATION MONITORING PLOTS

SMITH AND AUSTIN
WAKE FOREST
WAKE COUNTY, N.C.

SMITH AND AUSTIN
PLAN SHEET SMITH CREEK-1

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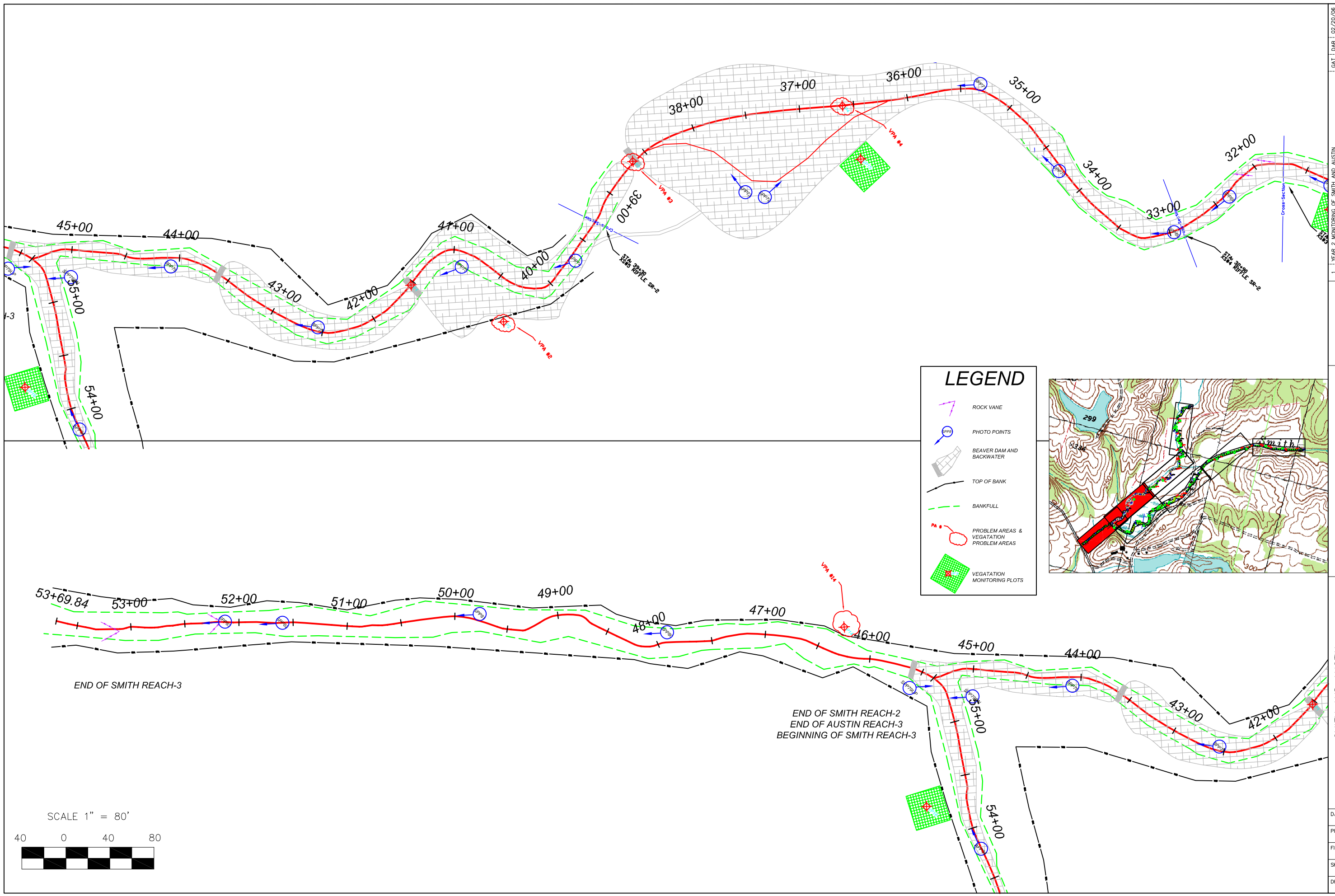
DRAWING NO.	SHEET NO.	FILENAME	PROJECT NO.	DATE
		SMITH AND AUSTIN.DWG		02/20/2006

NO	REVISIONS	DRN	CHK	DATE
1	YEAR 2 MONITORING OF SMITH AND AUSTIN	GAT	DAB	02/20/06



LEGEND

- ROCK VANE
- PHOTO POINTS
- BEAVER DAM AND BACKWATER
- TOP OF BANK
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- PROBLEM AREAS & VEGATATION PROBLEM AREAS
- VEGATATION MONITORING PLOTS

NO	REVISIONS	DRN	CHK	DATE
1	YEAR 2 MONITORING OF SMITH AND AUSTIN	GAT	DAB	02/20/06

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SMITH AND AUSTIN
WAKE FOREST
WAKE COUNTY, N.C.

SMITH AND AUSTIN
PLAN SHEET SMITH CREEK-2

DATE	02/20/2006
PROJECT NO.	
FILENAME	SMITH AND AUSTIN.DWG
SHEET NO.	
DRAWING NO.	

III. Project Condition and Monitoring Results

Below are results of the June 2005 monitoring.

A. Vegetation Assessment

Using the protocols specified in the Content, Format and Data Requirements for EEP Monitoring Reports, we established and surveyed 38 vegetation monitoring plots within the riparian buffers of Smith and Austin Creeks.

Vegetation within the riparian buffer of Smith and Austin Creeks varied in degree of success. The planted native herbaceous vegetation is dense in most areas and sparse in others. Live stakes are sparse. Planted trees are at mitigation levels, but survival is not comparable to other successful projects monitored this year. The removal of beaver dams has left remnant bare banks and impacts from machinery or vehicles.

Planted trees and shrubs exhibit low-level mortality throughout the buffer. Extrapolation from the 38 plots resulted in an overall average of 416 planted living woody stems per acre for this restoration site. Live staked shrubs fared particularly badly, averaging fewer than two per plot.

In many areas, compacted or nutrient-poor soil resulted in bare ground. In a few places, mowing from the adjacent parks has encroached on the buffer. There was heavy deer browse on some of the young trees and shrubs.

Invasive species were not a significant problem on the site when monitored in 2005. However, new construction surrounding the buffer may encourage invasion and this should be monitored in upcoming monitoring periods.

Mulching and reseeding bare areas would increase vegetation cover. Some bare banks left from the beaver dam removal, as well as newly eroding bare banks, need replacement live stakes. Tree replacement may be needed in later years if mortality continues at the current rate.

The following tables summarize vegetation and soils results for 2005 monitoring. Soil samples were collected and analyzed during the 2005 monitoring period. Vegetation problem areas are summarized below in table VII. Raw vegetation data can be found in Appendix A. Data is summarized in Table VIII below. Photos of each vegetation plot can be found in the photo log.

Table VI. Preliminary Soil Data

Project Number and Name:343 (Smith and Austin Creeks)

Series	Max Depth (in.)	% Clay on Surface	K	T	OM %
AltaVista (AfA)	48				
Buncombe (Bu)	40				
Chewacla (Cm)	48				
Louisburg (LoD)	36				
Wedowee (WmC)	40				
Wilkes (WwF)	38				
Worsham (Wy)	45				

Note: No data provided for % Clay, K, T, or OM%

Table VII. Vegetative Problem Areas			
Project Number and Name:343 (Smith and Austin Creeks)			
Feature/Issue	**Station # / Range**	**Probable Cause**	**Photo #**
Beaver Dam Rements on Bank	41+50	Beaver dam rements inhibiting vegetation growth	VPA1
Unvegetated Bank	40+40	Backwater from old beaver dam	VPA2
Gully in Floodplain	38+60	Overland Flow	VPA3
Unvegetated Bank	36+60	Backwater from old beaver dam	VPA4
Mowed Floodplain	29+60	Mowing into easement	VPA5
Unvegetated Bank	26+60	Poor vegetation establishment	VPA6
Bare Floodplain	21+30	Compacted soils Poor seedbed preparation	VPA7
Bare Floodplain	14+25	Compacted soils Poor seedbed preparation	VPA8
Bare Floodplain	14+30	Compacted soils Poor seedbed preparation	VPA9
Bare Floodplain	9+70	Compacted soils Poor seedbed preparation	VPA10
Bare Floodplain	1+30	Compacted soils Poor seedbed preparation	VPA11
Bare Floodplain	32+00	Compacted soils Poor seedbed preparation	VPA12
Bare Bank	34+00	Backwater from old beaver dam	VPA13

Table VIII: Stem counts for each species arranged by plot.
Project Number and Name:343 (Smith and Austin Creeks)

Smith Creek	**PlotNumbers**																	MY3 Totals
Species	1	2	3	4	5	6	7	8	9	10	13	14	15	35	36	37	38	
Shrubs																		
Baccharis halimifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Cornus amomum	1	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	2
Rosa palustris	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	1
Salix nigra	0	0	0	0	0	0	2	1	3	0	2	1	2	0	0	0	0	11
Trees																		
Acer negundo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Acer rubrum	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Alnus serrulata	1	1	2	0	1	0	0	0	0	0	0	0	0	0	0	0	2	7
Betula nigra	2	0	0	0	0	0	1	1	1	0	11	0	4	1	1	0	4	26
Celtis laevigata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Diospyros virginiana	3	2	0	2	2	2	3	1	0	0	1	0	1	0	3	3	1	24
Fraxinus pennsylvanica	1	0	1	2	2	1	0	1	2	3	5	7	2	1	0	3	1	32
Hamamelis virginiana	2	3	3	4	2	2	0	2	4	5	0	0	0	0	0	0	0	27
Juglans nigra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Liriodendron tulipifera	0	1	2	0	0	0	0	0	0	0	0	0	0	0	1	0	0	4
Ostrya virginiana	0	0	0	0	0	0	0	0	0	0	0	2	0	0	2	3	2	9
Platanus occidentalis	0	1	0	0	0	0	0	0	0	0	1	1	2	1	1	3	3	13
Quercus coccinea	0	1	0	0	1	0	0	2	0	0	0	0	0	0	0	0	0	4
Quercus falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	1	0	4
Quercus laurifolia	1	3	1	0	0	0	0	1	0	0	0	0	0	0	1	0	0	7
Quercus lyrata	0	0	1	0	0	0	1	0	0	0	1	0	0	2	0	0	0	5
Quercus michauxii	1	0	1	1	1	0	2	1	0	0	0	0	0	1	2	0	0	10
Quercus pagoda	0	0	0	0	0	0	1	0	0	0	0	0	0	1	0	0	0	2
Quercus phellos	0	0	0	0	0	0	0	0	0	0	0	2	0	0	0	0	0	2
Quercus spp.	2	0	1	0	0	0	0	0	1	1	0	1	1	0	1	0	0	8
																		Averages
Woody stem plot totals	14	12	12	9	10	5	10	10	11	9	21	14	13	8	14	13	13	11.6
Extrapolated woody stems per acre	567	486	486	364	405	202	405	405	445	364	850	567	526	324	567	526	526	471.4

Table VIII: Stem counts for each species arranged by plot.
Project Number and Name:343 (Austin Creek)

AUSTIN CREEK	Plot Numbers																					MY3 Totals
Species	11	12	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	32	33	34	
Shrubs																						
Baccharis halimifolia	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Cornus amomum	0	0	1	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	2
Rosa palustris	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Salix nigra	0	0	1	0	0	0	0	0	0	0	0	1	7	2	1	0	0	0	0	0	2	14
Trees																						
Acer negundo	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	2	0	1	4
Acer rubrum	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	1
Alnus serrulata	0	0	0	0	0	0	0	0	0	2	2	0	0	0	1	1	0	0	0	0	5	11
Betula nigra	0	1	1	0	0	0	0	4	2	2	3	0	2	2	0	0	1	0	0	0	0	18
Celtis laevigata	0	0	0	0	0	0	1	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1
Diospyros virginiana	0	0	0	0	0	0	0	1	2	0	1	1	1	0	0	3	1	3	0	0	0	13
Fraxinus pennsylvanica	0	0	4	5	2	15	3	1	0	0	4	5	1	2	0	1	0	1	5	3	0	52
Hamamelis virginiana	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	1	0	0	2
Juglans nigra	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	1	0	0	0	0	0	1
Liriodendron tulipifera	0	0	0	0	0	0	0	0	0	1	1	1	1	2	2	0	0	0	0	3	0	11
Ostrya virginiana	0	0	0	0	1	0	0	0	0	0	1	0	1	0	0	0	0	1	1	1	0	6
Platanus occidentalis	0	0	2	2	0	0	0	2	2	2	1	2	2	0	1	0	1	0	1	2	3	23
Quercus coccinea	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quercus falcata	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quercus laurifolia	0	1	0	0	0	0	0	0	0	0	2	0	0	0	1	2	0	0	1	0	1	8
Quercus lyrata	0	0	0	0	0	0	0	0	0	0	0	0	2	0	0	1	0	0	0	0	0	3
Quercus michauxii	0	0	0	1	3	0	0	1	2	1	0	0	1	0	0	0	4	2	1	1	0	17
Quercus pagoda	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quercus phellos	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
Quercus spp.	0	0	0	1	0	1	0	1	0	1	0	0	0	1	0	0	0	0	0	0	0	5
																						Averages
Woody stem plot totals	0	2	9	9	6	16	4	10	8	11	15	10	18	9	6	10	7	9	12	10	12	9.2
Extrapolated woody stems per acre	0	81	364	364	243	647	162	405	324	445	607	405	728	364	243	405	283	364	486	405	486	372

Totals for Smith and Austin Creeks	**Total Average**
Woody stem plot totals	**10**
Extrapolated woody stems per acre	**422**

B. Stream Assessment

Smith Creek Reach 1 (Station 0+00 to 20+00)

This reach is a sand-bed channel with very little gravel. The restoration construction created a high-width/depth C5 channel to replace a channelized G5/F5 channel from STATION 7+00 to STATION 20+00. From STATION 0+00 to STATION 7+00, the channel was stabilized in place with no significant change in pattern or profile. Constructed riffles and rock cross vanes were installed to provide grade control. For this reach, the valley slope is 0.0045 ft/ft, the constructed entrenchment ratio is greater than 3.0, and the bank height ratio is very close to 1.0. In general, this reach is stable, with some signs of aggradation in the form of mid-channel bars and depositional benches. The banks are mostly stable and will likely improve as vegetation becomes established over time. Stream bed scour is limited to meander bends and downstream of structures where energy is being dissipated.

The channel dimensions (Table XI) were measured at four cross-sections, with typical bankfull widths ranging from 23 to 26 feet in riffles and 41 to 50 feet in pools. The observed bankfull indicators are well-established depositional benches. Cross-sectional areas range from 41 to 60 square feet in riffles and 53 to 56 square feet in pools. Cross-Section 1 is located upstream of the project reach and is not included in this study. Riffle Cross-Section 2 has a bankfull area of 59.6 square feet, which is very similar to previous years. Riffle Cross-Section 3 has a bankfull area of 41.3 square feet, which is slightly higher than the previous year but very similar to earlier years. Pool Cross-Section 4 has a bankfull area of 53.4 square feet, which is slightly higher than the previous year but very similar to earlier years. Pool Cross-Section 5 has a bankfull area of 55.8 square feet, which is lower than previous years. All four of the measured cross-sections have low near-bank stress and low bank erosion potential.

The channel pattern has not changed since construction. Stream banks are fairly stable, with the exception of localized areas of scour near mid channel bars and structures. The channel profile is very similar to the as-built profile, with some indications of minor deposition. Some deposition has resulted from backwater resulting from downstream beaver dams that were recently removed. The stream bed is predominantly runs with some shallow pools and flattened riffles. For the most part, stream bed features are currently located in their design locations. The rock cross vanes do not show indications of major failures.

Problem areas are minor in this reach (Table IX). There are three local areas of erosion and scour behind root wads at STATIONS 6+10, 15+60, and 18+75. These are in areas with high banks along the outsides of meander bends with poor vegetation establishment to provide deep roots for bank protection. At STATION 6+80, there is scour upstream of a single vane on the left bank due to a steep vane arm slope and lack of deep rooted vegetation. At STATION 19+10, there is a debris jam in the channel where a vane structure is collecting debris.

Smith Creek Reach 2 (Station 20+00 to 45+50)

This reach is a sand-bed channel with very little gravel. The restoration construction created a high-width/depth C5 channel to replace a channelized G5/F5 channel from STATION 20+00 to STATION 45+50. Constructed riffles and rock cross vanes were installed to provide grade control. For this reach, the valley slope is 0.0045 ft/ft, the constructed entrenchment ratio is greater than 3.0, and the bank height ratio is very close to 1.0. In general, this reach is stable, with some signs of aggradation in the form of mid-channel bars and depositional benches. The banks are mostly stable and will likely improve as vegetation becomes established over time. Stream bed scour is limited to meander bends and downstream of structures where energy is being dissipated. Before 2005, there were

several beaver dams in this reach that resulted in backwater effects over a length of about 400 feet. The beaver dams have since been removed, resulting in improved stability in this reach.

The channel dimensions (Table XI) were measured at four cross-sections, with typical bankfull widths ranging from 16 to 20 feet in riffles and 26 to 35 feet in pools. The observed bankfull indicators are well-established depositional benches. Cross-sectional areas range from 31 to 51 square feet in riffles and 49 to 65 square feet in pools. Riffle Cross-Section 1 has a bankfull area of 51.3 square feet, which is slightly higher than previous years. Pool Cross-Section 2 has a bankfull area of 64.5 square feet, which is slightly higher than previous years. Pool Cross-Section 3 has a bankfull area of 49.4 square feet, which is slightly lower than previous years. Riffle Cross-Section 4 has a bankfull area of 39.5 square feet, which is very similar to previous years. Riffle Cross-Section 5 has a bankfull area of 31.4 square feet, which is slightly lower than previous years. All of the measured cross-sections have low near-bank stress and low bank erosion potential.

The channel pattern remains stable following removal of the beaver dams. Stream banks are fairly stable, with the exception of localized areas of scour near mid channel bars and structures. The channel profile is very similar to the as-built profile, with some indications of minor deposition. Some deposition has resulted from backwater resulting from downstream beaver dams that were recently removed. The stream bed is predominantly runs with some shallow pools and flattened riffles. For the most part, stream bed features are currently located in their design locations. The rock cross vanes do not show indications of major failures.

Problem areas are minor in this reach (Table IX). There is an area of stream bank scour at STATION 21+60, where backwater from a beaver dam inhibited vegetation establishment. The beaver dams have since been removed.

Smith Creek Reach 3 (Station 45+50 to 53+70 – confluence)

This reach is a sand-bed channel with very little gravel. The restoration construction stabilized this reach by installing grade control structures, root wads for bank protection, and a bankfull bench without removing existing large vegetation. The existing G5/F5 channel was stabilized and provided with a larger floodplain. For this reach, the valley slope is 0.0024 ft/ft, the constructed entrenchment ratio is greater than 2.0, and the bank height ratio is approximately 1.8. In general, this reach is stable, with low stream bank erodibility and good riparian vegetation. There were no observed problem areas in this reach.

Austin Creek Reach 1 (Station 0+00 to 26+20)

This reach is a sand-bed channel with very little gravel. The restoration construction stabilized this reach by grading the left bank to a stable slope in some locations and excavating a bankfull bench on the right bank along the entire reach. The existing G5/F5 channel was converted to a low-sinuosity C5 channel with a larger floodplain. Rock cross vanes were installed to provide grade control and protect streambanks. For this reach, the valley slope is 0.0032 ft/ft, the constructed entrenchment ratio is greater than 3.0, and the bank height ratio is approximately 1.0. In general, this reach is stable, with some signs of aggradation in the form of mid-channel bars and depositional benches. The banks are mostly stable and will likely improve as vegetation becomes established over time.

The channel dimensions (Table XI) were measured at three cross-sections, with typical bankfull widths ranging from 23 to 27 feet in riffles and 21 feet in pools. The observed bankfull indicators are well-established depositional benches. Cross-sectional areas range from 54 to 64 square feet in riffles and 34 square feet in pools. Cross-Section 1 is located upstream of the project reach and is not

included in this study. Riffle Cross-Section 2 has a bankfull area of 63.5 square feet, which is slightly higher than previous years. Riffle Cross-Section 3 has a bankfull area of 54.7 square feet, which is slightly higher than previous years. Pool Cross-Section 4 has a bankfull area of 34.0 square feet, which is slightly lower than previous years. All of the measured cross-sections have low near-bank stress and low bank erosion potential.

The channel pattern has not changed since construction. Stream banks are fairly stable, with the exception of localized areas of scour near mid channel bars and structures. The channel profile is very similar to the as-built profile, with some indications of minor deposition. Some deposition has resulted from backwater resulting from downstream beaver dams that were recently removed. The stream bed is predominantly runs with some shallow pools and flattened riffles. For the most part, stream bed features are currently located in their design locations. The rock cross vanes do not show indications of major failures, with the exception of the cross vane at STATION 3+70, which has failing cross boulders resulting in some loss of grade control.

Problem areas are minor in this reach (Table IX). There is some loss of grade control at STATION 3+70 due to a failing cross vane. There are four local areas of erosion and scour at STATIONS 3+95, 7+45, 19+40, and 21+10. These are in areas with high banks and poor vegetation establishment to provide deep roots for bank protection. At STATION 7+50, there is an area of bare floodplain due to poor soil conditions for plant establishment. There are mid-channel bars forming at STATIONS 9+30 and 11+90, where the channel is slightly overwide. At STATION 13+10, there is an exposed log that is creating excessive bed scour.

Austin Creek Reach 2 (Station 26+30 to 31+00)

This reach is a sand-bed channel with very little gravel. The restoration construction stabilized this reach by grading the left bank to a stable slope in some locations and excavating a bankfull bench on the right bank along the entire reach. The existing G5/F5 channel was converted to a low-sinuosity C5 channel with a larger floodplain. Rock cross vanes were installed to provide grade control and protect streambanks. For this reach, the valley slope is 0.0032 ft/ft, the constructed entrenchment ratio is greater than 3.0, and the bank height ratio is approximately 1.0. In general, this reach is stable, with some signs of aggradation in the form of mid-channel bars and depositional benches. The banks are mostly stable and will likely improve as vegetation becomes established over time.

The channel dimensions (Table XI) were measured at three cross-sections, with typical bankfull widths ranging from 20 to 25 feet in riffles and 18 feet in pools. The observed bankfull indicators are well-established depositional benches. Cross-sectional areas range from 53 to 56 square feet in riffles and 43 square feet in pools. Riffle Cross-Section 1 has a bankfull area of 56.1 square feet, which is slightly lower than the previous year but higher than earlier years. Pool Cross-Section 2 has a bankfull area of 43.0 square feet, which is similar to previous years. Riffle Cross-Section 3 has a bankfull area of 53.4 square feet, which is similar to previous years. All of the measured cross-sections have low near-bank stress and low bank erosion potential.

The channel pattern has not changed since construction. Stream banks are fairly stable, with the exception of localized areas of scour near mid channel bars and structures. The channel profile is very similar to the as-built profile, with some indications of minor deposition. Some deposition has resulted from backwater resulting from downstream beaver dams that were recently removed. The stream bed is predominantly runs with some shallow pools and flattened riffles. For the most part, stream bed features are currently located in their design locations. The rock cross vanes do not show indications of major failures.

Problem areas are minor in this reach (Table IX). There are mid-channel bars forming at STATIONS 31+50 and 32+50, where the channel is slightly overwide.

Austin Creek Reach 3 (Station 31+00 to 55+50 – end of project)

This reach is a sand-bed channel with very little gravel. The restoration construction created a high-width/depth C5 channel to replace a channelized G5/F5 channel. Constructed riffles and rock cross vanes were installed to provide grade control. For this reach, the valley slope is 0.0032 ft/ft, the constructed entrenchment ratio is greater than 3.0, and the bank height ratio is very close to 1.0. In general, this reach is stable, with signs of aggradation and transition from a riffle-pool system to a run-dominated system with relatively little bedform diversity. The banks are mostly stable and will likely improve as vegetation becomes established over time. Stream bed scour is limited to meander bends and downstream of structures where energy is being dissipated. Before 2005, there was a beaver dam on Smith Creek Reach 2 that produced backwater along about 500 feet of Austin Creek. The beaver dams have since been removed, resulting in improved stability in this reach. There were no observed problem areas in this reach.

The channel dimensions (Table XI) were measured at six cross-sections, with typical bankfull widths ranging from 32 to 37 feet in riffles and 38 to 39 feet in pools. The observed bankfull indicators are well-established depositional benches. Cross-sectional areas range from 61 to 93 square feet in riffles and 63 to 91 square feet in pools. Pool Cross-Section 1 has a bankfull area of 77.7 square feet, which is slightly higher than the previous year but lower than earlier years. Riffle Cross-Section 2 has a bankfull area of 91.5 square feet, which is lower than previous years. Pool Cross-Section 3 has a bankfull area of 90.5 square feet, which is lower than previous years. Riffle Cross-Section 4 has a bankfull area of 61.0 square feet, which is lower than previous years. Riffle Cross-Section 5 has a bankfull area of 93.4 square feet, which is lower than previous years. Pool Cross-Section 6 has a bankfull area of 63.7 square feet, which is lower than previous years. All of the measured cross-sections have low near-bank stress and low bank erosion potential.

The channel pattern has not changed since construction. Stream banks are fairly stable, with the exception of localized areas of scour near mid channel bars and structures. The channel profile is similar to the as-built profile, with some indications of deposition. The stream bed has transitioned to predominantly runs with some shallow pools. For the most part, stream bed features are currently located in their design locations. The rock cross vanes do not show indications of major failures.

Table IX. Stream Problem Areas				
Project Number and Name:343 (Smith and Austin Creeks)				
Problem Number	**Feature Issue**	**Station numbers**	**Suspected Cause**	**Photo number**
PA 1	Cross boulders in vane failed	3+70 to 3+80 Austin Creek	Steep vane slope causing excessive downstream scour	PA1
PA 2	Scour on right bank below cross vane	3+95 to 4+10 Austin Creek	Poor deep rooting vegetation establishment Steep vane slope and vane constriction	PA2
PA 3	Toe scour on right bank	7+45 to 7+50 Austin Creek	Poor deep rooting vegetation establishment High bank along outside bend	APP7
PA 4	Bare floodplain	7+50 to 8+40 Austin Creek	Compacted soils Poor seedbed preparation	VPA10 typ.
PA 5	Central bar	9+30 to 9+55 Austin Creek	Excessive sediment from upstream sources Overwide baseflow channel	APP8
PA 6	Central bar	11+90 to 12+10 Austin Creek	Excessive sediment from upstream sources Overwide baseflow channel	APP9
PA 7	Log sill exposed	13+10 Austin Creek	Excessive bed scour Not a problem at this point but should be watched.	PA7
PA 8	Scour around sewer crossing	19+40 to 19+50 Austin Creek	Poor deep rooting vegetation establishment High bank and constriction due to elevated sewrer pipe crossing	PA8
PA 9	Toe scour on right bank	21+10 to 21+20 Austin Creek	Poor deep rooting vegetation establishment High bank along outside bend	PA9
PA 10	Central bar	31+50 to 31+75 Austin Creek	Excessive sediment from upstream sources Overwide baseflow channel	APP20
PA 11	Central bar	32+50 to 33+00 Austin Creek	Excessive sediment from upstream sources Overwide baseflow channel	APP21
PA 12	Erosion and scour behind root wads	6+10 to 6+20 Smith Creek	High bank along outside bend Poor deep rooting vegetation establishment	PA12
PA 13	Scour upstream of single vane on left bank	6+80 to 6+95 Smith Creek	Lack of deep rooting vegetation Steep vane slope	PA13
PA 14	Erosion and scour behind root wads	15+60 to 15+85 Smith Creek	Poor deep rooting vegetation establishment High bank along outside bend	SSP54
PA 15	Erosion and scour behind root wads	18+75 to 19+00 Smith Creek	High bank along outside bend Poor deep rooting vegetation establishment	PA15
PA16	Debris Jam in channel	19+10 to 19+20 Smith Creek	Vane structure collecting vane	PA16
PA17	Bank scour	21+60 to 21+85 Smith Creek	Backwater from previous beaver dam inhibited vegetation establishment	PA17

Table X. Baseline Morphology and Hydraulic Summary
Project Number and Name:343 (Smith and Austin Creeks)

Parameter	USGS Gage Data			Regional Curve			Pre-Existing			Project Reference			Design			As-built		
Dimension	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
BF Width (ft)	USGS gage data is unavailable for this project						Please refer the Stream Mitigation Plan for Pre-Existing Conditions Data			Please refer the Stream Mitigation Plan for Project Reference Reach Data			Please refer the Stream Mitigation Plan and Construction Plan Sheets for Design Data			Plese refer to individual reaches for as-built data (MY-0)		
Floodprone Width (ft)																		
BF Cross Sectional Area (ft2)																		
BF Mean Depth (ft)																		
BF Max Depth (ft)																		
Width/Depth Ratio																		
Entrenchment Ratio																		
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																		
Number of Bankfull Events																		
Extent of BF floodplain (acres)																		
*BEHI																		

Table XI. Morphology and Hydraulic Monitoring Summary
Project Number and Name:343 (Smith and Austin Creeks)
Segment/Reach: Smith Creek Reach 1 (SR1)

Parameter	Cross Section 2 Station 9+35 Riffle				Cross Section 3 Station 11+30 Riffle				Cross Section 4 Station 12+00 Pool				Cross Section 5 Station 16+90 Pool			
Dimension	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3
BF Width (ft)	26.1	25.1	23.6	23.5	31.3	25.6	25.9	25.8	46.5	47.4	45.1	49.7	41.8	44.2	43.2	41.4
Floodprone Width (ft) (approx)	> 120				> 140				> 140				> 140			
BF Cross Sectional Area (ft^2)	54.6	55.9	60.8	59.6	44.9	47.5	36.6	41.3	57.9	69.3	43.8	53.4	109.2	123.2	78.9	55.8
BF Mean Depth (ft)	2.1	2.2	2.6	2.5	1.4	1.9	1.4	1.6	1.2	1.5	1.0	1.1	2.6	2.8	1.8	1.3
BF Max Depth (ft)	3.2	3.1	3.7	3.7	2.8	2.7	2.4	2.7	3.8	4.1	3.7	3.8	3.2	3.1	3.7	3.7
Width/Depth Ratio	12.5	11.3	9.2	9.3	21.8	13.8	18.3	16.1	37.3	32.4	46.4	46.3	16.0	15.9	23.7	30.7
Entrenchment Ratio	4.6	4.8	5.1	5.1	4.5	5.5	5.4	5.4								
Wetted Perimeter(ft)																
Hydraulic radius (ft)																
Substrate	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3
d50 (mm)			0.56				0.82				1.07				0.32	
d84 (mm)			2.04				2.65				2.72				1.83	

Parameter	MY-02 (2004)			MY-03 (2005)			MY-04 (2006)			MY-05 (2007)								
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	38	139	89															
Radius of Curvature (ft)	20	64	36															
Meander Wavelength (ft)	90	248	172															
Meander Width ratio																		
Profile																		
Riffle length (ft)	15	39	18															
Riffle slope (ft/ft)	0.7%	3.9%	1.3%															
Pool length (ft)	6	76	33															
Pool spacing (ft)	16	149	60															

Additional Reach Parameters	MY-00 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)						
Channel Length (ft)						
Sinuosity						
Water Surface Slope (ft/ft)						
BF slope (ft/ft)						
Rosgen Classification						
Number of Bankfull Events						
Extent of BF floodplain (area)						

Note: Cross Section 1 is located upstream of the project

Table XI. Morphology and Hydraulic Monitoring Summary
Project Number and Name:343 (Smith and Austin Creeks)
Segment/Reach: Smith Creek Reach 2 (SR2)

Parameter	Cross Section 1 Station 24+30 Riffle				Cross Section 2 Station 24+87 Pool				Cross Section 3 Station 31+25 Pool				Cross Section 4 Station 32+45 Riffle				Cross Section 5 Station 39+20 Riffle			
Dimension	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3
BF Width (ft)	33.2	20.2	20	20.2	26.9	26.2	25.7	26.1	39.1	37.7	36.3	35.1	18.7	18.9	18.4	17.6	18.4	16.9		16.4
Floodprone Width (ft) (approx)	> 200				> 100				> 120				> 100				> 140			
BF Cross Sectional Area (ft^2)	46.5	45.9	44.9	51.3	48.5	59.2	60.8	64.5	64	59.6	52.4	49.4	38.9	42.7	38.4	39.5	37.2	35.8		31.4
BF Mean Depth (ft)	1.4	2.3	2.2	2.5	1.8	2.3	2.4	2.5	1.6	1.6	1.4	1.4	2.1	2.3	2.1	2.2	2.0	2.1		1.9
BF Max Depth (ft)	3.1	3.3	3.9	3.6	3.8	3.8	4.6	4.6	4.1	4.2	3.4	3.6	3.1	3.3	3.2	2.8	3	3		2.8
Width/Depth Ratio	23.7	8.9	8.9	8.0	14.9	11.6	10.9	10.6	23.9	23.8	25.1	24.9	9.0	8.4	8.8	7.8	9.1	8.0		8.6
Entrenchment Ratio	6.0	9.9	10.0	9.9									5.3	5.3	5.4	5.7	7.6	8.3		8.5
Wetted Perimeter(ft)																				
Hydraulic radius (ft)																				
Substrate	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3
d50 (mm)			0.28				0.1				n/a				n/a	0.6				
d84 (mm)			2.27				0.73				n/a				n/a	1.1				

Parameter	MY-02 (2004)			MY-03 (2005)			MY-04 (2006)			MY-05 (2007)								
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	67	140	95															
Radius of Curvature (ft)	42	97	62															
Meander Wavelength (ft)	204	398	309															
Meander Width ratio																		
Profile																		
Riffle length (ft)	n/a	n/a	n/a															
Riffle slope (ft/ft)	n/a	n/a	n/a															
Pool length (ft)	23	83	43															
Pool spacing (ft)	40	120	89															

Additional Reach Parameters	MY-00 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)						
Channel Length (ft)						
Sinuosity						
Water Surface Slope (ft/ft)						
BF slope (ft/ft)						
Rosgen Classification						
Number of Bankfull Events						
Extent of BF floodplain (area)						

Table XI. Morphology and Hydraulic Monitoring Summary
Project Number and Name:343 (Smith and Austin Creeks)
Segment/Reach: Austin Creek Reach 1 (AR1)

Parameter	Cross Section 2 Station 4+42 Riffle				Cross Section 3 Station 13+95 Riffle				Cross Section 4 Station 20+90 Pool			
Dimension	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3
BF Width (ft)	32.4	32.4	29.5	27.3	24.4	23.8	22.8	23.5	23.3	22.5	22.7	21.4
Floodprone Width (ft) (approx)	> 100				> 90				> 60			
BF Cross Sectional Area (ft^2)	49	49	62.4	63.5	49.8	51.2	52.7	54.7	38.2	38.5	38.3	34
BF Mean Depth (ft)	1.5	1.5	2.1	2.3	2.0	2.2	2.3	2.3	1.6	1.7	1.7	1.6
BF Max Depth (ft)	3.9	3.9	4	4.8	3.2	3.2	3.9	3.8	2.5	2.5	2.8	2.7
Width/Depth Ratio	21.4	21.4	13.9	11.7	12.0	11.1	9.9	10.1	14.2	13.1	13.5	13.5
Entrenchment Ratio	3.1	3.1	3.4	3.7	3.7	3.8	3.9	3.8				
Wetted Perimeter(ft)												
Hydraulic radius (ft)												
Substrate	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3
d50 (mm)			n/a	0.34			0.07	3.1			0.22	
d84 (mm)			n/a	1.33			2.31	13.3			2.54	

Parameter	MY-02 (2004)			MY-03 (2005)			MY-04 (2006)			MY-05 (2007)								
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	n/a	n/a	n/a															
Radius of Curvature (ft)	n/a	n/a	n/a															
Meander Wavelength (ft)	n/a	n/a	n/a															
Meander Width ratio																		
Profile																		
Riffle length (ft)	10	55	15															
Riffle slope (ft/ft)	1.1%	6.4%	4.2%															
Pool length (ft)	13	72	31															
Pool spacing (ft)	23	287	64															

Additional Reach Parameters	MY-00 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)						
Channel Length (ft)						
Sinuosity						
Water Surface Slope (ft/ft)						
BF slope (ft/ft)						
Rosgen Classification						
Number of Bankfull Events						
Extent of BF floodplain (area)						

Note: Cross Section 1 is located upstream of the project

Table XI. Morphology and Hydraulic Monitoring Summary
Project Number and Name:343 (Smith and Austin Creeks)
Segment/Reach: Austin Creek Reach 2 (AR2)

Parameter	Cross Section 1 Station 27+90 Riffle				Cross Section 2 Station 28+35 Pool				Cross Section 3 Station 30+45 Riffle									
Dimension	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3						
BF Width (ft)	19.3	18.8	20.8	20.6	21.3	19.7	17.3	18.2	24.9	24	24.1	25.1						
Floodprone Width (ft) (approx)	> 120				> 130				> 140									
BF Cross Sectional Area (ft^2)	48.1	45.4	62.1	56.1	37.1	36.9	43.9	43	54.4	56.4	53.9	53.4						
BF Mean Depth (ft)	2.5	2.4	3.0	2.7	1.7	1.9	2.5	2.4	2.2	2.4	2.2	2.1						
BF Max Depth (ft)	3.6	3.6	4	4	3.6	3.5	3.4	3.3	3.1	3.2	3.2	3.1						
Width/Depth Ratio	7.7	7.8	7.0	7.6	12.2	10.5	6.8	7.7	11.4	10.2	10.8	11.8						
Entrenchment Ratio	6.2	6.4	5.8	5.8					5.6	5.8	5.8	5.6						
Wetted Perimeter(ft)																		
Hydraulic radius (ft)																		
Substrate	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3						
d50 (mm)			n/a				0.7				0.64							
d84 (mm)			n/a				2.02				1.9							

Parameter	MY-02 (2004)			MY-03 (2005)			MY-04 (2006)			MY-05 (2007)								
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	n/a	n/a	n/a															
Radius of Curvature (ft)	n/a	n/a	n/a															
Meander Wavelength (ft)	n/a	n/a	n/a															
Meander Width ratio																		
Profile																		
Riffle length (ft)	8	10	9															
Riffle slope (ft/ft)	5.4%	7.3%	6.3%															
Pool length (ft)	21	48	22															
Pool spacing (ft)	59	157	102															

Additional Reach Parameters	MY-00 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)						
Channel Length (ft)						
Sinuosity						
Water Surface Slope (ft/ft)						
BF slope (ft/ft)						
Rosgen Classification						
Number of Bankfull Events						
Extent of BF floodplain (area)						

Table XI. Morphology and Hydraulic Monitoring Summary
Project Number and Name:343 (Smith and Austin Creeks)
Segment/Reach: Austin Creek Reach 3 (AR3)

Parameter	Cross Section 1 Station 34+55 Pool				Cross Section 2 Station 35+15 Riffle				Cross Section 3 Station 38+15 Pool				Cross Section 4 Station 41+00 Riffle				Cross Section 5 Station 46+40 Riffle				Cross Section 6 Station 48+20 Pool			
Dimension	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3
BF Width (ft)	37.3	41.2	39.6	38.5	38.4	37.2	35.5	37.6	38.5	39.4	39.1	38.8	31.6	34.1	35.1	32.7	34.3	39.1	35.6	36.4	58.3	58.4	56.9	39.1
Floodprone Width (ft) (approx)	> 120				> 160				> 150				> 100				> 380				> 150			
BF Cross Sectional Area (ft^2)	97.1	87.5	72.7	77.7	126.5	125.1	97.1	91.5	153.8	151.2	93	90.5	78.8	77.4	63.7	61	99.9	116	94	93.4	135.7	108.9	70	63.7
BF Mean Depth (ft)	2.6	2.1	1.8	2.0	3.3	3.4	2.7	2.4	4.0	3.8	2.4	2.3	2.5	2.3	1.8	1.9	2.9	3.0	2.6	2.6	2.3	1.9	1.2	1.6
BF Max Depth (ft)	4.8	4.8	3.8	4.2	5.3	5.3	3.8	3.8	7.1	7.1	3.8	3.8	4	4	3.3	3.2	4.2	4.7	4	3.9	6.9	6.7	3.4	3.2
Width/Depth Ratio	14.3	19.4	21.6	19.1	11.7	11.1	13.0	15.5	9.6	10.3	16.4	16.6	12.7	15.0	19.3	17.5	11.8	13.2	13.5	14.2	25.0	31.3	46.3	24.0
Entrenchment Ratio					4.2	4.3	4.5	4.3					3.2	2.9	2.8	3.1	11.1	9.7	10.7	10.4				
Wetted Perimeter(ft)																								
Hydraulic radius (ft)																								
Substrate	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3	MY0	MY1	MY2	MY3
d50 (mm)			n/a				0.56	1.13			1.1	n/a			n/a	n/a			0.75	n/a			0.47	n/a
d84 (mm)			n/a				3	2.4			2.89	n/a			n/a	n/a			2.28	n/a			1.95	n/a

Parameter	MY-02 (2004)			MY-03 (2005)			MY-04 (2006)			MY-05 (2007)								
Pattern	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med	Min	Max	Med
Channel Beltwidth (ft)	77	239	95															
Radius of Curvature (ft)	87	178	99															
Meander Wavelength (ft)	321	507	346															
Meander Width ratio																		
Profile																		
Riffle length (ft)	21	36	28															
Riffle slope (ft/ft)	1.20%	1.70%	1.40%															
Pool length (ft)	14	89	26															
Pool spacing (ft)	32	492	113															

Additional Reach Parameters	MY-00 (2004)	MY-01 (2005)	MY-02 (2006)	MY-03 (2007)	MY-04 (2008)	MY-05 (2009)
Valley Length (ft)						
Channel Length (ft)						
Sinuosity						
Water Surface Slope (ft/ft)						
BF slope (ft/ft)						
Rosgen Classification						
Number of Bankfull Events						
Extent of BF floodplain (area)						

IV. Methodology Section

Monitoring methods used are based on US Army Corps of Engineering and NC Division of Water Quality Guides as referenced below.

References:

USACOE (2003) *Stream Mitigation Guidelines*. USACOE, USEPA, NCWRC, NCDENR-DWQ

Rosgen, D L. (1996) *Applied River Morphology*. Wildland Hydrology Books, Pagosa Springs, CO.

APPENDIX A

Vegetation Raw Data

1. Vegetation Photo Log
2. Vegetation Problem Area Photo Log
3. Vegetation Survey Data Tables

Note: Vegetation problem area locations are shown in Problem Area Plan View in Appendix B.

APPENDIX A

Vegetation Raw Data

1. Vegetation Photo Log
2. Vegetation Problem Area Photo Log
3. Vegetation Survey Data Tables

Note: Vegetation problem area locations are shown in Problem Area Plan View in Appendix B.

Austin Creek Vegetation Photo Log 2005

AVP1. Austin Vegetation Plot #1

AVP2. Austin Vegetation Plot #2

AVP3. Austin Vegetation Plot #3

AVP4. Austin Vegetation Plot #4

AVP5. Austin Vegetation Plot #5

AVP6. Austin Vegetation Plot #6

AVP7. Austin Vegetation Plot #7

AVP8. Austin Vegetation Plot #8

AVP9. Austin Vegetation Plot #9

AVP10. Austin Vegetation Plot #10

AVP11. Austin Vegetation Plot #11

AVP12. Austin Vegetation Plot #12


AVP13. Austin Vegetation Plot #13


AVP14. Austin Vegetation Plot #14

AVP15. Austin Vegetation Plot #15

AVP16. Austin Vegetation Plot #16

AVP17. Austin Vegetation Plot #17

AVP18. Austin Vegetation Plot #18

AVP19. Austin Vegetation Plot #19

AVP20. Austin Vegetation Plot #20

AVP21. Austin Vegetation Plot #21

AVP22. Austin Vegetation Plot #22

AVP23. Austin Vegetation Plot #23

AVP24. Austin Vegetation Plot #24

AVP25. Austin Vegetation Plot #25

AVP26. Austin Vegetation Plot #26

AVP27. Austin Vegetation Plot #27

AVP28. Austin Vegetation Plot #28

AVP29. Austin Vegetation Plot #29

AVP30. Austin Vegetation Plot #30

AVP31. Austin Vegetation Plot #31

AVP32. Austin Vegetation Plot #32

AVP33. Austin Vegetation Plot #33

AVP34. Austin Vegetation Plot #34

AVP35. Austin Vegetation Plot #35

AVP36. Austin Vegetation Plot #36

AVP37. Austin Vegetation Plot #37

AVP38. Austin Vegetation Plot #38

Vegetation Problem Area Photos 2005

VPA1.Smith Creek Station 41+50. Beaver Dam remnants on bank.

VPA2. Smith Creek Station 40+40. Un-vegetated Bank

VPA3 Smith Creek Station 38+60. Gully in floodplain from overland flow.

VPA4. Smith Creek Station 36+60. Un-vegetated Bank

VPA5. Smith Creek Station X+XX. Mowing in floodplain

VPA6. Smith Creek Station X+XX. Un-vegetated Bank

VPA7. Austin Creek Station 21+30. Bare floodplain

VPA8. Austin Creek Station 14+25. Bare floodplain

VPA9. Austin Creek Station 14+30. Bare floodplain.

VPA10. Austin Creek Station 9+70. Bare floodplain

VPA11. Austin Creek Station 1+30. Bare floodplain.

VPA12. Austin Creek Station 32+00. Bare floodplain.

VPA13. Austin Creek Station 34+00. Bare bank.

VPA 14. Smith Creek Station 26+50. Previous bare bank behind beaver dam removed. Now a hardy stand of *Juncus sp*. is establishing. Not a problem location.

2005 Smith and Austin Raw Vegetation Data										
Smith-Austin 7-Jun-2005										
No.	**Species**	**Count**		**No.**	**Species**	**Count**		**No.**	**Species**	**Count**
13	BENI	11		23	ACRU	1		31	FRPE	1
13	FRPE	5		23	LITU	1		31	FAGR	1
13	SANI	2		24	FRPE	4		31	HAVI	1
13	PLOC	1		24	BENI	3		31	ACNE	1
13	DIVI4	1		24	ALSE	2		32	FRPE	5
13	scarlet 1	1		24	QULA	2		32	ACNE	2
14	FRPE	7		24	PLOC	1		32	QUMI	1
14	QUPH	2		24	DIVI4	1		32	PLOC	1
14	FAGR	2		24	FAGR	1		32	QULA	1
14	PLOC	1		24	LITU	1		32	FAGR	1
14	SANI	1		25	FRPE	5		32	HAVI	1
14	QULY	1		25	PLOC	2		33	FRPE	3
15	BENI	4		25	DIVI4	1		33	LITU	3
15	PLOC	2		25	SANI	1		33	PLOC	2
15	FRPE	2		25	LITU	1		33	QUMI	1
15	SANI	2		26	SANI	7		33	FAGR	1
15	DIVI4	1		26	PLOC	2		34	ALSE	5
15	ukn 1	1		26	BENI	2		34	PLOC	3
15	QULY	1		26	scarlet 1	2		34	SANI	2
16	FRPE	4		26	QUMI	1		34	QULA	1
16	PLOC	2		26	DIVI4	1		34	ACNE	1
16	BENI	1		26	FRPE	1		35	scarlet 1	2
16	SANI	1		26	FAGR	1		35	QUMI	1
16	ukn 1	1		26	LITU	1		35	PLOC	1
17	FRPE	5		27	FRPE	2		35	FRPE	1
17	PLOC	2		27	BENI	2		35	BENI	1
17	QUMI	1		27	SANI	2		35	QUFA	1
17	QULY	1		27	LITU	2		35	turkey	1
18	QUMI	3		27	QULY	1		36	DIVI4	3
18	FRPE	2		28	LITU	2		36	QUMI	2
18	FAGR	1		28	PLOC	1		36	FAGR	2
19	FRPE	15		28	ALSE	1		36	turkey	2
19	QULY	1		28	SANI	1		36	PLOC	1
20	FRPE	3		28	QULA	1		36	BENI	1
20	CELA	1		29	DIVI4	3		36	QULA	1
21	BENI	4		29	QULA	2		36	QULY	1
21	PLOC	2		29	FRPE	1		36	LITU	1
21	QUMI	1		29	ALSE	1		37	PLOC	3
21	DIVI4	1		29	scarlet 1	1		37	DIVI4	3
21	FRPE	1		29	unk2	1		37	FRPE	3
21	QULY	1		29	JUNI	1		37	FAGR	3
22	QUMI	2		30	QUMI	4		37	turkey	1
22	PLOC	2		30	PLOC	1		38	BENI	4
22	DIVI4	2		30	DIVI4	1		38	PLOC	3
22	BENI	2		30	BENI	1		38	ALSE	2
23	PLOC	2		31	DIVI4	3		38	FAGR	2
23	BENI	2		31	QUMI	2		38	DIVI4	1
23	ALSE	2						38	FRPE	1
23	QUMI	1								
23	ukn 1	1								
23	QULY	1								
23	ACRU	1								

APPENDIX B

Morphology Raw Data

1. Problem Area Plan View
2. Project Photo Log
3. Stream Problem Area Photos
4. Cross section and Pebble Count Plots and Raw Data Tables
5. Longitudinal Plots and Raw Data Tables

APPENDIX B

Morphology Raw Data

1. Problem Area Plan View
2. Project Photo Log
3. Stream Problem Area Photos
4. Cross section and Pebble Count Plots and Raw Data Tables
5. Longitudinal Plots and Raw Data Tables

Project Name	Smith and Austin
Cross Section	SR1-2
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

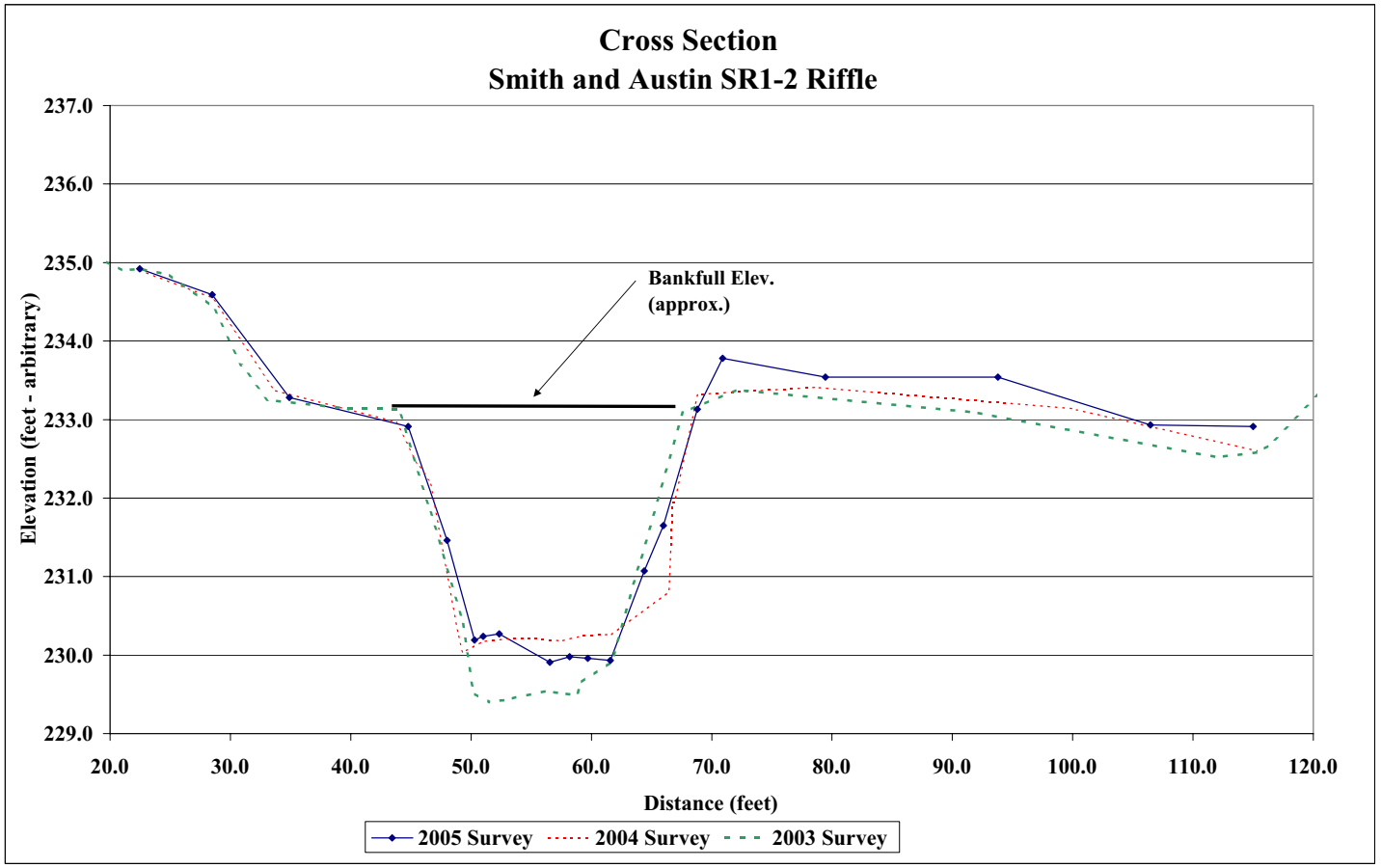
2005 Survey		
Station	**Elevation**	**Notes**
22.5	234.9	LP
28.5	234.6	
34.9	233.3	
44.8	232.9	
48.0	231.5	
50.3	230.2	
51.0	230.2	
52.3	230.3	
56.5	229.9	
58.2	230.0	
59.7	230.0	
61.6	229.9	
64.4	231.1	
66.0	231.7	
68.8	233.1	
70.9	233.8	
79.5	233.5	
93.8	233.5	
106.5	232.9	
115.0	232.9	RP

2004 Survey		
Station	**Elevation**	**Notes**
22.5	234.9	LP
28.5	234.6	
33.7	233.4	
43.8	233.0	BKF
45.6	232.4	
46.6	232.2	
48.9	230.3	
49.3	230.0	
50.9	230.2	
53.3	230.2	
55.0	230.2	
57.5	230.2	
59.3	230.3	
61.7	230.3	
66.4	230.8	
66.8	231.9	
66.9	231.9	
68.8	233.3	BKF
78.6	233.4	
99.9	233.1	
115.3	232.6	RP

2003 Survey		
Station	**Elevation**	**Notes**
1.0	235.7	
12.0	235.6	
21.0	234.9	
22.5	234.9	LP
25.0	234.8	
28.6	234.4	
30.9	233.7	
33.1	233.3	
39.7	233.1	
44.0	233.1	
46.6	231.8	
49.3	230.5	
50.2	229.5	
51.5	229.4	
52.8	229.4	
56.1	229.5	
57.7	229.5	
58.8	229.5	
59.1	229.7	
61.7	229.9	
64.0	231.2	
67.6	233.1	BKF
72.1	233.4	
92.0	233.1	
112.0	232.5	
115.3	232.6	RP
116.2	232.7	
122.0	233.6	
130.0	234.8	
136.0	235.4	
140.0	235.4	

Photo of Cross-Section SR1-2 - Looking Downstream @ STA 9+35

	2005	**2004**	**2003**	**AS-BUILT**
Area	54.6	55.9	60.8	59.6
Width	26.1	25.1	23.6	23.5
Mean Depth	2.1	2.2	2.6	2.5
Max Depth	3.2	3.1	3.7	3.7
W/D	12.5	11.3	9.2	9.3



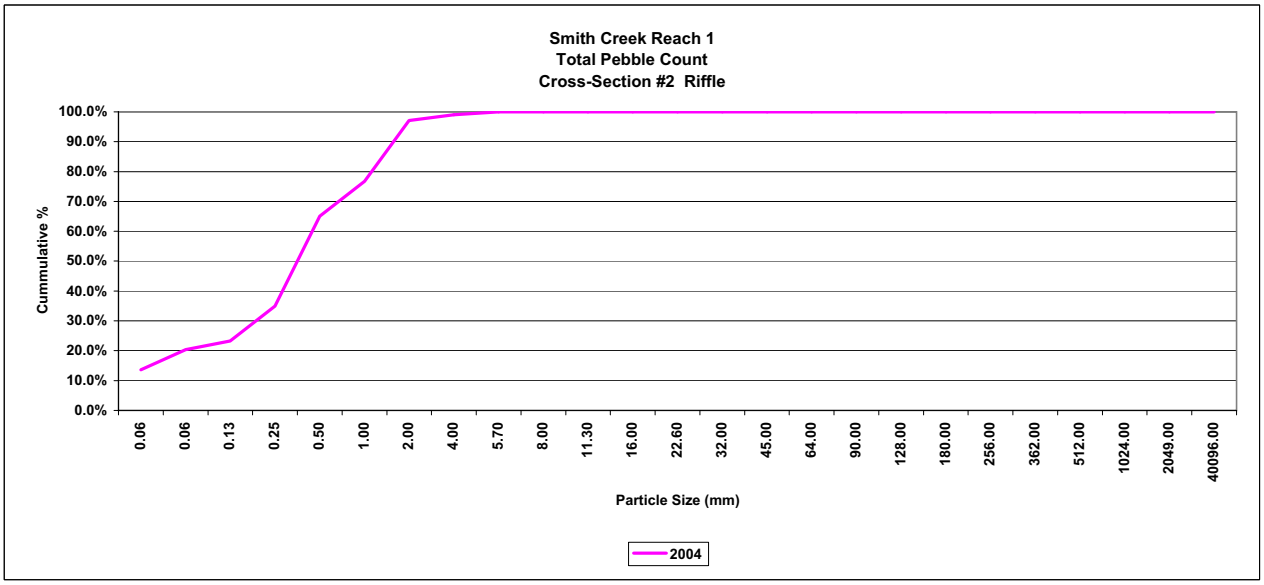
Project Name	Smith Reach 1
Cross Section	#2
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Riffle - Bank	Riffle - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	10	4	13.6%	13.6%
Sand	very fine sand	0.062	7	0	6.8%	20.4%
	fine sand	0.125	2	1	2.9%	23.3%
	medium sand	0.25	8	4	11.7%	35.0%
	course sand	0.50	20	11	30.1%	65.0%
	very course sand	1.0	3	9	11.7%	76.7%
G r a v e l	very fine gravel	2.0	2	19	20.4%	97.1%
	fine gravel	4.0	0	2	1.9%	99.0%
	fine gravel	5.7	0	1	1.0%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			52	51	100.0%	

	d16	d35	d50	d85	d95
2004	0.07	0.38	0.56	2.04	2.85



Project Name	Smith and Austin
Cross Section	SR1-3
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
27.2	232.2	LP
48.9	232.2	
55.4	232.5	
67.6	232.5	
72.9	232.8	
74.7	232.7	
77.9	232.2	
80.8	231.3	
84.6	230.3	
87.5	229.9	
88.1	229.9	
89.0	229.4	
90.7	229.2	
92.1	229.5	
94.5	229.5	
95.8	229.6	
96.5	229.9	
97.7	230.9	
106.6	232.0	
118.1	232.0	
134.1	232.1	
153.2	232.4	
165.6	232.6	

2004
2004 Survey

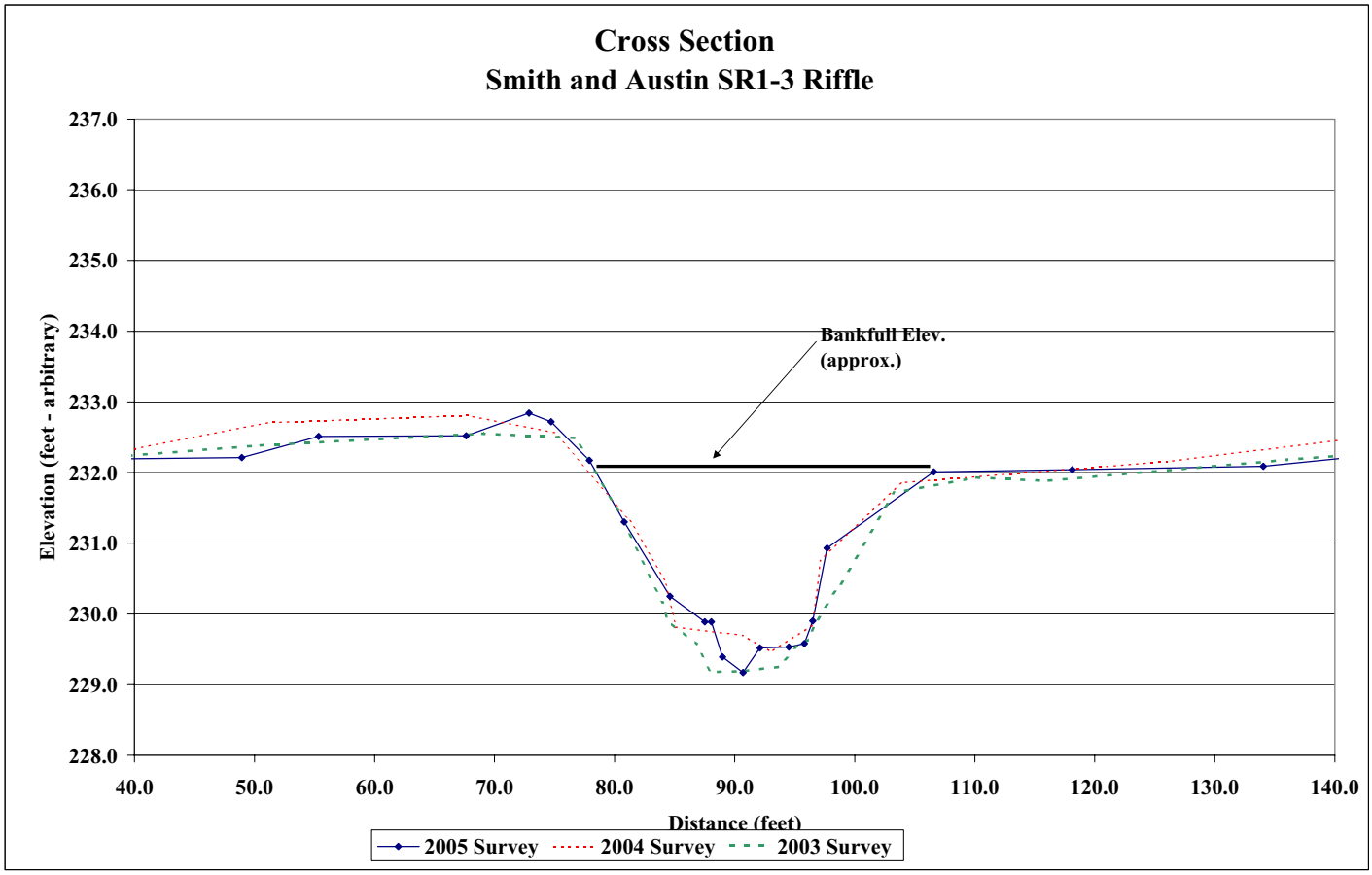
Station	Elevation	Notes
27.0	232.2	LP
40.0	232.3	
51.1	232.7	
67.8	232.8	
75.0	232.6	
81.2	231.3	
84.2	230.5	
85.1	229.8	
90.7	229.7	
93.0	229.5	
96.5	229.8	
97.2	230.8	
103.8	231.9	BKF
126.0	232.2	
147.4	232.6	
172.9	232.7	RP

2003
2003 Survey

Station	Elevation	Notes
2.8	236.6	
7.0	236.3	
13.0	235.1	
18.0	233.7	
24.0	232.5	
27.4	232.3	LP
33.0	232.2	
50.0	232.4	
69.0	232.6	
76.7	232.5	
80.0	231.6	
84.0	230.2	
84.4	229.9	
86.8	229.6	
88.0	229.2	
90.6	229.2	
93.6	229.3	
95.2	229.5	
96.2	229.7	
96.8	229.9	
98.7	230.4	
103.3	231.7	
110.0	231.9	BKF
116.0	231.9	
136.0	232.2	
169.0	232.6	
172.5	232.7	RP
174.5	232.7	
179.0	233.6	
185.0	234.4	
191.0	235.0	
194.0	235.4	
204.8	235.4	

Photo of Cross-Section SR1-3 - Looking Downstream @ STA 11+30

	2005	2004	2003	AS-BUILT
Area	41.3	36.6	47.5	44.9
Width	25.8	25.9	25.6	31.3
Mean Depth	1.6	1.4	1.9	1.4
Max Depth	2.7	2.4	2.7	2.8
W/D	16.1	18.3	13.8	21.8



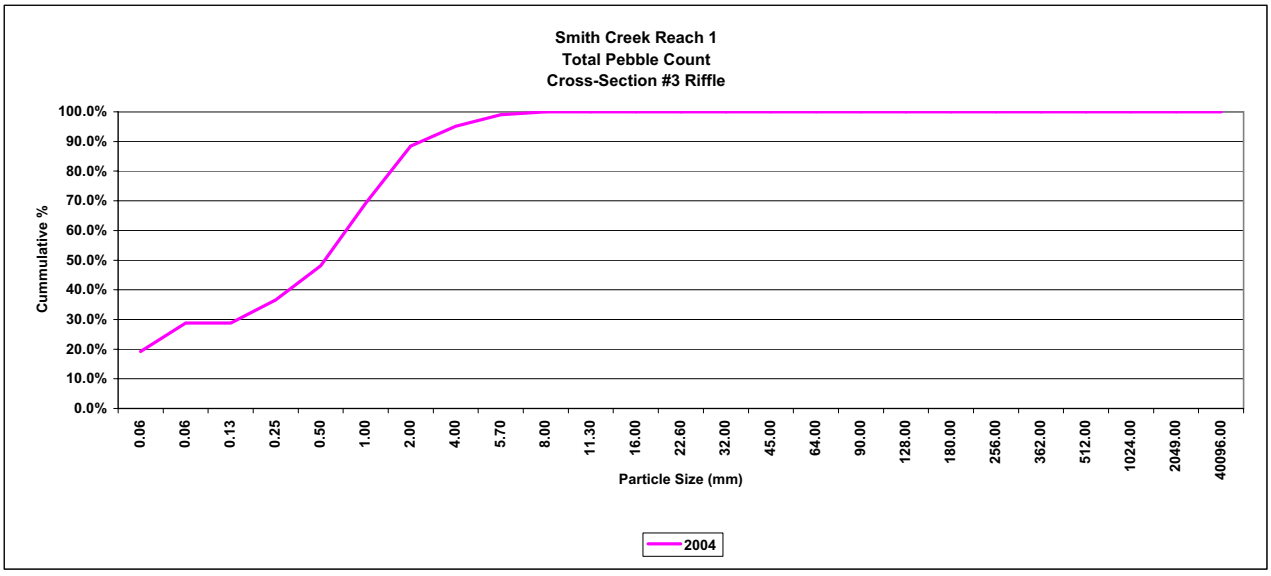
Project Name	Smith Reach 1
Cross Section	#3
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Riffle - Bank	Riffle - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	20	0	19.2%	19.2%
Sand	very fine sand	0.062	10	0	9.6%	28.8%
	fine sand	0.125	0	0	0.0%	28.8%
	medium sand	0.25	0	8	7.7%	36.5%
	course sand	0.50	0	12	11.5%	48.1%
	very course sand	1.0	0	22	21.2%	69.2%
Gravel	very fine gravel	2.0	0	20	19.2%	88.5%
	fine gravel	4.0	0	7	6.7%	95.2%
	fine gravel	5.7	0	4	3.8%	99.0%
	medium gravel	8.0	0	1	1.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			30	74	100.0%	

	d16	d35	d50	d85	d95
2004	0.00	0.34	0.82	2.65	4.80



Project Name	Smith and Austin
Cross Section	SR1-4
Feature	Pool
Date	6/2/05
Crew	Bidelspach, Clinton

2005

2005 Survey

Station	Elevation	Notes
30.1	232.5	LP
37.3	232.6	
50.8	232.8	
63.8	232.6	
72.8	232.5	
78.1	232.5	
86.1	232.0	
98.2	231.4	
102.2	231.4	
105.0	231.2	
107.8	231.3	
109.1	231.0	
112.1	229.9	
114.3	229.9	
114.7	229.6	
116.6	229.4	
118.2	229.1	
119.5	229.0	
119.7	228.8	
121.7	228.7	
122.4	229.7	
122.5	230.0	
123.3	230.5	
123.7	230.9	
128.2	232.9	
136.4	233.9	RP

2004

2004 Survey

Station	Elevation	Notes
30.1	232.5	LP
48.0	232.6	
63.4	232.6	
81.6	232.4	BKF
98.9	232.0	
104.6	231.1	
107.9	231.1	
111.2	230.3	
116.0	229.8	
119.0	229.8	
121.0	228.8	
122.5	229.7	
123.4	230.9	
123.5	231.1	
124.5	231.1	
125.6	231.7	
126.7	232.5	BKF
128.5	233.4	
129.6	233.4	
129.9	233.3	
132.8	233.6	
137.2	233.8	RP

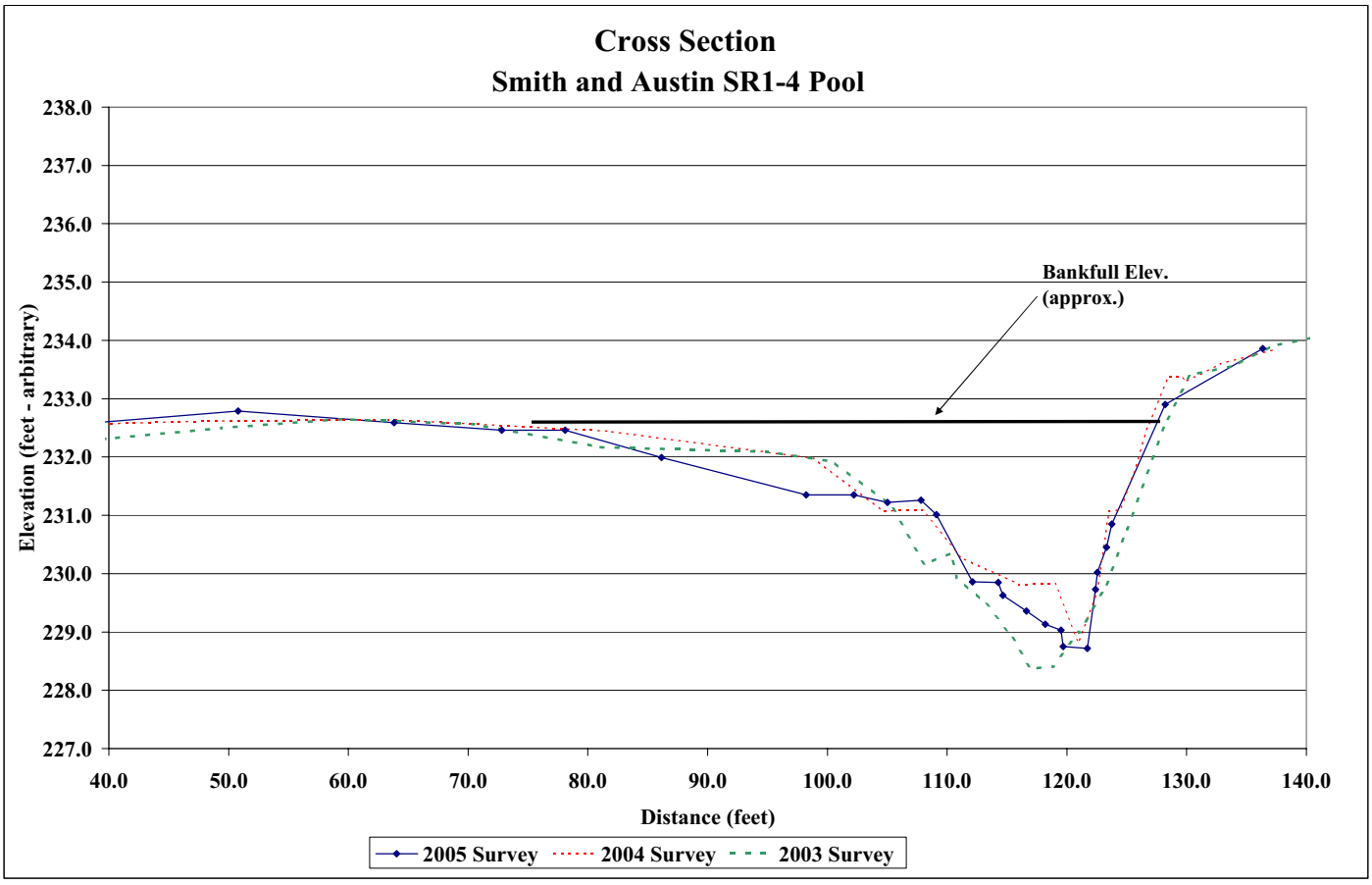
2003

2003 Survey

Station	Elevation	Notes
11.2	236.8	
13.7	236.6	
17.7	235.4	
22.3	233.7	
26.2	232.6	
30.2	232.5	LP
39.7	232.3	
49.4	232.5	
59.4	232.7	
70.5	232.6	BKF
81.0	232.2	
95.0	232.1	
100.5	231.9	
105.3	231.2	
108.1	230.2	
110.3	230.4	
110.8	229.9	
113.2	229.5	
115.2	229.0	
117.0	228.4	
118.8	228.4	
121.0	229.0	
123.2	229.8	
125.0	230.8	
128.4	232.7	
130.3	233.4	
134.0	233.6	
137.1	233.9	RP
155.0	234.6	

Photo of Cross-Section SR1-4 - Looking Downstream @ STA 12+00

	2005	2004	2003	AS-BUILT
Area	53.4	43.8	69.3	57.9
Width	49.7	45.1	47.4	46.5
Mean Depth	1.1	1.0	1.5	1.2
Max Depth	3.8	3.7	4.1	3.8
W/D	46.3	46.4	32.4	37.3



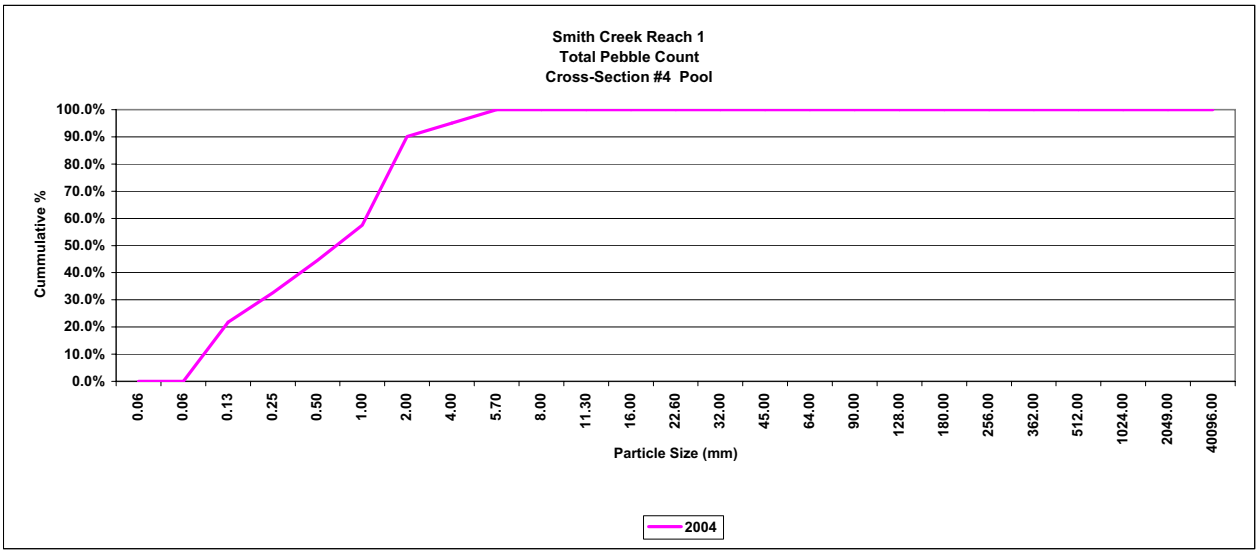
Project Name	Smith Reach 1
Cross Section	#4
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Pool - Bank	Pool - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	0	0	0.0%	0.0%
Sand	very fine sand	0.062	0	0	0.0%	0.0%
	fine sand	0.125	22	0	21.8%	21.8%
	medium sand	0.25	10	1	10.9%	32.7%
	course sand	0.50	6	6	11.9%	44.6%
	very course sand	1.0	4	9	12.9%	57.4%
G r a v e l	very fine gravel	2.0	8	25	32.7%	90.1%
	fine gravel	4.0	0	5	5.0%	95.0%
	fine gravel	5.7	0	5	5.0%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			50	51	100.0%	

	d16	d35	d50	d85	d95
2004	0.16	0.45	1.07	2.72	4.83



Project Name	Smith and Austin
Cross Section	SR1-5
Feature	Pool
Date	6/2/05
Crew	Bidelspach, Clinton

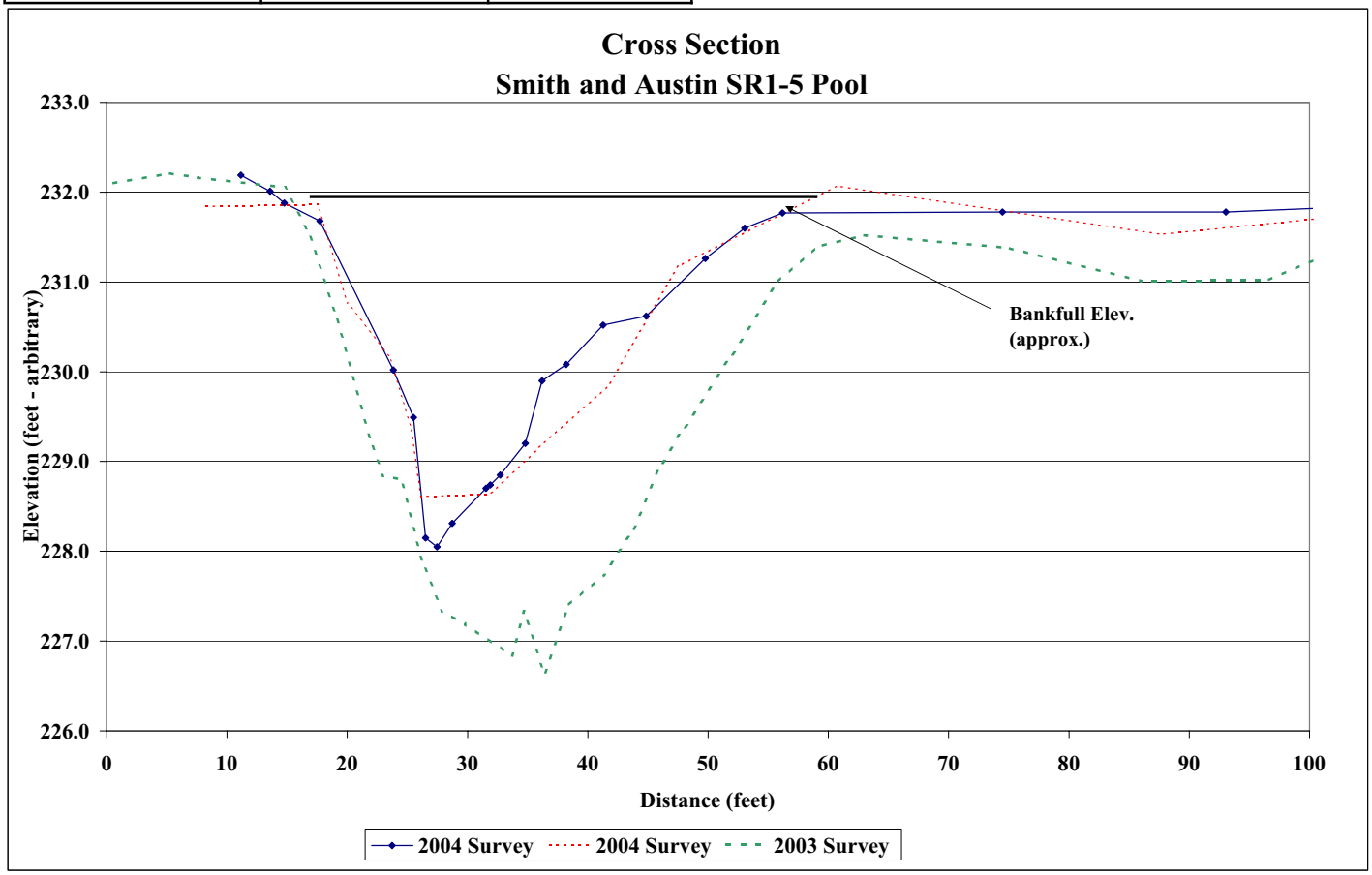
2004 2004 Survey		
Station	**Elevation**	**Notes**
11.16	232.2	
13.58	232.0	
14.77	231.9	
17.71	231.7	
23.83	230.0	
25.5	229.5	
26.51	228.2	
27.45	228.1	
28.73	228.3	
31.53	228.7	
31.89	228.7	
32.72	228.9	
34.8	229.2	
36.2	229.9	
38.2	230.1	
41.3	230.5	
44.9	230.6	
49.8	231.3	
53.1	231.6	
56.18	231.8	
74.47	231.8	
93.05	231.8	
120.54	231.9	
139.22	231.4	

2004 2004 Survey		
Station	**Elevation**	**Notes**
8.2	231.8	LP
17.5	231.9	BKF
20.0	230.8	
23.5	230.2	
25.3	229.4	
26.1	228.6	
28.4	228.6	
31.9	228.6	
35.7	229.1	
41.7	229.8	
47.5	231.2	
60.7	232.1	
87.7	231.5	
117.1	231.9	
139.2	231.4	RP

2003 2003 Survey		
Station	**Elevation**	**Notes**
0.6	232.1	
5.2	232.2	
7.6	232.2	LP
14.8	232.1	
16.8	231.6	
19.0	230.7	
22.0	229.2	
23.0	228.8	
24.5	228.8	
26.2	227.9	
27.9	227.3	
29.8	227.2	
33.7	226.8	
34.7	227.3	
36.4	226.6	
38.4	227.4	
41.3	227.7	
43.8	228.2	
45.9	228.9	
47.6	229.3	
51.7	230.1	
55.8	231.0	
59.0	231.4	
63.0	231.5	BKF
75.0	231.4	
86.0	231.0	
96.6	231.0	
101.5	231.3	
113.0	231.7	
122.0	231.5	
135.0	231.2	
139.8	231.1	RP
153.5	231.4	
166.0	231.9	
172.0	232.0	

Photo of Cross-Section SR1-5 - Looking Downstream @ STA 16+90

	2004	**2004**	**2003**	**AS-BUILT**
Area	55.8	78.9	123.2	109.2
Width	41.4	43.2	44.2	41.8
Mean Depth	1.3	1.8	2.8	2.6
Max Depth	3.6	3.1	5.1	4.8
W/D	30.7	23.6	15.9	16.0



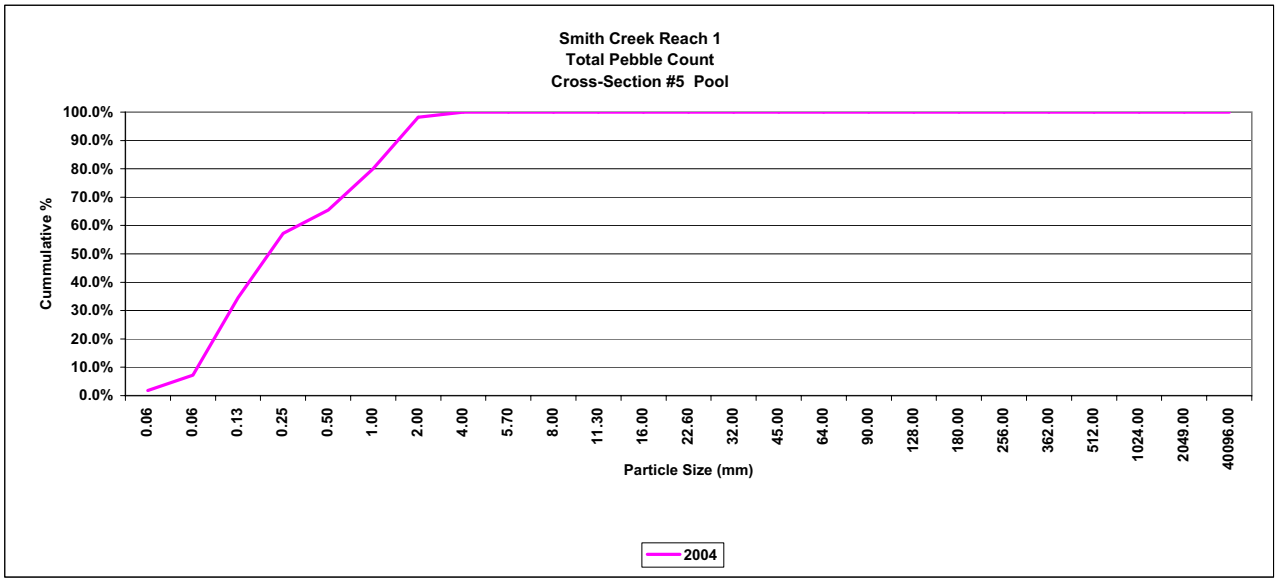
Project Name	Smith Reach 1
Cross Section	#5
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Pool - Bank	Pool - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	2	0	1.8%	1.8%
Sand	very fine sand	0.062	6	0	5.5%	7.3%
	fine sand	0.125	30	0	27.3%	34.5%
	medium sand	0.25	21	4	22.7%	57.3%
	course sand	0.50	0	9	8.2%	65.5%
	very course sand	1.0	0	16	14.5%	80.0%
Gravel	very fine gravel	2.0	1	19	18.2%	98.2%
	fine gravel	4.0	0	2	1.8%	100.0%
	fine gravel	5.7	0	0	0.0%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			60	50	100.0%	

	d16	d35	d50	d85	d95
2004	0.12	0.19	0.32	1.83	2.74



Project Name	Smith and Austin
Cross Section	SR2-1
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
112.4	229.7	
129.8	229.7	
146.4	229.3	
148.7	228.0	
149.4	227.5	
150.0	227.1	
150.8	226.9	
151.2	226.7	
153.5	225.5	
154.3	225.5	
156.2	225.6	
158.4	226.1	
158.5	226.3	
162.9	227.3	
167.5	228.8	
168.9	228.8	
172.6	229.0	
188.0	229.0	

2004
2004 Survey

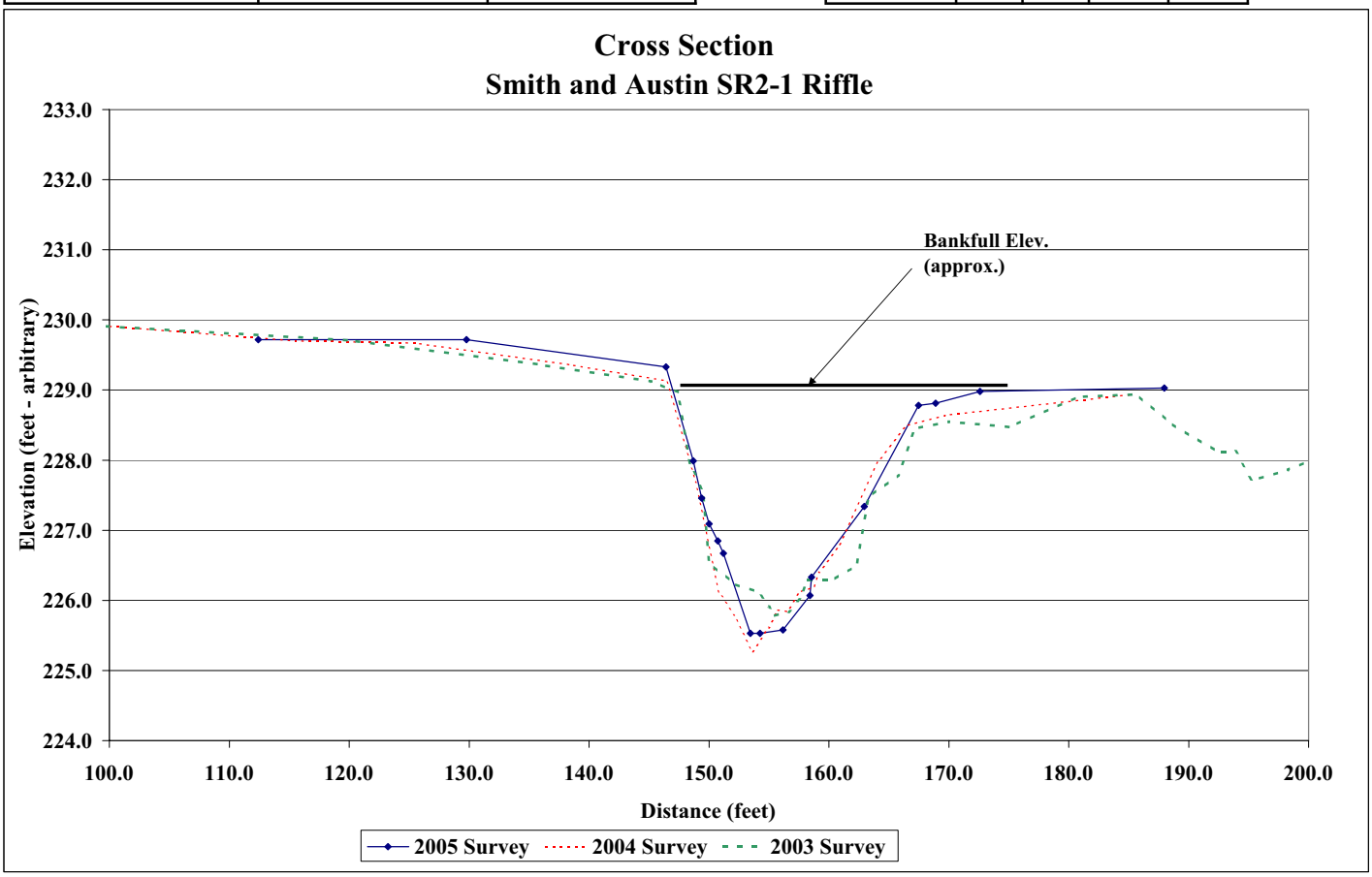
Station	Elevation	Notes
100.0	229.9	LP
115.5	229.7	
125.5	229.7	
138.4	229.4	
146.5	229.1	
148.9	227.7	
150.8	226.1	
152.1	225.8	
153.6	225.3	
155.0	225.6	
155.7	225.9	
156.6	225.8	
157.6	226.1	
158.8	226.2	
159.2	226.4	
160.8	226.7	
164.1	228.0	
166.5	228.5	BKF
169.7	228.6	
185.5	228.9	RP

2003
2003 Survey

Station	Elevation	Notes
0.0	232.3	
11.0	232.0	
20.0	231.2	
22.8	231.1	
39.0	231.4	
50.0	231.2	
60.4	231.2	
69.0	231.2	
79.0	230.8	
89.0	230.4	
97.0	230.1	
99.8	229.9	LP
120.0	229.7	
136.0	229.4	
145.2	229.1	
147.4	229.0	
148.4	228.0	
149.5	227.6	
150.0	226.5	
152.2	226.2	
154.1	226.1	
155.0	225.9	
155.4	225.8	
156.6	225.8	
157.6	226.0	
158.2	226.3	
160.3	226.3	
162.3	226.5	

Photo of Cross-Section SR2-1 - Looking Downstream @ STA 24+30

	2005	2004	2003	AS-BUILT
Area	51.3	44.9	45.9	46.5
Width	20.2	20.0	20.2	33.2
Mean Depth	2.5	2.2	2.3	1.4
Max Depth	3.6	3.9	3.3	3.1
W/D	7.9	8.9	8.9	23.7



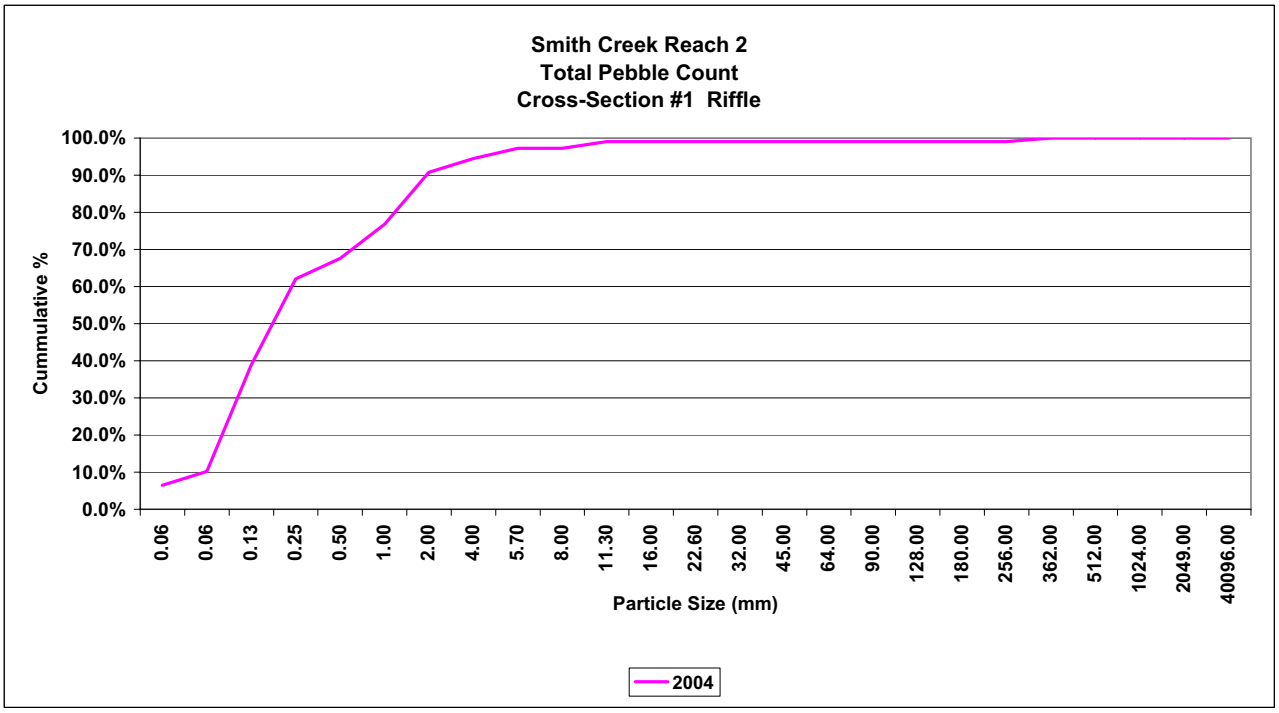
Project Name	Smith Reach 2
Cross Section	#1
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Riffle - Bank	Riffle - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	7	0	6.5%	6.5%
Sand	very fine sand	0.062	4	0	3.7%	10.2%
	fine sand	0.125	27	4	28.7%	38.9%
	medium sand	0.25	11	14	23.1%	62.0%
	course sand	0.50	2	4	5.6%	67.6%
	very course sand	1.0	0	10	9.3%	76.9%
G r a v e l	very fine gravel	2.0	0	15	13.9%	90.7%
	fine gravel	4.0	0	4	3.7%	94.4%
	fine gravel	5.7	0	3	2.8%	97.2%
	medium gravel	8.0	0	0	0.0%	97.2%
	medium gravel	11.3	0	2	1.9%	99.1%
	course gravel	16.0	0	0	0.0%	99.1%
	course gravel	22.6	0	0	0.0%	99.1%
	very course gravel	32	0	0	0.0%	99.1%
	very course gravel	45	0	0	0.0%	99.1%
Cobble	small cobble	64	0	0	0.0%	99.1%
	medium cobble	90	0	0	0.0%	99.1%
	large cobble	128	0	0	0.0%	99.1%
	very large cobble	180	0	0	0.0%	99.1%
Boulder	small boulder	256	0	0	0.0%	99.1%
	small boulder	362	0	1	0.9%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			51	57	100.0%	

	d16	d35	d50	d85	d95
2004	0.11	0.17	0.28	2.27	5.25



Project Name	Smith and Austin
Cross Section	SR2-2
Feature	Pool
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
4.0	229.9	
13.2	229.6	
16.7	228.4	
16.9	228.1	
18.7	227.5	
20.0	227.0	
20.6	226.4	
21.1	225.4	
22.6	224.4	
23.2	224.2	
23.8	224.1	
24.5	224.0	
26.9	224.2	
27.9	224.5	
29.3	224.9	
33.4	226.8	
34.6	227.2	
37.9	228.1	
43.0	228.8	
50.1	228.7	
57.4	228.7	

2004
2004 Survey

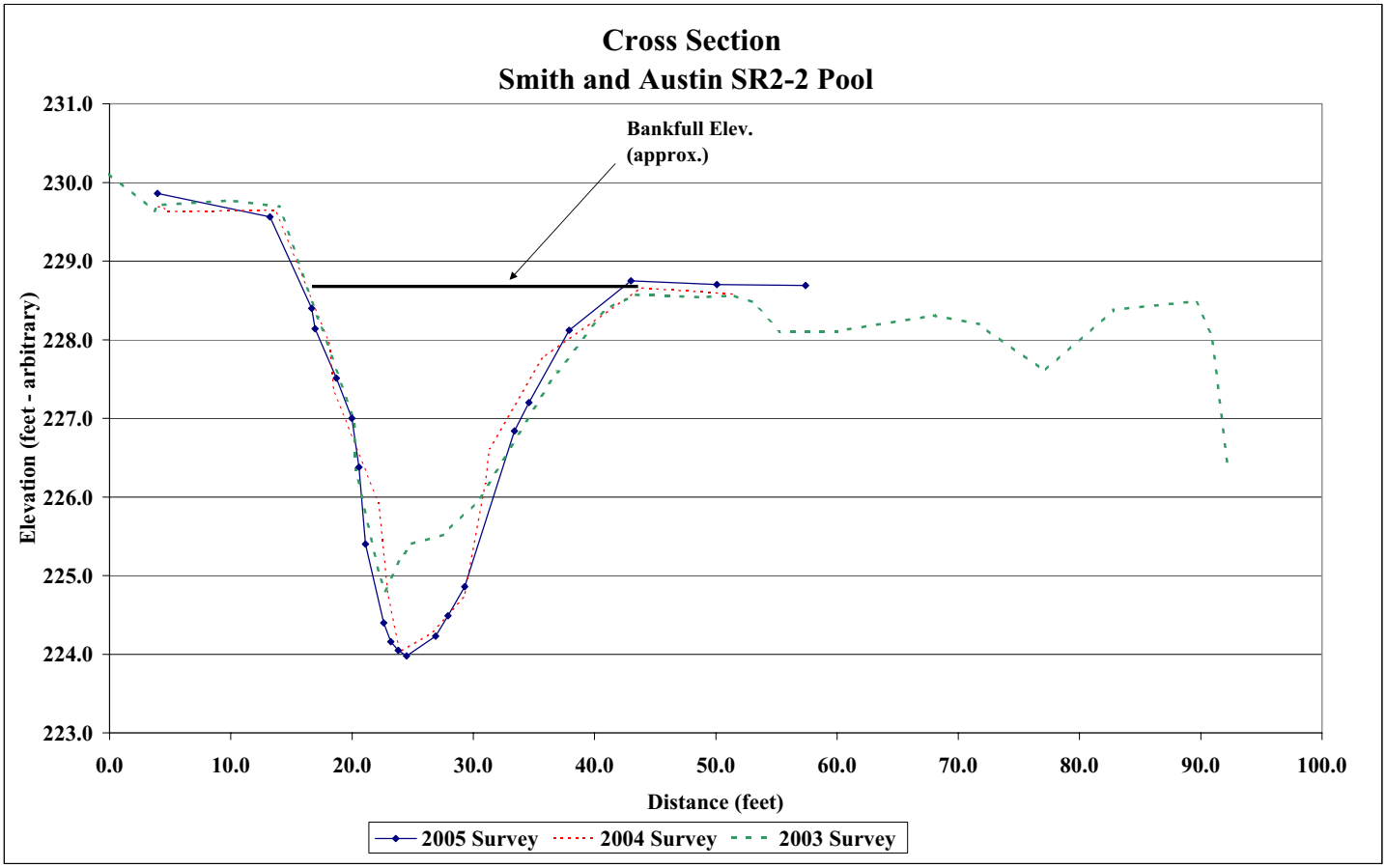
Station	Elevation	Notes
4.0	229.7	LP
4.5	229.7	
4.7	229.6	
13.7	229.7	
18.1	228.0	
18.5	227.3	
22.2	225.9	
23.0	224.8	
23.9	224.0	
26.5	224.3	
29.2	224.7	
31.0	226.2	
31.3	226.6	
35.7	227.8	
43.8	228.7	BKF
51.4	228.6	RP

2003
2003 Survey

Station	Elevation	Notes
0.0	230.1	
3.7	229.6	
4.0	229.7	LP
10.0	229.8	
14.0	229.7	
17.2	228.3	
20.2	227.0	
20.3	226.4	
22.3	225.0	
22.7	224.8	
24.0	225.2	
24.9	225.4	
27.5	225.5	
30.3	225.9	
36.9	227.6	
41.0	228.4	
43.4	228.6	
48.8	228.5	
51.5	228.6	RP
53.0	228.5	
55.3	228.1	
60.0	228.1	
68.0	228.3	
71.7	228.2	
77.1	227.6	
82.8	228.4	
89.6	228.5	
90.9	228.1	
92.2	226.4	
99.4	226.2	
101.8	226.1	
103.1	228.1	
104.4	228.4	
107.4	228.9	

Photo of Cross-Section SR2-2 - Looking Downstream @ STA 24+87

	2005	2004	2003	AS-BUILT
Area	64.5	60.8	59.2	48.5
Width	26.1	25.7	26.2	26.9
Mean Depth	2.5	2.4	2.3	1.8
Max Depth	4.6	4.6	3.8	3.8
W/D	10.5	10.9	11.6	14.9



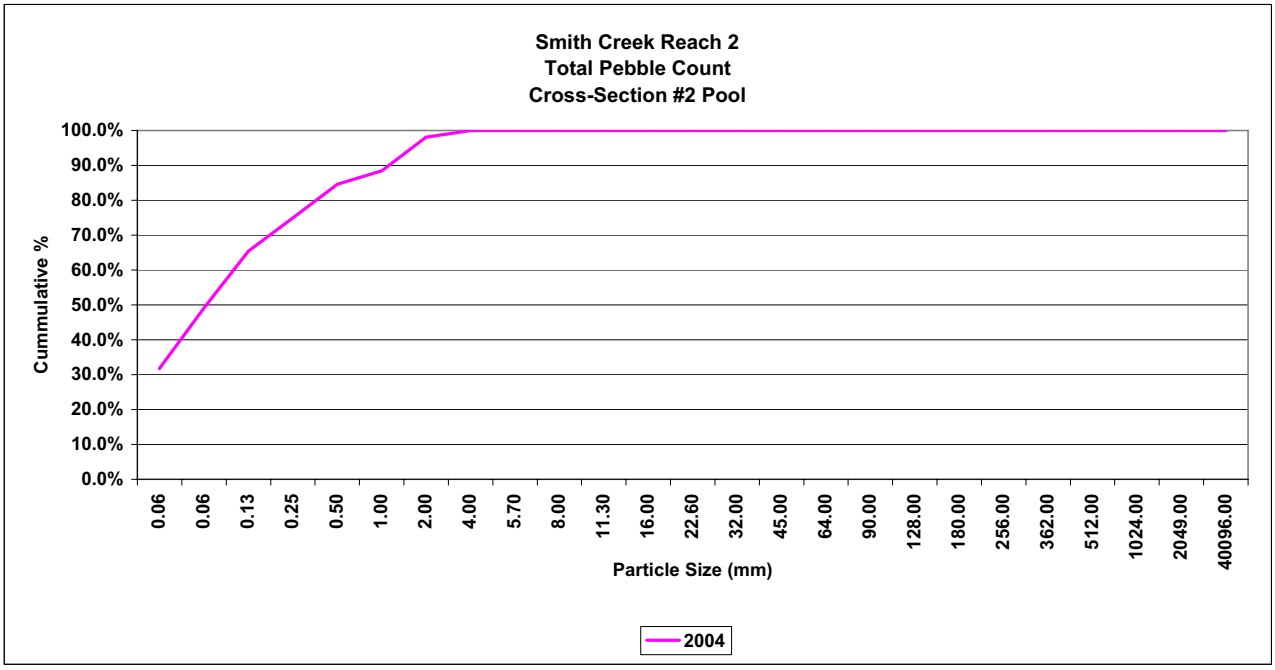
Project Name	Smith Reach 2
Cross Section	#2
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Pool - Bank	Pool - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	33	0	31.7%	31.7%
Sand	very fine sand	0.062	18	0	17.3%	49.0%
	fine sand	0.125	4	13	16.3%	65.4%
	medium sand	0.25	0	10	9.6%	75.0%
	course sand	0.50	0	10	9.6%	84.6%
	very course sand	1.0	0	4	3.8%	88.5%
Gravel	very fine gravel	2.0	0	10	9.6%	98.1%
	fine gravel	4.0	0	2	1.9%	100.0%
	fine gravel	5.7	0	0	0.0%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			55	49	100.0%	

	d16	d35	d50	d85	d95
2004	0.00	0.07	0.10	0.73	2.52

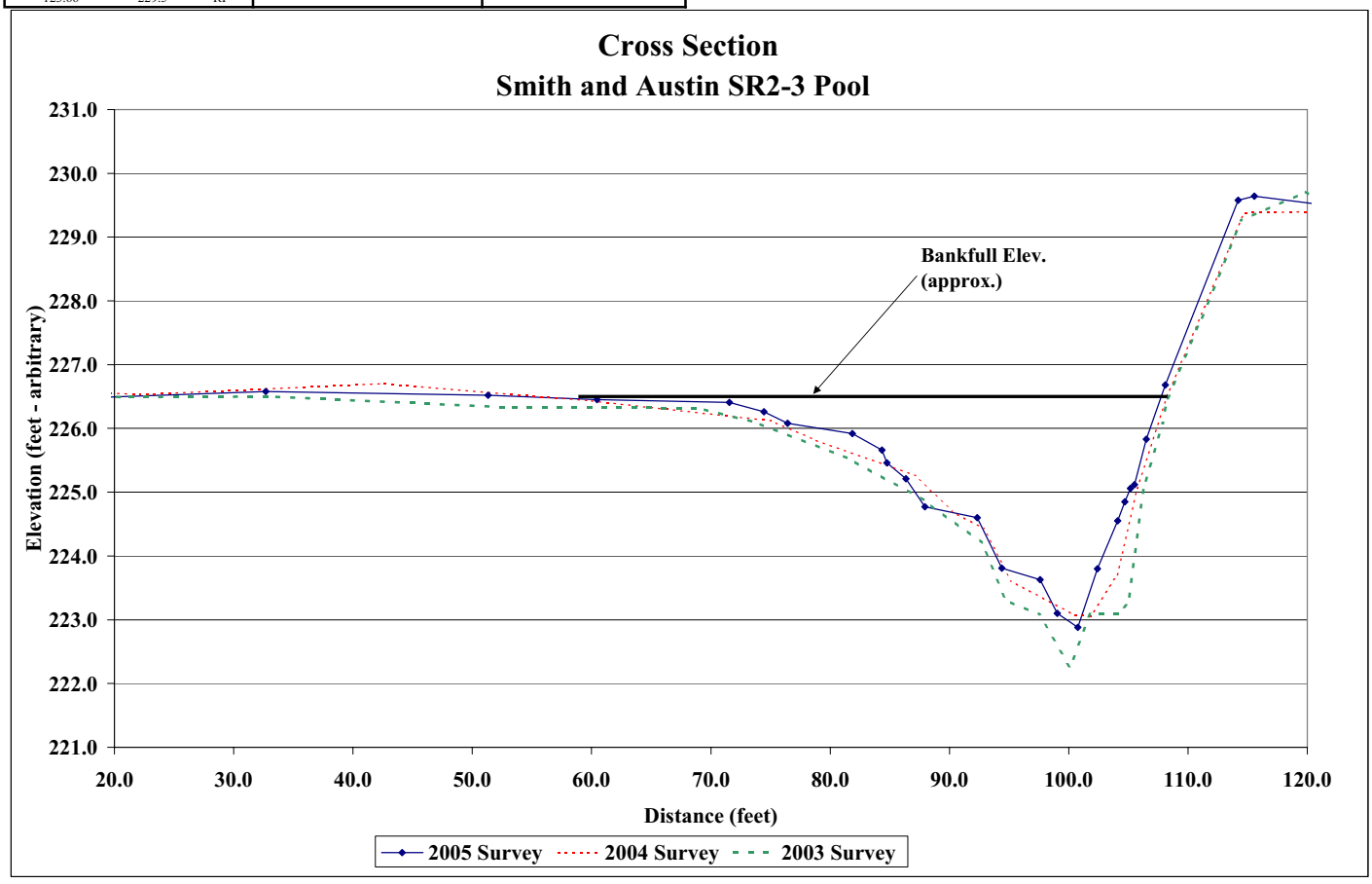


Project Name	Smith and Austin
Cross Section	SR2-3
Feature	Pool
Date	6/2/05
Crew	Bidelspach, Clinton

2005 Survey			2004 Survey			2003 Survey		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
7.8	226.5	LP	7.4	226.6	LP	2.0	226.7	
8.6	226.6		8.1	226.7		7.0	226.6	
19.5	226.5		22.2	226.5		7.6	226.5	LP
32.7	226.6		42.4	226.7		21.0	226.5	
51.3	226.5		59.9	226.4	BKF	33.0	226.5	BKF
60.5	226.5		75.0	226.1		53.0	226.3	
71.6	226.4		78.8	225.8		69.0	226.3	
74.5	226.3		87.2	225.3		74.0	226.1	
76.4	226.1		90.2	224.7		81.9	225.5	
81.9	225.9		92.9	224.4		88.0	224.9	
84.3	225.7		95.2	223.6		92.7	224.2	
84.8	225.5		100.5	223.1		94.7	223.3	
86.4	225.2		101.8	223.1		97.5	223.1	
88.0	224.8		104.1	223.7		100.1	222.3	
92.3	224.6		105.8	225.1		101.8	223.1	
94.4	223.8		108.3	226.6	BKF	104.2	223.1	
97.6	223.6		114.7	229.4		105.0	223.3	
99.0	223.1		123.7	229.4	RP	106.3	225.1	
100.8	222.9					107.9	226.1	
102.4	223.8					108.2	226.4	
104.1	224.6					110.9	227.6	
104.7	224.9					114.5	229.3	
105.2	225.1					119.9	229.7	
105.5	225.1					122.1	229.5	
106.5	225.8					123.5	229.4	RP
108.10	226.7							
114.22	229.6							
115.56	229.6							
123.66	229.5	RP						

Photo of Cross-Section SR2-3 - Looking Downstream @ STA 31+25

	2005	**2004**	**2003**	**AS-BUILT**
Area	49.4	52.4	59.6	64.0
Width	35.1	36.3	37.7	39.1
Mean Depth	1.4	1.4	1.6	1.6
Max Depth	3.6	3.4	4.2	4.1
W/D	25.0	25.1	23.8	23.9



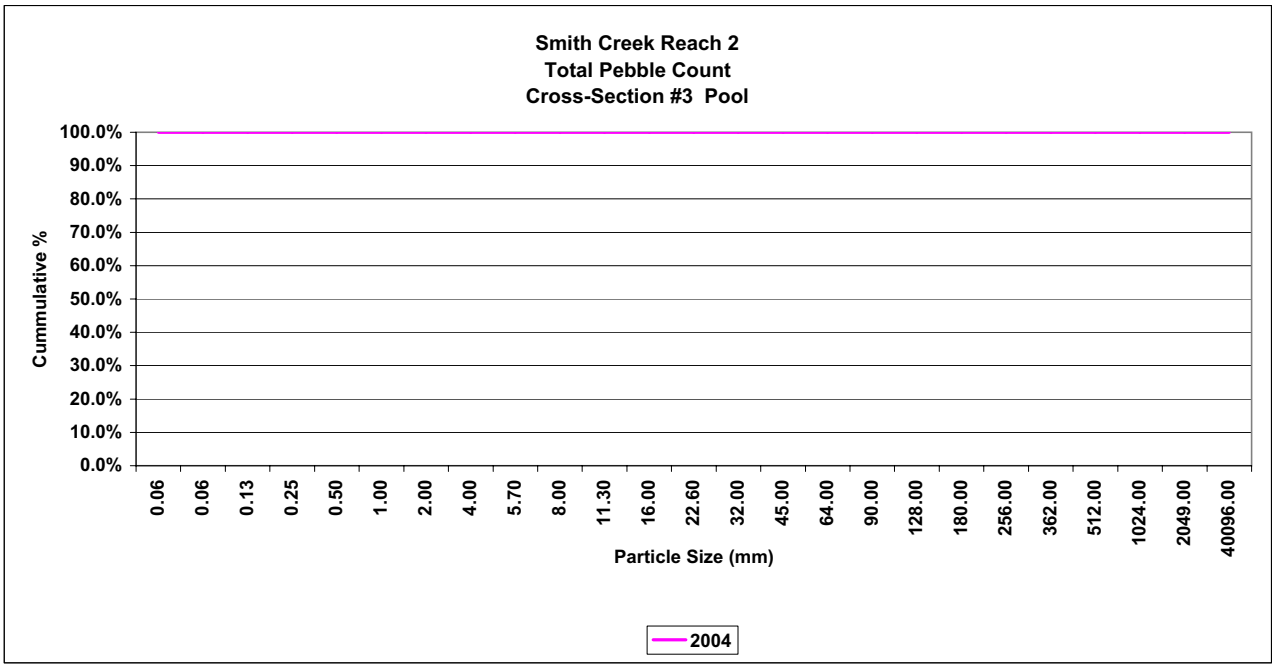
Project Name	Smith Reach 2
Cross Section	#3
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Pool - Bank	Pool - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	1	0	100.0%	100.0%
Sand	very fine sand	0.062	0	0	0.0%	100.0%
	fine sand	0.125	0	0	0.0%	100.0%
	medium sand	0.25	0	0	0.0%	100.0%
	course sand	0.50	0	0	0.0%	100.0%
	very course sand	1.0	0	0	0.0%	100.0%
Gravel	very fine gravel	2.0	0	0	0.0%	100.0%
	fine gravel	4.0	0	0	0.0%	100.0%
	fine gravel	5.7	0	0	0.0%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			1	0	100.0%	

	d16	d35	d50	d85	d95
2004	0.00	0.00	0.00	0.00	0.00



Project Name	Smith and Austin
Cross Section	SR2-4
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
17.3	226.1	
26.2	226.1	
26.5	226.1	
35.5	225.9	
35.7	225.3	
35.9	225.0	
37.9	224.5	
38.8	223.6	
39.5	223.5	
43.0	223.1	
43.5	223.1	
47.4	223.1	
50.4	224.1	
50.5	224.2	
51.6	224.5	
53.1	225.9	
53.1	226.2	
58.4	225.8	
58.7	225.8	
62.0	225.7	
64.8	225.9	
69.5	226.4	
72.5	225.8	

2004
2004 Survey

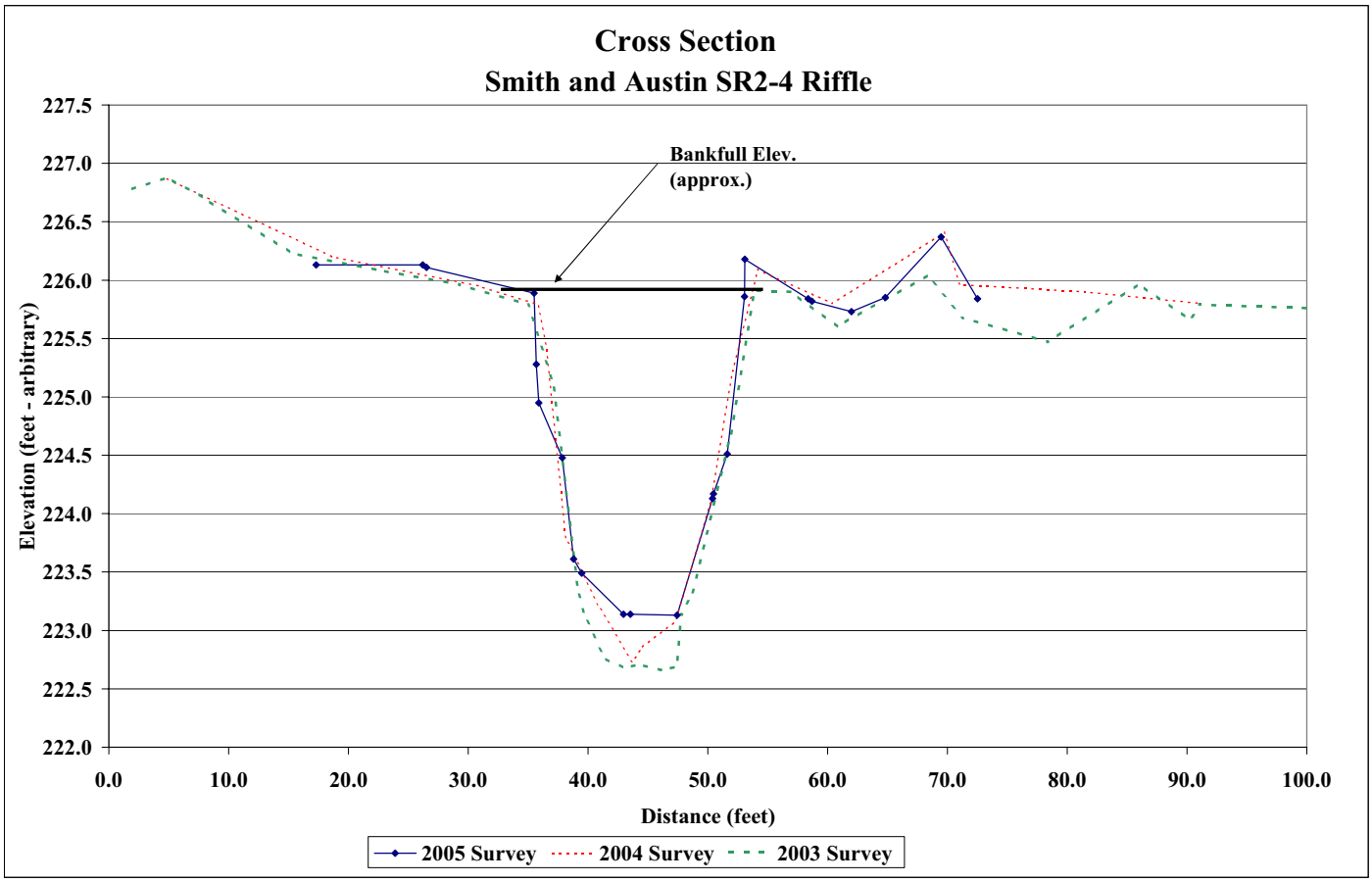
Station	Elevation	Notes
4.9	226.9	LP
18.6	226.2	
30.8	226.0	
35.8	225.8	BKF
36.5	225.5	
38.1	223.8	
40.8	223.2	
43.7	222.7	
44.6	222.9	
47.3	223.1	
50.2	224.1	
52.1	225.2	
54.2	226.1	
60.4	225.8	
67.0	226.2	
69.8	226.4	
71.0	226.0	
81.5	225.9	
91.1	225.8	RP

2003
2003 Survey

Station	Elevation	Notes
2.000	226.8	
4.90	226.9	LP
8.000	226.7	
15.3	226.2	
22.3	226.1	
29.3	226.0	
35.0	225.8	BKF
37.1	225.1	
39.2	223.3	
39.7	223.1	
41.4	222.8	
43.0	222.7	
44.3	222.7	
46.1	222.7	
47.4	222.7	
47.8	223.1	
48.7	223.3	
51.9	224.7	
53.9	225.9	
57.0	225.9	
60.8	225.6	
68.3	226.0	
71.3	225.7	
78.4	225.5	
86.0	226.0	
90.2	225.7	
91.1	225.8	RP
100.1	225.8	
108.0	226.0	
113.6	226.3	
117	226.49	
118.6	228.21	
121.3	228.46	
124.6	228.13	

Photo of Cross-Section SR2-4 - Looking Downstream @ STA 32+45

	2005	2004	2003	AS-BUILT
Area	39.5	38.4	42.7	38.9
Width	17.6	18.4	18.9	18.7
Mean Depth	2.2	2.1	2.3	2.1
Max Depth	2.8	3.2	3.3	3.1
W/D	7.8	8.8	8.4	9.0

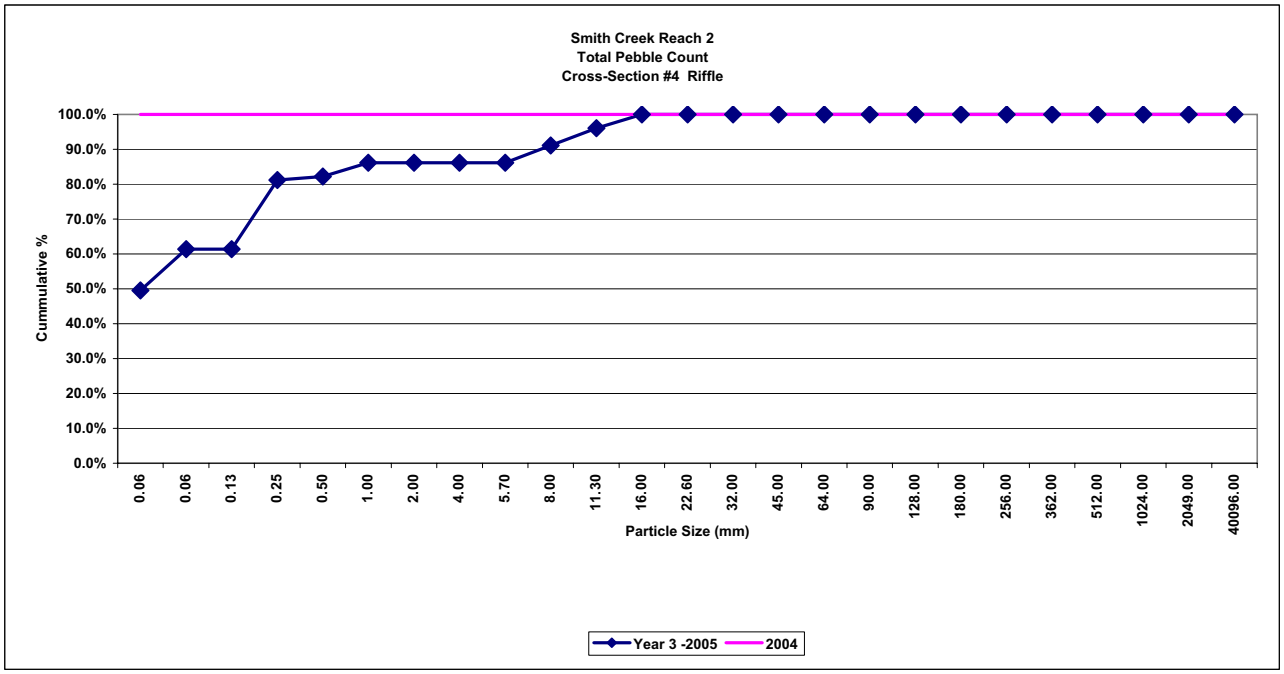


Project Name	Smith Reach 2
Cross Section	#4
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004				Year 3 -2005		
Description	**Material**	**Size (mm)**	**Riffle - Bank**	**Riffle - Bed**	**%**	**Cum %**	**Riffle**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	1	0	100.0%	100.0%	50	49.5%	49.5%
Sand	very fine sand	0.062	0	0	0.0%	100.0%	12	11.9%	61.4%
	fine sand	0.125	0	0	0.0%	100.0%	0	0.0%	61.4%
	medium sand	0.25	0	0	0.0%	100.0%	20	19.8%	81.2%
	course sand	0.50	0	0	0.0%	100.0%	1	1.0%	82.2%
	very course sand	1.0	0	0	0.0%	100.0%	4	4.0%	86.1%
Gravel	very fine gravel	2.0	0	0	0.0%	100.0%	0	0.0%	86.1%
	fine gravel	4.0	0	0	0.0%	100.0%	0	0.0%	86.1%
	fine gravel	5.7	0	0	0.0%	100.0%	0	0.0%	86.1%
	medium gravel	8.0	0	0	0.0%	100.0%	5	5.0%	91.1%
	medium gravel	11.3	0	0	0.0%	100.0%	5	5.0%	96.0%
	course gravel	16.0	0	0	0.0%	100.0%	4	4.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%	0	0.0%	100.0%
TOTAL / %of whole count			1	0	100.0%		101	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
Year 3 -2005	0.00	0.00	0.06	1.10	12.81



Project Name	Smith and Austin
Cross Section	AR1-2
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
7.2	240.3	
12.3	240.9	
17.9	239.1	
21.1	236.8	
23.3	234.5	
25.4	232.8	
26.5	232.1	
27.6	231.7	
29.2	231.5	
30.4	231.5	
33.4	230.7	
37.0	231.2	
37.2	231.7	
38.2	232.1	
39.2	233.1	
39.5	233.9	
40.1	234.3	
40.1	234.3	
41.4	234.7	
45.0	235.0	
50.6	235.6	
59.7	235.8	
65.3	235.8	
82.0	236.2	
83.7	236.3	RP

2004
2004 Survey

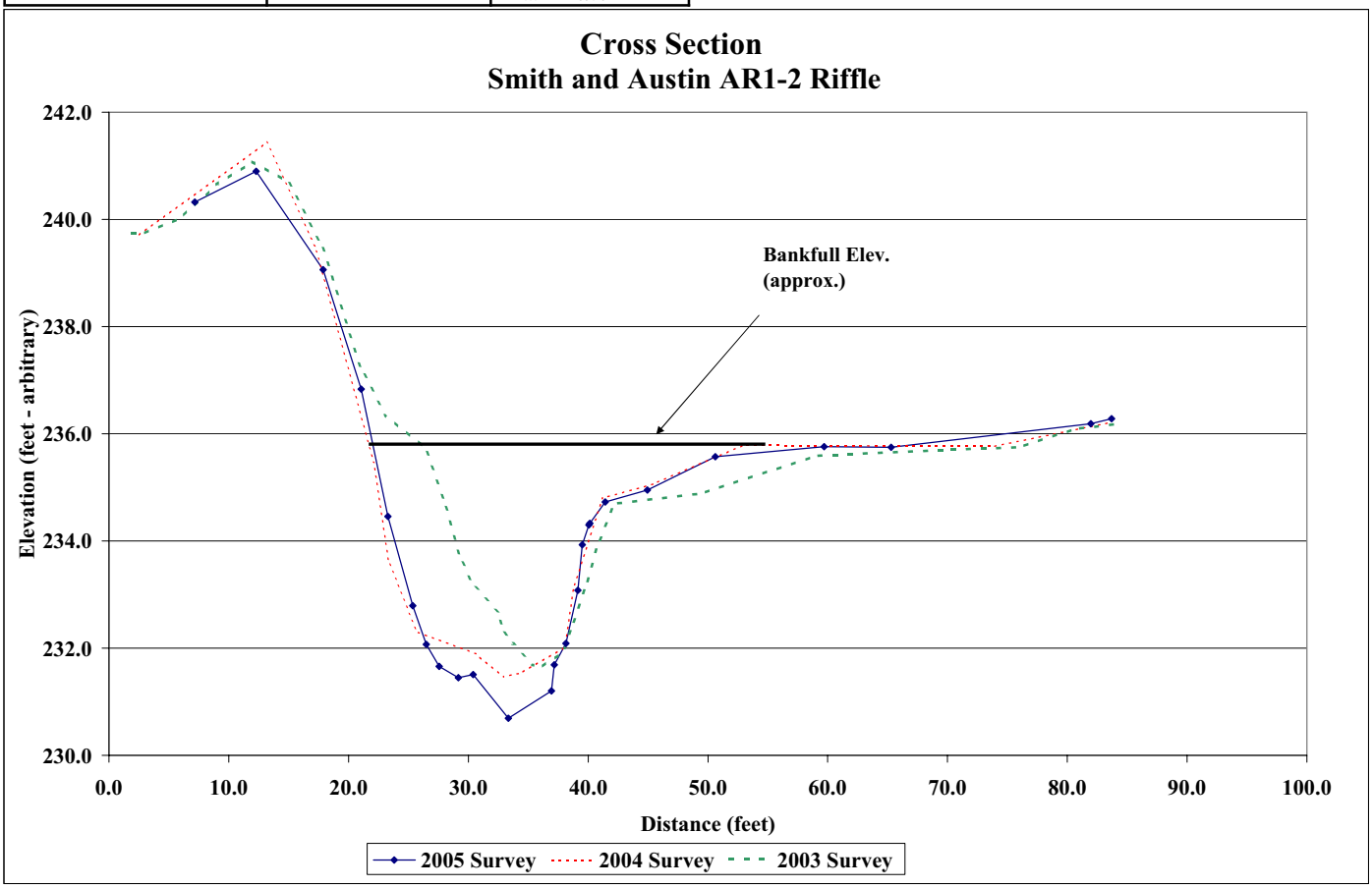
Station	Elevation	Notes
2.6	239.7	LP
13.2	241.4	
17.2	239.5	
22.1	235.5	BKF
23.4	233.6	
25.7	232.3	
30.6	231.9	
33.0	231.5	
34.4	231.5	
38.1	232.0	
38.8	233.1	
41.2	234.8	
45.5	235.1	
52.9	235.8	
73.9	235.8	
83.5	236.2	RP

2003
2003 Survey

Station	Elevation	Notes
2.0	239.74	LP
3.0	239.74	
6.0	240.03	
9.0	240.65	
12.0	241.08	
15.0	240.69	
17.8	239.51	
21.0	237.24	
23.1	236.35	
26.4	235.73	BKF
27.9	234.81	
29.3	233.71	
30.4	233.17	
32.5	232.69	
32.9	232.31	
33.7	232.08	
35.4	231.69	
36.2	231.66	
37.9	231.93	
38.7	232.43	
39.8	233.14	
40.8	233.92	
42.2	234.69	
49.6	234.89	
59.0	235.59	BKF
70.0	235.70	
76.0	235.75	
80.5	236.08	
84.0	236.18	RP
84.7	236.20	
89.5	237.33	
97.9	239.58	
102.0	239.53	
110.0	239.29	

Photo of Cross-Section AR1-2 - Looking Downstream @ STA 4+42

	2005	2004	2003	AS-BUILT
Area	63.5	62.4	49.0	49.0
Width	27.3	29.5	32.4	32.4
Mean Depth	2.3	2.1	1.5	1.5
Max Depth	4.8	4.0	3.9	3.9
W/D	11.7	14.0	21.4	21.4

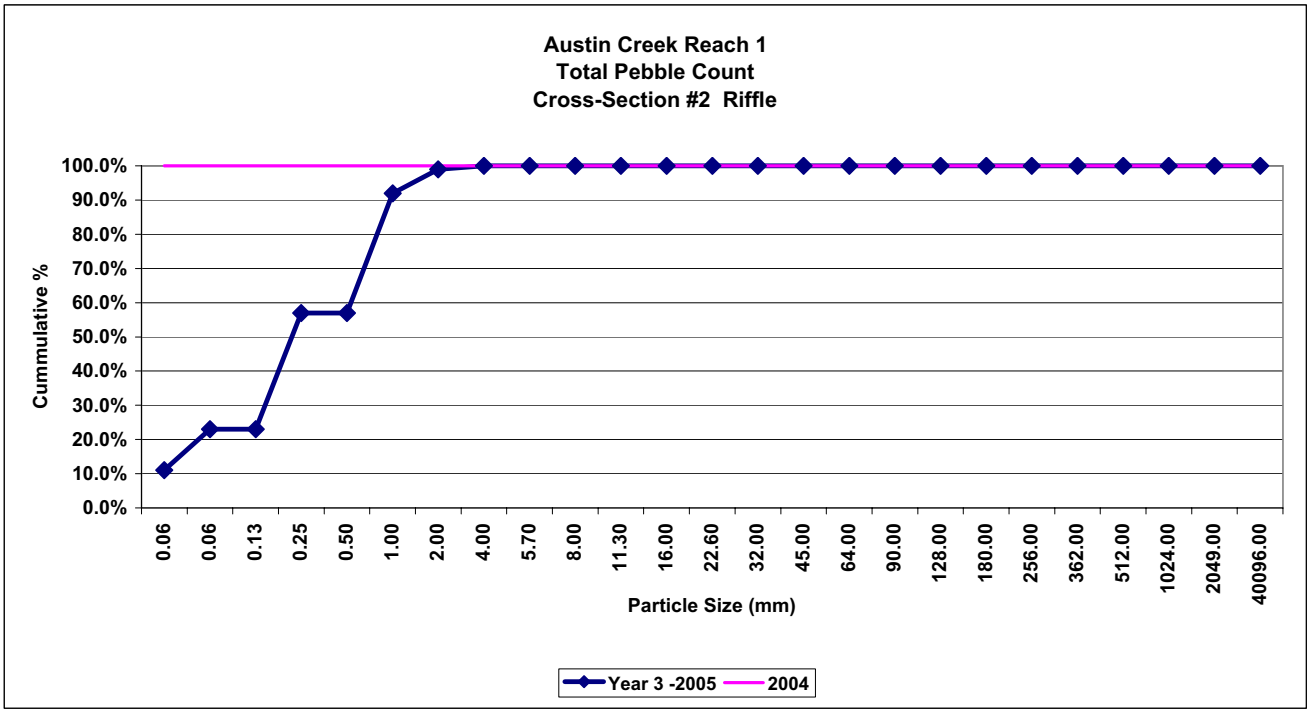


Project Name	Austin Reach 1
Cross Section	#2
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004				Year 3 -2005		
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**	**Riffle**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	1	0	100.0%	100.0%	11	11.0%	11.0%
Sand	very fine sand	0.062	0	0	0.0%	100.0%	12	12.0%	23.0%
	fine sand	0.125	0	0	0.0%	100.0%	0	0.0%	23.0%
	medium sand	0.25	0	0	0.0%	100.0%	34	34.0%	57.0%
	course sand	0.50	0	0	0.0%	100.0%	0	0.0%	57.0%
	very course sand	1.0	0	0	0.0%	100.0%	35	35.0%	92.0%
G r a v e l	very fine gravel	2.0	0	0	0.0%	100.0%	7	7.0%	99.0%
	fine gravel	4.0	0	0	0.0%	100.0%	1	1.0%	100.0%
	fine gravel	5.7	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%	0	0.0%	100.0%
TOTAL / %of whole count			1	0	100.0%		100	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
Year 3 -2005	0.07	0.25	0.34	1.33	2.14

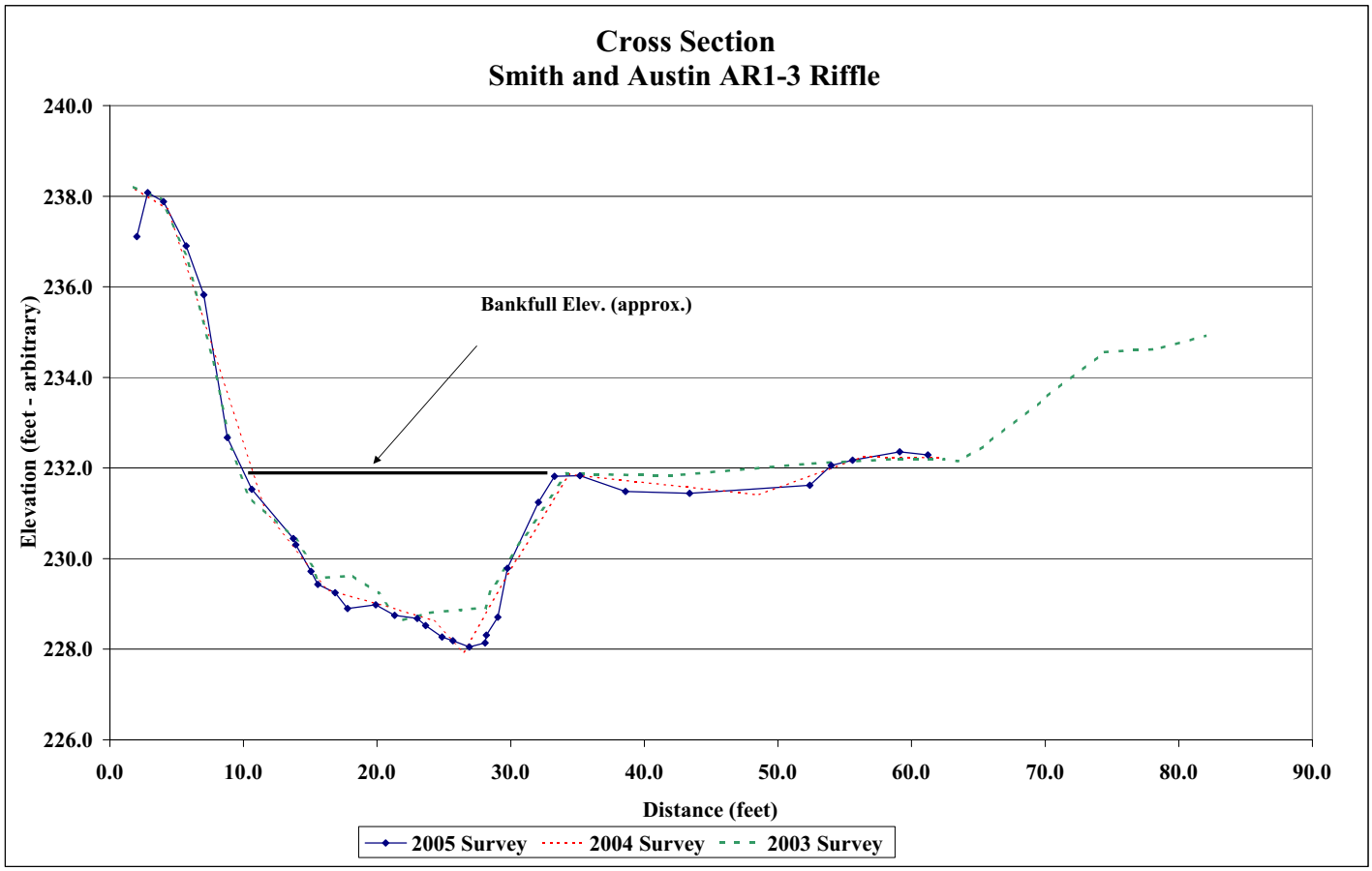


Project Name	Smith and Austin
Cross Section	AR1-3
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005 Survey			2004 Survey			2003 Survey		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
2.0	237.1	LP	1.9	238.2	LP	1.8	238.2	LP
2.8	238.1		4.3	237.7		3.8	237.9	
4.0	237.9		11.7	231.0		5.7	236.7	
5.7	236.9		16.3	229.3		7.7	234.4	
7.0	235.8		21.5	228.9		9.1	232.4	
8.8	232.7		24.2	228.6		10.4	231.4	
10.6	231.5		26.5	227.9		13.9	230.4	
13.7	230.4		30.4	230.0		15.2	229.8	
13.9	230.3		34.4	231.9	BKF	15.5	229.6	
15.1	229.7		48.6	231.4		18.2	229.6	
15.6	229.4		56.3	232.2		20.1	229.2	
16.9	229.3		62.4	232.2	RP	21.3	228.8	
17.8	228.9					21.9	228.6	
19.9	229.0					23.9	228.8	
21.3	228.8					26.3	228.9	
23.0	228.7					28.1	228.9	
23.6	228.5					28.5	229.3	
24.9	228.3					31.0	230.5	
25.7	228.2					34.2	231.9	BKF
26.9	228.1					42.0	231.8	
28.1	228.1					52.4	232.1	
28.2	228.3					59.0	232.2	
29.0	228.7					62.4	232.2	RP
29.8	229.8					63.5	232.2	
32.1	231.2					65.4	232.5	
33.3	231.8					70.0	233.6	
35.2	231.8					74.4	234.6	
38.6	231.5					78.4	234.6	
43.4	231.4					82.0	234.9	
52.4	231.6					86.0	235.9	
54.0	232.1					89.0	236.5	

Photo of Cross-Section AR1-3 - Looking Downstream @ STA 13+95

	2005	2004	2003	AS-BUILT
Area	54.7	52.7	51.2	49.8
Width	23.5	22.8	23.8	24.4
Mean Depth	2.3	2.3	2.2	2.0
Max Depth	3.8	3.9	3.2	3.2
W/D	10.1	9.9	11.1	12.0

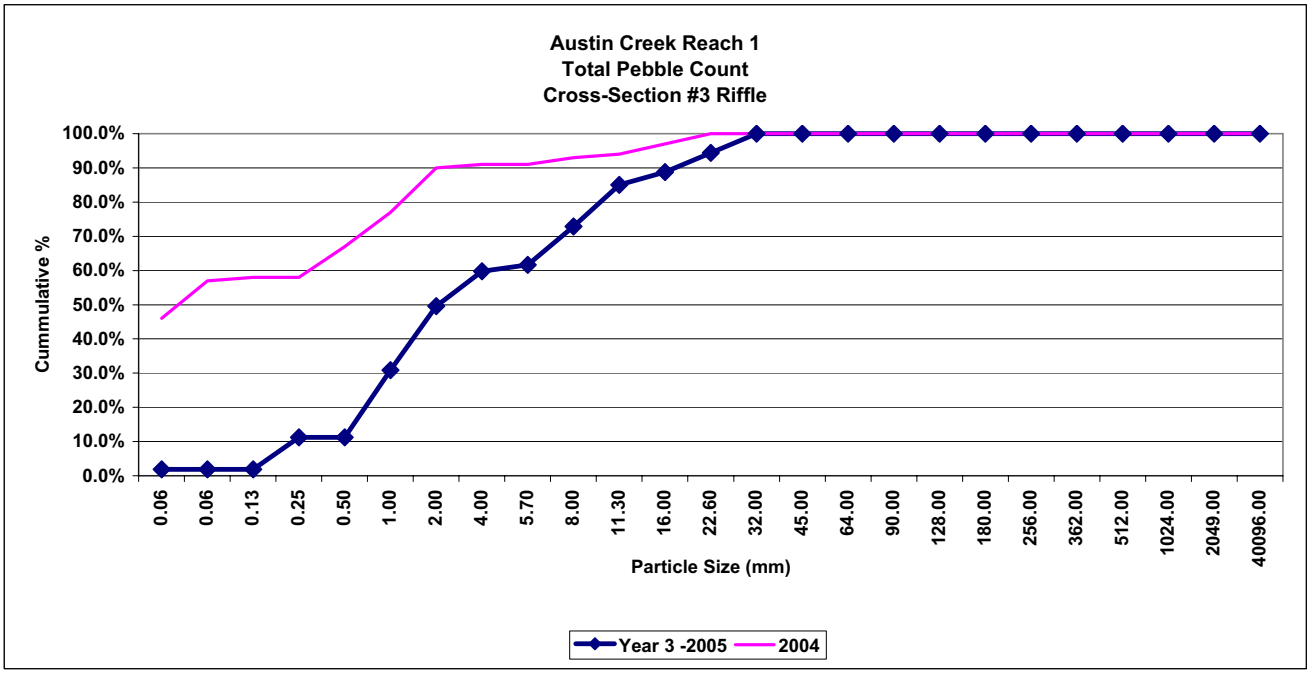


Project Name	Austin Reach 1
Cross Section	#3
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004				Year 3 -2005		
Description	**Material**	**Size (mm)**	**Riffle - Bank**	**Riffle - Bed**	**%**	**Cum %**	**Riffle**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	41	5	46.0%	46.0%	2	1.9%	1.9%
Sand	very fine sand	0.062	9	2	11.0%	57.0%	0	0.0%	1.9%
	fine sand	0.125	0	1	1.0%	58.0%	0	0.0%	1.9%
	medium sand	0.25	0	0	0.0%	58.0%	10	9.3%	11.2%
	course sand	0.50	0	9	9.0%	67.0%	0	0.0%	11.2%
	very course sand	1.0	0	10	10.0%	77.0%	21	19.6%	30.8%
Gravel	very fine gravel	2.0	0	13	13.0%	90.0%	20	18.7%	49.5%
	fine gravel	4.0	0	1	1.0%	91.0%	11	10.3%	59.8%
	fine gravel	5.7	0	0	0.0%	91.0%	2	1.9%	61.7%
	medium gravel	8.0	0	2	2.0%	93.0%	12	11.2%	72.9%
	medium gravel	11.3	0	1	1.0%	94.0%	13	12.1%	85.0%
	course gravel	16.0	0	3	3.0%	97.0%	4	3.7%	88.8%
	course gravel	22.6	0	3	3.0%	100.0%	6	5.6%	94.4%
	very course gravel	32	0	0	0.0%	100.0%	6	5.6%	100.0%
	very course gravel	45	0	0	0.0%	100.0%	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%	0	0.0%	100.0%
TOTAL / %of whole count			50	50	100.0%		107	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.00	0.00	0.07	2.31	15.53
Year 3 -2005	0.93	1.83	3.08	13.31	28.51

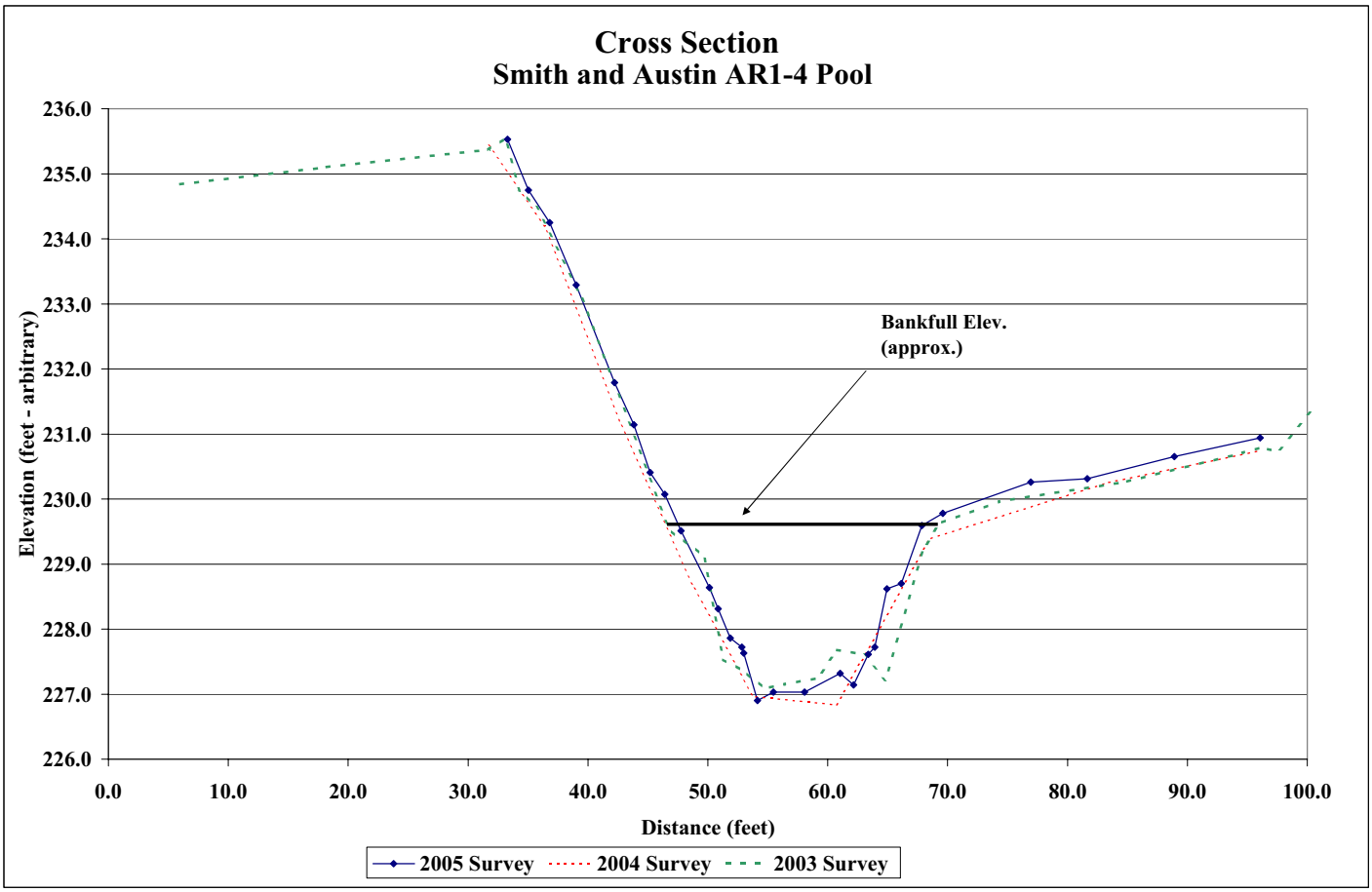


Project Name	Smith and Austin
Cross Section	AR1-4
Feature	Pool
Date	6/2/05
Crew	Bidelspach, Clinton

2005			2004			2003		
2005 Survey			2004 Survey			2003 Survey		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
33.3	235.5		31.7	235.4	LP	6.0	234.8	
35.0	234.8		36.4	234.2		18.0	235.1	
36.8	234.3		42.7	231.2		31.7	235.4	LP
39.0	233.3		48.8	228.6		33.1	235.6	
42.2	231.8		53.8	227.0		34.3	234.7	
43.8	231.1		60.7	226.8		35.7	234.5	
45.2	230.4		62.7	227.5		39.4	233.1	
46.4	230.1		68.5	229.4	BKF	42.0	231.9	
47.8	229.5		83.2	230.2		46.8	229.5	
50.1	228.6		96.1	230.7	RP	49.7	229.1	
50.9	228.3					51.3	227.5	
51.9	227.9					53.1	227.4	
52.8	227.7					54.7	227.1	
53.0	227.6					56.4	227.2	
54.2	226.9					59.1	227.2	
55.5	227.0					60.8	227.7	
58.1	227.0					63.0	227.6	
61.0	227.3					64.8	227.2	
62.2	227.1					68.0	229.2	
63.4	227.6					69.3	229.6	BKF
63.9	227.7					74.3	230.0	
64.9	228.6					85.0	230.3	
66.1	228.7					94.6	230.7	
67.9	229.6					96.1	230.8	RP
69.6	229.8					97.5	230.7	
77.0	230.3					103.0	232.0	
81.7	230.3					108.6	233.4	

Photo of Cross-Section AR1-4 - Looking Downstream @ STA 20+90

	2005	2004	2003	AS-BUILT
Area	34.0	38.3	38.5	38.2
Width	21.4	22.7	22.5	23.3
Mean Depth	1.6	1.7	1.7	1.6
Max Depth	2.7	2.8	2.5	2.5
W/D	13.4	13.5	13.1	14.2

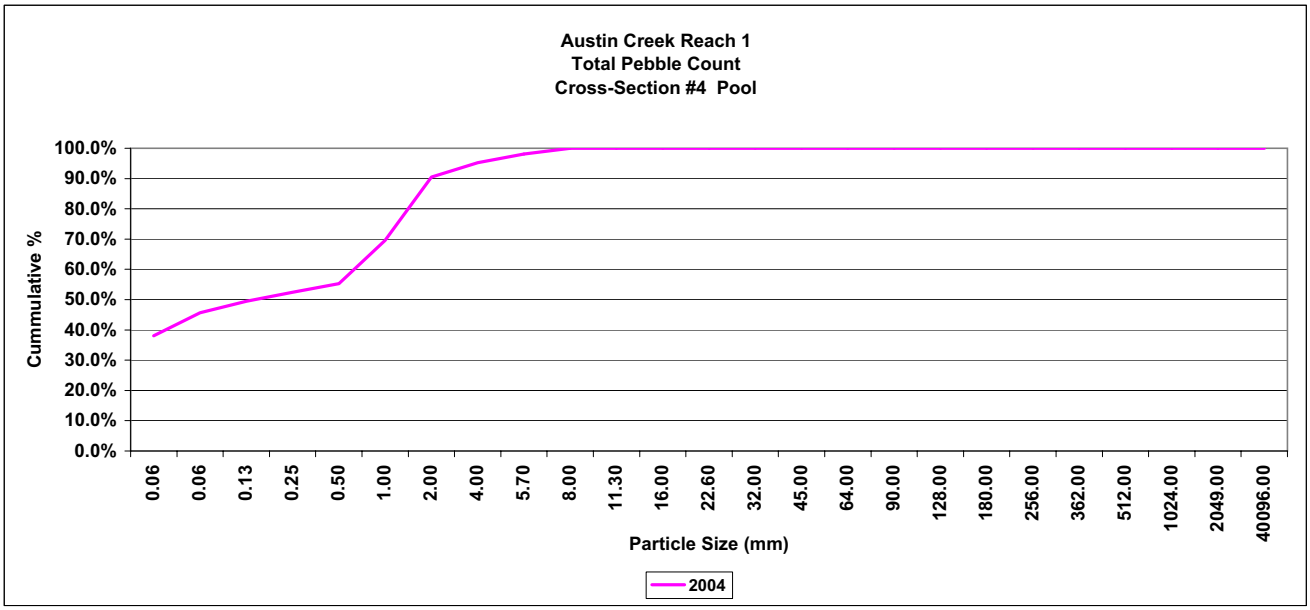


Project Name	Austin Reach 1
Cross Section	#4
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004			
Description	**Material**	**Size (mm)**	**Riffle - Bank**	**Riffle - Bed**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	40	0	38.1%	38.1%
Sand	very fine sand	0.062	8	0	7.6%	45.7%
	fine sand	0.125	4	0	3.8%	49.5%
	medium sand	0.25	0	3	2.9%	52.4%
	course sand	0.50	2	1	2.9%	55.2%
	very course sand	1.0	5	10	14.3%	69.5%
Gravel	very fine gravel	2.0	1	21	21.0%	90.5%
	fine gravel	4.0	0	5	4.8%	95.2%
	fine gravel	5.7	1	2	2.9%	98.1%
	medium gravel	8.0	0	2	1.9%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			61	44	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.00	0.00	0.22	2.54	4.76



Project Name	Smith and Austin
Cross Section	AR2-1
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
15.6	234.3	
21.5	232.3	
22.5	230.3	
25.0	229.2	
27.7	226.9	
29.5	225.2	
32.4	225.0	
32.6	224.9	
34.6	224.6	
36.3	224.3	
37.4	224.2	
39.0	224.6	
40.4	224.7	
42.2	224.8	
43.0	225.0	
43.1	225.0	
44.4	226.1	
45.4	227.1	
46.2	227.7	
48.3	228.4	
54.5	228.7	
63.4	228.6	
74.3	228.2	
85.0	228.2	
104.9	228.1	
115.6	228.2	
120.6	228.4	RP

2004
2004 Survey

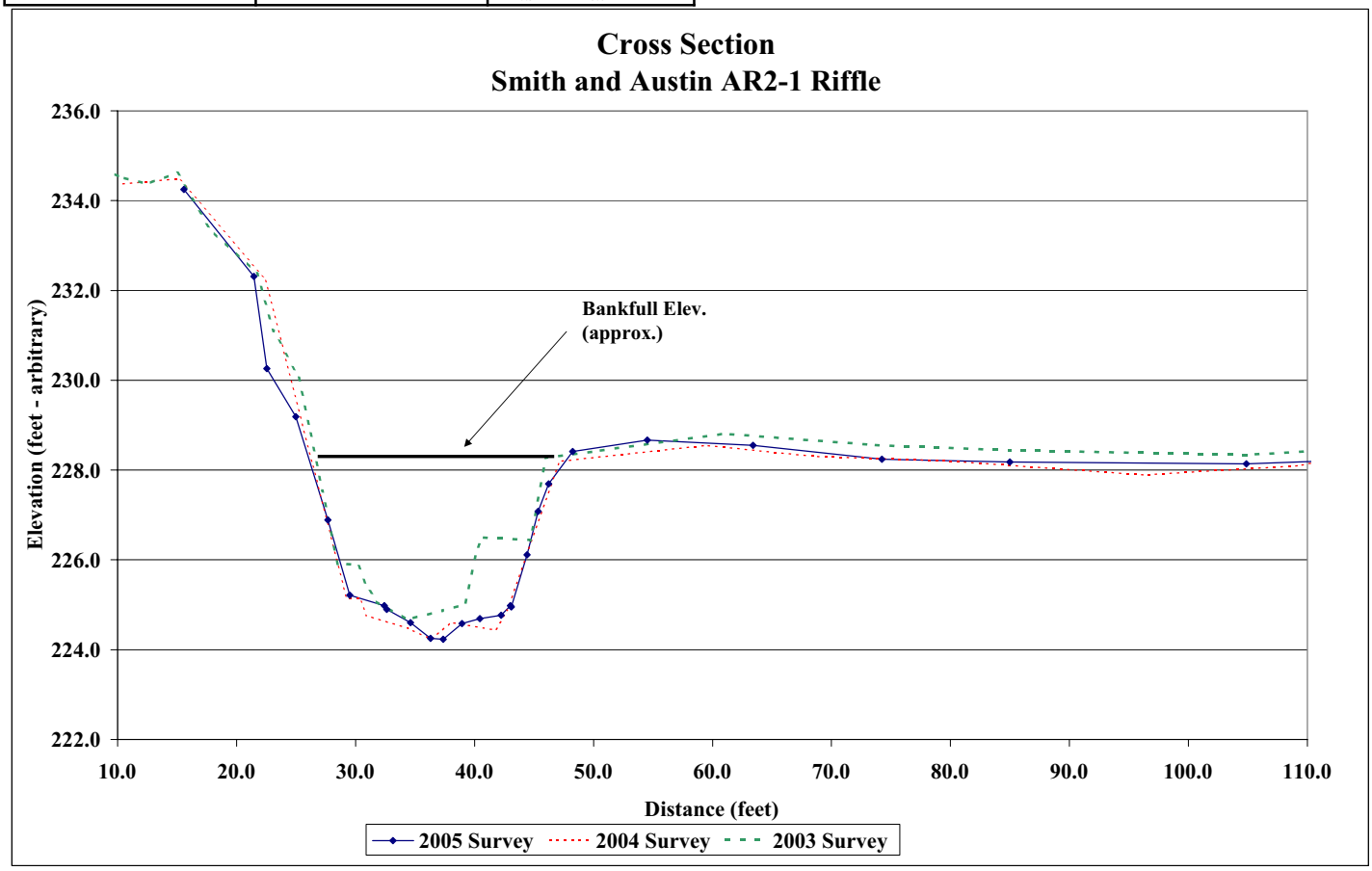
Station	Elevation	Notes
10.5	234.4	LP
15.1	234.5	
22.4	232.3	
26.3	228.2	
29.2	225.1	
30.4	225.1	
30.9	224.8	
34.4	224.5	
36.4	224.2	
36.7	224.3	
38.0	224.6	
41.8	224.4	
42.7	224.9	
47.2	228.2	BKF
59.5	228.6	
68.6	228.3	
79.6	228.2	
96.2	227.9	
109.3	228.1	
120.6	228.7	RP

2003
2003 Survey

Station	Elevation	Notes
7.5	234.8	
10.3	234.5	
10.6	234.5	LP
12.5	234.4	
15.0	234.6	
17.8	233.4	
21.7	232.4	
23.1	231.1	
25.2	230.1	
26.1	229.0	
27.2	227.5	
28.5	225.9	
30.2	225.9	
30.9	225.4	
31.8	225.1	
34.3	224.7	
37.3	224.9	
39.2	225.0	
40.2	226.2	
40.6	226.5	
44.7	226.4	
46.0	228.3	BKF
50.2	228.4	
61.0	228.8	
73.6	228.6	
85.0	228.4	
105.0	228.3	
118.0	228.6	
120.5	228.6	RP

Photo of Cross-Section AR2-1 - Looking Downstream @ STA 27+90

	2005	2004	2003	AS-BUILT
Area	56.1	62.1	45.4	48.1
Width	20.6	20.8	18.8	19.3
Mean Depth	2.7	3.0	2.4	2.5
Max Depth	4.0	4.0	3.6	3.6
W/D	7.5	7.0	7.8	7.7

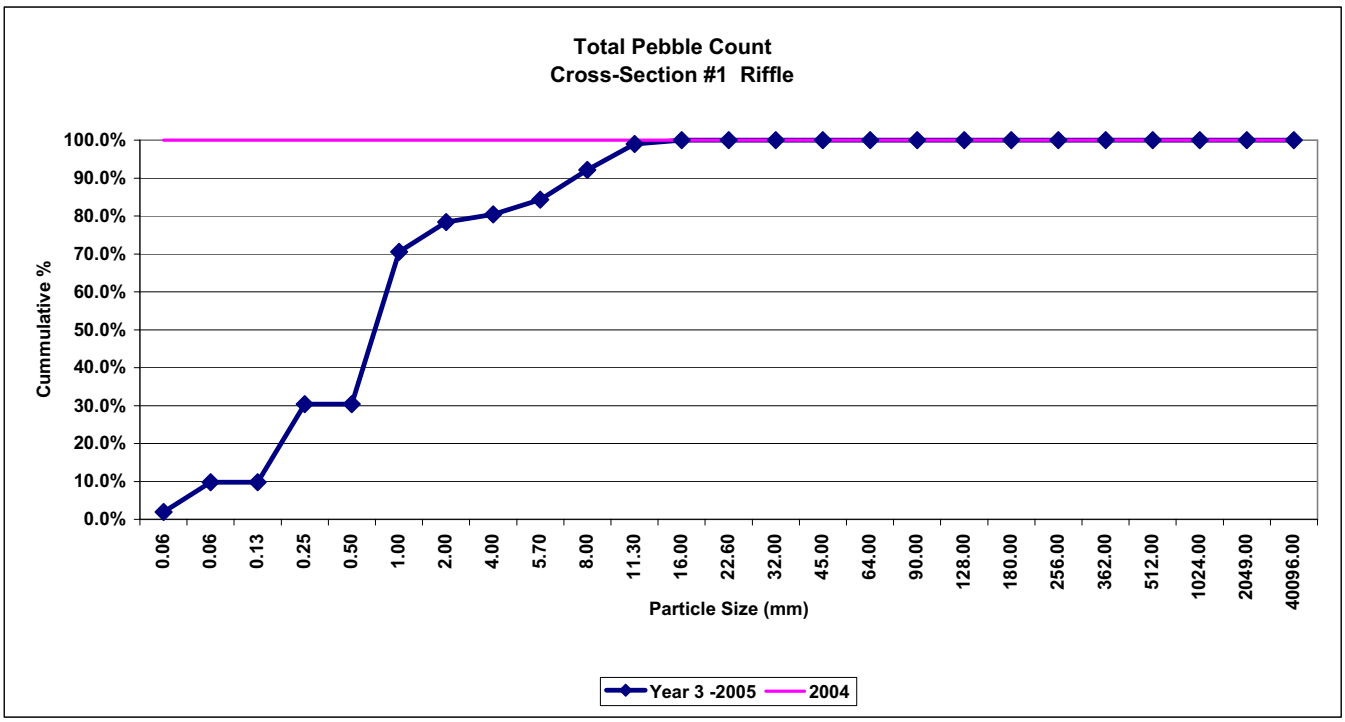


Project Name	Austin Reach 2
Cross Section	#1
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004				Year 3 -2005		
Description	**Material**	**Size (mm)**	**Riffle - Bank**	**Riffle - Bed**	**%**	**Cum %**	**Riffle**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	1	0	100.0%	100.0%	2	2.0%	2.0%
Sand	very fine sand	0.062	0	0	0.0%	100.0%	8	7.8%	9.8%
	fine sand	0.125	0	0	0.0%	100.0%	0	0.0%	9.8%
	medium sand	0.25	0	0	0.0%	100.0%	21	20.6%	30.4%
	course sand	0.50	0	0	0.0%	100.0%	0	0.0%	30.4%
	very course sand	1.0	0	0	0.0%	100.0%	41	40.2%	70.6%
Gravel	very fine gravel	2.0	0	0	0.0%	100.0%	8	7.8%	78.4%
	fine gravel	4.0	0	0	0.0%	100.0%	2	2.0%	80.4%
	fine gravel	5.7	0	0	0.0%	100.0%	4	3.9%	84.3%
	medium gravel	8.0	0	0	0.0%	100.0%	8	7.8%	92.2%
	medium gravel	11.3	0	0	0.0%	100.0%	7	6.9%	99.0%
	course gravel	16.0	0	0	0.0%	100.0%	1	1.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%	0	0.0%	100.0%
TOTAL / %of whole count			1	0	100.0%		102	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
Year 3 -2005	0.24	0.84	1.12	6.69	11.31
2004	0.00	0.00	0.00	0.00	0.00



Project Name	Smith and Austin
Cross Section	AR2-2
Feature	Pool
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
8.4	232.4	
10.3	232.0	
11.2	231.7	
12.7	230.6	
13.2	230.2	
15.8	226.8	
16.4	225.6	
16.5	224.4	
18.6	224.5	
20.7	224.7	
22.3	224.5	
25.6	224.5	
26.6	224.8	
28.2	226.3	
29.6	227.3	
34.0	227.7	
43.2	228.0	
54.8	227.8	
64.4	227.6	
75.2	227.4	
86.4	227.3	
101.9	227.4	
108.1	227.5	
108.1	227.5	RP

2004
2004 Survey

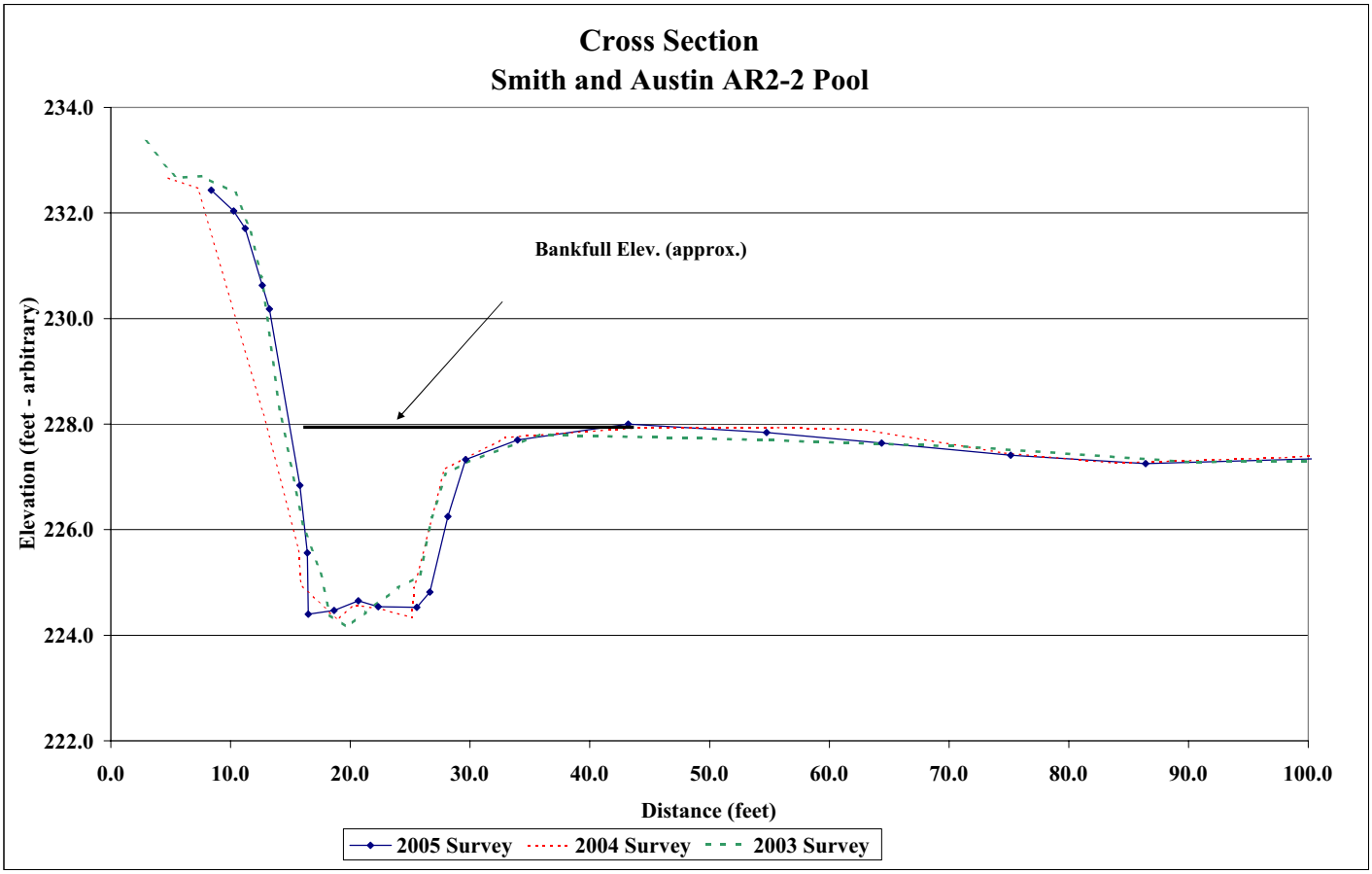
Station	Elevation	Notes
4.8	232.7	LP
7.3	232.5	
12.7	228.2	
15.7	225.6	
15.9	225.0	
18.9	224.3	
20.2	224.6	
20.7	224.6	
22.6	224.5	
25.1	224.3	
25.3	224.9	
27.9	227.1	
33.0	227.7	BKF
44.4	227.9	
55.3	227.9	
62.9	227.9	
74.4	227.5	
83.8	227.3	
98.1	227.4	
108.5	227.5	RP

2003
2003 Survey

Station	Elevation	Notes
2.9	233.4	
5.0	232.8	
5.5	232.7	LP
7.6	232.7	
10.4	232.4	
11.6	231.7	
12.6	230.8	
14.1	228.3	BKF
16.1	226.1	
17.5	225.2	
18.3	224.4	
19.7	224.2	
21.3	224.4	
24.0	224.9	
25.8	225.1	
26.8	226.2	
28.0	227.1	
29.4	227.2	
35.8	227.8	BKF
54.4	227.7	
71.6	227.6	
90.0	227.3	
103.0	227.3	
107.0	227.4	
107.8	227.5	RP
109.0	227.6	
114.0	228.8	
119.0	230.0	
121.2	230.6	
130.0	230.9	
136.0	231.1	

Photo of Cross-Section AR2-2 - Looking Downstream @ STA 28+35

	2005	2004	2003	AS-BUILT
Area	43.0	43.9	36.9	37.1
Width	18.2	17.3	19.7	21.3
Mean Depth	2.4	2.5	1.9	1.7
Max Depth	3.3	3.4	3.5	3.6
W/D	7.7	6.8	10.5	12.2

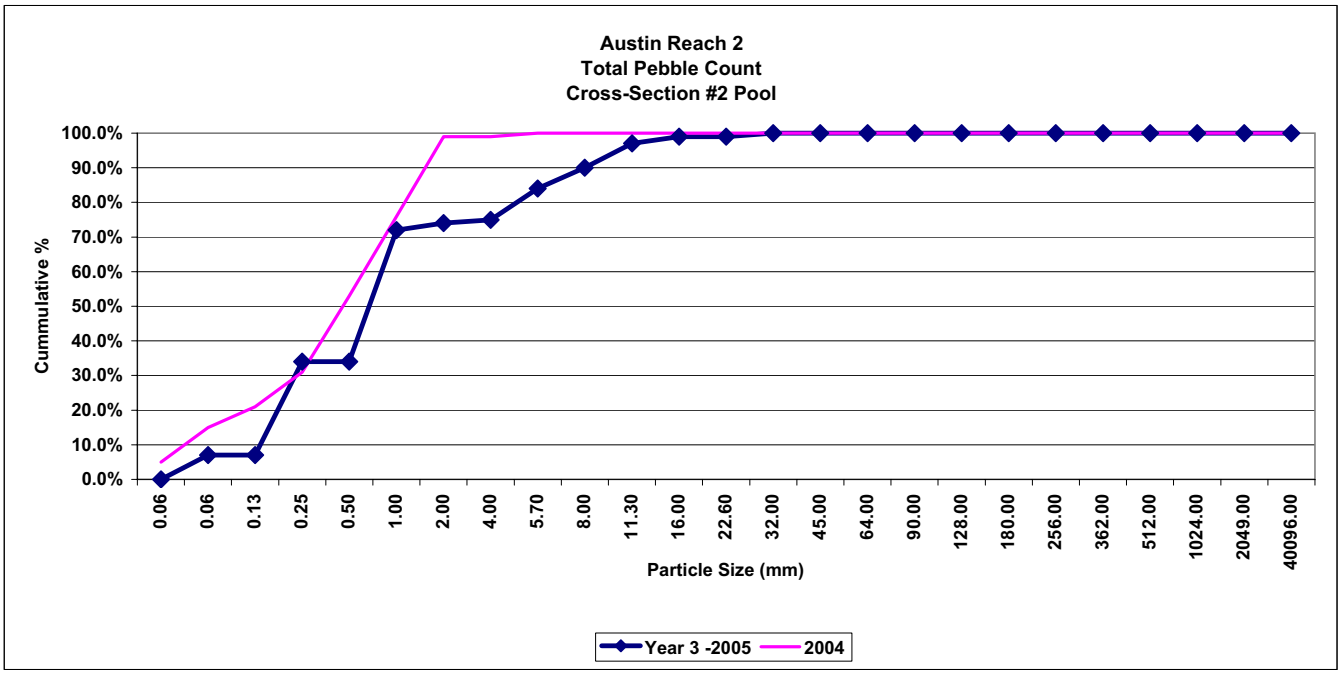


Project Name	Austin Reach 2
Cross Section	#2
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004				Year 3 -2005		
Description	**Material**	**Size (mm)**	**Pool - Bank**	**Pool - Bed**	**%**	**Cum %**	**Pool**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	5	0	5.0%	5.0%	0	0.0%	0.0%
Sand	very fine sand	0.062	10	0	10.0%	15.0%	7	7.0%	7.0%
	fine sand	0.125	5	1	6.0%	21.0%	0	0.0%	7.0%
	medium sand	0.25	0	10	10.0%	31.0%	27	27.0%	34.0%
	course sand	0.50	0	22	22.0%	53.0%	0	0.0%	34.0%
	very course sand	1.0	0	23	23.0%	76.0%	38	38.0%	72.0%
Gravel	very fine gravel	2.0	0	23	23.0%	99.0%	2	2.0%	74.0%
	fine gravel	4.0	0	0	0.0%	99.0%	1	1.0%	75.0%
	fine gravel	5.7	0	1	1.0%	100.0%	9	9.0%	84.0%
	medium gravel	8.0	0	0	0.0%	100.0%	6	6.0%	90.0%
	medium gravel	11.3	0	0	0.0%	100.0%	7	7.0%	97.0%
	course gravel	16.0	0	0	0.0%	100.0%	2	2.0%	99.0%
	course gravel	22.6	0	0	0.0%	100.0%	0	0.0%	99.0%
	very course gravel	32	0	0	0.0%	100.0%	1	1.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%	0	0.0%	100.0%
TOTAL / %of whole count			20	80	100.0%		100	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
Year 3 -2005	0.25	0.77	1.07	6.85	12.51
2004	0.11	0.44	0.70	2.02	2.74



Project Name	Smith and Austin
Cross Section	AR2-3
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
2.1	232.0	
3.8	230.3	
6.0	228.8	
8.6	226.7	
10.3	225.8	
12.0	225.3	
12.5	224.4	
14.2	224.3	
15.7	224.2	
18.1	224.4	
21.3	224.5	
25.1	224.4	
27.4	224.0	
27.7	224.0	
28.6	224.4	
28.9	225.2	
29.5	225.6	
30.9	226.3	
32.0	227.0	
33.7	227.1	
41.2	227.3	
50.5	227.6	
63.0	227.8	
75.2	228.0	
82.2	228.2	RP

2004
2004 Survey

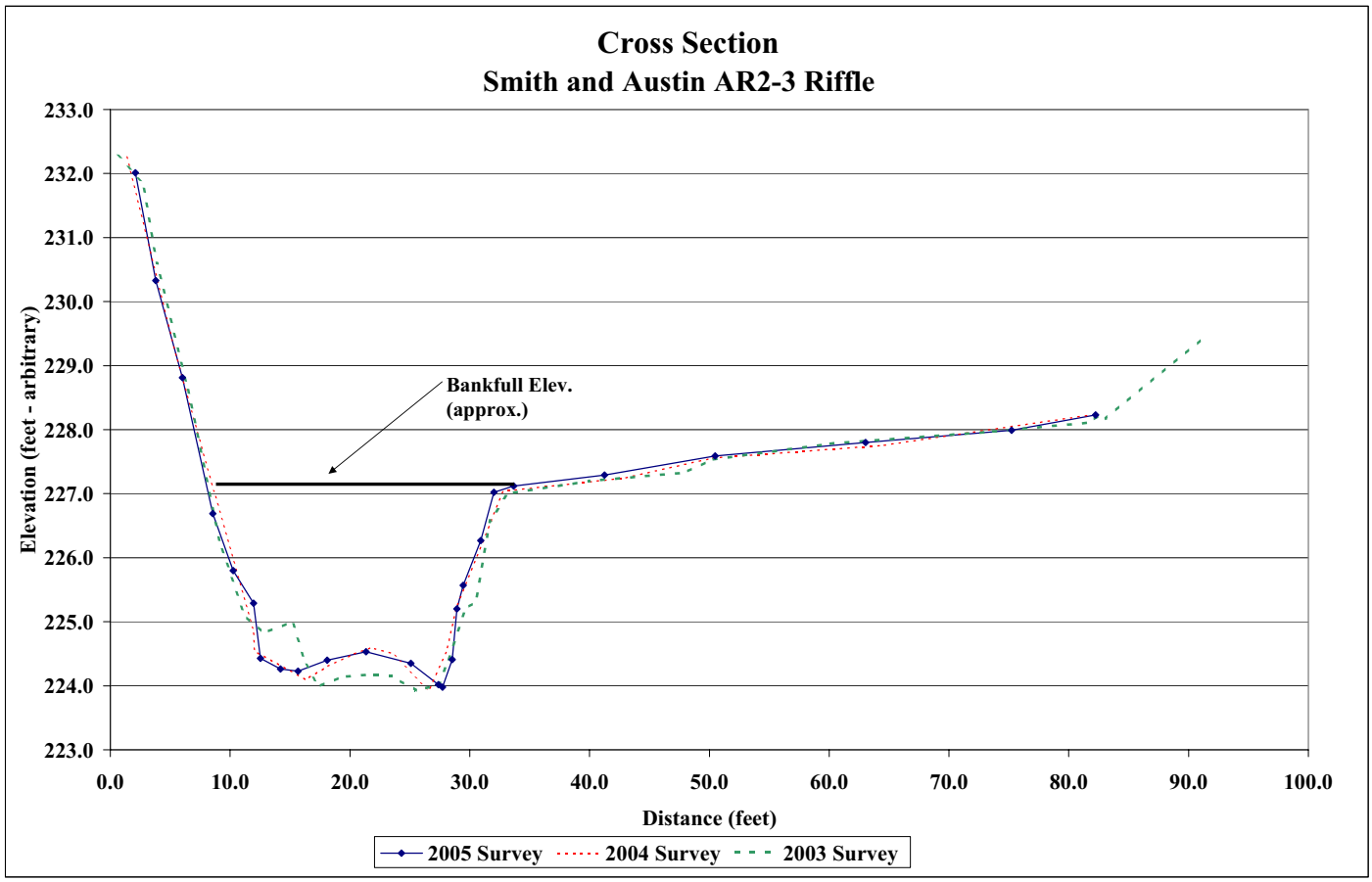
Station	Elevation	Notes
1.4	232.3	LP
5.5	229.2	
8.7	227.0	
12.0	224.9	
12.0	224.5	
16.3	224.1	
18.1	224.3	
20.0	224.5	
21.8	224.6	
23.5	224.5	
26.6	223.9	
28.1	224.5	
28.9	225.2	
32.8	227.0	BKF
43.0	227.2	
50.2	227.6	
64.6	227.8	
81.6	228.2	RP

2003
2003 Survey

Station	Elevation	Notes
0.6	232.3	LP
2.7	231.9	
3.9	230.6	
6.5	228.6	
9.2	226.2	
11.2	225.1	
12.8	224.8	
15.2	225.0	
16.3	224.3	
17.4	224.0	
19.3	224.1	
21.4	224.2	
23.4	224.2	
25.5	223.9	
27.4	224.0	
28.1	224.3	
29.7	225.2	
30.5	225.3	
31.7	226.6	
33.2	227.0	BKF
40.0	227.2	
48.0	227.3	
50.2	227.5	
60.0	227.8	
73.7	228.0	
81.5	228.1	
82.4	228.2	RP
83.1	228.2	
91.0	229.4	
96.5	230.0	
103.3	230.5	
112.0	231.1	
121.0	231.6	
140.0	231.9	
145.0	232.0	

Photo of Cross-Section AR2-3 - Looking Downstream @ STA 30+45

	2005	2004	2003	AS-BUILT
Area	53.4	53.9	56.4	54.4
Width	25.1	24.1	24.0	24.9
Mean Depth	2.1	2.2	2.4	2.2
Max Depth	3.1	3.2	3.2	3.1
W/D	11.8	10.8	10.2	11.4

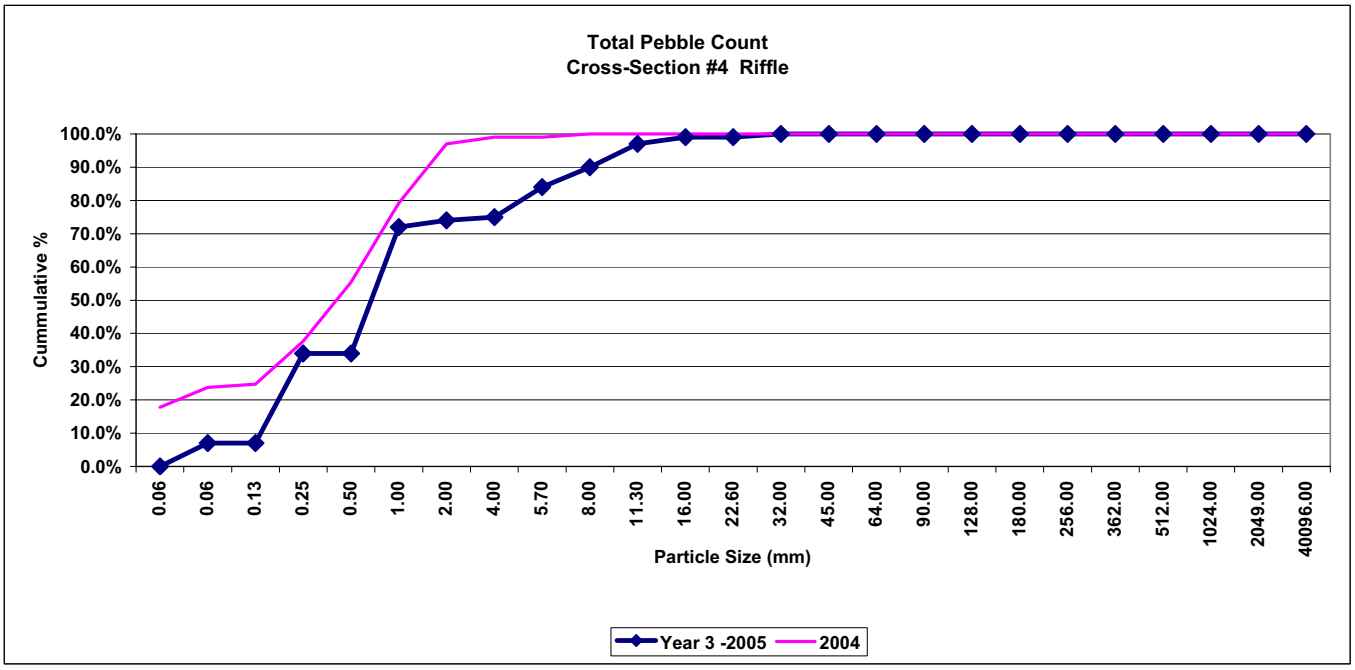


Project Name	Austin Reach 2
Cross Section	#3
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004				Year 3 -2005		
Description	**Material**	**Size (mm)**	**Riffle - Bank**	**Riffle - Bed**	**%**	**Cum %**	**Riffle**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	15	3	17.8%	17.8%	0	0.0%	0.0%
Sand	very fine sand	0.062	6	0	5.9%	23.8%	7	7.0%	7.0%
	fine sand	0.125	1	0	1.0%	24.8%	0	0.0%	7.0%
	medium sand	0.25	0	13	12.9%	37.6%	27	27.0%	34.0%
	course sand	0.50	0	18	17.8%	55.4%	0	0.0%	34.0%
	very course sand	1.0	0	24	23.8%	79.2%	38	38.0%	72.0%
G r a v e l	very fine gravel	2.0	0	18	17.8%	97.0%	2	2.0%	74.0%
	fine gravel	4.0	0	2	2.0%	99.0%	1	1.0%	75.0%
	fine gravel	5.7	0	0	0.0%	99.0%	9	9.0%	84.0%
	medium gravel	8.0	0	1	1.0%	100.0%	6	6.0%	90.0%
	medium gravel	11.3	0	0	0.0%	100.0%	7	7.0%	97.0%
	course gravel	16.0	0	0	0.0%	100.0%	2	2.0%	99.0%
	course gravel	22.6	0	0	0.0%	100.0%	0	0.0%	99.0%
	very course gravel	32	0	0	0.0%	100.0%	1	1.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%	0	0.0%	100.0%
TOTAL / %of whole count			22	79	100.0%		100	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
Year 3 -2005	0.25	0.77	1.07	6.85	12.51
2004	0.00	0.34	0.64	1.90	2.83



Project Name	Smith and Austin
Cross Section	AR3-1
Feature	Pool
Date	6/2/05
Crew	Bidelspach, Clinton

Photo of Cross-Section AR3-1 - Looking Downstream @ STA 34+55

	2005	2004	2003	AS-BUILT
Area	77.7	72.7	87.5	97.1
Width	38.5	39.6	41.2	37.3
Mean Depth	2.0	1.8	2.1	2.6
Max Depth	4.2	3.8	4.8	4.8
W/D	19.0	21.6	19.4	14.3

2005
2005 Survey

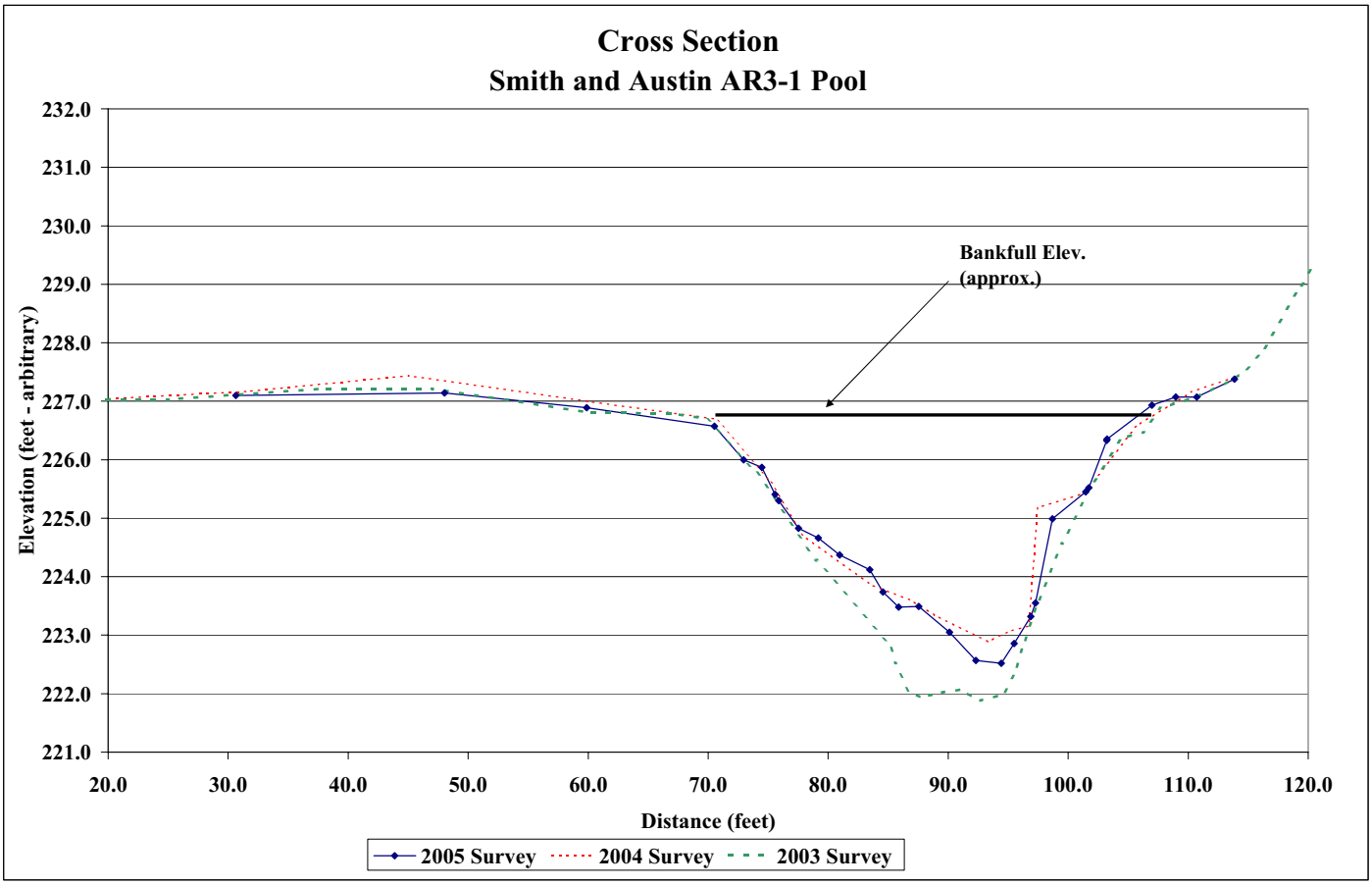
Station	Elevation	Notes
30.6	227.1	
48.0	227.1	
59.9	226.9	
70.5	226.6	
73.0	226.0	
74.5	225.9	
75.6	225.4	
75.9	225.3	
77.5	224.8	
79.2	224.7	
81.0	224.4	
83.5	224.1	
84.6	223.7	
85.9	223.5	
87.6	223.5	
90.1	223.1	
92.3	222.6	
94.4	222.5	
95.5	222.9	
96.9	223.3	
97.3	223.6	
98.7	225.0	
101.5	225.5	
101.7	225.5	
103.2	226.3	
103.2	226.4	
107.0	226.9	
109.0	227.1	
110.7	227.1	
113.9	227.4	RP

2004
2004 Survey

Station	Elevation	Notes
16.9	227.0	LP
31.6	227.2	
45.1	227.4	
60.0	227.0	
70.6	226.7	
75.1	225.7	
77.9	224.7	
83.5	223.9	
87.0	223.6	
88.9	223.3	
93.3	222.9	
95.0	223.1	
96.7	223.2	
97.5	225.2	
101.3	225.4	
105.8	226.6	BKF
110.3	227.2	
113.9	227.4	RP

2003
2003 Survey

Station	Elevation	Notes
2.0	230.0	
4.4	230.1	
6.0	230.3	
7.9	230.2	
10.0	229.7	
11.3	229.3	
12.2	228.5	
13.0	227.4	
14.0	226.9	
16.9	227.0	LP
25.0	227.0	
38.0	227.2	
47.0	227.2	
60.0	226.8	
67.0	226.8	
69.8	226.7	BKF
74.0	225.8	
79.0	224.3	
85.2	222.8	
85.6	222.5	
86.7	222.0	
87.7	221.9	
89.5	222.0	
91.0	222.1	
92.7	221.9	
94.6	222.0	
95.5	222.3	
96.2	222.8	
97.4	223.5	
99.5	224.6	
102.1	225.6	
104.5	226.4	
106.2	226.5	
107.7	226.9	BKF
111.0	227.1	
113.9	227.4	RP
114.6	227.5	
116.0	227.8	
119.0	228.8	
122.0	229.9	
132.0	230.2	
145.0	230.5	
155.0	230.7	

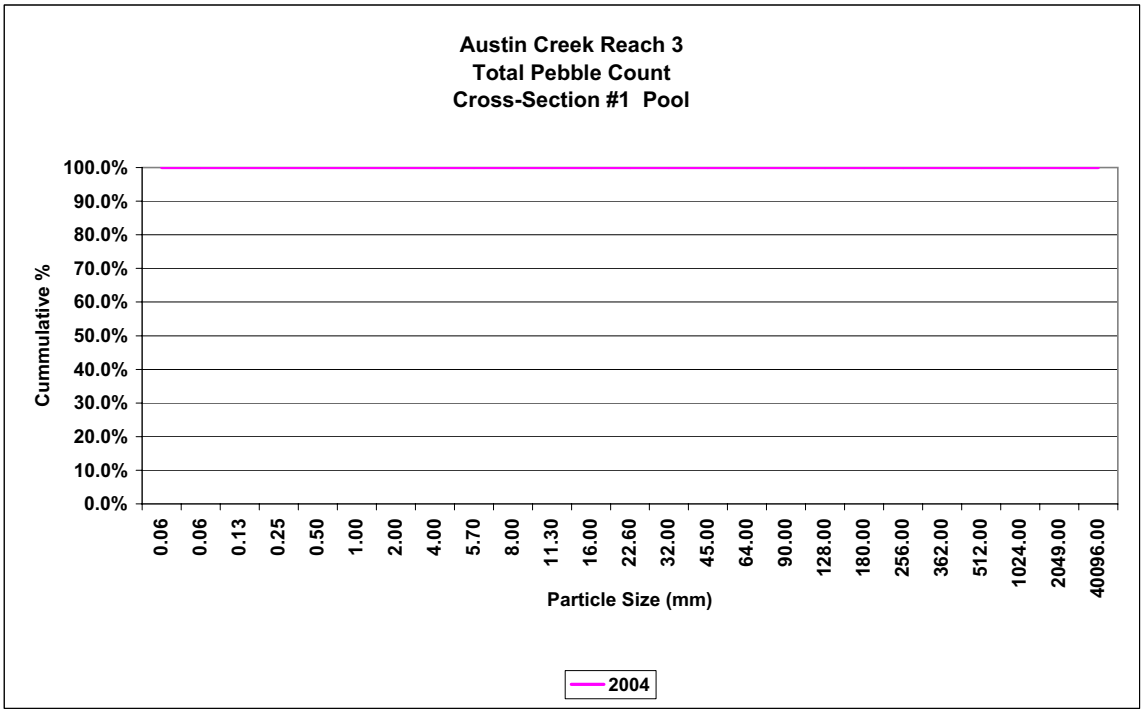


Project Name	Austin Reach 3
Cross Section	#1
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004			
Description	**Material**	**Size (mm)**	**Pool - Bank**	**Pool - Bed**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	1	0	100.0%	100.0%
Sand	very fine sand	0.062	0	0	0.0%	100.0%
	fine sand	0.125	0	0	0.0%	100.0%
	medium sand	0.25	0	0	0.0%	100.0%
	course sand	0.50	0	0	0.0%	100.0%
	very course sand	1.0	0	0	0.0%	100.0%
Gravel	very fine gravel	2.0	0	0	0.0%	100.0%
	fine gravel	4.0	0	0	0.0%	100.0%
	fine gravel	5.7	0	0	0.0%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			1	0	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.00	0.00	0.00	0.00	0.00



Project Name	Smith and Austin
Cross Section	AR3-2
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
12.3	227.5	LP
13.2	227.5	
18.7	227.4	
26.9	227.3	
34.9	226.9	
39.5	226.6	
41.7	226.2	
42.9	225.6	
44.4	225.0	
46.0	224.4	
46.8	223.7	
48.0	223.1	
49.3	222.9	
50.5	223.1	
51.8	223.2	
53.6	223.3	
55.5	223.7	
57.5	224.0	
58.8	224.2	
60.6	224.1	
64.6	224.1	
67.6	223.9	
69.1	224.3	
72.5	224.9	
77.1	226.6	
80.4	226.8	
96.2	227.1	
113.8	227.3	

2004
2004 Survey

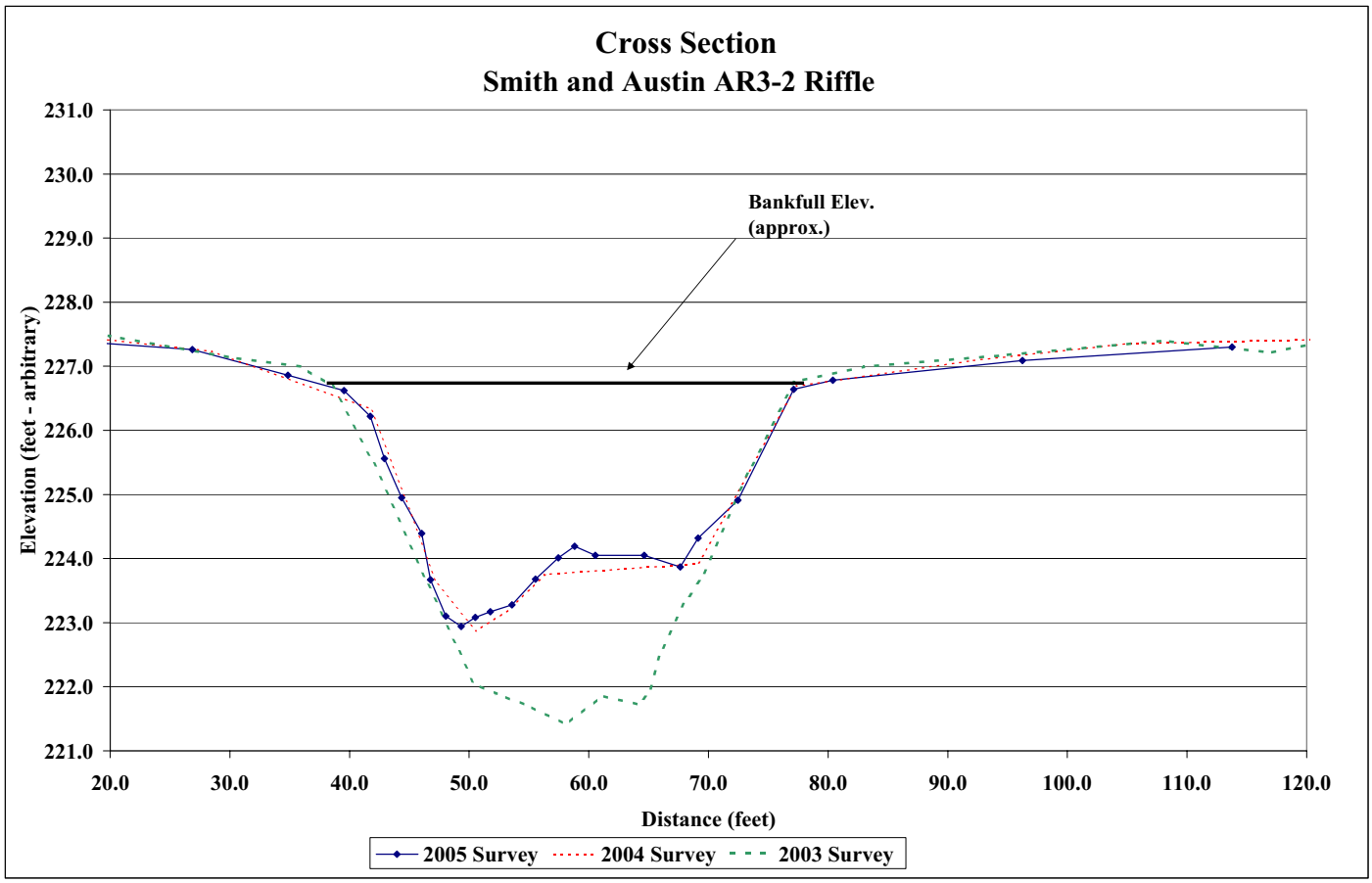
Station	Elevation	Notes
12.3	227.6	LP
28.5	227.2	
41.8	226.3	
44.7	224.9	
47.3	223.6	
50.6	222.9	
53.4	223.2	
56.3	223.8	
69.1	223.9	
77.4	226.7	BKF
92.1	227.1	
104.9	227.4	
122.7	227.4	RP

2003
2003 Survey

Station	Elevation	Notes
3.0	229.6	
4.0	226.8	
6.0	227.0	
9.4	227.3	
12.6	227.6	LP
20.0	227.5	
30.0	227.1	
36.0	227.0	
38.6	226.7	BKF
42.0	225.5	
46.5	223.6	
48.9	222.7	
50.4	222.0	
52.3	221.9	
55.0	221.7	
58.1	221.4	
61.1	221.9	
64.2	221.7	
65.1	221.9	
66.0	222.5	
68.0	223.3	
69.4	223.7	
73.4	225.4	
77.2	226.8	BKF
83.0	227.0	
95.0	227.2	
108.0	227.4	
117.0	227.2	
122.4	227.4	RP
124.0	227.5	
128.0	228.1	
132.0	228.9	
136.0	229.6	
145.0	230.1	
161.0	230.6	

Photo of Cross-Section AR3-2 - Looking Downstream @ STA 35+15

	2005	2004	2003	AS-BUILT	BENCH
Area	91.5	97.1	125.1	126.5	10.2
Width	37.6	35.5	37.2	38.4	12.8
Mean Depth	2.4	2.7	3.4	3.3	0.8
Max Depth	3.8	3.8	5.3	5.3	1.3
W/D	15.4	13.0	11.1	11.7	16.1

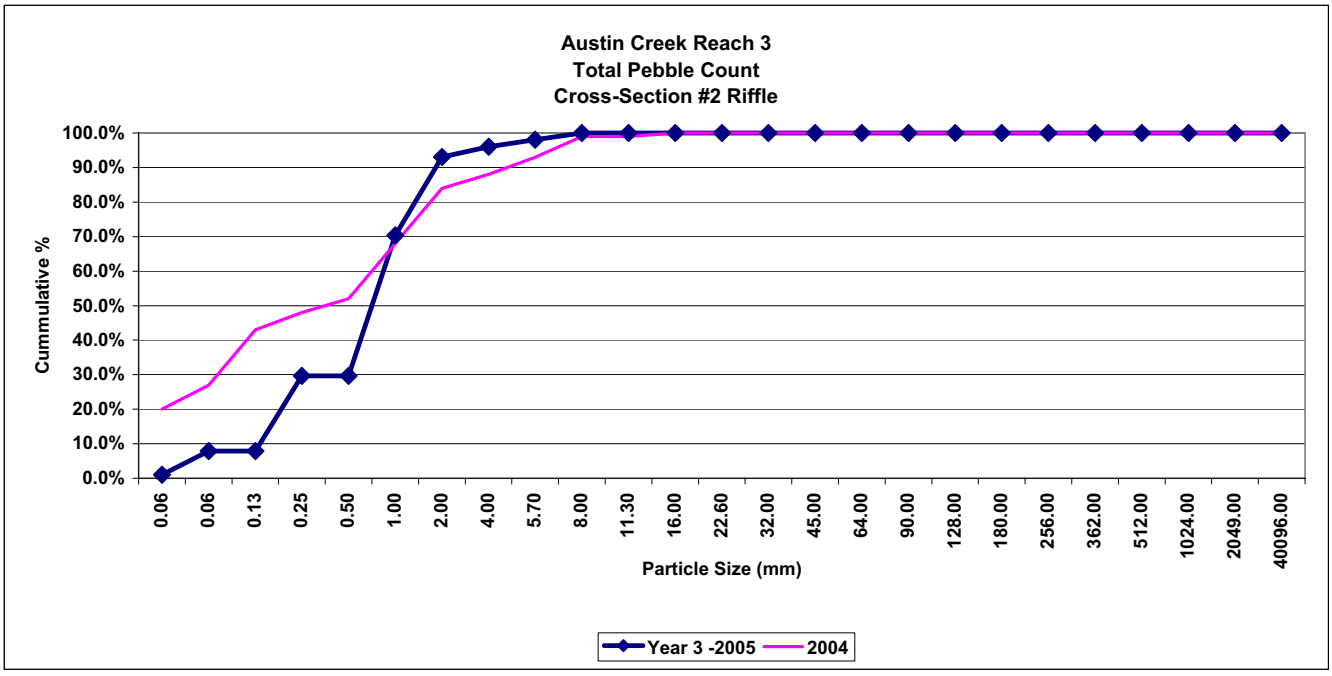


Project Name	Austin Reach 3
Cross Section	#2
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004				Year 3 -2005		
Description	**Material**	**Size (mm)**	**Riffle - Bank**	**Riffle - Bed**	**%**	**Cum %**	**Riffle**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	8	12	20.0%	20.0%	1	1.0%	1.0%
Sand	very fine sand	0.062	7	0	7.0%	27.0%	7	6.9%	7.9%
	fine sand	0.125	15	1	16.0%	43.0%	0	0.0%	7.9%
	medium sand	0.25	0	5	5.0%	48.0%	22	21.8%	29.7%
	course sand	0.50	0	4	4.0%	52.0%	0	0.0%	29.7%
	very course sand	1.0	0	16	16.0%	68.0%	41	40.6%	70.3%
Gravel	very fine gravel	2.0	0	16	16.0%	84.0%	23	22.8%	93.1%
	fine gravel	4.0	0	4	4.0%	88.0%	3	3.0%	96.0%
	fine gravel	5.7	0	5	5.0%	93.0%	2	2.0%	98.0%
	medium gravel	8.0	0	6	6.0%	99.0%	2	2.0%	100.0%
	medium gravel	11.3	0	0	0.0%	99.0%	0	0.0%	100.0%
	course gravel	16.0	0	1	1.0%	100.0%	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%	0	0.0%	100.0%
TOTAL / %of whole count			30	70	100.0%		101	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
Year 3 -2005	0.26	0.85	1.13	2.40	4.20
2004	0.00	0.14	0.56	3.00	7.78



Project Name	Smith and Austin
Cross Section	AR3-3
Feature	Pool
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
51.2	226.1	
60.0	226.3	
75.3	226.5	
92.3	226.5	
102.7	226.5	
109.3	224.7	
111.6	224.4	
114.2	224.1	
115.6	223.3	
117.6	223.1	
119.3	222.8	
120.4	222.7	
122.5	222.7	
124.8	223.3	
126.5	223.6	
127.4	223.5	
129.3	223.4	
132.0	223.4	
134.8	223.6	
136.3	224.1	
137.4	224.5	
141.5	226.7	
143.9	226.7	
148.8	226.7	RP
149.1	226.7	

2004
2004 Survey

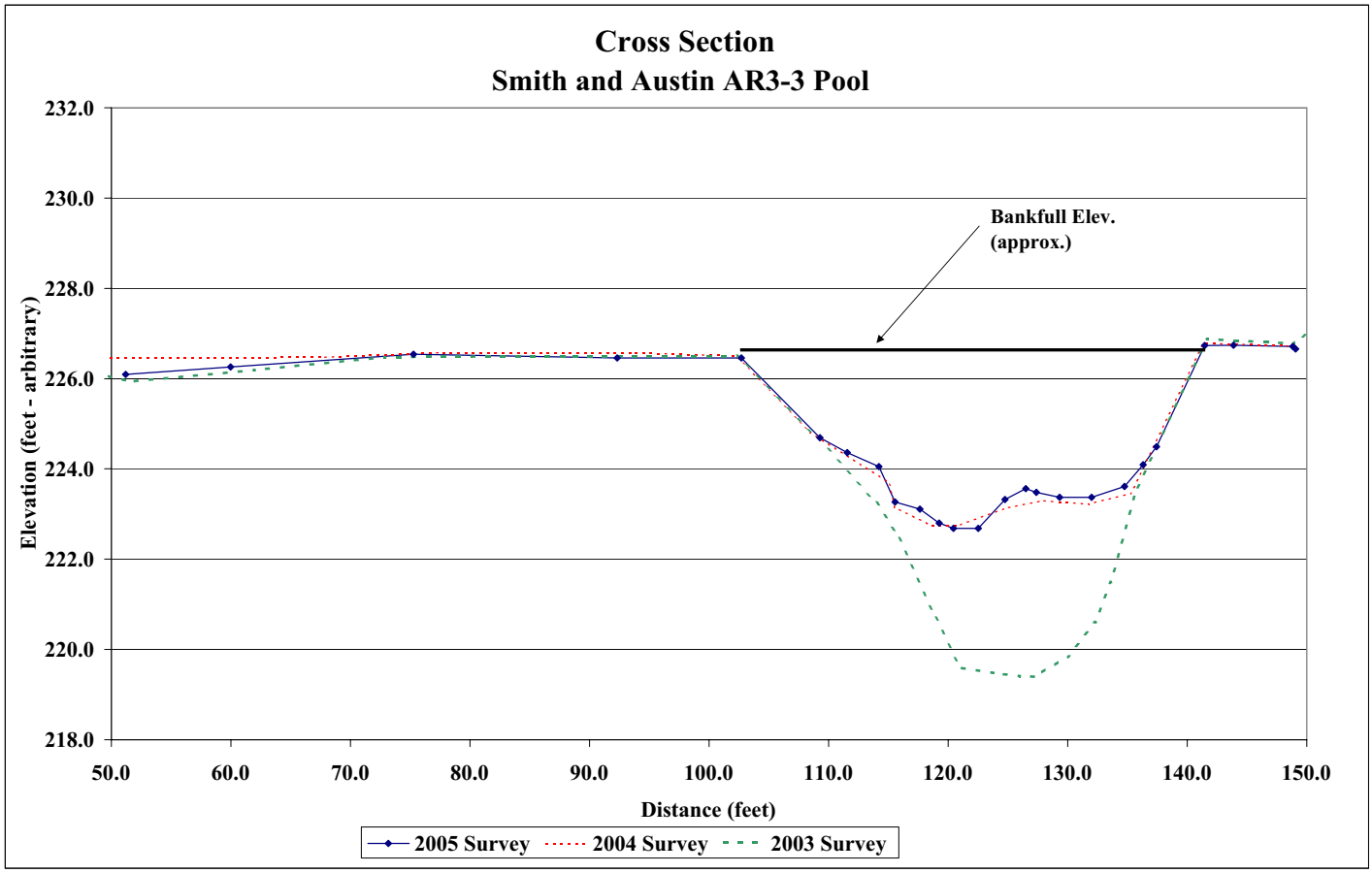
Station	Elevation	Notes
44.3	226.5	LP
67.7	226.5	
77.5	226.6	
93.8	226.6	
102.2	226.5	BKF
108.5	224.8	
115.1	223.7	
115.5	223.2	
118.6	222.7	
120.9	222.7	
124.8	223.1	
127.9	223.3	
131.7	223.2	
135.3	223.5	
141.3	226.8	
148.2	226.7	
148.8	226.7	RP

2003
2003 Survey

Station	Elevation	Notes
4.0	230.2	
15.0	229.4	
25.0	228.8	
35.7	228.5	
39.3	227.8	
43.7	226.4	
44.2	226.4	LP
51.6	225.9	
62.0	226.2	
72.9	226.5	
88.0	226.5	
102.3	226.5	BKF
109.0	224.7	
114.0	223.2	
115.8	222.5	
118.7	220.9	
121.0	219.6	
123.8	219.5	
126.0	219.4	
127.2	219.4	
130.0	219.8	
132.3	220.6	
133.6	221.5	
135.8	223.6	
141.7	226.9	BKF
148.9	226.8	RP
149.4	226.9	
153.0	227.8	
156.9	228.7	
164.0	228.9	
180.0	228.8	
201.0	228.8	

Photo of Cross-Section AR3-3 - Looking Downstream @ STA 38+15

	2005	2004	2003	AS-BUILT	BENCH
Area	90.5	93.0	151.2	153.8	11.7
Width	38.8	39.1	39.4	38.5	12.3
Mean Depth	2.3	2.4	3.8	4.0	1.0
Max Depth	3.8	3.8	7.1	7.1	1.3
W/D	16.6	16.4	10.3	9.6	12.9

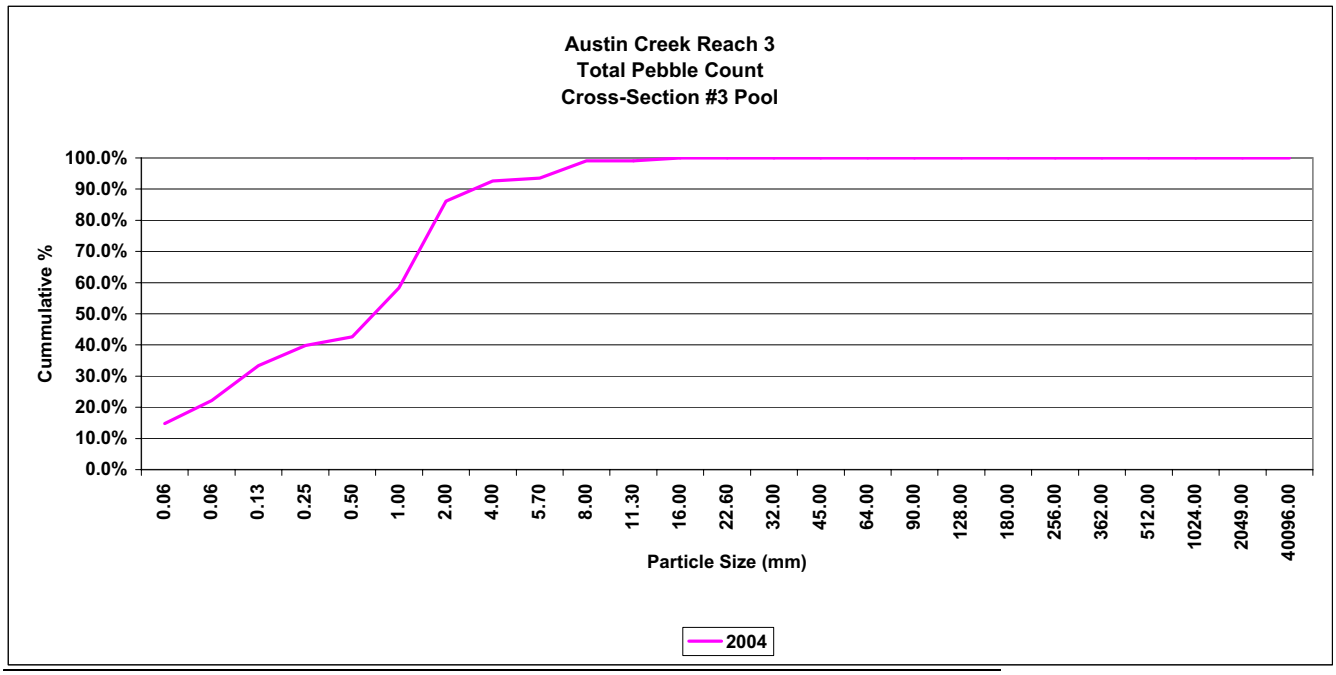


Project Name	Austin Reach 3
Cross Section	#3
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004			
Description	**Material**	**Size (mm)**	**Pool - Bank**	**Pool - Bed**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	13	3	14.8%	14.8%
Sand	very fine sand	0.062	8	0	7.4%	22.2%
	fine sand	0.125	12	0	11.1%	33.3%
	medium sand	0.25	7	0	6.5%	39.8%
	course sand	0.50	0	3	2.8%	42.6%
	very course sand	1.0	0	17	15.7%	58.3%
G r a v e l	very fine gravel	2.0	0	30	27.8%	86.1%
	fine gravel	4.0	0	7	6.5%	92.6%
	fine gravel	5.7	0	1	0.9%	93.5%
	medium gravel	8.0	0	6	5.6%	99.1%
	medium gravel	11.3	0	0	0.0%	99.1%
	course gravel	16.0	0	1	0.9%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			40	68	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.07	0.24	1.10	2.89	7.60



Project Name	Smith and Austin
Cross Section	AR3-4
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
19.0	225.3	
22.1	225.3	
33.1	225.5	
42.3	225.3	
46.3	223.9	
48.6	223.0	
50.5	223.0	
54.5	223.1	
57.1	223.0	
60.2	222.4	
61.7	222.3	
63.2	222.5	
65.2	222.8	
66.6	223.4	
68.7	223.7	
70.1	224.2	
71.1	224.8	
71.2	224.8	
75.0	225.9	
76.9	226.2	
80.1	226.2	
88.6	226.5	
91.9	226.1	
99.9	226.4	RP

2004
2004 Survey

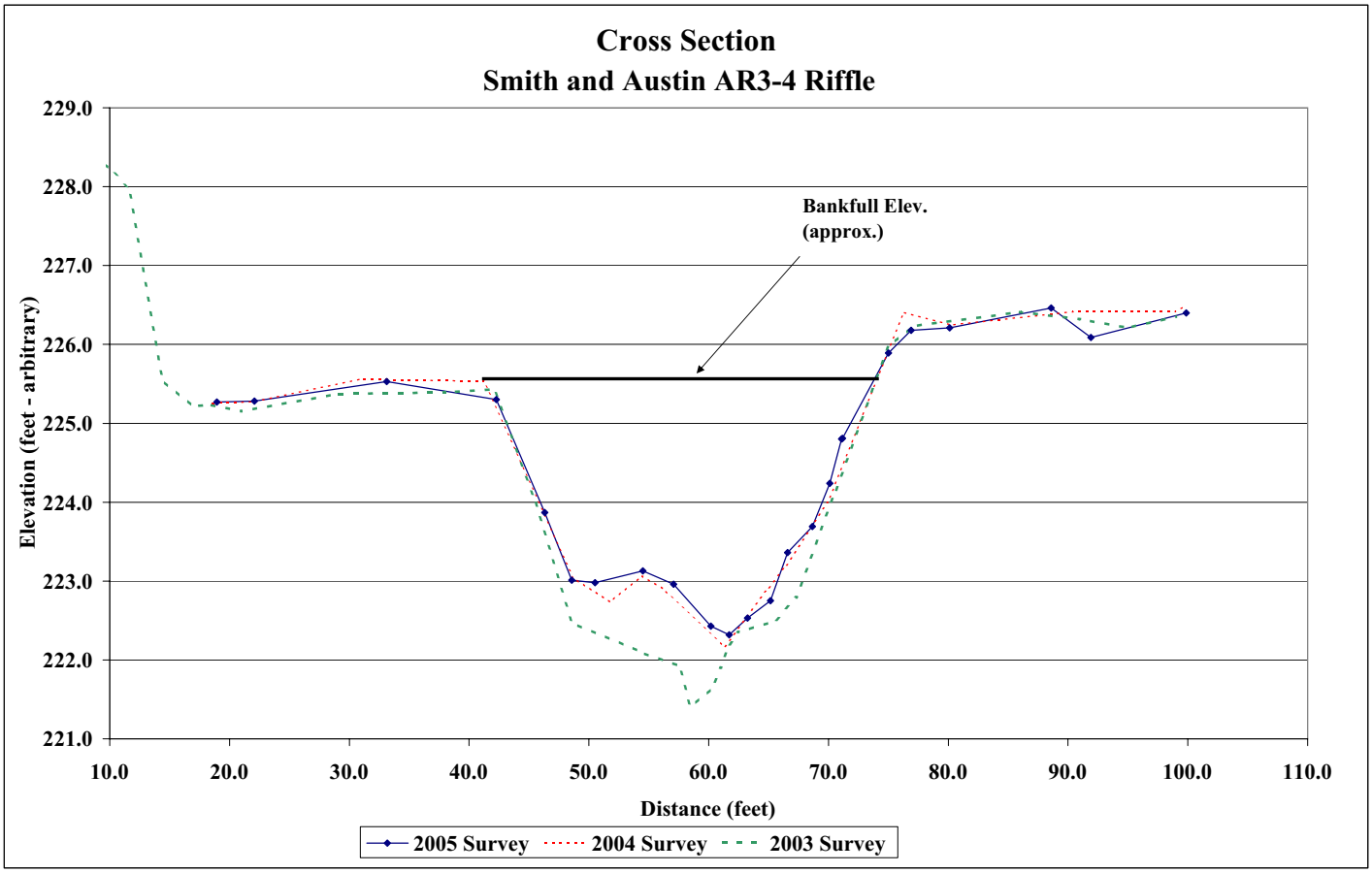
Station	Elevation	Notes
18.5	225.3	LP
22.1	225.3	
30.8	225.6	
41.2	225.5	BKF
48.7	223.0	
51.8	222.7	
54.5	223.1	
56.2	222.9	
61.3	222.2	
64.8	222.9	
66.5	223.2	
69.9	224.0	
76.3	226.4	
80.2	226.2	
90.4	226.4	
99.0	226.4	
99.9	226.5	RP

2003
2003 Survey

Station	Elevation	Notes
6.5	228.6	
10.0	228.2	
11.6	228.0	
14.4	225.6	
16.9	225.2	
18.5	225.2	LP
21.0	225.2	
29.0	225.4	
38.0	225.4	
42.1	225.4	BKF
45.4	224.1	
48.6	222.5	
54.7	222.1	
57.6	221.9	
58.4	221.5	
58.9	221.5	
60.3	221.7	
61.0	221.9	
61.7	222.2	
62.5	222.4	
65.5	222.5	
67.3	222.8	
70.4	224.1	
75.0	226.0	
77.0	226.2	
86.0	226.4	
91.0	226.3	
95.0	226.2	
99.0	226.4	
99.9	226.5	RP
100.6	226.5	
103.6	227.5	
106.3	228.2	
112.0	228.2	
128.0	228.2	
133.0	228.5	
147.2	228.3	
150.0	228.6	

Photo of Cross-Section AR3-4 - Looking Downstream @ STA 41+00

	2005	2004	2003	AS-BUILT	BENCH
Area	61.0	63.7	77.4	78.8	10.3
Width	32.7	35.1	34.1	31.6	20.0
Mean Depth	1.9	1.8	2.3	2.5	0.5
Max Depth	3.2	3.3	4.0	4.0	1.1
W/D	17.6	19.3	15.0	12.7	38.8

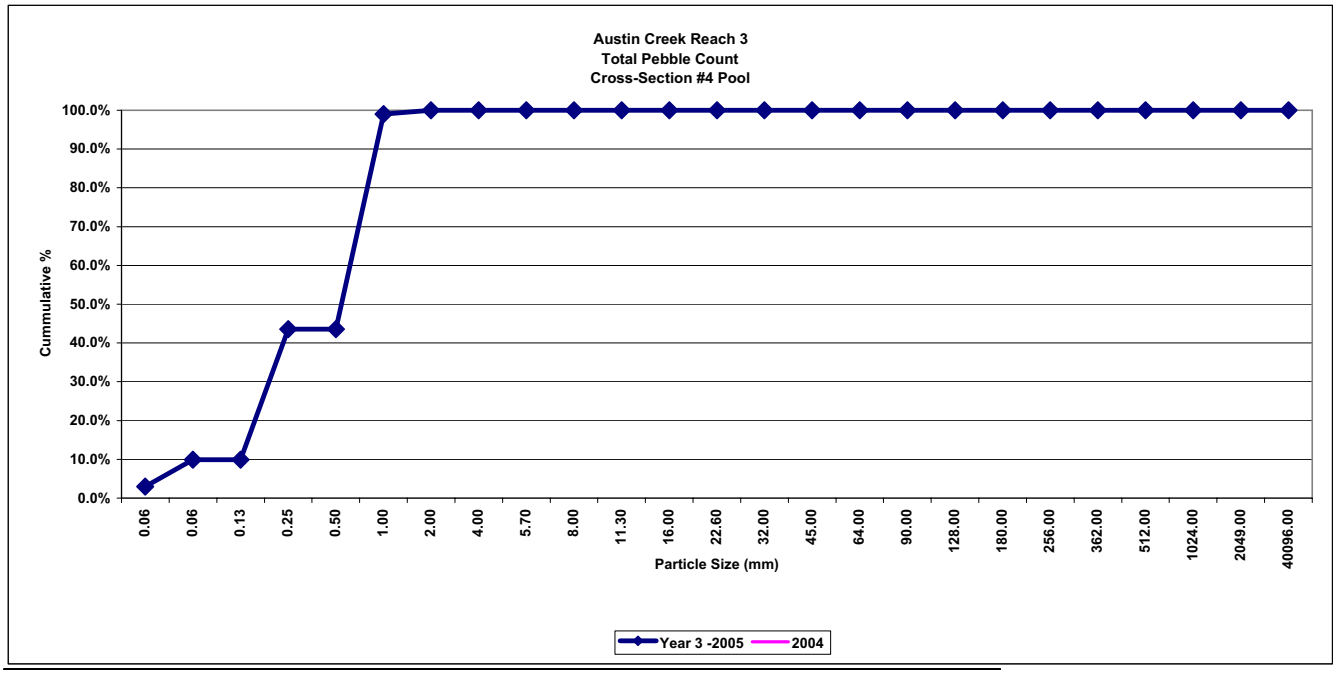


Project Name	Austin Reach 3
Cross Section	#4
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004				Year 3 -2005		
Description	**Material**	**Size (mm)**	**Pool - Bank**	**Pool - Bed**	**%**	**Cum %**	**Riffle**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061					3	3.0%	3.0%
Sand	very fine sand	0.062					7	6.9%	9.9%
	fine sand	0.125					0	0.0%	9.9%
	medium sand	0.25					34	33.7%	43.6%
	course sand	0.50					0	0.0%	43.6%
	very course sand	1.0					56	55.4%	99.0%
G r a v e l	very fine gravel	2.0					1	1.0%	100.0%
	fine gravel	4.0					0	0.0%	100.0%
	fine gravel	5.7					0	0.0%	100.0%
	medium gravel	8.0					0	0.0%	100.0%
	medium gravel	11.3					0	0.0%	100.0%
	course gravel	16.0					0	0.0%	100.0%
	course gravel	22.6					0	0.0%	100.0%
	very course gravel	32					0	0.0%	100.0%
	very course gravel	45					0	0.0%	100.0%
Cobble	small cobble	64					0	0.0%	100.0%
	medium cobble	90					0	0.0%	100.0%
	large cobble	128					0	0.0%	100.0%
	very large cobble	180					0	0.0%	100.0%
Boulder	small boulder	256					0	0.0%	100.0%
	small boulder	362					0	0.0%	100.0%
	medium boulder	512					0	0.0%	100.0%
	large boulder	1024					0	0.0%	100.0%
	very large boulder	2049					0	0.0%	100.0%
Bedrock	bedrock	40096					0	0.0%	100.0%
TOTAL / %of whole count							101	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
Year 3 -2005	0.22	0.33	0.84	1.30	1.45
2004	0.00	0.00	0.00	0.00	0.00



Project Name	Smith and Austin
Cross Section	AR3-5
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
21.2	226.5	
52.1	226.1	
81.7	226.6	
104.9	226.2	
108.5	225.6	
111.6	224.0	
115.0	222.5	
117.8	222.3	
119.7	222.5	
124.3	222.2	
127.2	221.9	
128.8	221.8	
129.8	221.8	
130.6	222.0	
133.1	222.1	
135.2	222.8	
136.4	223.2	
139.0	223.8	
144.3	225.5	
154.2	226.0	
181.0	226.0	
229.5	225.3	
284.9	225.6	
338.9	225.4	

2004
2004 Survey

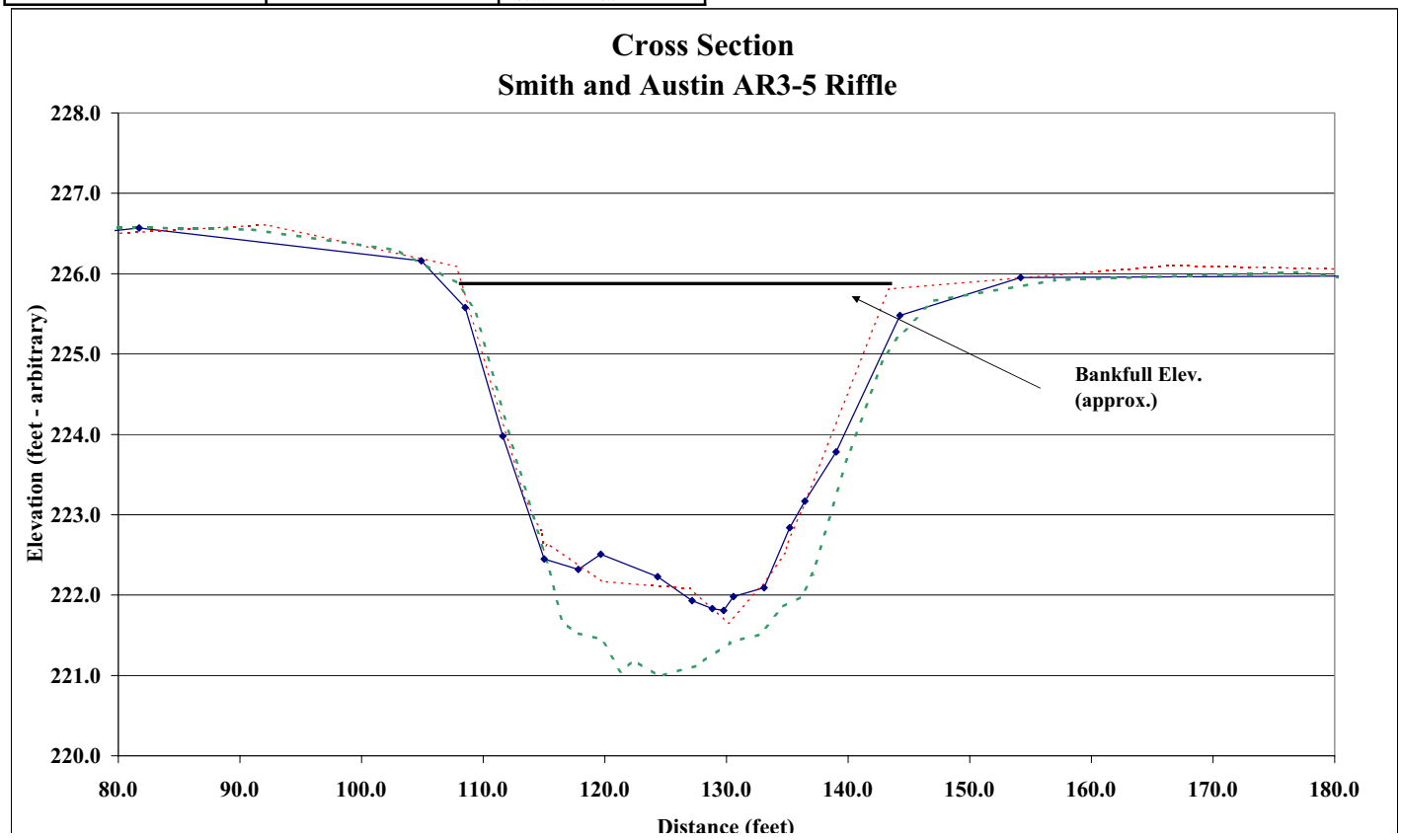
Station	Elevation	Notes
16.6	226.7	LP
33.0	226.2	
60.3	226.3	
92.2	226.6	
107.8	226.1	
113.5	223.2	
114.7	222.8	
114.8	222.8	
115.0	222.6	
115.3	222.6	
119.8	222.2	
127.0	222.1	
130.1	221.7	
132.8	222.1	
134.9	222.5	
135.0	222.6	
136.2	223.1	
143.4	225.8	BKF
166.5	226.1	
186.9	226.0	
201.5	225.7	
229.0	225.4	
257.8	225.4	
282.8	225.7	
299.7	225.8	
310.9	225.7	
334.7	225.6	
358.6	224.6	RP

2003
2003 Survey

Station	Elevation	Notes
2.0	226.9	
7.0	226.7	
15.6	226.7	LP
31.0	226.4	
44.0	226.1	
58.0	226.4	
75.0	226.6	
91.0	226.6	
103.0	226.3	
107.9	225.9	BKF
109.3	225.6	
113.0	223.5	
115.3	222.4	
116.5	221.7	
117.7	221.5	
119.7	221.5	
121.3	221.1	
122.4	221.2	
124.5	221.0	
127.5	221.1	
130.3	221.4	
132.7	221.5	
134.7	221.9	
136.2	222.0	
137.1	222.3	
140.0	223.7	
143.0	225.0	
144.2	225.2	
147.0	225.7	BKF
157.0	225.9	
177.0	226.0	
200.0	225.6	
208.0	225.4	
219.0	225.5	
247.0	225.4	
274.0	225.5	
293.0	225.8	
300.0	225.7	
306.0	225.7	
320.0	225.4	
337.0	225.4	
356.0	225.6	
359.6	225.6	RP
363.5	225.6	
368.0	226.2	
376.0	226.7	
386.0	227.6	

Photo of Cross-Section AR3-5 - Looking Downstream @ STA 46+40

	2005	2004	2003	AS-BUILT
Area	93.4	94.0	116.0	99.9
Width	36.4	35.6	39.1	34.3
Mean Depth	2.6	2.6	3.0	2.9
Max Depth	3.9	4.0	4.7	4.2
W/D	14.2	13.2	13.2	11.8



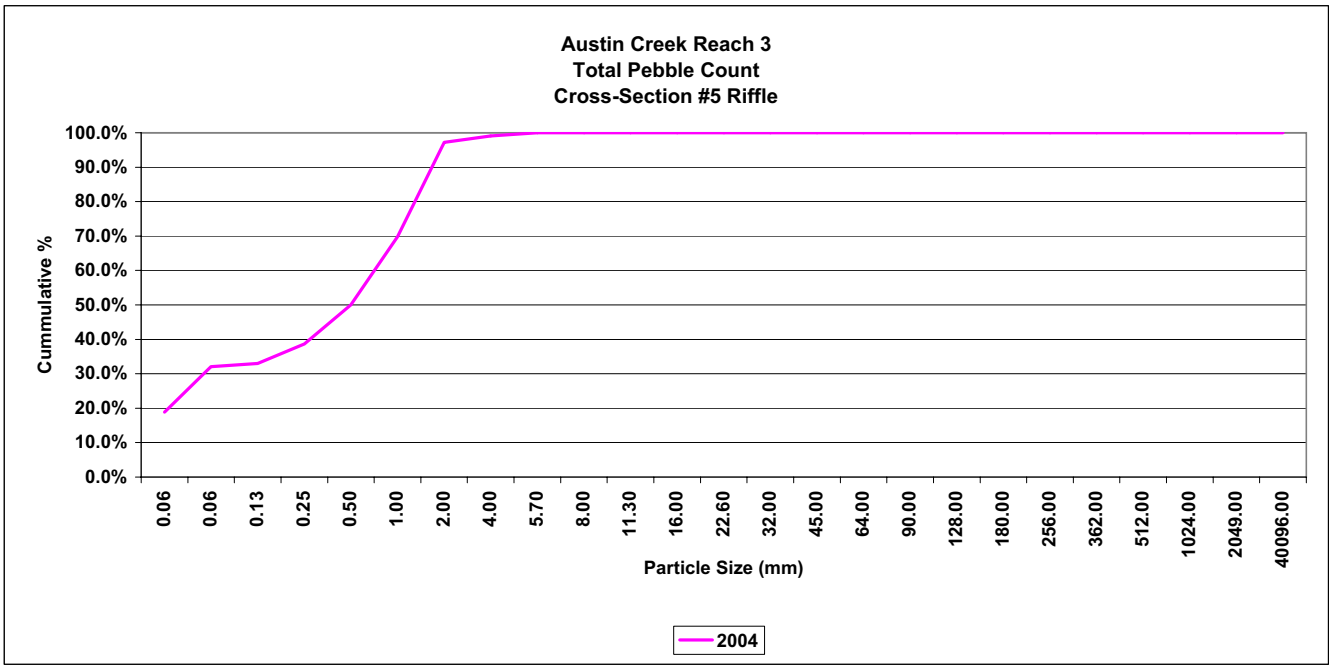
Project Name	Austin Reach 3
Cross Section	#5
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Riffle - Bank	Riffle - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	20	0	20.0%	20.0%
Sand	very fine sand	0.062	14	0	14.0%	34.0%
	fine sand	0.125	0	1	1.0%	35.0%
	medium sand	0.25	0	6	6.0%	41.0%
	course sand	0.50	4	8	12.0%	53.0%
	very course sand	1.0	2	19	21.0%	74.0%
G r a v e l	very fine gravel	2.0	0	29	29.0%	103.0%
	fine gravel	4.0	0	2	2.0%	105.0%
	fine gravel	5.7	0	1	1.0%	106.0%
	medium gravel	8.0	0	0	0.0%	106.0%
	medium gravel	11.3	0	0	0.0%	106.0%
	course gravel	16.0	0	0	0.0%	106.0%
	course gravel	22.6	0	0	0.0%	106.0%
	very course gravel	32	0	0	0.0%	106.0%
	very course gravel	45	0	0	0.0%	106.0%
Cobble	small cobble	64	0	0	0.0%	106.0%
	medium cobble	90	0	0	0.0%	106.0%
	large cobble	128	0	0	0.0%	106.0%
	very large cobble	180	0	0	0.0%	106.0%
Boulder	small boulder	256	0	0	0.0%	106.0%
	small boulder	362	0	0	0.0%	106.0%
	medium boulder	512	0	0	0.0%	106.0%
	large boulder	1024	0	0	0.0%	106.0%
	very large boulder	2049	0	0	0.0%	106.0%
Bedrock	bedrock	40096	0	0	0.0%	106.0%
TOTAL / %of whole count			40	66	106.0%	

	d16	d35	d50	d85	d95
2004	0.00	0.19	0.66	2.02	2.59



Project Name	Smith and Austin
Cross Section	AR3-6
Feature	Pool
Date	6/2/05
Crew	Bidelspach, Clinton

2005
2005 Survey

Station	Elevation	Notes
95.3	224.8	
126.9	224.7	
146.7	224.5	
165.6	224.0	
169.4	223.4	
170.7	223.0	
173.4	222.8	
175.1	222.5	
178.6	222.2	
180.5	222.5	
181.8	222.4	
184.2	222.0	
187.4	221.9	
189.4	221.7	
191.2	221.6	
192.2	221.3	
194.3	223.0	
196.5	223.3	
199.1	224.8	
204.7	225.2	
220.7	225.8	
227.4	226.2	RP

2004
2004 Survey

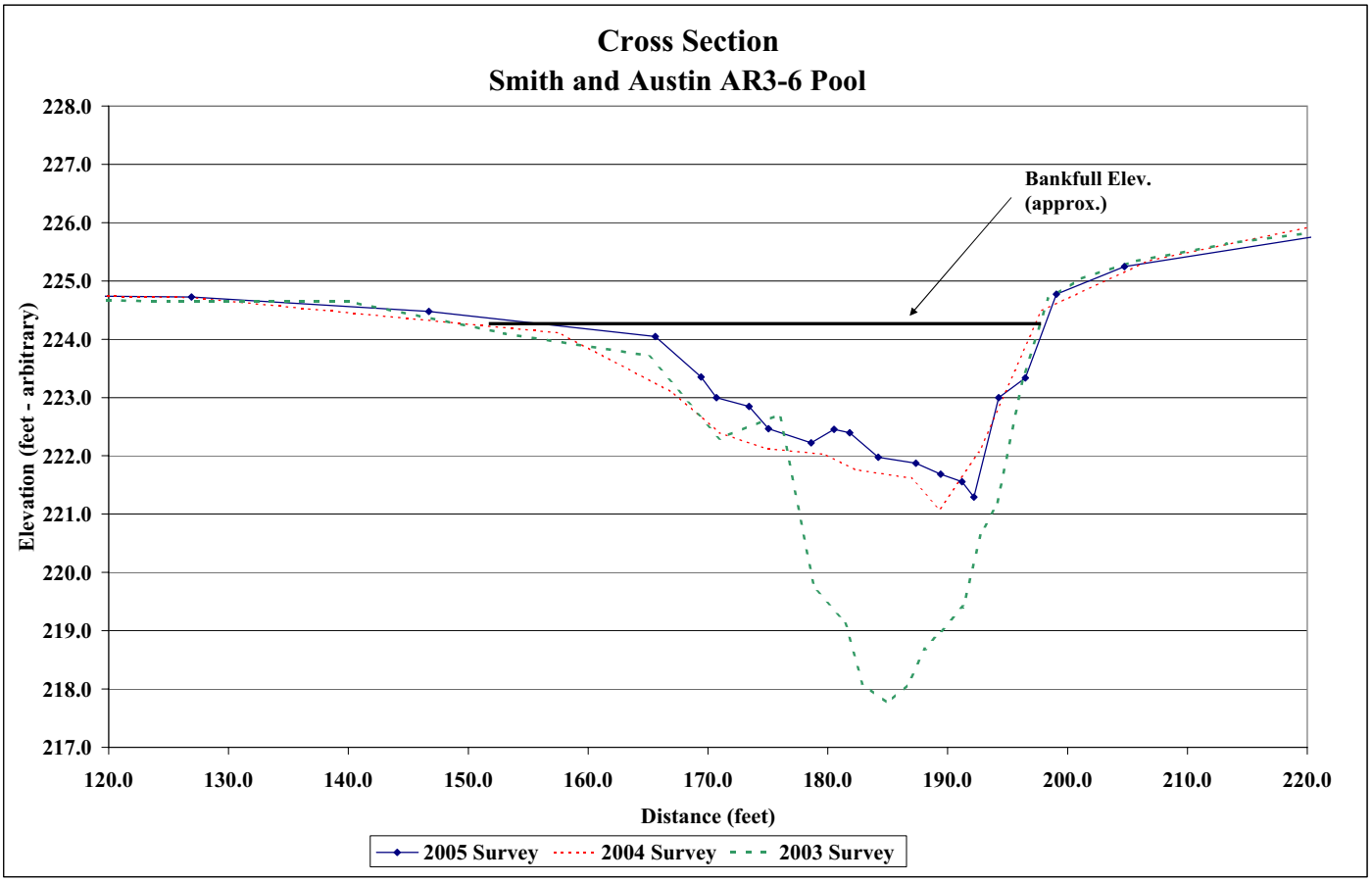
Station	Elevation	Notes
79.9	225.1	LP
94.7	224.8	
126.9	224.7	
157.7	224.1	BKF
167.2	223.1	
171.0	222.4	
174.8	222.1	
179.8	222.0	
182.2	221.8	
187.0	221.6	
189.3	221.1	
192.6	222.1	
197.8	224.5	
206.6	225.3	
227.4	226.2	RP

2003
2003 Survey

Station	Elevation	Notes
2.0	226.6	
20.0	226.2	
37.0	225.9	
61.0	225.4	
79.9	225.2	LP
101.0	224.7	
125.0	224.7	
140.0	224.7	BKF
153.0	224.1	
165.0	223.7	
171.0	222.3	
176.0	222.7	
178.9	219.7	
181.4	219.2	
182.9	218.1	
185.0	217.8	
186.7	218.1	
188.1	218.7	
189.4	219.0	
191.3	219.4	
192.8	220.7	
194.1	221.2	
196.3	223.3	
198.4	224.7	BKF
201.0	225.0	
205.3	225.3	
213.3	225.6	
223.0	225.9	
227.4	226.2	RP
229.0	226.2	

Photo of Cross-Section AR3-6 - Looking Downstream @ STA 48+20

	2005	2004	2003	AS-BUILT
Area	63.7	70.0	108.9	135.7
Width	39.1	56.9	58.4	58.3
Mean Depth	1.6	1.2	1.9	2.3
Max Depth	3.2	3.4	6.7	6.9
W/D	24.0	46.2	31.3	25.0

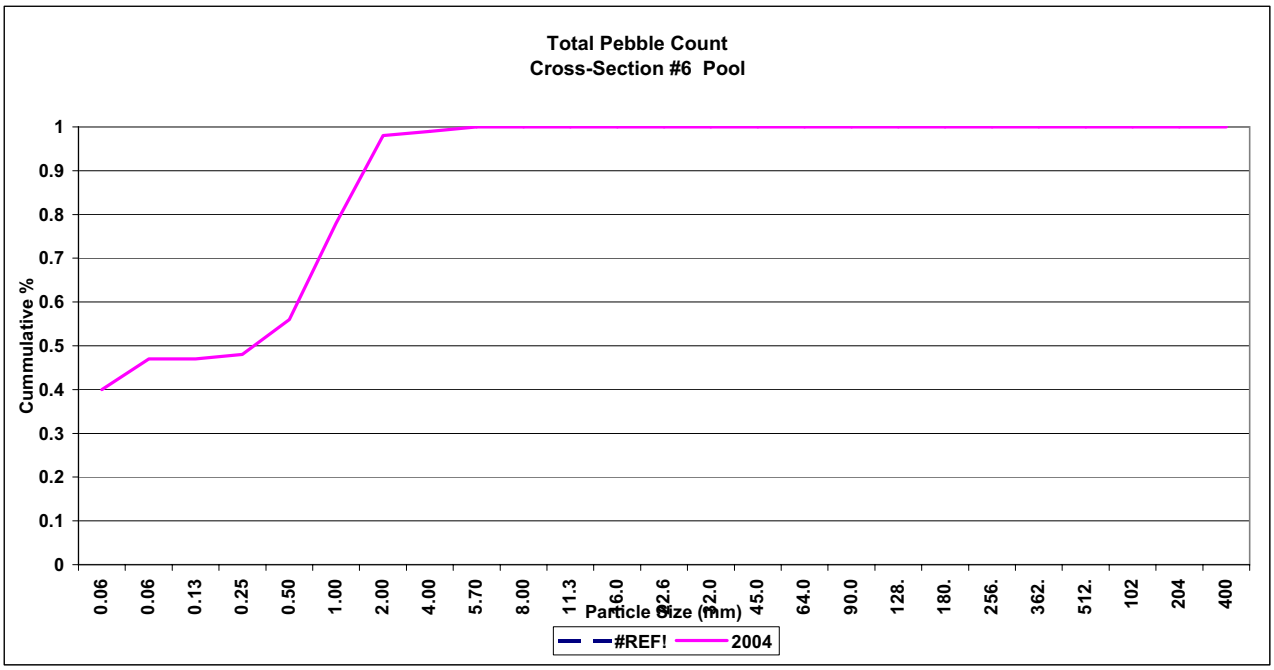


Project Name	Austin Reach 3
Cross Section	#6
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

			2004			
Description	**Material**	**Size (mm)**	**Pool - Bank**	**Pool - Bed**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	40	0	40.0%	40.0%
Sand	very fine sand	0.062	7	0	7.0%	47.0%
	fine sand	0.125	0	0	0.0%	47.0%
	medium sand	0.25	0	1	1.0%	48.0%
	course sand	0.50	1	7	8.0%	56.0%
	very course sand	1.0	9	13	22.0%	78.0%
Gravel	very fine gravel	2.0	3	17	20.0%	98.0%
	fine gravel	4.0	0	1	1.0%	99.0%
	fine gravel	5.7	0	1	1.0%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			60	40	100.0%	

	d16	**d35**	**d50**	**d85**	
2004	0.00	0.00	0.47	1.95	

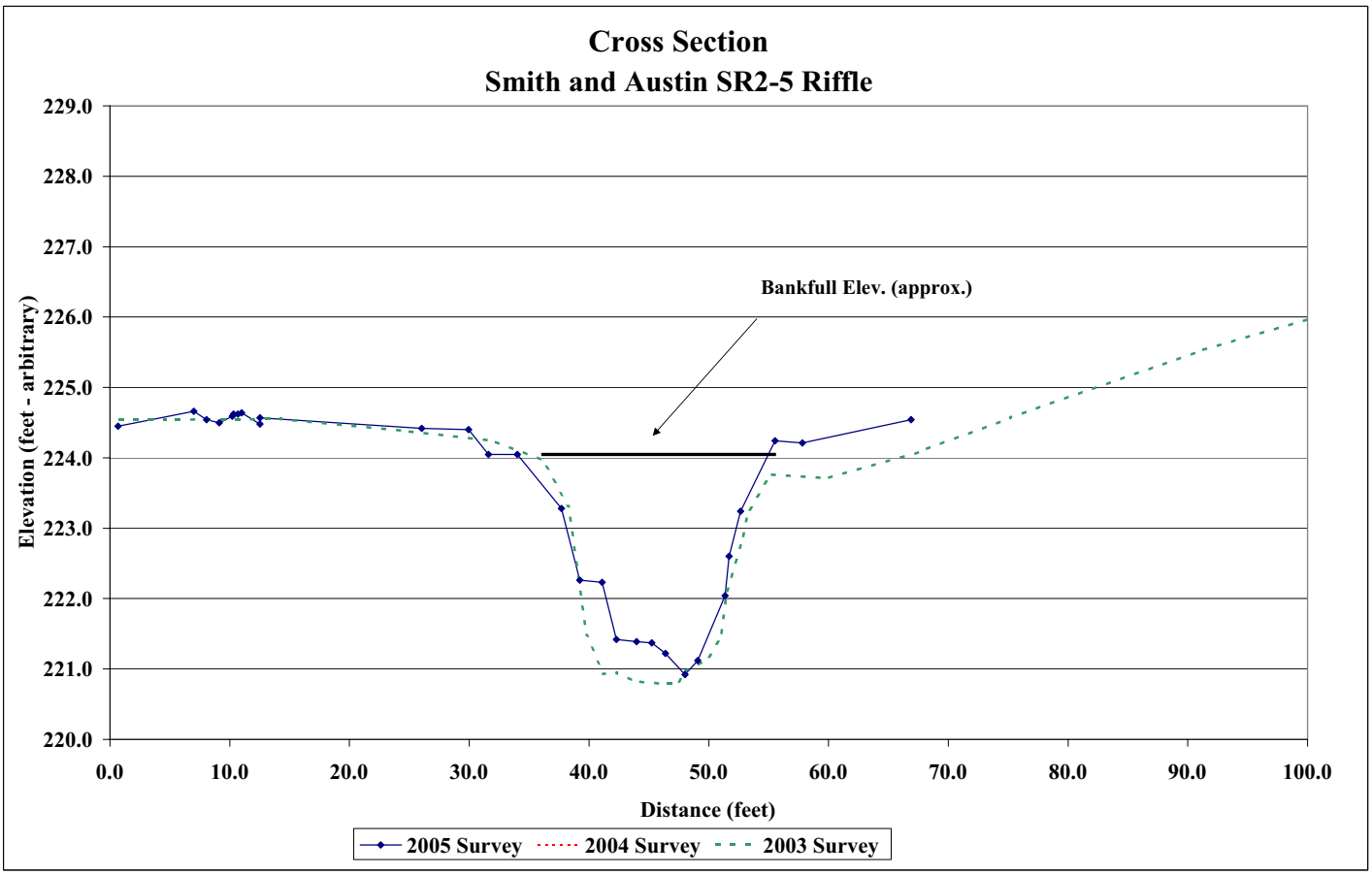


Project Name	Smith and Austin
Cross Section	SR2-5
Feature	Riffle
Date	6/2/05
Crew	Bidelspach, Clinton

2005 Survey			2004 Survey			2003 Survey		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.7	224.5	LP				0.8	224.5	LP
7.0	224.7					4.6	224.5	
8.1	224.5					14.3	224.6	
9.1	224.5					24.8	224.4	
10.2	224.6					32.0	224.2	
10.3	224.6					36.1	224.0	
10.7	224.6					38.3	223.3	
11.0	224.6					39.8	221.5	
12.5	224.5					41.2	220.9	
12.5	224.6					42.3	221.0	
26.0	224.4					43.7	220.8	
30.0	224.4					46.1	220.8	
31.6	224.1					47.4	220.8	
34.0	224.1					48.0	221.0	
37.7	223.3					49.8	221.1	
39.2	222.3					51.0	221.4	
41.1	222.2					51.5	222.1	
42.3	221.4					52.7	222.8	
44.0	221.4					53.3	223.2	
45.2	221.4					55.2	223.8	BKF
46.4	221.2					59.9	223.7	
48.0	220.9					67.5	224.1	
49.1	221.1					75.2	224.6	
51.4	222.0					90.9	225.5	
51.7	222.6					102.5	226.1	
52.7	223.2					111.6	227.3	
55.5	224.2					121.0	228.1	
57.8	224.2					125.9	228.3	RP
66.9	224.5					131.0	228.2	

Photo of Cross-Section SR2-5 - Looking Downstream @ STA 39+20

	2005	2004	2003	AS-BUILT
Area	31.4		35.8	37.2
Width	16.4		16.9	18.4
Mean Depth	1.9		2.1	2.0
Max Depth	2.8		3.0	3.0
W/D	8.6		8.0	9.1



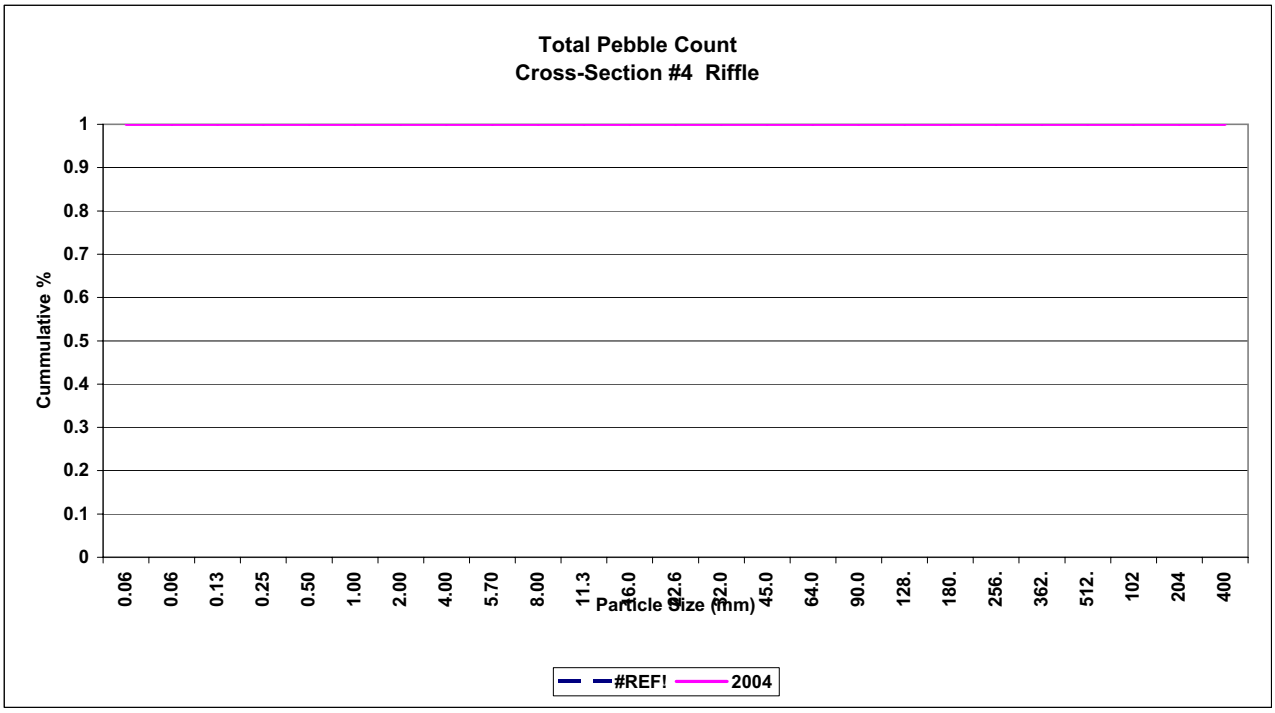
Project Name	Austin Reach 3
Cross Section	#4
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Riffle - Bank	Riffle - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	1	0	100.0%	100.0%
Sand	very fine sand	0.062	0	0	0.0%	100.0%
	fine sand	0.125	0	0	0.0%	100.0%
	medium sand	0.25	0	0	0.0%	100.0%
	course sand	0.50	0	0	0.0%	100.0%
	very course sand	1.0	0	0	0.0%	100.0%
Gravel	very fine gravel	2.0	0	0	0.0%	100.0%
	fine gravel	4.0	0	0	0.0%	100.0%
	fine gravel	5.7	0	0	0.0%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			1	0	100.0%	

	d16	d35	d50	d85	
2004	0.00	0.00	0.00	0.00	



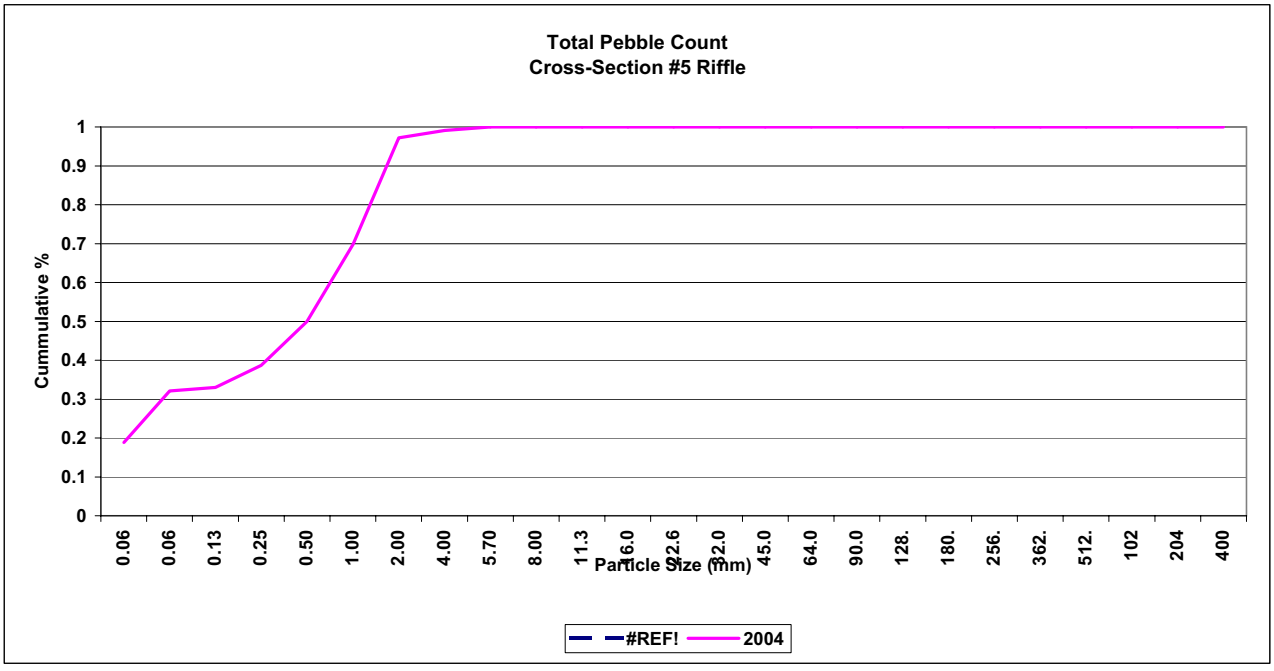
Project Name	Austin Reach 3
Cross Section	#5
Feature	Riffle
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

2004

Description	Material	Size (mm)	Riffle - Bank	Riffle - Bed	%	Cum %
Silt/Clay	silt/clay	0.061	20	0	18.9%	18.9%
Sand	very fine sand	0.062	14	0	13.2%	32.1%
	fine sand	0.125	0	1	0.9%	33.0%
	medium sand	0.25	0	6	5.7%	38.7%
	course sand	0.50	4	8	11.3%	50.0%
	very course sand	1.0	2	19	19.8%	69.8%
G r a v e l	very fine gravel	2.0	0	29	27.4%	97.2%
	fine gravel	4.0	0	2	1.9%	99.1%
	fine gravel	5.7	0	1	0.9%	100.0%
	medium gravel	8.0	0	0	0.0%	100.0%
	medium gravel	11.3	0	0	0.0%	100.0%
	course gravel	16.0	0	0	0.0%	100.0%
	course gravel	22.6	0	0	0.0%	100.0%
	very course gravel	32	0	0	0.0%	100.0%
	very course gravel	45	0	0	0.0%	100.0%
Cobble	small cobble	64	0	0	0.0%	100.0%
	medium cobble	90	0	0	0.0%	100.0%
	large cobble	128	0	0	0.0%	100.0%
	very large cobble	180	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0	0.0%	100.0%
	small boulder	362	0	0	0.0%	100.0%
	medium boulder	512	0	0	0.0%	100.0%
	large boulder	1024	0	0	0.0%	100.0%
	very large boulder	2049	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0	0.0%	100.0%
TOTAL / %of whole count			40	66	100.0%	

	d16	d35	d50	d85	
2004	0.00	0.25	0.75	2.28	

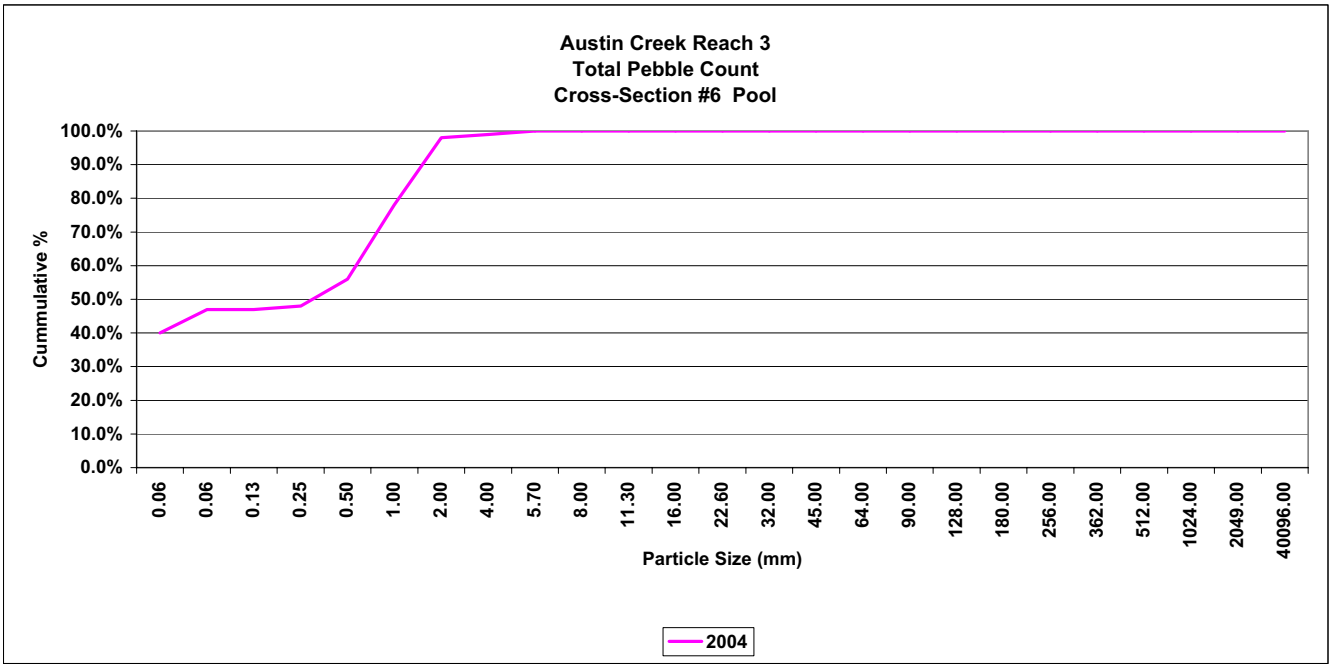


Project Name	Austin Reach 3
Cross Section	#6
Feature	Pool
Date	6/25/04
Crew	Bidelspach, Clinton

Note: As-built bed material not measured

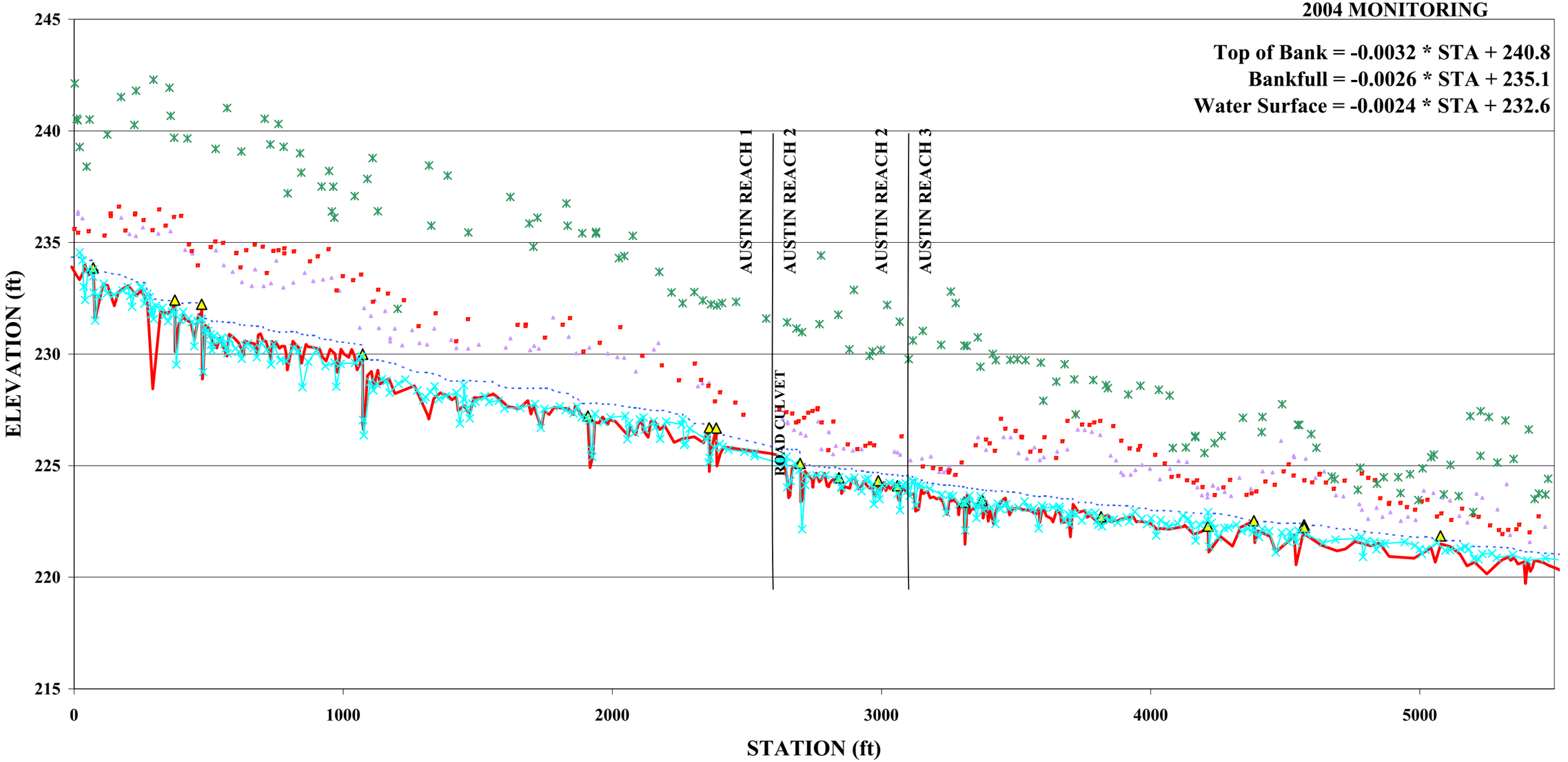
			2004			
Description	**Material**	**Size (mm)**	**Pool - Bank**	**Pool - Bed**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	40	0	37.0%	37.0%
Sand	very fine sand	0.062	7	0	6.5%	43.5%
	fine sand	0.125	0	0	0.0%	43.5%
	medium sand	0.25	0	1	0.9%	44.4%
	course sand	0.50	1	7	7.4%	51.9%
	very course sand	1.0	9	13	20.4%	72.2%
G r a v e l	very fine gravel	2.0	3	17	18.5%	90.7%
	fine gravel	4.0	0	1	0.9%	91.7%
	fine gravel	5.7	0	1	0.9%	92.6%
	medium gravel	8.0	0	0	0.0%	92.6%
	medium gravel	11.3	0	0	0.0%	92.6%
	course gravel	16.0	0	0	0.0%	92.6%
	course gravel	22.6	0	0	0.0%	92.6%
	very course gravel	32	0	0	0.0%	92.6%
	very course gravel	45	0	0	0.0%	92.6%
Cobble	small cobble	64	0	0	0.0%	92.6%
	medium cobble	90	0	0	0.0%	92.6%
	large cobble	128	0	0	0.0%	92.6%
	very large cobble	180	0	0	0.0%	92.6%
Boulder	small boulder	256	0	0	0.0%	92.6%
	small boulder	362	0	0	0.0%	92.6%
	medium boulder	512	0	0	0.0%	92.6%
	large boulder	1024	0	0	0.0%	92.6%
	very large boulder	2049	0	0	0.0%	92.6%
Bedrock	bedrock	40096	0	0	0.0%	92.6%
TOTAL / %of whole count			60	40	92.6%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.00	0.00	0.66	2.45	0.00

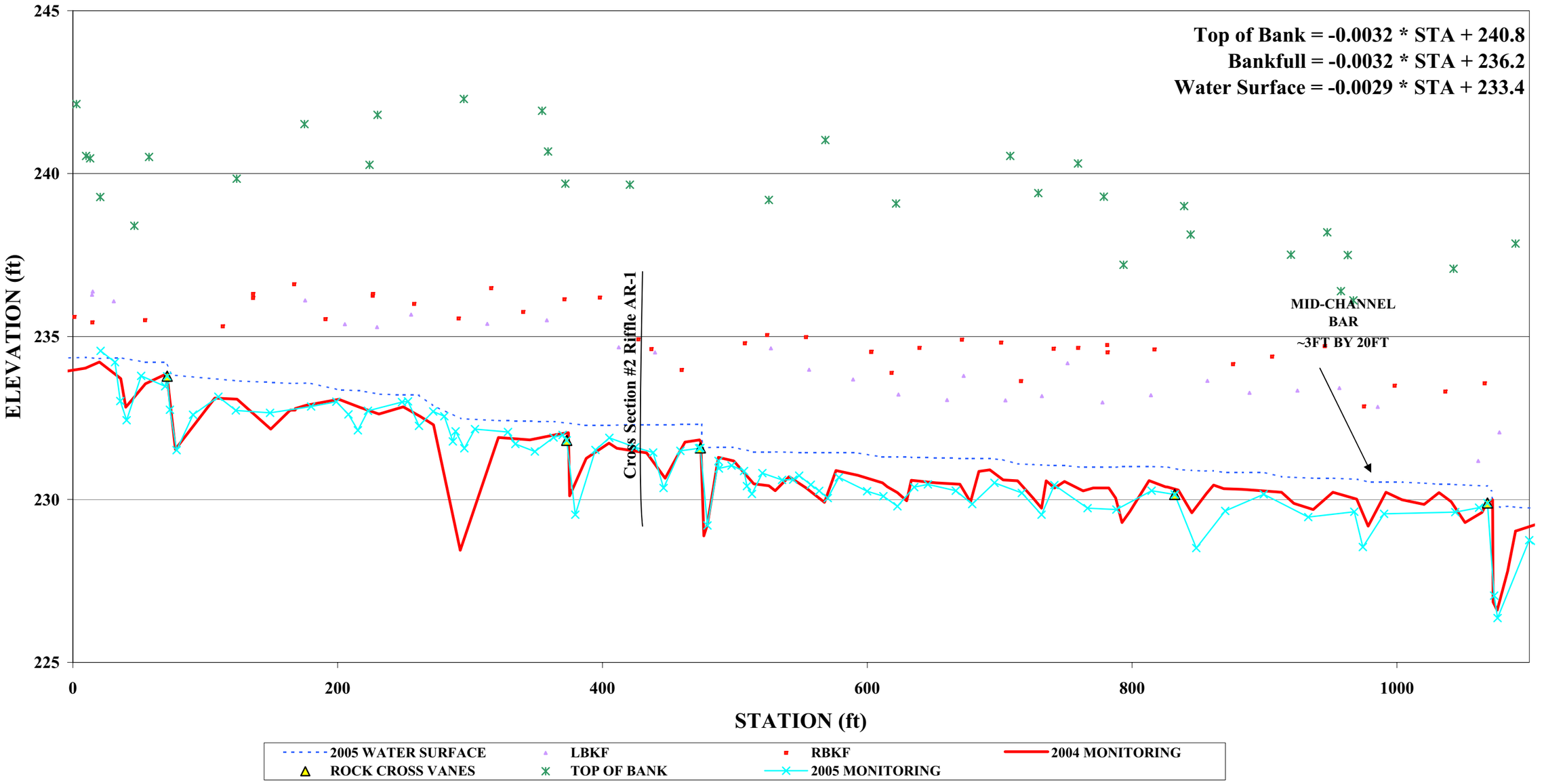


SMITH AND AUSTIN
LONG PROFILE
AUSTIN REACH
STA: 0+00 THRU STA: 55+00
2004 MONITORING

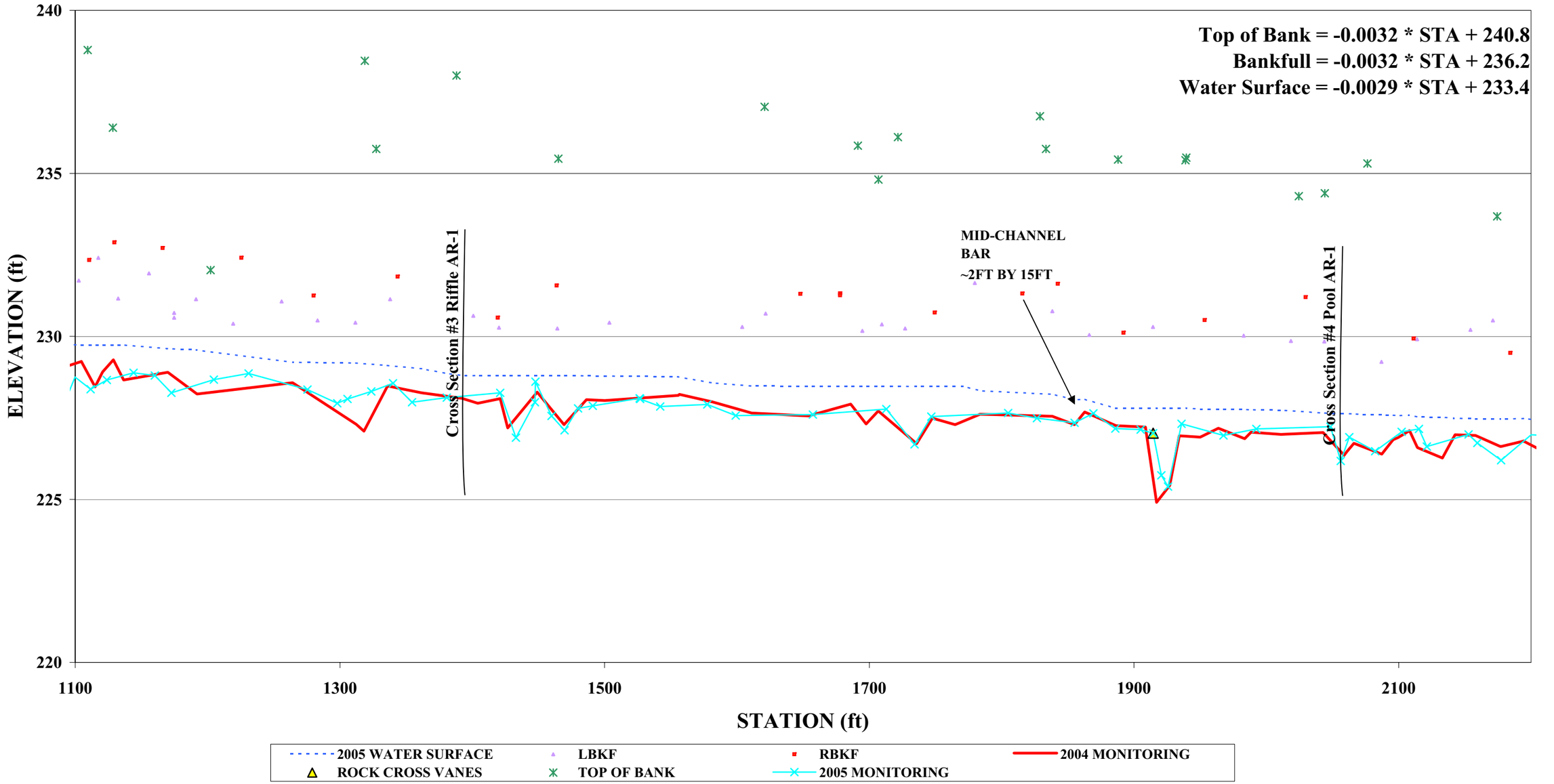
Top of Bank = -0.0032 * STA + 240.8
Bankfull = -0.0026 * STA + 235.1
Water Surface = -0.0024 * STA + 232.6



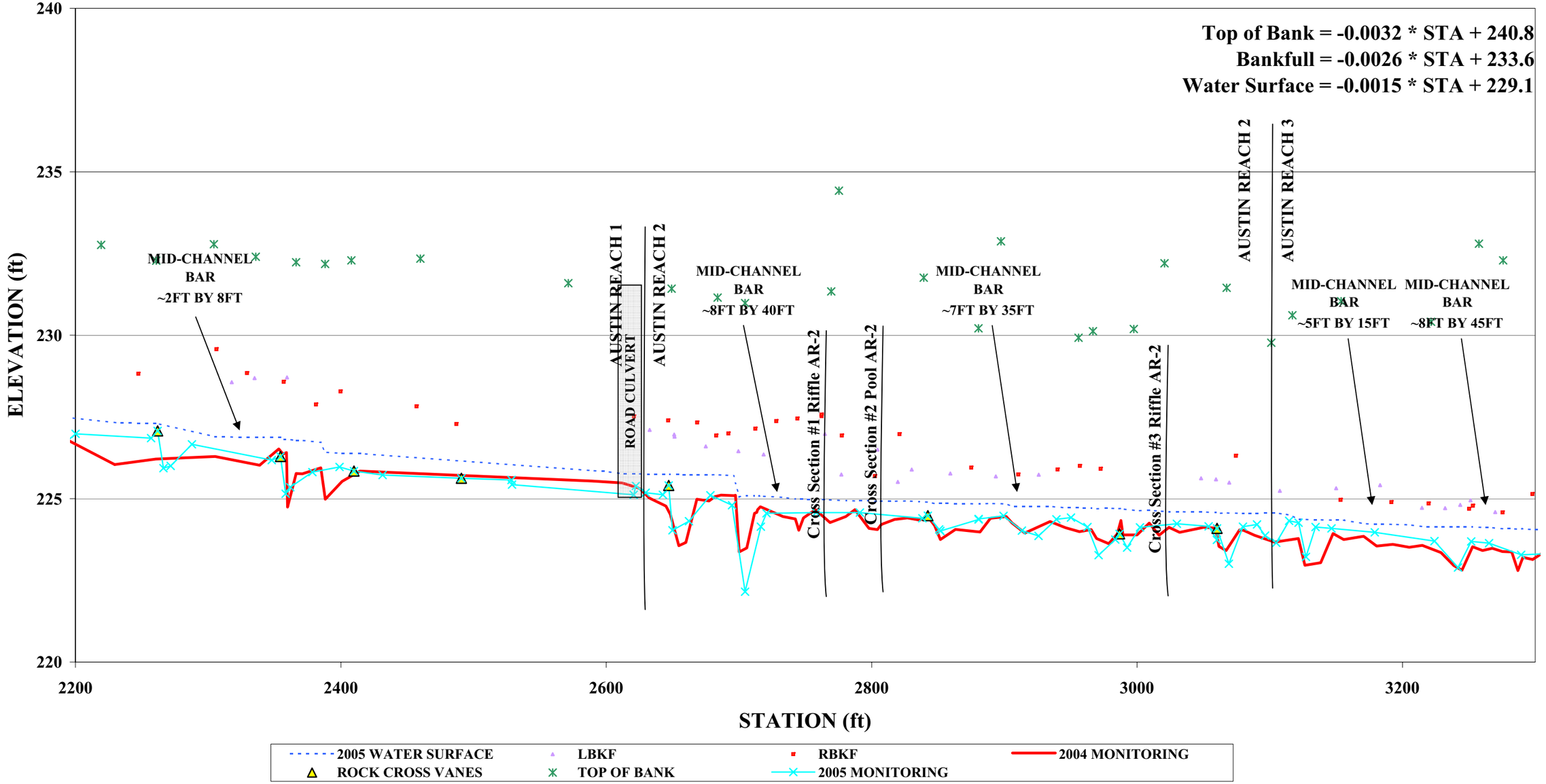
SMITH AND AUSTIN
LONG PROFILE
AUSTIN REACH-1
STA: 0+00 THRU STA: 11+00
2005 MONITORING



SMITH AND AUSTIN
LONG PROFILE
AUSTIN REACH-1
STA: 11+00 THRU STA: 22+00
2005 MONITORING

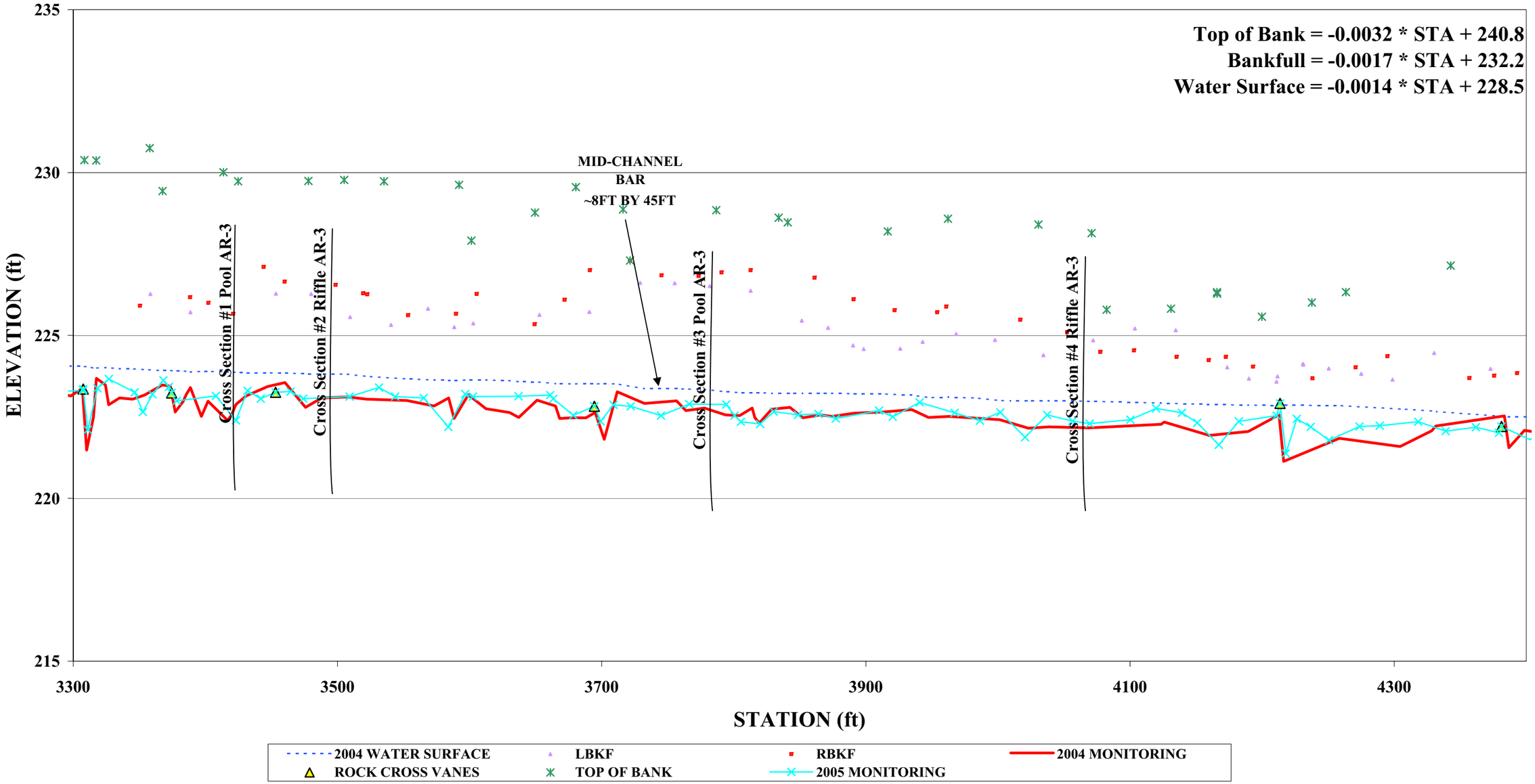


SMITH AND AUSTIN
LONG PROFILE
AUSTIN REACH-2
STA: 22+00 THRU STA: 33+00
2005 MONITORING

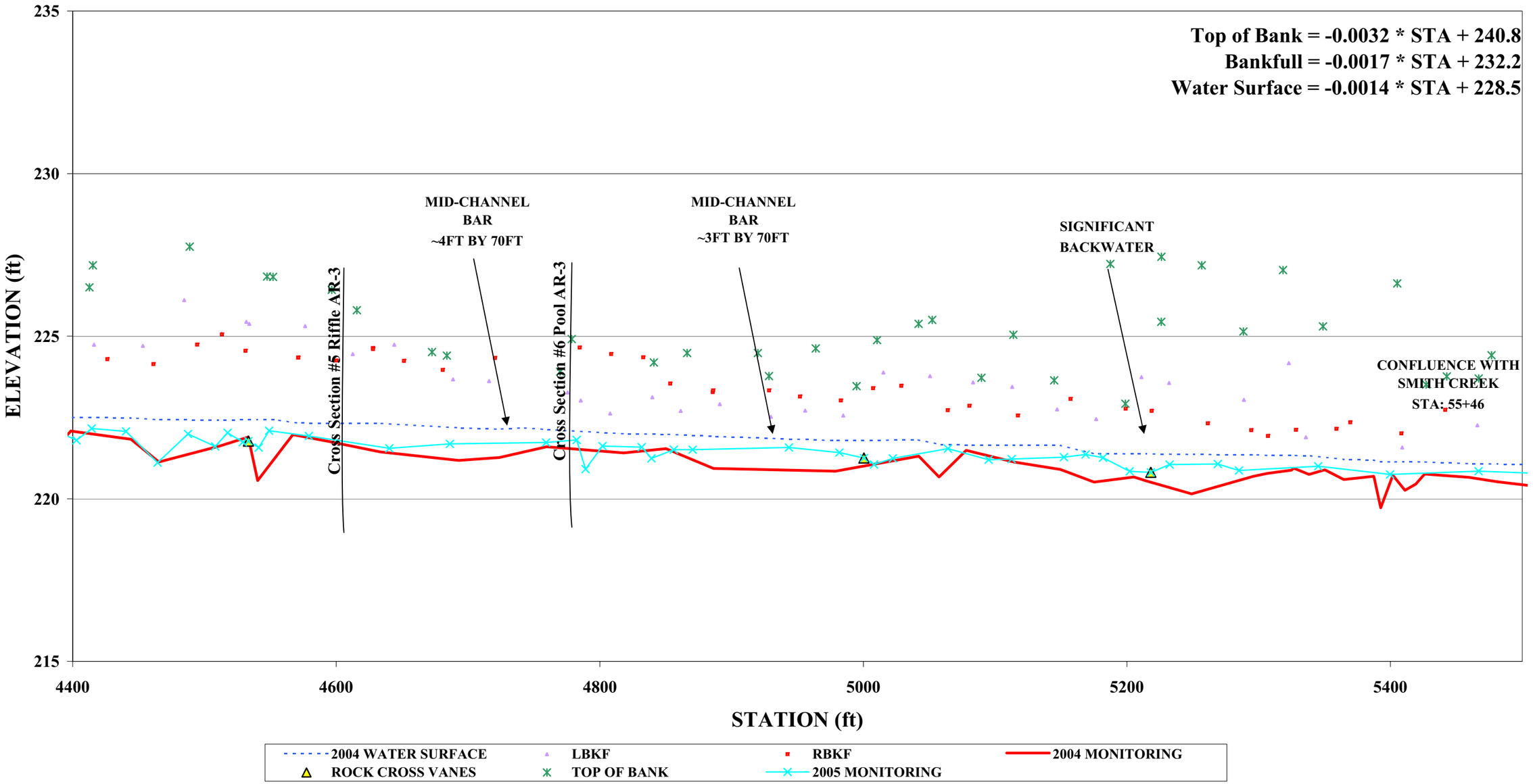


SMITH AND AUSTIN
LONG PROFILE
AUSTIN REACH-3
STA: 33+00 THRU STA: 44+00
2005 MONITORING

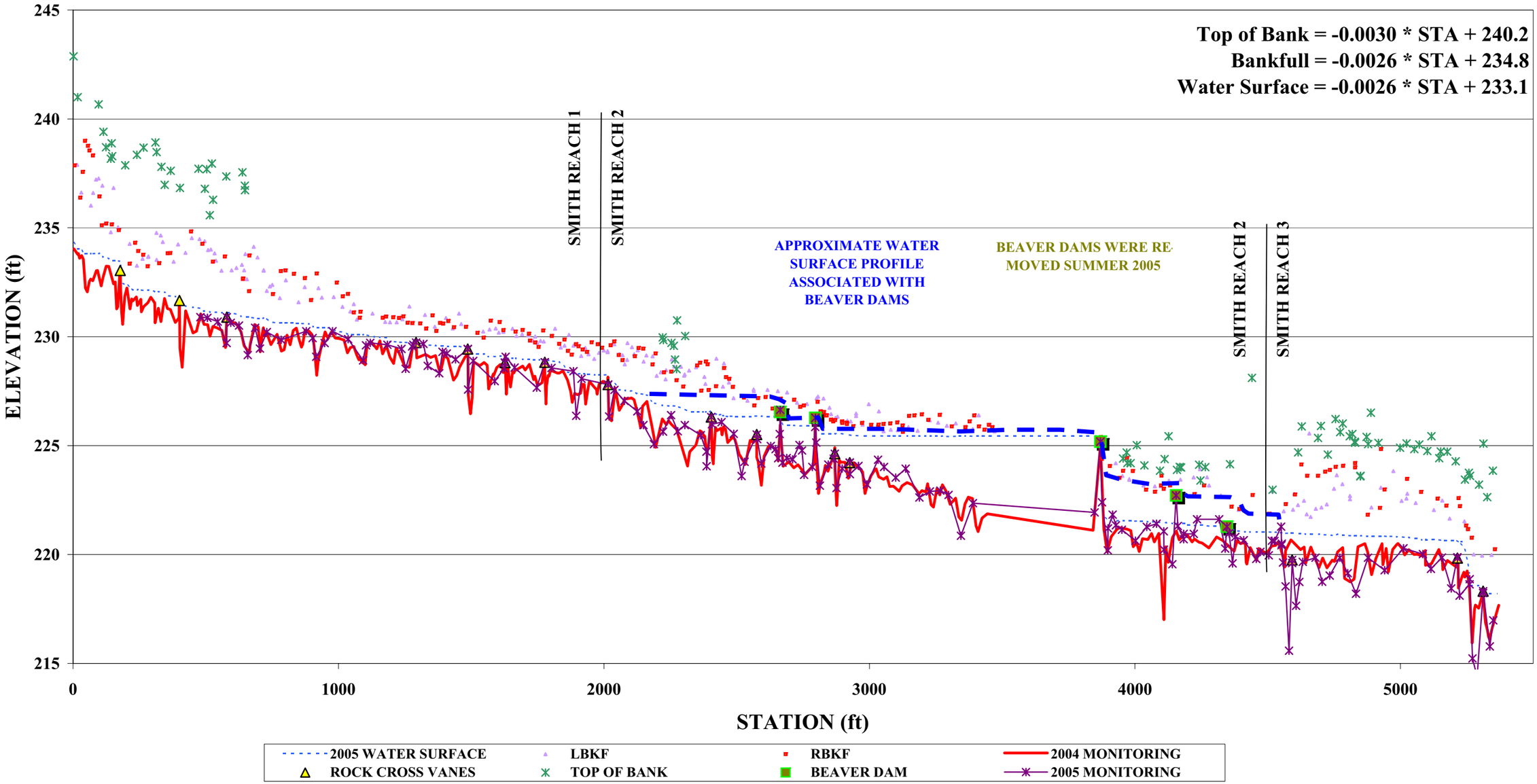
Top of Bank = -0.0032 * STA + 240.8
Bankfull = -0.0017 * STA + 232.2
Water Surface = -0.0014 * STA + 228.5



SMITH AND AUSTIN
LONG PROFILE
AUSTIN REACH-3
STA: 44+00 THRU STA: 55+00
2005 MONITORING

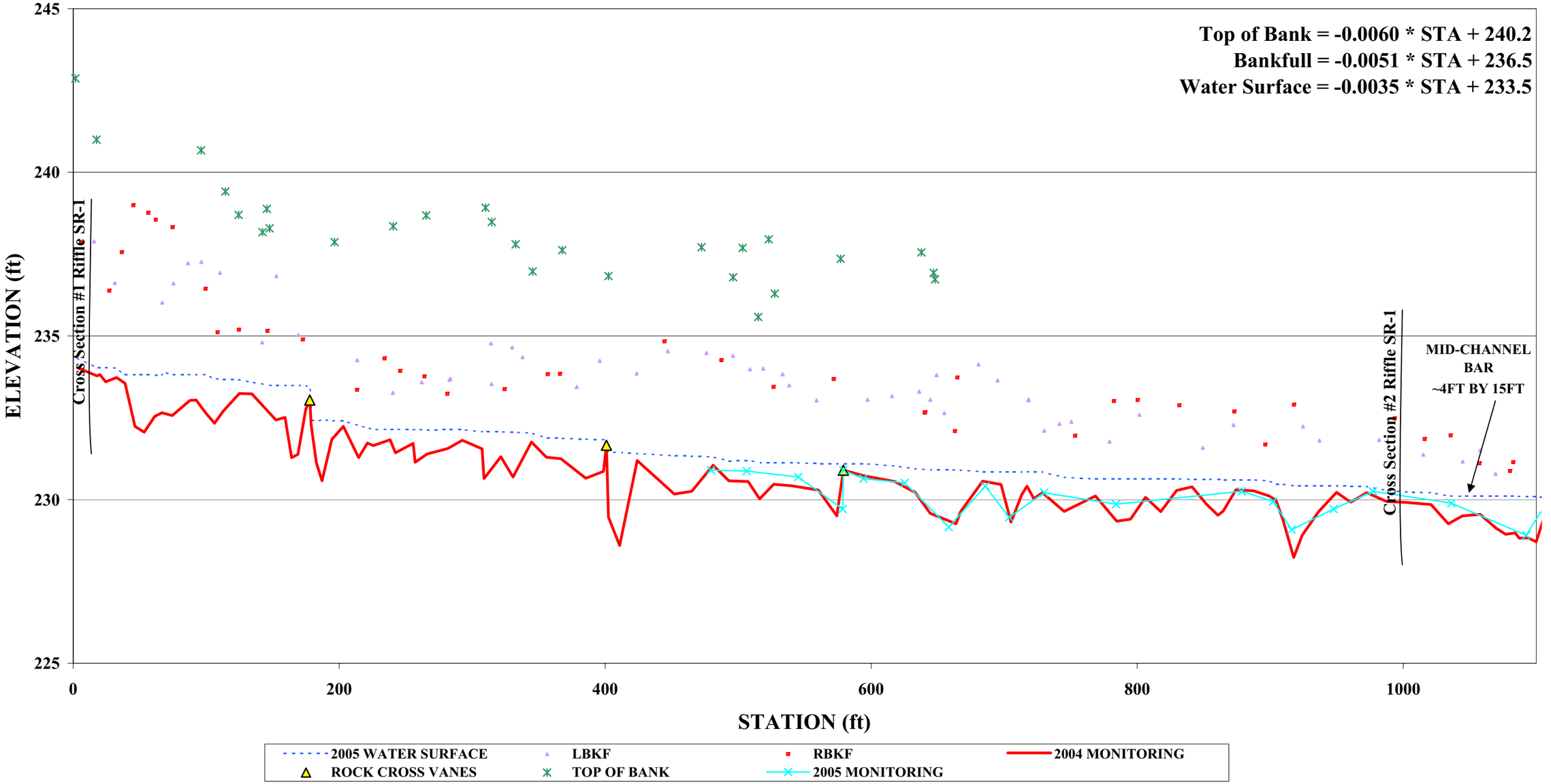


SMITH AND AUSTIN
LONG PROFILE
SMITH REACH
STA: 0+00 THRU STA: 53+70
2005 MONITORING

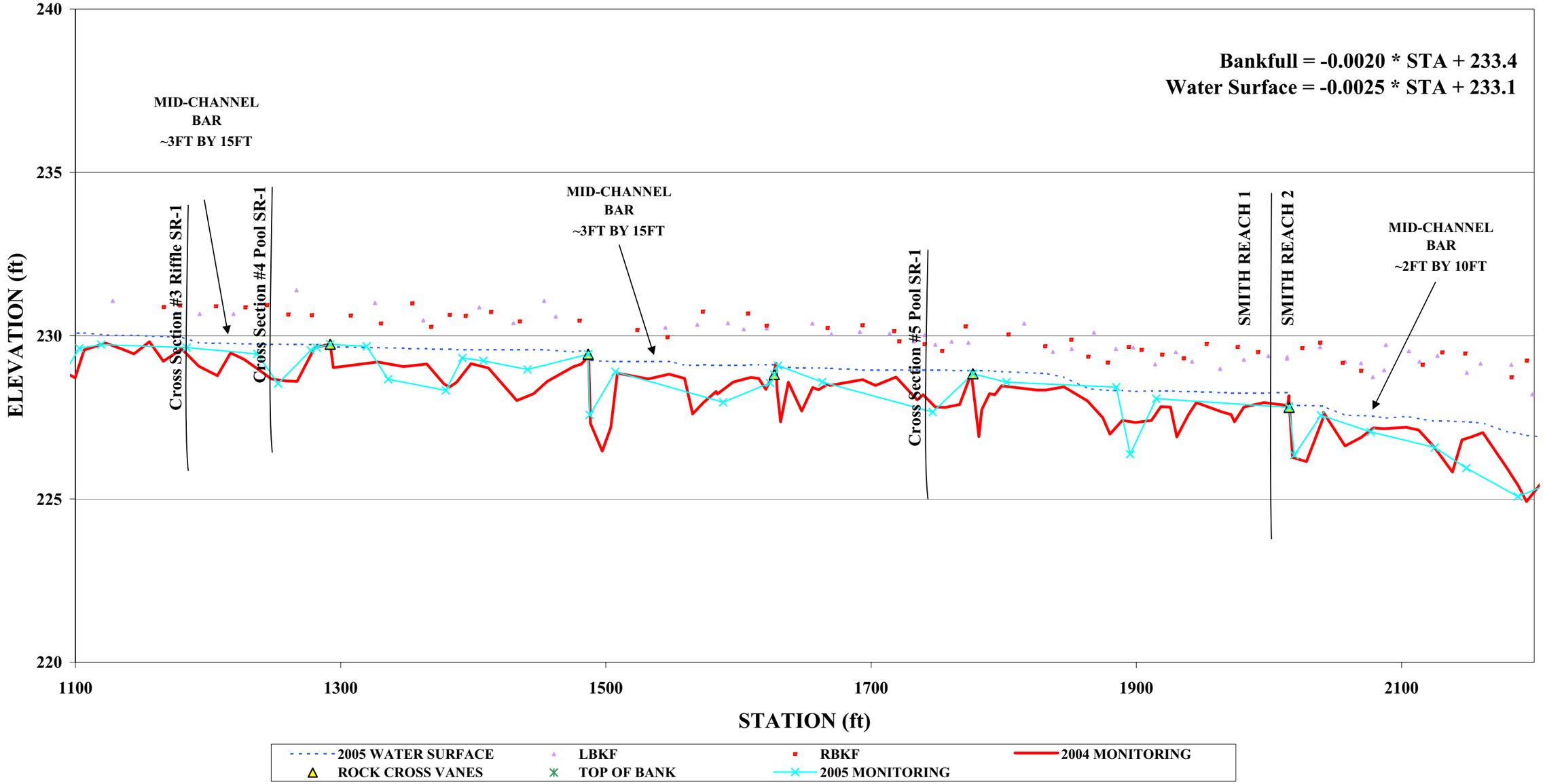


SMITH AND AUSTIN
LONG PROFILE
SMITH REACH-1
STA: 0+00 THRU STA: 11+00
2005 MONITORING

Top of Bank = -0.0060 * STA + 240.2
Bankfull = -0.0051 * STA + 236.5
Water Surface = -0.0035 * STA + 233.5



SMITH AND AUSTIN
LONG PROFILE
SMITH REACH-1
STA: 11+00 THRU STA: 22+00
2005 MONITORING



SMITH AND AUSTIN
LONG PROFILE
SMITH REACH-2
STA: 22+00 THRU STA: 33+00
2005 MONITORING

Bankfull = -0.0027 * STA + 233.5
Water Surface = -0.0014 * STA + 229.9

SIGNIFICANT BACKWATER

APPROXIMATE WATER SURFACE PROFILE ASSOCIATED WITH BEAVER DAMS

BEAVER DAMS WERE RE-MOVED SUMMER 2005

Cross Section #1 Riffle SR-2

Cross Section #2 Pool SR-2

Cross Section #3 Pool SR-2

Cross Section #4 Riffle SR-2

ELEVATION (ft)

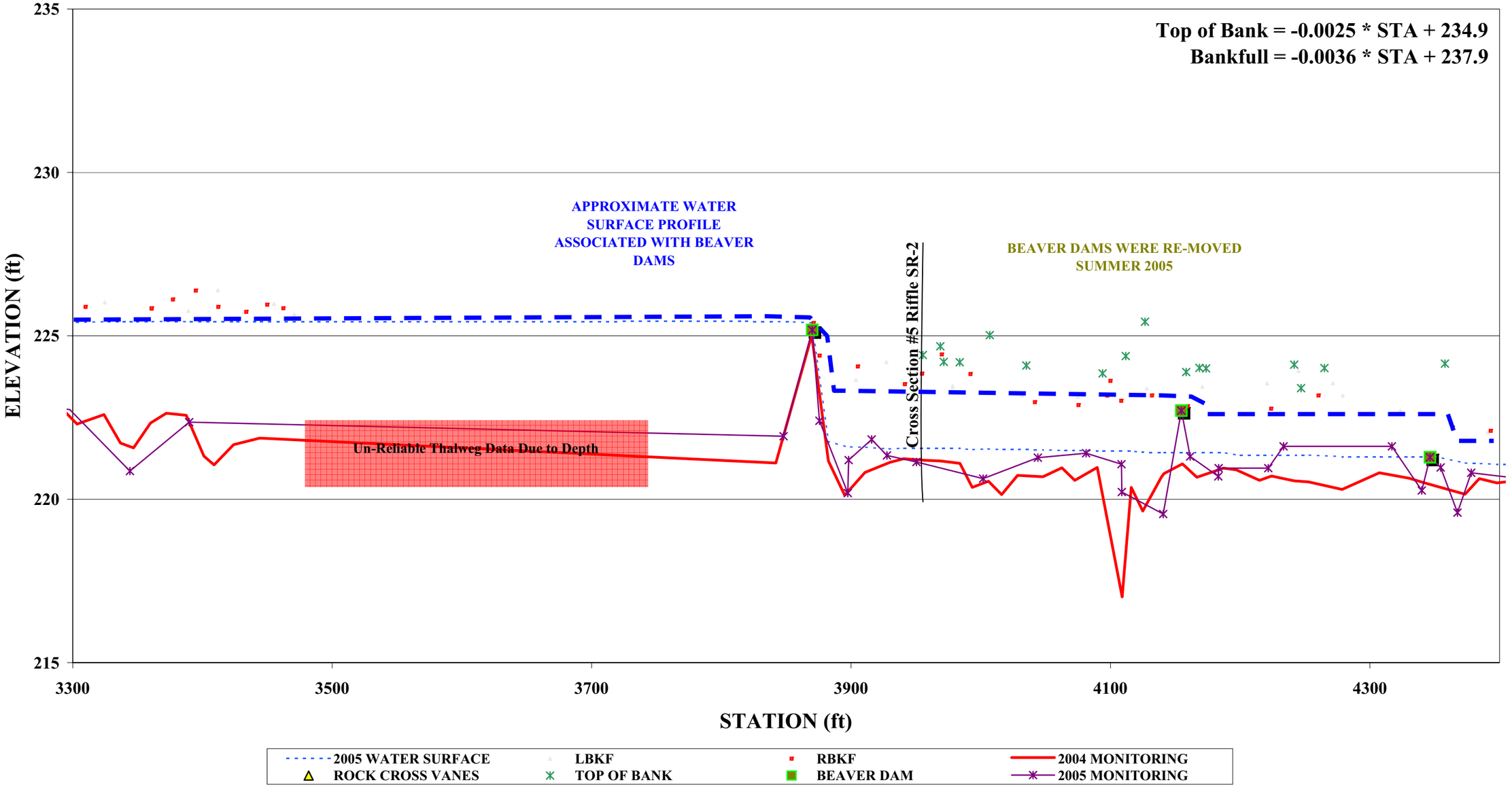
240
235
230
225
220

2200
2400
2600
2800
3000
3200

STATION (ft)

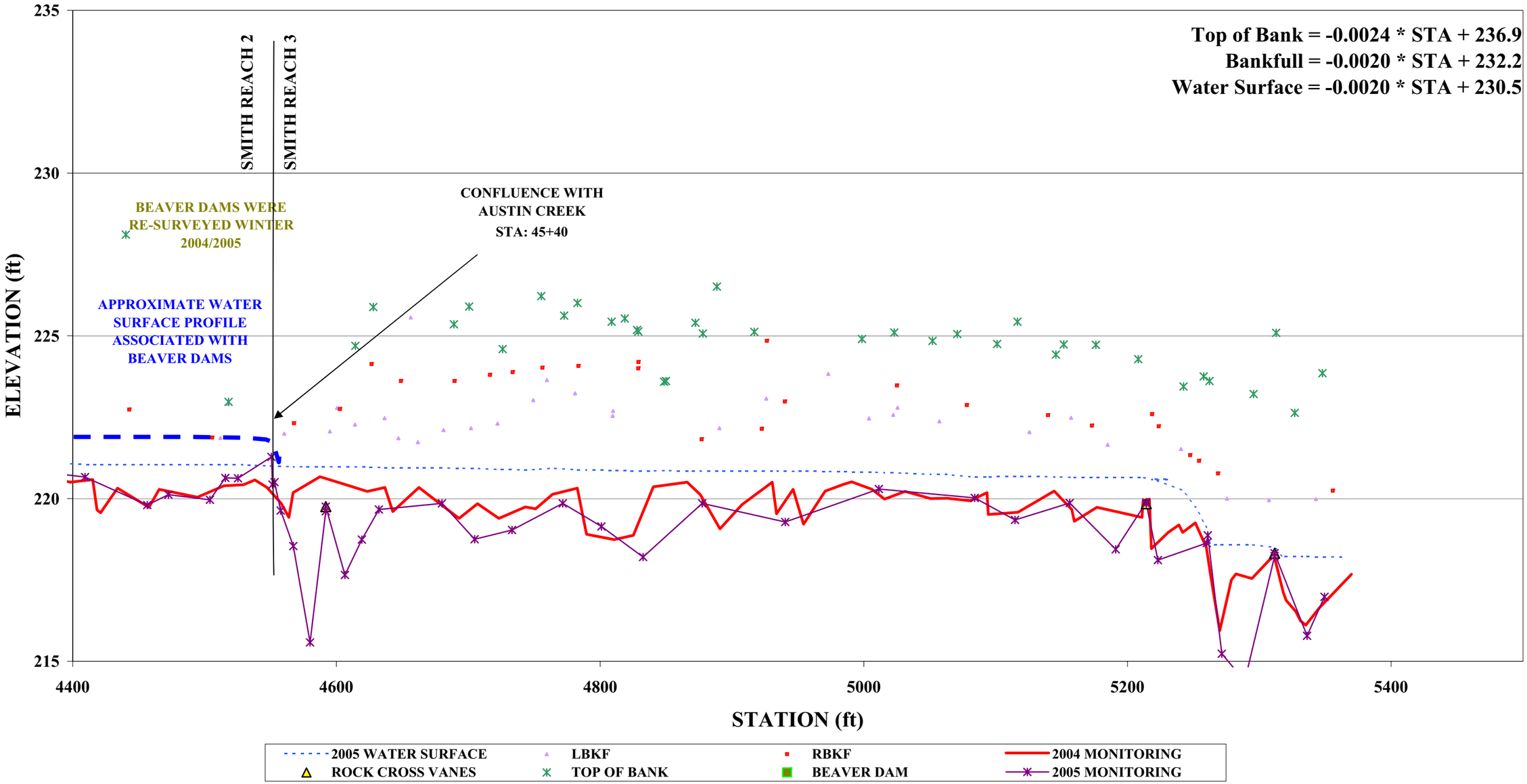
2005 WATER SURFACE
LBKF
RBKF
2004 MONITORING
ROCK CROSS VANES
TOP OF BANK
BEAVER DAM
2005 MONITORING

SMITH AND AUSTIN
LONG PROFILE
SMITH REACH-2
STA: 33+00 THRU STA: 44+00
2005 MONITORING



SMITH AND AUSTIN
LONG PROFILE
SMITH REACH-3
STA: 44+00 THRU STA: 55+00
2005 MONITORING

Top of Bank = -0.0024 * STA + 236.9
Bankfull = -0.0020 * STA + 232.2
Water Surface = -0.0020 * STA + 230.5



Point	Station	Elevation	Description
5995	479.44	230.9	R
5992	506.42	230.87	U
5989	545.18	230.69	G
5986	578.49	229.71	M
1209	579.03	230.9	Rock Vane
5983	594.1	230.64	R
5980	625.23	230.51	U
5977	658.21	229.16	M
5974	685.64	230.41	P
5971	703.69	229.46	M
5968	730	230.21	R
5871	784.06	229.86	G
5868	878.38	230.25	R
5865	902.26	229.94	P
5862	916.05	229.08	M
5859	947.63	229.71	G
5856	977.19	230.25	R
5852	1036.09	229.89	U
5849	1092.39	228.91	M
5847	1103.14	229.61	G
5844	1119.51	229.72	R
5841	1183.9	229.63	T
5838	1237.12	229.44	P
5810	1252.85	228.53	M
5807	1277.49	229.55	G
5804	1282.05	229.63	R
884	1292.14	229.73	Rock Vane
5801	1319.64	229.67	R
5798	1335.94	228.66	U
5795	1379.33	228.32	M
5792	1391.77	229.31	G
5789	1407.63	229.23	T
5786	1440.93	228.96	T
5783	1486.61	229.43	VANE
5783	1486.61	229.43	Rock Vane
5781	1487.89	227.57	T
5778	1507.12	228.89	U
5775	1588.4	227.96	M
5774	1623.78	228.55	T
5769	1626.94	228.81	RV
5769	1626.94	228.81	Rock Vane
5772	1629.77	229.08	T
5766	1663.17	228.58	T
5763	1746.45	227.66	M
5760	1776.76	228.83	RV
5760	1776.76	228.83	Rock Vane
5757	1802.03	228.57	R
5754	1884.84	228.42	P
5752	1895.33	226.37	M
5749	1915.01	228.07	G
5746	2015.15	227.8	RV
5746	2015.15	227.8	Rock Vane
5741	2019.25	226.34	M
5740	2039.07	227.56	R
5945	2076.78	227.05	T
5942	2125.04	226.57	T
5939	2148.83	225.94	T
5936	2187.73	225.07	T
5933	2222.34	225.64	T
5930	2252.83	226.4	T
5927	2277.87	225.66	T
5924	2304.28	225.94	T
5737	2364.74	225.48	T
5734	2385.55	224.72	T
5922	2386.44	224.05	m
568	2403.94	226.31	Rock Vane
5688	2406.54	225.98	T
5685	2442.35	226.08	T
5682	2488.31	225.54	T
5674	2518	223.6	t
5673	2529.11	224.26	t
10100	2575.45	225.51	Rock Vane
5672	2577.31	225.3	t
5671	2592.32	224.18	t
5665	2628.3	224.98	t
5663	2645.95	224.84	t
5660	2656.2	224.42	t
5658	2661.54	225.53	t
5657	2663.51	226.64	Beaver Dam
5654	2671.86	224.22	t
5651	2688.3	224.43	t
5648	2710.2	224.37	t
5643	2735.81	225.03	t
5641	2745.58	224.78	t
5640	2753.85	223.66	t
5637	2784.61	224.02	t
5634	2795.32	225.86	t
5633	2796.03	226.27	Beaver Dam
5631	2799.64	225.14	t
5628	2812.97	223.16	t
5625	2844.39	224.13	t
5621	2865.68	224.4	t
5620	2869.01	224.63	Rock Vane
5617	2875.77	223.05	m
5614	2897.03	223.95	t
5611	2925.74	224.22	rv
5611	2925.74	224.22	Rock Vane
5612	2926.3	223.69	t
5608	2958.67	224.07	t
5605	2990.2	223.22	T
5602	3031.91	224.35	t
5599	3054.7	224.02	t
5996	479.86	230.95	Water
5993	510.15	231.16	Water
5990	546.48	230.74	Water
5987	578.89	231.17	Water
5985	592.68	230.97	Water
5981	623.65	231.07	Water
5978	659.77	230.76	Water
5976	683.87	230.96	Water
5972	698.38	229.4	Water
5969	741.15	230.78	Water
5872	785.28	230.84	Water
5869	877.09	230.85	Water
5866	902.2	229.97	Water
5863	916.34	230.62	Water
5860	948.49	230.74	Water
5858	965.51	233.88	Water
5854	1033.63	230.35	Water
5851	1091.81	230.38	Water
5848	1103.19	230.44	Water
5846	1117.77	230.32	Water
5843	1184.79	229.53	Water
5839	1236.65	230.03	Water
5811	1253.64	230	Water
5809	1278.06	230.08	Water
5805	1284.39	229.85	Water
5802	1320.58	230.06	Water
5799	1335.21	229.94	Water
5797	1372.38	229.81	Water
5793	1391.3	229.88	Water
5791	1405.49	229.85	Water
5788	1441.02	229.85	Water
5784	1486.25	229.75	Water
5782	1487.25	227.58	Water
5779	1504.58	229.45	Water
5776	1589.01	228.94	Water
5331	1598.24	218.16	Water
5770	1626.7	229.41	Water
5773	1627.64	229.21	Water
5768	1663.18	231.07	Water
5764	1746.52	229.16	Water
5761	1777.43	229.17	Water
5758	1801.53	229.06	Water
5756	1888.44	228.29	Water
5753	1894.94	228.52	Water
5751	1916.19	228.47	Water
5745	2011.65	229.8	Water
5748	2015.14	229.17	Water
5743	2045.85	229	Water
5947	2076.14	227.35	Water
5944	2123.5	226.98	Water
5941	2148.25	226.94	Water
5937	2187.19	226.92	Water
5934	2221.76	227.44	Water
5932	2253.52	226.41	Water
5928	2275.17	225.23	Water
5926	2301.6	226.81	Water
5739	2364.31	227.17	Water
5923	2381.87	226.45	Water
5735	2382.86	227.19	Water
5689	2404.82	227.53	Water
5687	2444.98	229.76	Water
5683	2492.34	227.42	Water
5675	2519.07	227.51	Water
5677	2535.06	227.58	Water
5679	2571.02	227.53	Water
5680	2593.03	227.54	Water
5666	2628.8	223.63	Water
5664	2644	223.63	Water
5661	2652.77	223.58	Water
5659	2662	223.56	Water
5655	2667.92	226.26	Water
5652	2687.35	226.25	Water
5649	2711.31	226.21	Water
5647	2737.15	226.28	Water
5642	2744.94	226.23	Water
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5635	2795.94	226.25	Water
5632	2799.68	225.78	Water
5629	2811.89	225.86	Water
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5618	2876.06	225.81	Water
5615	2894.33	225.81	Water
5613	2926.26	225.82	Water
5610	2956.71	225.73	Water
5606	2991.5	225.8	Water
5603	3029.77	225.79	Water
5600	3055.14	225.79	Water
5597	3095.52	225.86	Water
5594	3141.04	225.76	Water
5527	3188.13	225.29	Water
5525	3228.54	226.13	Water
5521	3266.37	225.55	Water
5493	3300.15	225.89	Water
5467	3315.88	228.75	Water
5466	3340.05	229.06	Water
5491	3344.08	225.58	Water
5468	3357.36	229.04	Water
5488	3391.29	225.41	Water
5469	3421.35	228.88	Water
5465	3426.72	229.01	Water
5464	3490.09	229.11	Water
5470	3496.76	225.31	Water
5997	470.04	238.45	LBKF
5991	545.06	233.95	LBKF
5988	573.1	230.8	LBKF
5982	623.87	232.76	LBKF
5975	686.17	230.28	LBKF
5970	742.07	233.37	LBKF
5873	787.78	232.51	LBKF
5867	900.94	231.91	LBKF
5861	951.32	232.77	LBKF
5853	1038.57	233.49	LBKF
5845	1120.01	230.17	LBKF
5840	1237.09	231.52	LBKF
5812	1250	230.15	LBKF
5806	1285.14	232.43	LBKF
5800	1336.48	232.36	LBKF
5794	1394.3	231.08	LBKF
5787	1441.62	232.57	LBKF
5780	1505.84	231.8	LBKF
5771	1625.97	230.85	LBKF
5765	1745.42	232.32	LBKF
5762	1776.55	232.46	LBKF
5755	1882.86	229.64	LBKF
5750	1914.44	230.45	LBKF
5744	2019.22	229.64	LBKF
5943	2123.05	229.36	LBKF
5938	2181.95	229.52	LBKF
5929	2273.38	228.78	LBKF
5738	2362.13	229.34	LBKF
5690	2407.92	229.01	LBKF
5684	2491.66	227.74	LBKF
5676	2521.08	228.97	LBKF
5678	2552.35	229.57	LBKF
5681	2610.49	229.13	LBKF
5656	2660.17	224.64	LBKF
5650	2708.93	227.95	LBKF
5645	2731.71	227.39	LBKF
5644	2735.59	227.21	LBKF
5638	2787.18	228.1	LBKF
5630	2812.93	227.46	LBKF
5627	2847.62	226.63	LBKF
5624	2865.83	226.26	LBKF
5609	2954.9	226.8	LBKF
5604	3029.27	226.15	LBKF
5598	3089.85	226.12	LBKF
5595	3129.19	226.86	LBKF
5522	3268.85	225.99	LBKF
5413	3918.75	223.95	LBKF
5407	3948.9	224.05	LBKF
5403	4002.66	223.78	LBKF
5397	4084.2	223.14	LBKF
5392	4136.03	223.19	LBKF
5531	4177.56	223.75	LBKF
5560	4221.16	224.18	LBKF
5383	4232.81	222.3	LBKF
5559	4272.31	223.94	LBKF
5376	4347.11	222.61	LBKF
5372	4515.34	221.72	LBKF
5558	4518.29	223.11	LBKF
5314	4574.9	225.91	LBKF
5313	4644.53	224.29	LBKF
5312	4674.61	224.55	LBKF
5310	4726.18	224.76	LBKF
5309	4767.08	223.76	LBKF
5308	4807.4	224.93	LBKF
5307	4840.7	224.09	LBKF
5306	4923.39	223.71	LBKF
5304	4978.03	223.03	LBKF
5358	5085.42	224.43	LBKF
5360	5117.58	224.31	LBKF
5362	5186.42	224.02	LBKF
5364	5261.24	222.59	LBKF
5366	5350.37	223.09	LBKF
5994	506.99	236.39	RBKF
5984	598.37	231.54	RBKF
5979	654.42	232.37	RBKF
5973	681.37	232.7	RBKF
5870	880.97	233.63	RBKF
5864	908.06	233.76	RBKF
5857	975.48	233.78	RBKF
5850	1092.4	231.82	RBKF
5842	1183.95	231.29	RBKF
5808	1278.33	233.07	RBKF
5803	1319.49	232.69	RBKF
5796	1382.03	228.31	RBKF
5790	1406.65	231.51	RBKF
5785	1485.2	229.88	RBKF
5777	1586	233.92	RBKF
5767	1661.51	231	RBKF
5759	1801.73	229	RBKF
5747	2014.62	228.61	RBKF
5742	2047.32	229.69	RBKF
5946	2079.29	229.23	RBKF
5940	2146.1	229.78	RBKF
5935	2220.89	229.14	RBKF
5931	2251.6	227.9	RBKF
5925	2296.74	229.04	RBKF
5736	2387.6	229.59	RBKF
5686	2443.28	229.14	RBKF
5670	2498.13	228.23	RBKF
5669	2539.24	228.21	RBKF
5668	2585.32	228.56	RBKF
5667	2627.83	228.43	RBKF
5662	2651.76	224.34	RBKF
5653	2686.64	227.63	RBKF
5646	2738.8	227.15	RBKF
5636	2798.95	227.52	RBKF
5619	2871.37	226.4	RBKF
5616	2885.99	226.2	RBKF
5607	2991.57	226.13	RBKF
5601	3050.16	226.38	RBKF
5524	3226.56	226.07	RBKF
5494	3292.23	226.03	RBKF
5489	3389.92	226.26	RBKF
5409	3931.31	224.22	RBKF
5400	4039.57	223.96	RBKF
5534	4182.56	223.93	RBKF
5561	4194.42	223.24	RBKF
5562	4250.43	223.24	RBKF
5379	4319.83	222.71	RBKF
5545	4420.28	219.62	RBKF
5547	4440.25	219.25	RBKF
5549	4450.44	222.98	RBKF
5552	4480.16	222.88	RBKF
5557	4530.72	223.04	RBKF
5315	4578.81	223.31	RBKF
5316	4628.72	225.64	RBKF
5317	4673.21	225.6	RBKF
5320	4724.81	225.7	RBKF
5323	4825.72	225.01	RBKF
5324	4877.51	225.01	RBKF
5325	4918.38	224.73	RBKF
5326	4965.58	224.48	RBKF
5359	5099.6	224.45	RBKF
5361	5124.45	224.7	RBKF
5363	5162.95	224.66	RBKF
5365	5226.08	223.17	RBKF
5367	5326.52	222.02	RBKF

5596	3099.03	223.53	t
5593	3136.51	223.94	t
5526	3188.23	222.62	T
5523	3227.13	222.89	P
5520	3266.61	222.93	T
5492	3297.76	222.74	T
5490	3344.12	220.86	M
5487	3389.72	222.36	p
5450	3848	221.93	Beaver Dam
5450	3870.09	225.18	Beaver Dam
5448	3875.67	222.4	T
5445	3897.46	220.19	T
5446	3898.21	221.2	T
5411	3915.98	221.83	U
5408	3927.73	221.34	P
5405	3950.51	221.14	T
5402	4001.85	220.63	t
5399	4044.07	221.27	U
5396	4081.22	221.41	P
5394	4108.56	221.07	T
5393	4108.73	220.22	T
5390	4140.69	219.55	M
5388	4154.78	222.71	Beaver Dam
5529	4161.52	221.31	t
5385	4183.16	220.7	R
5532	4183.41	220.95	t
5535	4221.69	220.95	t
5382	4233.51	221.62	T
5380	4316.97	221.62	P
5377	4340.08	220.27	M
5374	4346.34	221.28	Beaver Dam
5537	4354.63	220.97	t
5539	4367.52	219.59	t
5541	4378.16	220.81	T
5543	4409.35	220.66	t
5548	4456.48	219.8	t
5550	4472.55	220.12	t
5553	4504.1	219.96	t
5371	4515.71	220.63	t
5555	4525.27	220.62	t
5213	4550.77	221.28	Beaver Dam
5278	4551.47	220.43	T
5321	4553.02	220.5	Beaver Dam
5277	4557.76	219.63	T
5275	4567.32	218.54	T
5273	4579.96	215.58	T
5280	4591.96	219.61	RV
5280	4591.96	219.75	Rock Vane
5283	4606.5	217.65	M
5284	4619.21	218.74	T
5285	4632.2	219.66	T
5287	4680.07	219.85	P
5288	4704.78	218.75	M
5291	4733.23	219.03	T
5292	4771.72	219.85	T
5294	4800.96	219.14	T
5296	4832.53	218.2	T
5299	4877.38	219.85	T
5300	4940.47	219.28	T
5302	5011.37	220.29	T
5356	5084.11	220.02	T
5354	5114.73	219.34	T
5352	5156.17	219.86	T
5350	5191	218.44	T
5348	5214.29	219.88	VANE
5348	5214.29	219.84	Rock Vane
5346	5223.01	218.11	M
5345	5260.14	218.63	T
5342	5260.84	218.87	T
5341	5271.49	215.23	T
5338	5288.94	214.39	M
5335	5311.57	218.23	VANE
5335	5311.57	218.32	Rock Vane
5334	5336.2	215.78	M
5333	5349.45	216.98	T

5471	3522.91	225.03	Water
5472	3530.27	225.17	Water
5463	3558.13	224.69	Water
5473	3560.65	225.26	Water
5474	3586.97	225.34	Water
5462	3596.85	225.18	Water
5475	3600.1	225.49	Water
5476	3631.92	225.37	Water
5477	3634.83	225.25	Water
5461	3634.9	225.2	Water
5478	3645.52	225.11	Water
5460	3647.89	225.24	Water
5479	3668.77	225.44	Water
5459	3672.84	225.22	Water
5458	3697.53	225.38	Water
5480	3709.55	225.34	Water
5457	3728.39	225.17	Water
5481	3733.04	225.46	Water
5456	3761.42	225.41	Water
5482	3776.47	225.25	Water
5455	3803.85	225.18	Water
5483	3817.76	225.23	Water
5454	3839.79	225.32	Water
5453	3848.57	225.43	Water
5484	3849.23	225.27	Water
5485	3853.05	225.24	Water
5452	3865.22	225.3	Water
5486	3867.44	225.24	Water
5451	3870.81	225.34	Water
5449	3875.6	222.41	Water
5447	3899.11	222.59	Water
5412	3913.94	222.6	Water
5410	3928.73	222.62	Water
5406	3950.05	222.71	Water
5404	4001.2	222.55	Water
5401	4044.99	222.56	Water
5398	4082.21	223.33	Water
5395	4107.19	222.59	Water
5391	4140.27	222.63	Water
5389	4154.36	222.7	Water
5387	4159.99	221.89	Water
5530	4163.83	222.07	Water
5533	4185.05	222.08	Water
5536	4223.36	222.06	Water
5384	4235.4	223.67	Water
5381	4317.2	221.07	Water
5378	4340.11	221.81	Water
5375	4345.26	221.81	Water
5538	4354.81	221.29	Water
5540	4371.46	221.32	Water
5542	4379.71	221.23	Water
5544	4405.64	221.35	Water
5546	4423.51	221.38	Water
5551	4473.68	221.36	Water
5554	4502.33	221.3	Water
5373	4514.82	221	Water
5556	4527.8	221.26	Water
5318	4551.78	221.37	Water
5279	4552.01	221.34	Water
5319	4554.44	221.01	Water
5276	4566.57	221.02	Water
5274	4591.82	221.05	Water
5281	4595.74	221.01	Water
5282	4608.51	221	Water
5286	4633.48	220.89	Water
5289	4686.72	221.02	Water
5290	4702.24	220.95	Water
5272	4715.61	230.14	Water
5293	4768.92	221	Water
5295	4802.83	220.94	Water
5297	4829.64	220.9	Water
5298	4868.08	220.97	Water
5301	4940.01	220.93	Water
5303	5029.9	220.89	Water
5357	5084.9	220.4	Water
5355	5109.63	220.83	Water
5353	5149.58	220.81	Water
5351	5184.44	220.86	Water
5349	5216.13	220.82	Water
5347	5221.11	220.62	Water
5344	5238.52	220.47	Water
5340	5261.92	218.8	Water
5339	5288.8	218.79	Water
5337	5313.24	218.74	Water
5336	5329.91	218.23	Water
5332	5359.86	218.13	Water

Smith and Austin GPS Coordinates
2005 Monitoring Period

		METERS				METERS NAD_1983_StatePlane_North_Carolina_FIPS_3200		METERS GCS_North_American_	
Location	Plot Number	Northing	Easting	Notes	Start Photo Number	EASTING	NORTHING	LONGITUDE	LATITUDE
Smith-Austin	11	3982162	725135		SA plot 11	654378.60	245042.79	-78.50361	35.95791
Smith-Austin	12	3982151	725135		SA plot 12	654378.37	245031.79	-78.50362	35.95781
Smith-Austin	13	3982141	725141		SA plot 13	654384.16	245021.67	-78.50355	35.95772
Smith-Austin	14	3982124	725166		SA plot 14	654408.80	245004.17	-78.50328	35.95756
Smith-Austin	15	3982093	725178		SA plot 15	654420.16	244972.94	-78.50316	35.95728
Smith-Austin	16	3982060	725188		SA plot 16	654429.47	244939.75	-78.50305	35.95698
Smith-Austin	17	3982045	725206	xvgps, N coord krieged	SA plot 17	654447.15	244924.38	-78.50286	35.95684
Smith-Austin	19	3981442	725102		SA plot 19	654330.79	244323.82	-78.50418	35.95143
Smith-Austin	20	3982010	725206	xvgps	SA plot 18	654363.41	244354.15	-78.50382	35.95171
Smith-Austin	20	3981473	725134		SA plot 20	654446.43	244889.40	-78.50287	35.95653
Smith-Austin	21	3981512	725119		SA plot 21	654349.22	244393.43	-78.50397	35.95206
Smith-Austin	22	3981553	725130	congps	SA plot 22	654361.06	244434.19	-78.50384	35.95243
Smith-Austin	30	3981776	725148	bvr dam upstream corner	SA plot 30	654383.64	244656.71	-78.50358	35.95443
Smith-Austin	31	3981695	725071	frpe nat regen	SA plot 31	654305.01	244577.33	-78.50445	35.95372
Smith-Austin	32	3981594	724980		SA plot 32	654211.98	244478.26	-78.50549	35.95283
Smith-Austin	33	3981359	724904	frpe regen	SA plot 33	654131.18	244244.93	-78.50640	35.95073
Smith-Austin	34	3981359	724999		SA plot 34	654226.13	244242.98	-78.50535	35.95071
Smith-Austin	35	3981359	725007		SA plot 35	654234.13	244242.81	-78.50526	35.95071
Smith-Austin	36	3981447	725057		SA plot 36	654285.92	244329.74	-78.50468	35.95149
Smith-Austin	37	3981449	725067		SA plot 37	654295.95	244331.54	-78.50457	35.95150
Smith-Austin	38	3981573	725168		SA plot 38	654399.46	244453.40	-78.50341	35.95260
Smith-Austin	39	3981582	725172		SA plot 39	654403.64	244462.31	-78.50337	35.95268
Smith-Austin	40	3981590	725185	channel side	SA plot 40	654416.80	244470.04	-78.50322	35.95275
Smith-Austin	41	3981614	725196	channel side	SA plot 41	654428.29	244493.80	-78.50309	35.95296
Smith-Austin	42	3981637	725240	channel side	SA plot 42	654472.74	244515.88	-78.50260	35.95316
Smith-Austin	43	3981795	725346	channel side	SA plot 43	654581.94	244671.62	-78.50138	35.95456
Smith-Austin	44	3981840	725362	channel side	SA plot 44	654598.86	244716.27	-78.50119	35.95496
Smith-Austin	45	3981996	725427	upstream of road, beni, ploc nat regen	SA plot 45	654667.04	244870.86	-78.50042	35.95635
Smith-Austin	46	3982022	725470		SA plot 46	654710.55	244895.96	-78.49994	35.95657
Smith-Austin	47	3982085	725539		SA plot 47	654780.81	244957.51	-78.49916	35.95712
Smith-Austin	48	3982100	725577		SA plot 48	654819.10	244971.72	-78.49873	35.95725
Smith-Austin	49	3982148	725655		SA plot 49	654898.05	245018.09	-78.49786	35.95767
Smith-Austin	50	3982189	725775		SA plot 50	655018.84	245056.60	-78.49651	35.95801
Smith-Austin	51	3982206	725903		SA plot 51	655147.13	245070.95	-78.49509	35.95813
Smith-Austin	52	3981966	725223		SA plot 52	654462.52	244845.07	-78.50269	35.95613
Smith-Austin	53	3982070	725172	doesn't include point bar	SA plot 53	654413.68	244950.07	-78.50323	35.95707
Smith-Austin	54	3982209	725149	channel side	SA plot 54	654393.56	245089.48	-78.50344	35.95833
Smith-Austin	55	3981982	725234	channel side	SA plot 55	654473.84	244860.84	-78.50257	35.95627

				NAD_1983_StatePlane_North_Carolina_FIPS_3200					
Location	**Problem #**	**UTM**	**UTM**	**EASTING**	**NORTHING**	**Problem T**	**Probable Cause**	**Photo #**	**Notes**
Smith-Austin	1	0724938	3981469	654167.43	244354.18	Bare Bank	Beaver dam removal	660	Both banks, 5 m
Smith-Austin	2	0724967	3981487	654196.78	244371.58	Bare Bank	Undercutting and lowering of water level	661	Coords on right, prob on left bank, 10 m long
Smith-Austin	3	0724953	3981535	654183.78	244419.84	Bare Flood	Headcut and channels on floodplain	662	Left floodplain, 5x5 m
Smith-Austin	4	0724969	3981599	654201.09	244483.48	Bare Bank	Lowering of water level after beaver dam removal	663	Left bank, 8 m long, coords on right upstream
Smith-Austin	5	0725118	3981719	654352.49	244600.35	Bare Buffer	Mowing	664	Left Buffer, 8 m long, coords at center
Smith-Austin	6	0725157	3981784	654392.80	244664.52	Bare Bank	Floodplain and buffer impact also; heavy equipment	665	Left bank, 3 m wide across all buffer
Smith-Austin	7	0725230	3981890	654467.95	244768.96	Bare Bank	Undercutting by stream	666	Left bank, 20 m
Smith-Austin	8	0725216	3982050	654457.25	244929.17	Bare Buffer	Compacted soil, possibly vehicle use	667	Left buffer, 30 m coords centered
Smith-Austin	9	0725622	3982138	654864.86	245008.77	Bare Buffer	Sandy, nutrient poor subsoil	668	Right buffer, 3 m wide, 10 m down 40 up from coord
Smith-Austin	10	0725742	3982197	654986.02	245065.27	Bare Buffer	Sandy, nutrient-poor subsoil	669	Right buffer, coords ctrd 15 m long 2 m wide
Smith-Austin	11	0725994	3982238	655238.74	245101.06	Bare Buffer	Sandy, nutrient-poor subsoil	670	Right buffer, 3x4 m
Smith-Austin	12	0725306	3981726	654540.54	244603.48	Bare Buffer	Sandy, nutrient-poor subsoil	671	Right buffer, 10 m wide 30 m long
Smith-Austin	13	0725268	3981692	654501.86	244570.28	Bare Buffer	Mowing	672	Right buffer, 15 m downstream from coords
Smith-Austin	14	0274862	3981385	204116.93	253338.52	Bare Bank	Downcutting on outside meander bend	673	Left bank 20 m below confl, t m long, coords at photo point on opp bank

APPENDIX B

Morphology Raw Data

1. Problem Area Plan View
2. Project Photo Log
3. Stream Problem Area Photos
4. Cross section and Pebble Count Plots and Raw Data Tables
5. Longitudinal Plots and Raw Data Tables

BEGINNING OF AUSTIN REACH-1

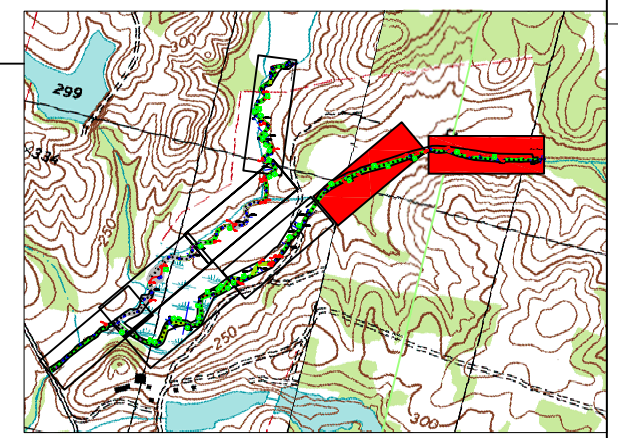
STA: 4+35
XS#2 RIFFLE AR-1

STA: -0+40
XS#1 RIFFLE AR-1

STA: 13+70
XS#3 RIFFLE AR-1

LEGEND

- ROCK VANE
- PHOTO POINTS
- BEAVER DAM AND BACKWATER
- TOP OF BANK
- BANKFULL
- PROBLEM AREAS & VEGATATION PROBLEM AREAS
- VEGATATION MONITORING PLOTS



SCALE 1" = 80'

40 0 40 80

NO	REVISIONS	DRN	CHK	DATE
1	YEAR 2 MONITORING OF SMITH AND AUSTIN	GAT	DAB	02/20/06

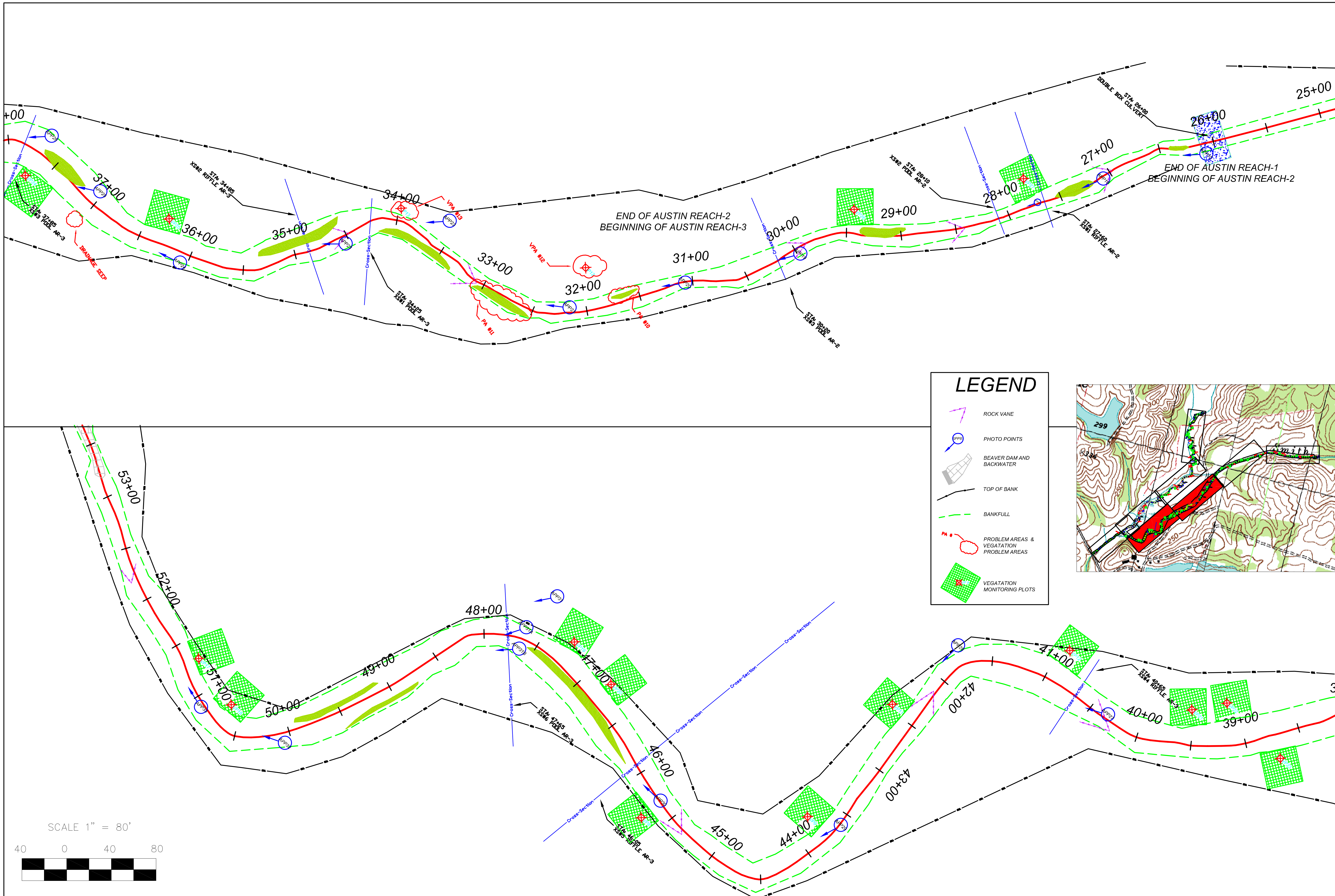
NC STATE UNIVERSITY

BIOLOGICAL & AGRICULTURAL ENGINEERING
Weaver Labs Campus Box 7625
North Carolina State University
Raleigh, NC 27695

SMITH AND AUSTIN
WAKE FOREST
WAKE COUNTY, N.C.

SMITH AND AUSTIN
PLAN SHEET AUSTIN CREEK-1

DATE	02/20/2006
PROJECT NO.	
FILENAME	SMITH AND AUSTIN.DWG
SHEET NO.	
DRAWING NO.	



1 YEAR 2 MONITORING OF SMITH AND AUSTIN GAT DAB 02/20/06

NO | REVISIONS | DRN | CHK | DATE

NC STATE UNIVERSITY

BIOLOGICAL & AGRICULTURAL ENGINEERING
Weaver Labs Campus Box 7625
North Carolina State University
Raleigh, NC 27695

SMITH AND AUSTIN
WAKE FOREST
WAKE COUNTY, N.C.

SMITH AND AUSTIN
PLAN SHEET AUSTIN CREEK-2

DATE 02/20/2006
PROJECT NO.
FILENAME SMITH AND AUSTIN.DWG
SHEET NO.
DRAWING NO.

SCALE 1" = 80'

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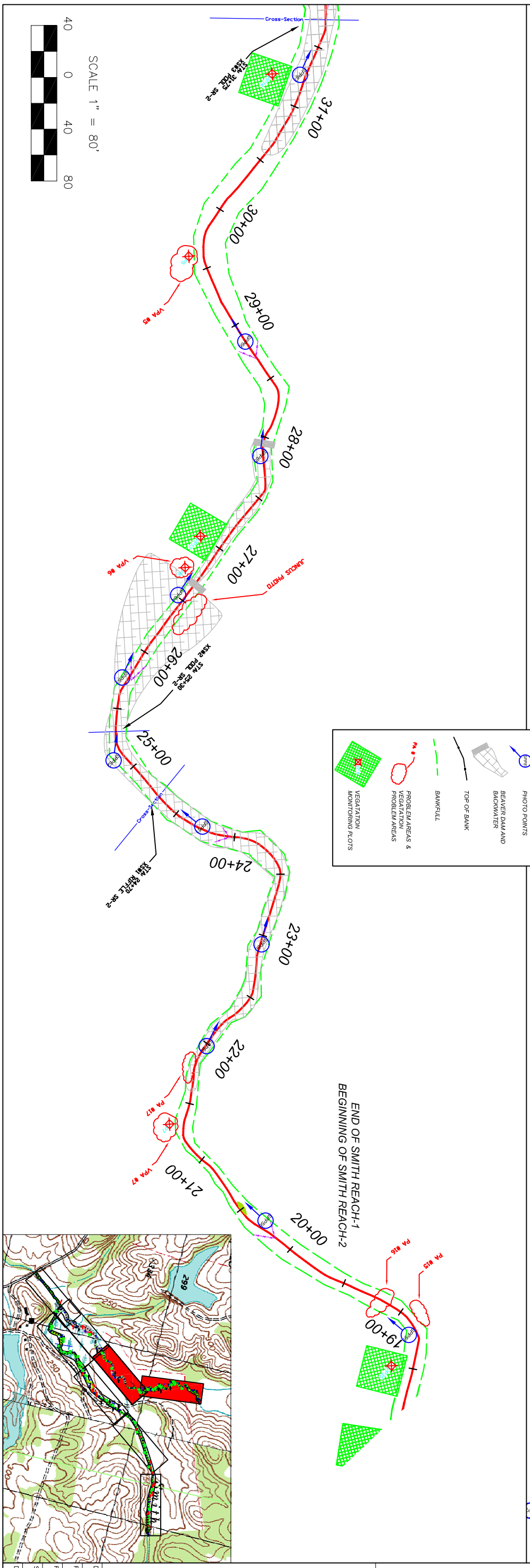

LEGEND

- ROCK VANE
- PHOTO POINTS
- BEAVER DAM AND BACKWATER
- TOP OF BANK
- BANKFULL
- PROBLEM AREAS & VEGATATION PROBLEM AREAS
- VEGATATION MONITORING PLOTS

SMITH AND AUSTIN
WAKE FOREST
WAKE COUNTY, N.C.

SMITH AND AUSTIN
PLAN SHEET SMITH CREEK-1

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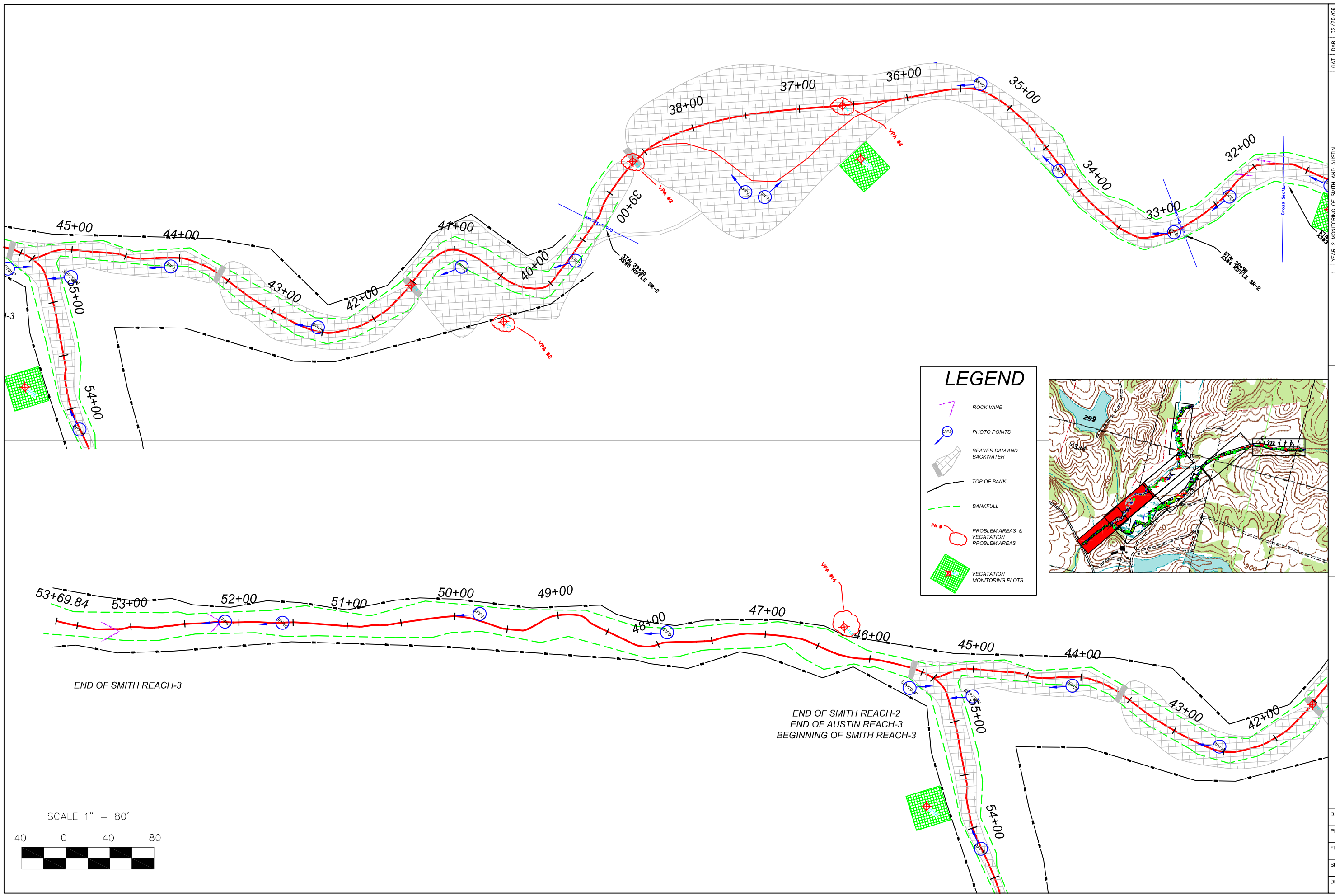
BIOLOGICAL & AGRICULTURAL ENGINEERING
Weaver Labs Campus Box 7625
North Carolina State University
Raleigh, NC 27695

DRAWING NO.	SHEET NO.	FILENAME	PROJECT NO.	DATE
		SMITH AND AUSTIN.DWG		02/20/2006

NO	REVISIONS	DRN	CHK	DATE
1	YEAR 2 MONITORING OF SMITH AND AUSTIN	GAT	DAB	02/20/06



LEGEND

- ROCK VANE
- PHOTO POINTS
- BEAVER DAM AND BACKWATER
- TOP OF BANK
- BANKFULL
- PROBLEM AREAS & VEGATATION PROBLEM AREAS
- VEGATATION MONITORING PLOTS

NO	REVISIONS	DRN	CHK	DATE
1	YEAR 2 MONITORING OF SMITH AND AUSTIN	GAT	DAB	02/20/06

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Weaver Labs Campus Box 7625
North Carolina State University
Raleigh, NC 27695

SMITH AND AUSTIN
WAKE FOREST
WAKE COUNTY, N.C.

SMITH AND AUSTIN
PLAN SHEET SMITH CREEK-2

DATE	02/20/2006
PROJECT NO.	
FILENAME	SMITH AND AUSTIN.DWG
SHEET NO.	
DRAWING NO.	

Austin Creek Photo Log
2005

APP1. Austin Creek Cross-Section 1 - Riffle (AR1)

APP2. Austin Creek Project Start (AR1)

APP3. Austin Creek Sta. 3+34 (AR1)


APP4. Austin Creek Cross-Section 2 - Riffle (AR1)

note: APP5 and APP5A photos were of vegetation plots relocated in 2005.


APP6. Austin Creek Sta. 5+92 (AR1)


APP7. Austin Creek Sta. 7+21 (AR1)


APP8. Austin Creek Sta. 9+13 (AR1)


APP8A. Austin Creek Sta. 10 +00 (AR1)


APP9. Austin Creek Sta. 11+42 (AR1)


APP10. Austin Creek Cross Section 3 (AR1)


APP11. Austin Creek Sta. 18+55 (AR1)


APP12. Austin Creek Cross Section 4 (AR1)


APP13. Austin Creek Sta. 22+51 (AR1)


APP14. Austin Creek Sta. 23+19 (AR1) FROM GOLF CART BRIDGE


APP15. Austin Creek (AR2) BEGIN REACH FROM CULVERT


APP16. Austin Creek Cross Section 1 (AR2)


APP17. Austin Creek Cross Section 2 (AR2)


APP19. Austin Creek Cross Section 3 (AR2)


APP20. Austin Creek (AR3) BEGIN REACH BEDROCK NICKPOINT


APP21. Austin Creek Sta. 32+60 (AR3)


APP22. Austin Creek Cross Section 1 (AR3)


APP23. Austin Creek Cross Section 2 (AR3) RIFFLE


APP24. Austin Creek Sta. 36+00 (AR3)


APP25. Austin Creek Cross Section 3 (AR3) POOL


APP26. Austin Creek Cross Section 3 (AR3) POOL


APP27. Austin Creek Cross Section 4 (AR3) RIFFLE


APP28. Austin Creek Sta. 41+80 (AR3)

APP29. Austin Creek Sta. 44+00 (AR3)

APP30. Austin Creek Cross Section 5 (AR3) RIFFLE

APP31. Austin Creek Cross Section 6 (AR3) POOL

APP31A. Austin Creek Cross Section 6 (AR3) POOL RTOB


APP31B. Austin Creek Cross Section 6 (AR3) POOL


APP32. Austin Creek Sta. 50+40 (AR3)


APP33. Austin Creek Sta. 50+75 (AR3)


APP34. Austin Creek Sta. 54+20 (AR3)

Smith Creek Photo Log
2005


SPP35. Smith Creek Cross Section 1 (R1) RIFFLE


SPP36. Smith Creek Sta. 0+00 (SR1)


SPP37. Smith Creek Sta. 0+50 (SR1)


SPP38. Smith Creek Sta. 1+25 (SR1)


SPP39. Smith Creek Sta. 2+00 (SR1)


SPP40. Smith Creek Sta. 2+55 (SR1)


SPP41. Smith Creek Sta. 3+25 (SR1) AT TRIBUTARY


SPP42. Smith Creek Sta. 3+90 (SR1)


SPP43. Smith Creek Sta. 4+90 (SR1)


SPP44. Smith Creek Sta. 5+25 (SR1)


SPP45. Smith Creek Sta. 6+50 (SR1)


SPP46. Smith Creek Sta. 7+25 (SR1)


SPP47. Smith Creek Cross Section 2 (SR1) RIFFLE


SPP48. Smith Creek Cross Section 3 (SR1) RIFFLE


SPP49. Smith Creek Cross Section 4 (SR1) POOL


SPP50. Smith Creek Sta. 12+10 (SR1)


SPP51. Smith Creek Sta. 13+35 (SR1)


SPP52. Smith Creek Sta. 14+10 (SR1)


SPP53. Smith Creek Sta. 15+00 (SR1)


SPP54. Smith Creek Sta. 15+35 (SR1)


SPP55. Smith Creek Cross Section 5 (SR1) POOL


SPP56. Smith Creek Sta. 17+05 (SR1)


SPP57. Smith Creek Sta. 18+40 (SR1)


SPP58. Smith Creek Sta. 20+60 (SR2)


SPP59. Smith Creek Sta. 21+95 (SR2)


SPP60. Smith Creek Sta.22+75 (SR2)


SPP61. Smith Creek Cross Section 1 (SR2) RIFFLE


SPP62. Smith Creek Cross Section 2 (SR2)


SPP63. Smith Creek Sta. 25+05 (SR2)


SPP64. Smith Creek Sta. 26+55 (SR2)


SPP65. Smith Creek Sta. 27+75 (SR2)


SPP66. Smith Creek Sta. 29+00 (SR2)


SPP67. Smith Creek Cross Section 3 (SR2) POOL


SPP68. Smith Creek Cross Section 4 (SR2) RIFFLE


SPP69. Smith Creek Sta. 32+75 (SR2)


SPP70. Smith Creek Sta. 34+50 (SR2)


SPP71. Smith Creek Sta. 35+10 (SR2)


SPP74. Smith Creek Sta.39+90 (SR2)


SPP75. Smith Creek Sta. 41+00 (SR2)


SPP77. Smith Creek Sta. 42+55 (SR2)


SPP78. Smith Creek Sta. 44+00 (SR2)


SPP79. Smith Creek/Austin Creek (SR2 AR3) CONFLUENCE UPSTREAM


SPP79. Smith Creek/Austin Creek (SR2 AR3) CONFLUENCE


SPP80. Smith Creek Sta. 47+90 (SR3)


SPP81. Smith Creek Sta. 50+00 (SR3)


SPP82. Smith Creek Sta. 51+50 (SR3)


SPP83. Smith Creek Sta.52+00 (SR3) PROJECT END