Brown Branch Stream Restoration
(Anita Alta 4-H Camp)
2004 Annual Monitoring Report

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Ecosystem Enhancement PROGRAM

NCDENR

NC STATE UNIVERSITY

2004 Brown Branch Monitoring Abstract

Brown Branch was restored through the North Carolina Wetlands Restoration Program (NCWRP). The objectives of the project are to:

1.) Establish an stable dimension, pattern and profile on 5100 feet of Brown Branch
2.) Improve habitat within Brown Branch
3.) Reduce bank erosion along Brown Branch
4.) Improve water quality in Brown Branch
5.) Establish an riparian buffer along Brown Branch
6.) Incorporate this project into a watershed wide management plan

This is the 2nd year of the 5-year monitoring plan for Brown Branch.

Table 1A. Background Information

Project Name	Brown Branch
Designer's Name	Biohabitats Inc. 15 West Aylesbury Road Timonium, MD 21093
Contractor's Name	Shamrock Environmental
Project County	Caldwell, North Carolina
Directions to Project Site	From US-321 ALT/N MAIN ST in Lenoir NC, turn LEFT 1.4 miles north of Lenoir onto NC-90/VALWAY RD NW. Continue on NC-90/VALWAY RD NW 1.3 miles and turn left onto NC-90/COLLETTSVILLE RD. Continue on NC-90/COLLETTSVILLE RD 4.0 miles and turn right onto MULBERRY CREEK RD. Continue on MULBERRY CREEK RD 3.5 miles and turn right into Anita Alta 4-H Camp and the location of Brown Branch restoration.
Drainage Area	1.1 sq. mi.
USGS Hydro Unit	03050101
NCDWQ Subbasin	11-38-32-13 Upper Catawba River Basin
Project Length	5,100 Linear feet
Restoration Approach	5,100 ft of priority 1 Natural Channel Design (dimension, pattern, and profile)
Date of Completion	September, 2003
Monitoring Dates	October, 2003; June 2004

Results and Discussion

Overall, while the majority of the stream is functioning well and holding grade, the stream has areas of concern and areas of immediate need. Table 2 shows a summary of monitoring measurement results. The stream classifies as a C4 but has areas of severe bank erosion with an entrenchment ratio between 2 and 3 for much of the reach. Channel dimension and pattern are

similar to as-built conditions with the exceptions of some limited areas of bank erosion. The channel profile shows that the stream is down cutting on the upstream reach and aggrading with fines on the downstream reach. With the exception of scour pools below cross vanes most of the pools have filled in this sediment resulting in longer runs and smaller and shallower pools. The channel planform is very similar to the as built condition with the exception of bank erosion. The general trend of the bank erosion on this reach occurs downstream on the outside of a meander bend and behind root wads. In two location the bank erosion migrated to the head of a riffle downstream and resulted in a over wide riffle that was not able to transport it's sediment creating a mid channel bar. The existing mid channel bars are producing more bank erosion by concentrating the flow paths near the toe of the bank slopes. The root wads the seem to be causing bank erosion are all located at a high elevation relative to the stream bed, in some areas the root wads were installed too high and in other areas the streambed has down-cut surrounding the root wad. Vegetation is not succeeding to levels required for mitigation credit. Placed structures are holding grade and functioning well, with the exception of some localized erosion on cross vane arms.

Table 2. Summary of Channel Conditions

DIMENSION	Brown Branch Cross-section #1 Riffle			Brown Branch Cross-section #2 Pool			Brown Branch Cross-section #3 Riffle			Brown Branch Cross-section #4 Pool			Brown Branch Cross-section #5 Riffle			Brown Branch Cross-section #6 Pool		
Monitoring Year	AS-BUILT	2003	2004	AS-BUILT	2003	2004	AS-BUILT	2003	2004	AS-BUILT	2003	2004	AS-BUILT	2003	2004	AS-BUILT	2003	2004
Bankfull Cross-sectional Area	11.4	22.7	19.8	13.3	12.2	9.5	15.4	16.6	15.1	21.9	22.5	23.2	11.67	14.8	15.1	29.9	24.92	21.7
Bankfull Width	10.0	14.1	15.2	21.9	22.5	23.1	16.8	14.9	14.9	20.0	22.9	24.7	16.00	14.6	15.3	18.0	21.60	21.3
Bankfull Mean Depth	1.1	1.6	1.3	0.6	0.5	0.4	0.9	1.1	1.0	1.1	1.0	0.9	0.73	1.0	1.0	1.7	1.15	1.0
Bankfull Max Depth	1.8	2.3	2.1	1.8	1.5	1.6	1.7	1.7	1.8	1.9	2.1	1.9	0.94	1.5	1.4	2.5	1.83	1.8

PATTERN	Brown Branch Design			Brown Branch As-built 2002			Brown Branch 2004		
	Minimum	Maximum	Median	Minimum	Maximum	Median	Minimum	Maximum	Median
Meander Wave Length	Not Reported			Not Reported			83	104	100
Radius of Curvature	Not Reported			Not Reported			28	87	66
Beltwidth	Not Reported			Not Reported			24	56	33

PROFILE	Brown Branch Design			Brown Branch As-built 2002			Brown Branch 2004		
	Minimum	Maximum	Median	Minimum	Maximum	Median	Minimum	Maximum	Median
Riffle Length	Not Reported			Not Reported			22	71	31
Riffle Slope	Not Reported			Not Reported			0.62%	4.53%	1.49%
Pool Length	Not Reported			Not Reported			9	62	18
Pool to Pool Spacing	Not Reported			Not Reported			35	65	61
Valley (TOB) Slope	Not Reported			Not Reported			1.1%		
Bankfull Slope	Not Reported			Not Reported			0.8%	1.4%	0.9%

SUBSTRATE	Brown Branch Cross-section #1 Riffle		Brown Branch Cross-section #2 Pool		Brown Branch Cross-section #3 Riffle		Brown Branch Cross-section #4 Pool		Brown Branch Cross-section #5 Riffle		Brown Branch Cross-section #6 Pool	
Monitoring Year	2002	2004	2002	2004	2002	2004	2002	2004	2002	2004	2002	2004
d50	N/A	14.50	N/A	0.25	N/A	17.69	N/A	16.22	N/A	1.38	N/A	1.46
d84	N/A	48.88	N/A	11.12	N/A	42.19	N/A	43.83	N/A	12.15	N/A	38.50

VEGETATION 2004 Monitoring	Quad 1 - Brown		Quad 2 - Brown Branch		Quad 3 - Brown Branch		Quad 4 - Brown		Quad 4 - Brown Branch	
	Observed	Planted*	Observed	Planted*	Observed	Planted*	Observed	Planted*	Observed	Planted*
Tree Stratum (stems/acre)	680	160	1120	240	680	200	4760	400	3000	200
Shrub Stratum (% cover)	3	n/a	0	n/a	0	n/a	0	n/a	0	n/a
Herb Stratum (%cover)	46	n/a	90	n/a	105	n/a	107	n/a	52	n/a

* Planted value represents number of stems observed alive that were planted.

The following areas of concern should be monitored closely and considered for repair as suggested:

Brown Branch

- Areas with bank erosion
  - Bank erosion has been noted at fourteen locations on the restored reach of this stream
  - There are two areas of major bank erosion due to the in-channel shearing forces of stream at station 4+40 and station at 7+00
    - At station 4+20 to 4+60 there is a 40 ft long area of severe bank erosion on the right bank the bank has an extreme BEHI and is actively eroding. This erosion is captured by the surveyed cross-section #1 and is photo documented. The actively eroding bank height is 4.2 ft with a vertical non-protected bank.
    - At station 6+80 to 7+20 there is a 40 ft long area of severe bank erosion on the left bank the bank has an extreme BEHI and is actively eroding. The actively eroding bank height is 6.5 ft with a vertical non-protected bank.
  - The remainder of the bank erosion issues could be described as being caused by circulations behind a root wad or as occurring downstream on the outside of a meander bend
  - There are two areas of bank erosion due to overland seepage or flow at station 20+00 on the right bank and at station at 29+50 on the right bank
  - There are three areas with an active mid-channel bar at station 40+10, at station 43+25 and at station at 44+50
    - At station 40+20 to 40+50 there is a 30 ft long mid channel bar.
    - At station 43+10 to 43+60 there is a 50 ft long mid channel bar that. This mid-channel bar is captured by the surveyed cross-section #5 and is photo documented.
    - At station 44+45 to 40+50 there is a 5 ft long mid channel bar that
- Stream Profile
  - The stream is showing signs of down–cutting from station 0+00 to 9+00 the average slope for this reach is 1.4%
    - The this reach has down-cut in some areas as much as 6 inches but the reach is maintaining well defined riffles and riffle slopes that are close to the as-built riffle slopes.
  - From station 10+00 to 51+00 the average slope for this reach is 1.0% and pools are filling with sediment and loosing capacity
    - This reach has not significantly aggraded but the riffle are becoming shorter and generating steeper riffle slopes.
    - Pools are still generally located in the outside of the meander bends but the pool length and depth have decreased.
- Vegetation
  - Replanting trees should occur to obtain mitigation requirements
  - The site could benefit from larger containerized trees both for bank stability and aesthetics, although mitigation requirements are currently being met.

- It is recommended to stake in areas where erosion is problematic, particularly on outside meander bends.

Photos

The following are photographs of typical sections and areas of concern throughout the project.

Typical Pool

Typical Riffle

Issue Photo 1. Bank Erosion Left Bank
STA: 6+75

Issue Photo 2. Mid-Channel Bar
STA: 40+20

Issue Photo 3 Pool Filling with Sediment At STA: 44+50

Issue Photo 4 Bank Erosion at STA: 38+50

***There are more issue photos in the photo log of this report**

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Tables and Figures

1.0 BACKGROUND INFORMATION

Project planning was initiated for the Brown Branch Stream Restoration in 2002 for the implementation of a stream restoration project in Mulberry, North Carolina Located in Caldwell Co. (Figure 1).

The project consisted of the analysis of the 1.1 square mile portion of the Brown Branch watershed (located within USGS Hydrologic Unit Code 03050101, NCDWQ Sub-basin 11-38-32-13 Upper Catawba River Basin) that contributes 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, stream restoration, and community education.

Following coordination with local leaders, the Wetlands Restoration Program and citizens groups, the project was initiated and focused on the restoration of approximately 5100 linear feet of degraded stream within the Anita Alta 4-H Camp. 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 September 2003.

The restoration of this portion of Brown Branch, located within the Anita Alta 4-H Camp, 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 September 2003.

1.1 Goals and Objective

The goals and objectives of this project are as follows:

1.) Restore 5,100-linear feet of Brown Branch through a priority 1 natural channel design approach.
2.) Establish a riparian zone surrounding restored section of Brown Branch.
3.) Improve the habitat within the channel and the riparian zone.
4.) Incorporate this project into a watershed wide management plan.

1.2 Project Location

This project is located north the city limits of Lenoir, North Carolina in Caldwell County. From US-321 ALT/N MAIN ST in Lenoir NC, turn LEFT 1.4 miles north of Lenoir onto NC-90/VALWAY RD NW. Continue on NC-90/VALWAY RD NW 1.3 miles and turn left onto NC-90/COLLETTSVILLE RD. Continue on NC-90/COLLETTSVILLE RD

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Drainage Area	1.1 sq. mi.
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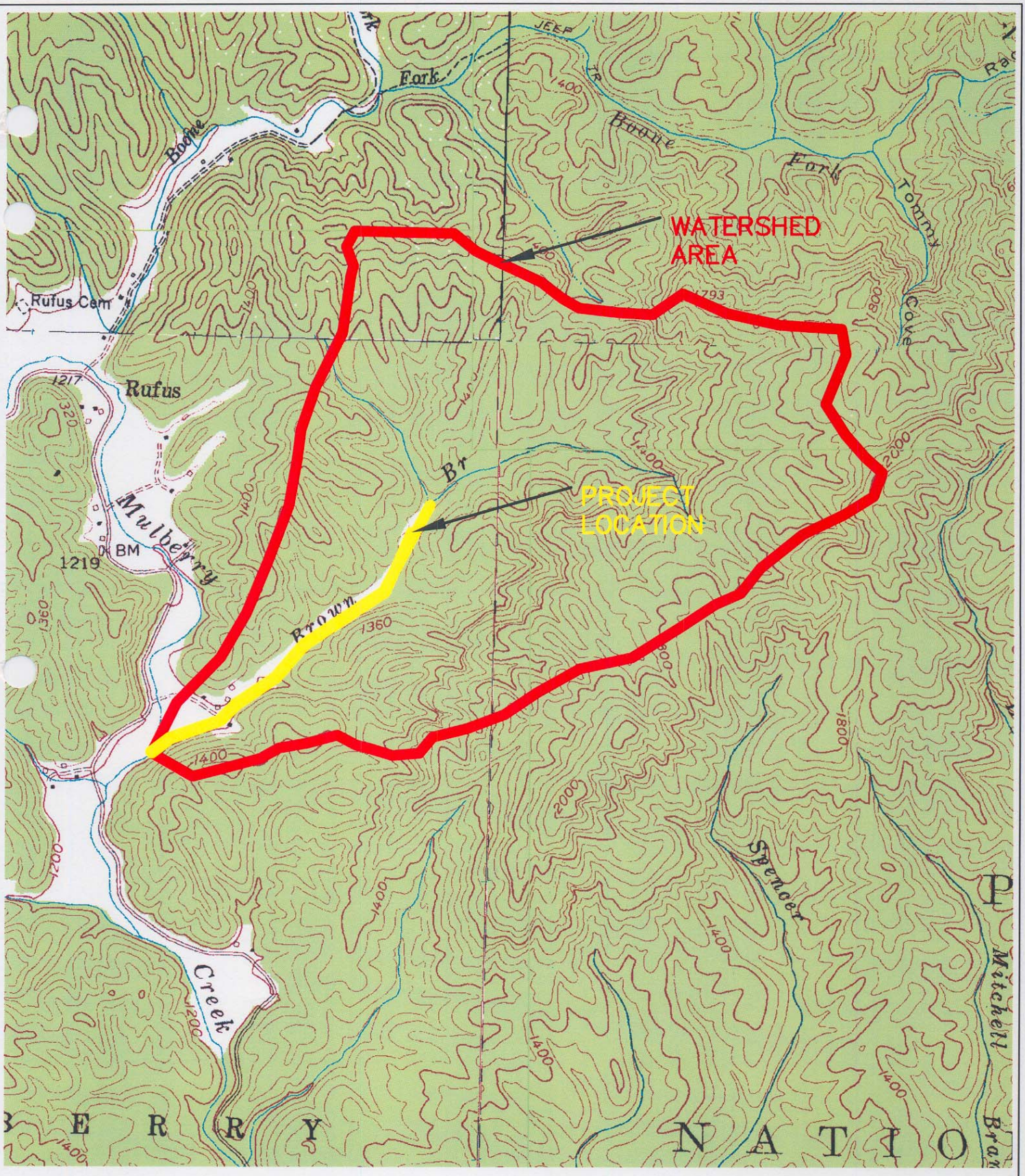
4.0 miles and turn right onto MULBERRY CREEK RD. Continue on MULBERRY CREEK RD 3.5 miles and turn right into Anita Alta 4-H Camp and the location of Brown Branch restoration.

1.3 Project Description

A previously straight and incised channel through the Anita Alta 4-H Camp, Brown Branch was restored using channel dimension, pattern, and profile modifications and the establishment of riparian zone adjacent to the creek. Channel profile is maintained through the use of rock cross vanes. Channel pattern is maintained through the use of single vanes and vegetation along the channel banks.

In September 2003 a stream restoration design and construction project using natural stream channel geometry design parameters was completed on Brown Branch, a tributary to Mulberry Creek in Caldwell County, North Carolina near Lenoir. The study reach begins at the confluence of two 1st-order tributaries and follows the 2nd-order channel downstream for a mile through an alluvial valley. The project was undertaken by the Wetlands Restoration Program (WRP) of the North Carolina Department of Environment and Natural Resources.

The stream restoration was motivated by an unstable channel configuration that was causing poor water quality, a featureless bed, a lack of riparian cover, and poor habitat. The overarching goal of the project was to establish a stable planform, cross-sectional, and profile pattern that would improve water quality, enhance in-stream habitat, and improve the functional and aesthetic value of the riparian corridor. Brown Branch is believed to have supported a trout population historically. By creating a range of aquatic niches, the project is also intended to provide in-stream habitat that could support trout populations in the future. Brown Branch was classified in 1990 as a high quality waters by the state of North Carolina.



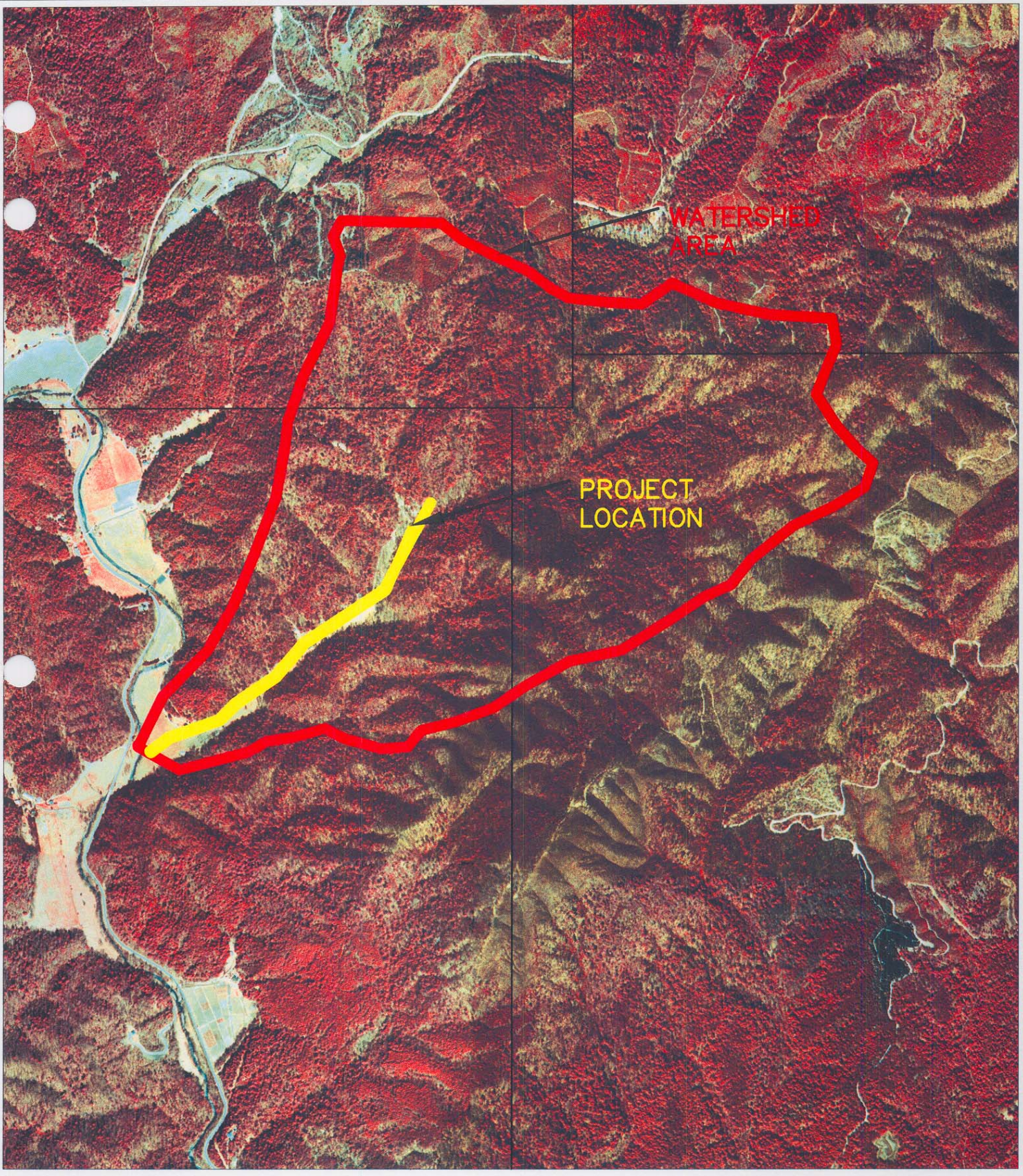
DRAWING NO.	
SHEET NO.	PL - 1
FILENAME	Brown Branch.DWG
PROJECT NO.	
DATE	02/26/2005

BROWN BRANCH
ANITA ALTA 4-H CAMP
CALDWELL COUNTY, N.C.

WATERSHED AREA 1.1 SQMI
USGS TOPO MAP

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

NO	REVISIONS	DRN	CHK	DATE
1	NITIAL DESIGN	DAB	DRC	02/26/05



750 0 750 1500

SCALE 1" = 1500'

DRAWING NO.

SHEET NO. PL - 1

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DATE 02/26/2005

BROWN BRANCH
ANITA ALTA 4-H CAMP
CALDWELL COUNTY, N.C.

WATERSHED AREA 1.1 SQMI
DIGITAL ORTHO PHOTO MAP

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NO	REVISIONS	DRN	CHK	DATE
1	NITIAL DESIGN	DAB	DRC	02/26/05

Figure 3. Plan view of As-built conditions
(To be attached)
showing all structures with station numbers
showing vegetation permanent plots
showing permanent cross-sections and benchmarks
showing vegetation plots
showing monitoring gauges

Figure 4. Plan view of 2003 overlain on As-built
(To be attached)

2.0 YEAR 2004 RESULTS AND DISCUSSION

Year 2004 monitoring results are shown for Brown Branch Monitoring.

2.1 Vegetation

Using the Draft Vegetation Monitoring Plan for NCWRP Riparian Buffer and Wetland Restoration Projects, 4 vegetation monitoring plots were randomly located within the riparian buffer of the Brown Branch project. No reference area was studied; therefore no comparisons could be made to reference conditions.

2.1.1 Results and Discussion

Vegetation within the riparian buffer varied in success level. Cover throughout the site ranges from 50 to 100%. Herbaceous vegetation, both planted and naturally regenerating, is doing extremely well and contributes to the bank stability of the project. Live stakes have not succeeded in most plots. Where they have survived (plot #1), deer browse is evident. Plots 4 and 5 also showed evidence of cattle presence.

Planted trees and shrubs are doing poorly throughout the entire buffer. Success levels do not meet mitigation requirements. Plots typically had approximately 200 surviving planted trees per acre with the exception of plot 4, which had 400 surviving planted trees per acre. Deer browse appears to be the major contributor to vegetation failure. Extrapolation from the plots resulted in an overall average of approximately 240 surviving planted trees per acre for this restoration site.

Natural regeneration of woody stems dominated the plots, especially nearest the stream. Tulip poplar (Liriodendron tulipifera) and sycamore (Platanus occidentalis) dominated the trees species reproducing through natural regeneration. Overall, the area appeared to be in an early successional state.

Recommendations include replanting trees to obtain mitigation requirements, and adding live stakes to streambanks where erosion or scour are evident. Invasive vegetation is not a major issue on this project site but smartweed (Polygonum spp.), Japanese stilt grass (Microstegium vimineum), Japanese honeysuckle (Lonicera japonica), and fescue (Festuca spp.) were identified in locations throughout the site. These should be monitored, and may need control so more diverse herbaceous vegetation can develop.

2.2 Morphology

Restored channel dimension, pattern, profile and substrate were examined during the 2004 monitoring.

2.2.1 Results and Discussion

Bank erosion has been noted at fourteen locations on the restored reach of this stream. There are two areas of major bank erosion due to the in-channel shearing forces on the stream at station 4+40 and station at 7+00. The first area or major bank erosion occurred at station 4+20 to 4+60 there is a 40 ft long area of severe bank erosion on the right bank the bank has an extreme BEHI and is actively eroding. This erosion is captured by the surveyed cross-section #1 and is photo documented. The actively eroding bank height is 4.2 ft with a vertical non-protected bank. The second area of severe bank erosion occurred at station 6+80 to 7+20 there is a 40 ft long area of severe bank erosion on the left bank the bank has an extreme BEHI and is actively eroding. The actively eroding bank height is 6.5 ft with a vertical non-protected bank. The remainder of the bank erosion issues could be described as being caused by circulations behind a root wad or as occurring downstream on the outside of a meander bend. These causes or bank erosion will be investigated with future surveys and research. There are two areas of bank erosion due to overland seepage or flow at station 20+00 on the right bank and at station at 29+50 on the right bank. There are also three areas with an active mid-channel bar at station 40+10, at station 43+25 and at station at 44+50. At station 40+20 to 40+50 there is a 30 ft long mid channel bar. At station 43+10 to 43+60 there is a 50 ft long mid channel bar that. This mid-channel bar is captured by the surveyed cross-section #5 and is photo documented. At station 44+45 to 40+50 there is a 5 ft long mid channel bar that. These mid-channel bars will lead to future bank erosion and high near bank stress.

The stream is showing signs of down–cutting from station 0+00 to 9+00 the average slope for this reach is 1.4%. This upper reach has down-cut in some areas as much as 6 inches but the reach is maintaining well defined riffles and riffle slopes that are close to the as-built riffle slopes. From station 10+00 to 51+00 the average slope for this reach is 0.8% and pools are filling with sediment and loosing capacity. This reach has not significantly aggraded but the riffle are becoming shorter and generating steeper riffle slopes. Pools are still generally located in the outside of the meander bends but the pool length and depth have decreased. The pool to pool spacing has not decreased on either reach. The overall planform of the entire reach has also remained similar to the as-built conditions with no significant change in radius of curvature, belt width or wave length.

Cross sections number 2, 3 and 4 have remained stable with similar cross sectional areas, no major signs of erosion and similar substrate. Cross section #1 is a riffle located at STA 4+30 that has down cut 6 inches with major bank erosion on the right bank. The cross sectional area has increased 90% to 20 sqft from 11.5 sqft. Cross section #5 is a riffle located at STA 43+20 that has down cut 3 inches and has formed a mid-channel bar with bank erosion on the right bank. The cross sectional area has increased 35% to 15 sqft from 11.7 sqft. Cross section #6 is a pool located at STA 43+40 that has aggraded 12. The cross sectional area has decreased 35% to 20 sqft from 30 sqft.

Table 1. Summary of Channel Conditions

DIMENSION	Brown Branch Cross-section #1 Riffle			Brown Branch Cross-section #2 Pool			Brown Branch Cross-section #3 Riffle			Brown Branch Cross-section #4 Pool			Brown Branch Cross-section #5 Riffle			Brown Branch Cross-section #6 Pool		
Monitoring Year	AS-BUILT	2003	2004	AS-BUILT	2003	2004	AS-BUILT	2003	2004	AS-BUILT	2003	2004	AS-BUILT	2003	2004	AS-BUILT	2003	2004
Bankfull Cross-sectional Area	11.4	22.7	19.8	13.3	12.2	9.5	15.4	16.6	15.1	21.9	22.5	23.2	11.67	14.8	15.1	29.9	24.92	21.7
Bankfull Width	10.0	14.1	15.2	21.9	22.5	23.1	16.8	14.9	14.9	20.0	22.9	24.7	16.00	14.6	15.3	18.0	21.60	21.3
Bankfull Mean Depth	1.1	1.6	1.3	0.6	0.5	0.4	0.9	1.1	1.0	1.1	1.0	0.9	0.73	1.0	1.0	1.7	1.15	1.0
Bankfull Max Depth	1.8	2.3	2.1	1.8	1.5	1.6	1.7	1.7	1.8	1.9	2.1	1.9	0.94	1.5	1.4	2.5	1.83	1.8

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SUBSTRATE	Brown Branch Cross-section #1 Riffle		Brown Branch Cross-section #2 Pool		Brown Branch Cross-section #3 Riffle		Brown Branch Cross-section #4 Pool		Brown Branch Cross-section #5 Riffle		Brown Branch Cross-section #6 Pool	
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d84	N/A	48.88	N/A	11.12	N/A	42.19	N/A	43.83	N/A	12.15	N/A	38.50

VEGETATION 2004 Monitoring	Quad 1 - Brown		Quad 2 - Brown Branch		Quad 3 - Brown Branch		Quad 4 - Brown		Quad 4 - Brown Branch	
	Observed	Planted*	Observed	Planted*	Observed	Planted*	Observed	Planted*	Observed	Planted*
Tree Stratum (stems/acre)	680	160	1120	240	680	200	4760	400	3000	200
Shrub Stratum (% cover)	3	n/a	0	n/a	0	n/a	0	n/a	0	n/a
Herb Stratum (%cover)	46	n/a	90	n/a	105	n/a	107	n/a	52	n/a

* Planted value represents number of stems observed alive that were planted.

2.3 Biological and Ecological

Samples were collected from three locations on Brown Branch. A stable reference reach was selected above the restored reach. This site (site #1) was located above the project start point (52 + 87) but below the confluence of a small tributary. Sedimentation is apparent within this reach since most of the pools are at least partially filled in with sand. However, there is a good riparian canopy and lots of large woody debris (LWD). The LWD offers substantial habitat for aquatic insects, as many Limnephilid caddisflies were very abundant during the pre-construction investigation. These taxa include Pycnopsyche (2 or 3 species), Heteroplectron and Anisocentropus. Interestingly there were very few mayflies were collected from this reach. This includes Heptageniids (including Epeorus) or Ephemerelids. This may due to the sedimentation or pH may be chronically low.

The next downstream site was located immediately below a farm pond on the property. Brown Branch at this point is much different then at station 1. The width/depth ratio appears to have increased substantially prior to construction and most of the canopy has been eliminated. In addition LWD was scarce, as was fine organic matter in the substrate. This physical change in the structure of Brown Branch has impacted the benthic fauna. Many fewer Limnephilids were collected and we started to see Ephemerelids and Heptageniids. Embeddedness also has increased significantly between these two locations.

Station 3 (the most downstream location) was located near the confluence with Mulberry Creek. The site is directly across the pasture from the owner's home. The stream at this point appears to have incised some and there is evidence of enrichment. Macrophytes are common and cattle have direct access to the stream. EPT abundance values appear to have increased from site 2. Another interesting observation is the shift in the structure of the snail population. The upstream location was dominated by Elimia, but as soon as the canopy opened up, the number of Elimia dropped off and they were replaced by some Physella and Planorbula at the downstream locations. Data from both surveys are listed in table 15.

Table 15. Summary statistics from the stream restoration project at Brown Branch (Caldwell County).

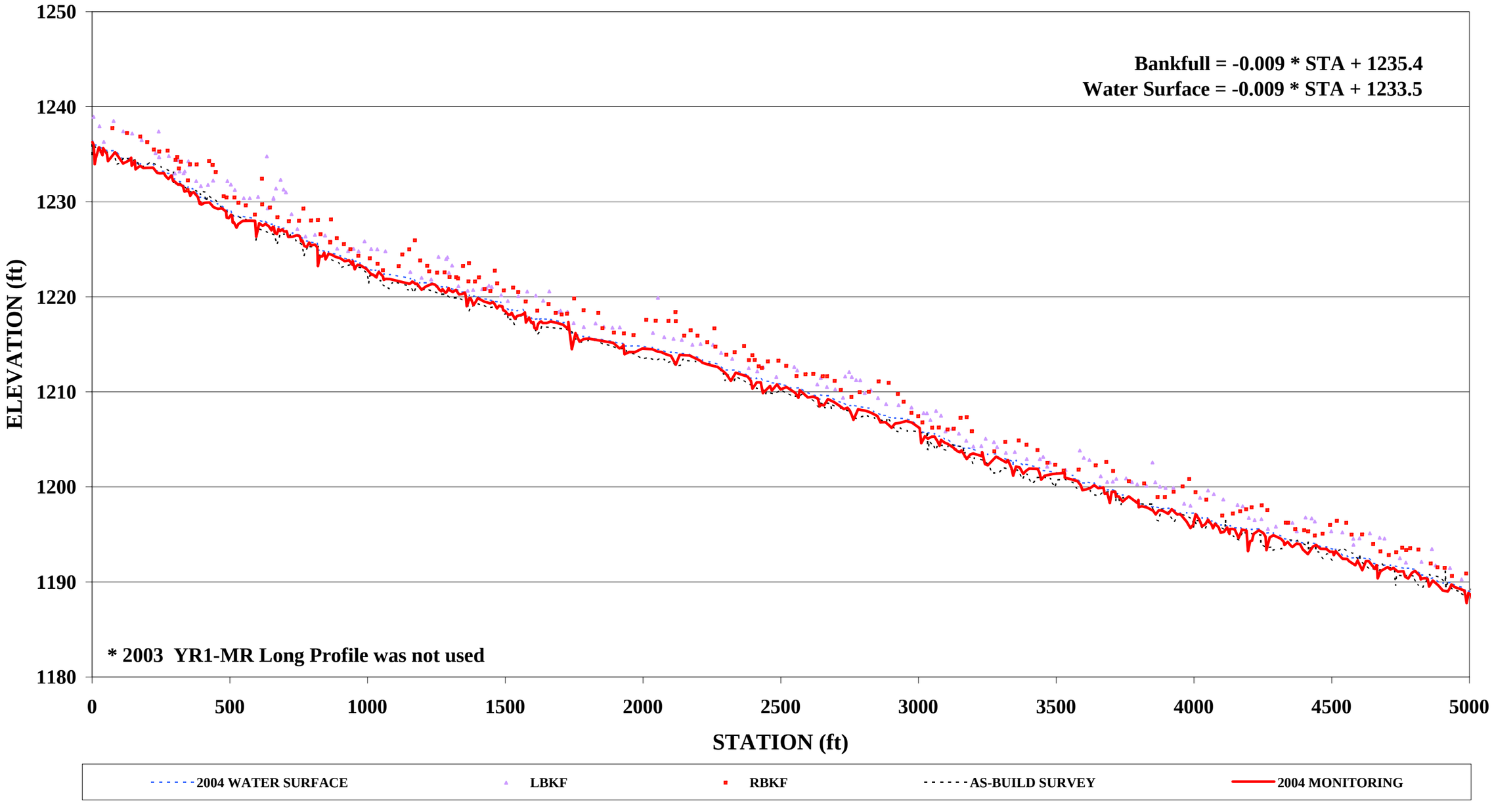
	Upstream Ref, site1		**Site 2**		**Site 3**	
Metric/Survey	Apr 2002	June 2004	Apr 2002	June 2004	Apr 2002	June 2004
Total Taxa Richness	57	50	57	59	67	59
EPT Taxa Richness	33	23	31	32	33	32
EPT Abundance	133	111	87	142	119	167
Dominant in Common Index (%)	-	-	39%	63%	33%	44%
# Keystone Species	23	**16**	13	12	14	10

Much lower EPT taxa richness values were recorded at site 1 in 2004 during the first post-construction survey. Much of this difference is due to lower caddisfly and stonefly numbers in 2004. For example 11 stonefly taxa were collected in the April 2002 survey, while only 5 stonefly taxa were collected during the 2004 survey. These differences are a result of seasonal variability in the data as the 2004 data were collected in June. Note also the much lower number of keystone taxa collected during the 2004 survey at the reference site (in bold). Dominant in Common numbers were much lower during the 2002 pre-construction survey than during the first post-construction survey, suggesting that there is some recovery and improvement occurring in these restored reaches. However, seasonal variability in the data will make direct comparisons between surveys difficult. In addition slightly lower number of keystone taxa were collected at the restored reaches following restoration. April surveys will be conducted at this project in 2005 to corroborate data that suggests improvements following restoration..

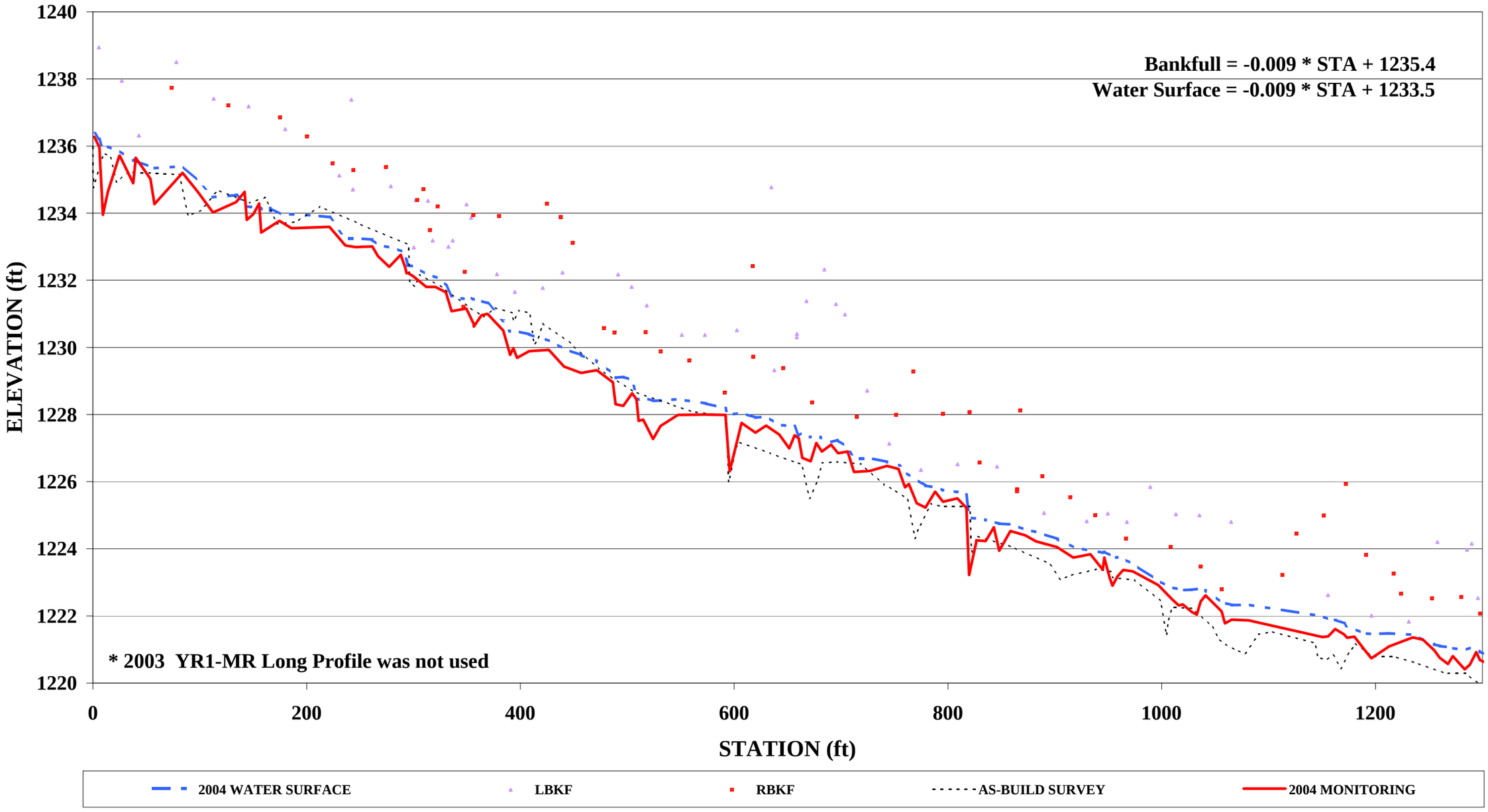
2.3.1 Results and Discussion

Direct comparison between pre and post-construction community structure is difficult due to seasonal variability in the data (the pre-construction survey was conducted in April 2002 and the first post-construction survey was conducted in June 2004). Whereas significant decreases in all metrics were noted at the reference reach during the post-construction survey, very subtle differences were noted in taxa richness at the two restored reaches between surveys; in fact, increases were noted for EPT abundance and the Dominant in Common index following construction. These data suggest the biological integrity of this feature improved following construction above those recorded prior to construction; however, seasonal variability in the data makes direct comparison difficult.

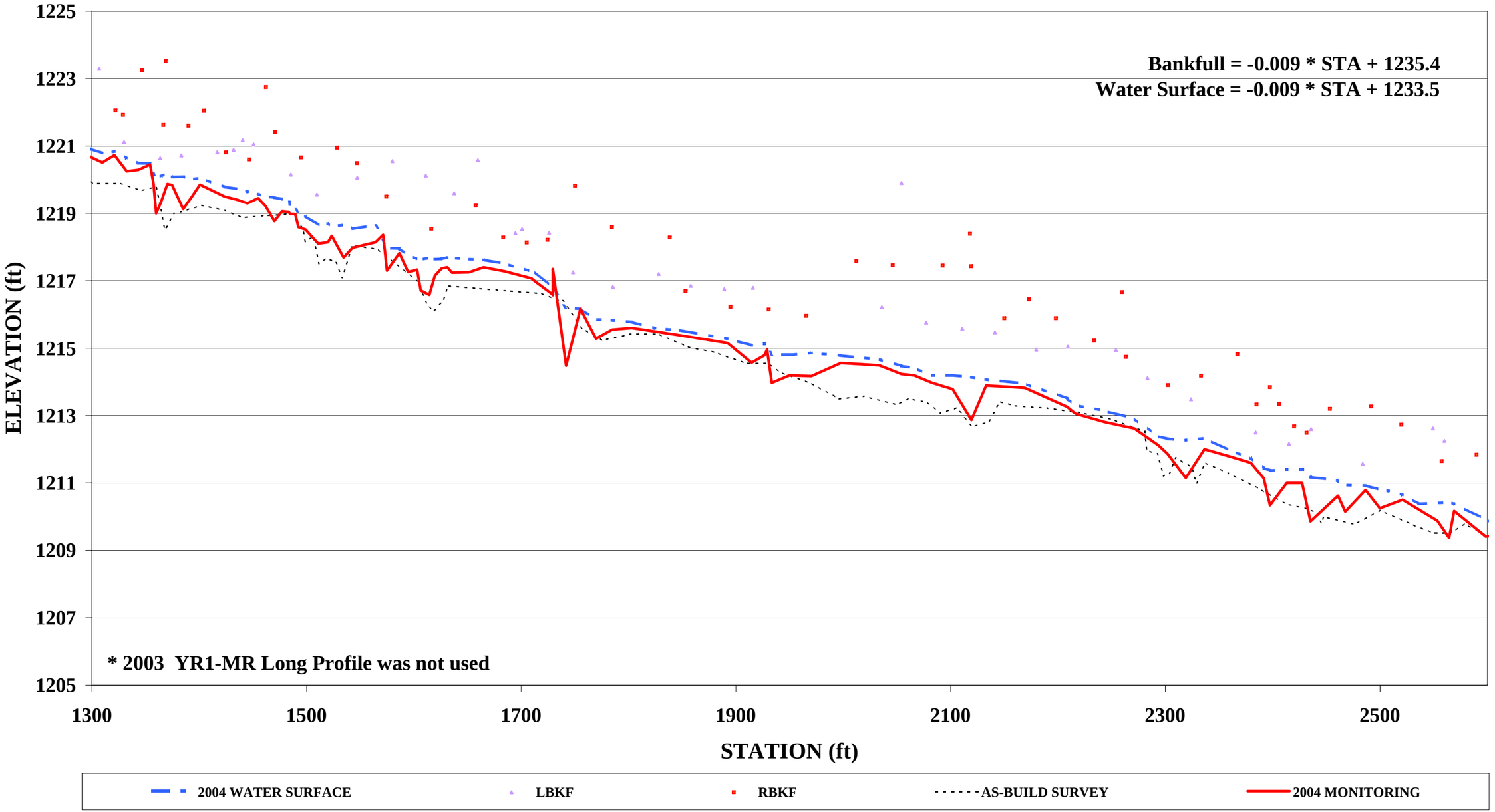
BROWN BRANCH
LONG PROFILE
2004 MONITORING



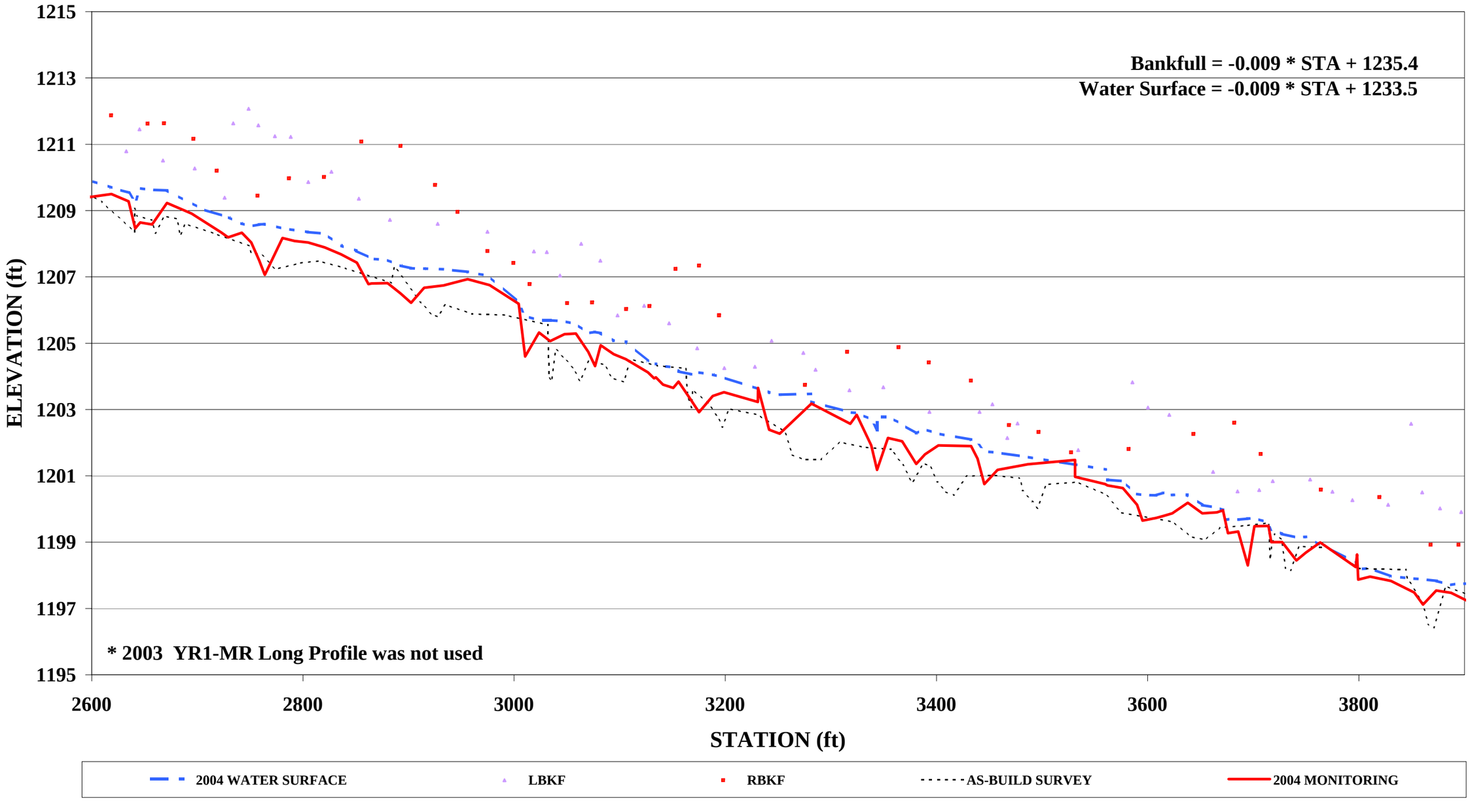
BROWN BRANCH
LONG PROFILE
2004 MONITORING



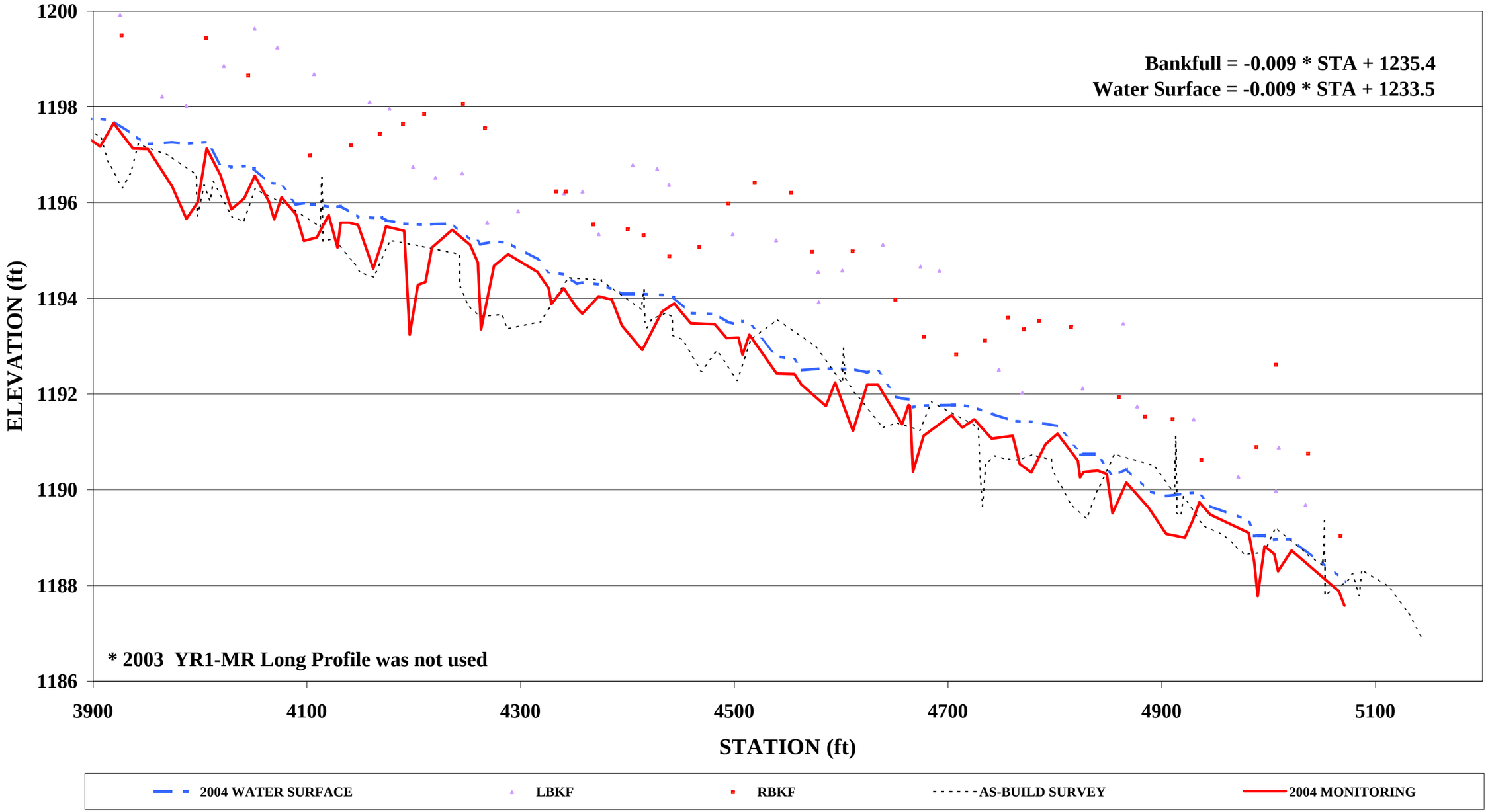
BROWN BRANCH
LONG PROFILE
2004 MONITORING



BROWN BRANCH
LONG PROFILE
2004 MONITORING



BROWN BRANCH
LONG PROFILE
2004 MONITORING



2.3 Areas of Concern

The following areas of concern should be monitored closely and considered for repair as suggested:

Brown Branch

- Areas with bank erosion
    - Bank erosion has been noted at fourteen locations on the restored reach of this stream
    - There are two areas of major bank erosion due to the in-channel shearing forces of stream at station 4+40 and station at 7+00
        - At station 4+20 to 4+60 there is a 40 ft long area of severe bank erosion on the right bank the bank has an extreme BEHI and is actively eroding. This erosion is captured by the surveyed cross-section #1 and is photo documented. The actively eroding bank height is 4.2 ft with a vertical non-protected bank.
        - At station 6+80 to 7+20 there is a 40 ft long area of severe bank erosion on the left bank the bank has an extreme BEHI and is actively eroding. The actively eroding bank height is 6.5 ft with a vertical non-protected bank.
    - The remainder of the bank erosion issues could be described as being caused by circulations behind a root wad or as occurring downstream on the outside of a meander bend
    - There are two areas of bank erosion due to overland seepage or flow at station 20+00 on the right bank and at station at 29+50 on the right bank
    - There are three areas with an active mid-channel bar at station 40+10, at station 43+25 and at station at 44+50
        - At station 40+20 to 40+50 there is a 30 ft long mid channel bar.
        - At station 43+10 to 43+60 there is a 50 ft long mid channel bar that. This mid-channel bar is captured by the surveyed cross-section #5 and is photo documented.
        - At station 44+45 to 40+50 there is a 5 ft long mid channel bar that
- Stream Profile
    - The stream is showing signs of down–cutting from station 0+00 to 9+00 the average slope for this reach is 1.4%
        - The this reach has down-cut in some areas as much as 6 inches but the reach is maintaining well defined riffles and riffle slopes that are close to the as-built riffle slopes.
    - From station 10+00 to 51+00 the average slope for this reach is 1.0% and pools are filling with sediment and loosing capacity
        - This reach has not significantly aggraded but the riffle are becoming shorter and generating steeper riffle slopes.
        - Pools are still generally located in the outside of the meander bends but the pool length and depth have decreased.
- Vegetation
    - Replanting trees should occur to obtain mitigation requirements

- The site could benefit from larger containerized trees both for bank stability and aesthetics, although mitigation requirements are currently being met.
- It is recommended to stake in areas where erosion is problematic, particularly on outside meander bends.

PS #1 Looking Downstream from STA 0+05

PS #2 Looking Downstream from STA 1+70

PS #3 Looking Downstream from STA 3+10

PS #4 Looking Downstream from STA 7+10

PS#5 Looking Downstream from STA 9+90

PS#6 Looking Downstream from STA 13+00

PS #7 Looking Downstream from STA 14+90

PS #8 Looking Downstream from STA 15+80

PS #9 Looking Downstream from STA 19+90

PS #10 Looking Downstream from STA 23+10

PS #11 Looking Downstream from STA 25+40

PS #12 Looking Downstream from STA 26+50

PS #13 Looking Downstream from STA 28+90

PS #14 Looking Downstream from STA 30+40

PS #15 Looking Downstream from STA 33+25

PS #16 Looking Downstream from STA 36+65

PS #17 Looking Downstream from STA 38+50

PS #18 Looking Downstream from STA 41+00

PS #19 Looking Downstream from STA 42+50

PS #20 Looking Downstream from STA 45+80

PS #21 Looking Downstream from STA 47+50

PS #22 Looking Downstream from STA 49+40

PS#1 Loooking Downstream from STA 0+05

~Station 2

PS#2 Looking Downstream from STA 1+70

~ Station 3

PS#3 Looking Downstream from STA 3+10

~ Station 4

PS#4 Looking Downstream from STA 7+10

~ Station 5

PS#5 Looking Downstream from STA 9+90

~ Station 6

PS#6 Looking Downstream from STA 13+00

~ Station 7

PS#7 Looking Downstream from STA 14+90

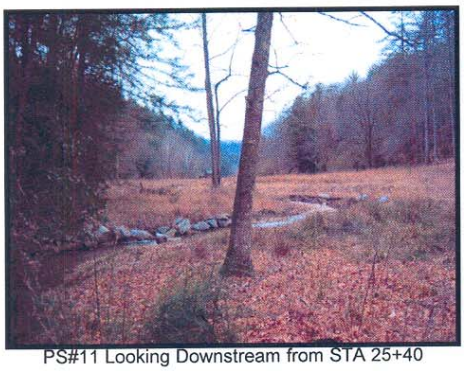
PS#8 Looking Downstream from STA 15+80

~ Station 9

PS#9 Looking Downstream from STA 19+90

PS#10 Looking Downstream from STA 23+10

~ Station 11

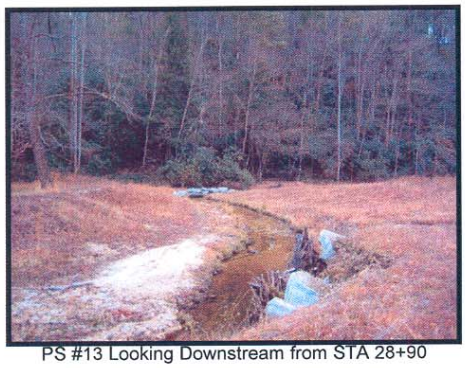


PS#11 Looking Downstream from STA 25+40

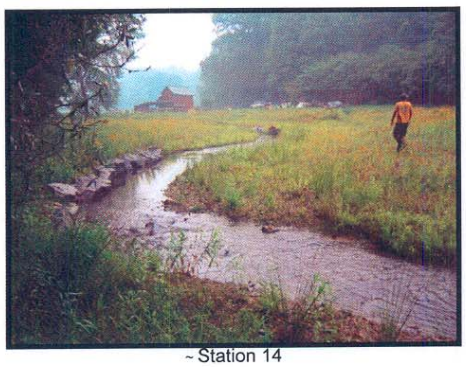
~ Station 12

PS#12 Looking Downstream from STA 26+50

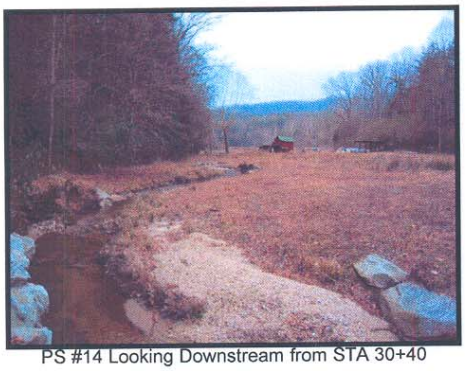
~ Station 13



PS #13 Looking Downstream from STA 28+90



~ Station 14



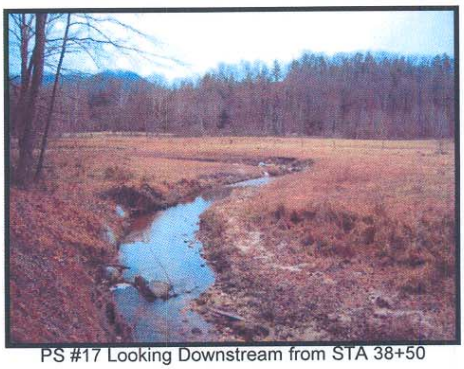
PS #14 Looking Downstream from STA 30+40

~ Station 15

PS #15 Looking Downstream from STA 33+25

PS #16 Looking Downstream from STA 36+65

~ Station 17



PS #17 Looking Downstream from STA 38+50

~ Station 18

PS #18 Looking Downstream from STA 41+00

~ Station 19

PS #19 Looking Downstream from STA 42+50

~ Station 20

PS #20 Looking Downstream from STA 45+80

~ Station 21

PS #21 Looking Downstream from STA 47+50

~ Station 22

PS #22 Looking Downstream from STA 49+40

Photographs from Monumented Locations
Brown Branch Stream Restoration 2003
Stationing starts downstream and ascending upstream

Photo Station #1. Looking downstream from as-built Station ~51+00.

Photo Station #2. Looking downstream from as-built Station ~49+30.

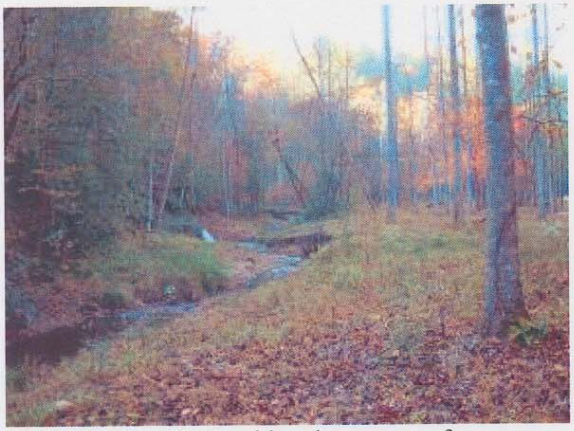


Photo Station #3. Looking downstream from as-built Station ~47+90.

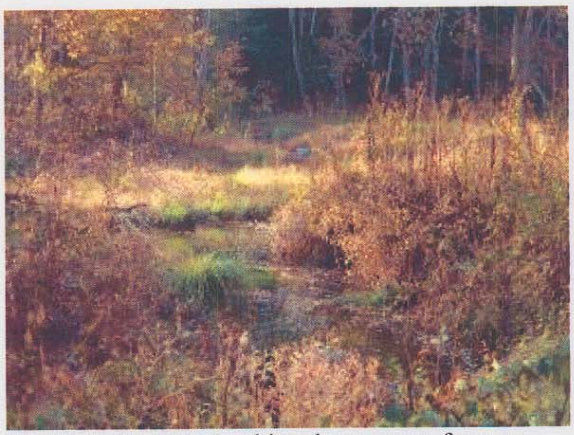


Photo Station #4. Looking downstream from as-built Station ~44+00. Oxbow wetland in foreground.

Photo Station #5. Looking downstream at channel plug protection from as-built Station ~41+25.

Photo Station #6. Looking downstream from as-built Station ~38+00.

Photographs from Monumented Locations
Brown Branch Stream Restoration 2003
Stationing starts downstream and ascending upstream

Photo Station #7. Looking downstream from as-built Station ~36+10.

Photo Station #8. Looking downstream from as-built Station ~35+15.

Photo Station #9. Looking downstream from as-built Station ~31+10 near gravel roadway.

Photo Station #10. Looking downstream from as-built Station ~28+25.

Photo Station #11. Looking downstream from as-built Station ~25+85.

Photo Station #12. Looking downstream from as-built Station ~24+50.

Photographs from Monumented Locations
Brown Branch Stream Restoration 2003
Stationing starts downstream and ascending upstream

Photo Station #13. Looking downstream from as-built Station ~22+20.

Photo Station #14. Looking downstream from as-built Station ~20+70. Small tributary confluence to left.

Photo Station #15. Looking downstream from as-built Station ~17+75.

Photo Station #16. Looking downstream from as-built Station ~14+25.

Photo Station #17. Looking downstream from as-built Station ~12+50. Tributary confluence to left. Rock has rolled from bank into channel from left.

Photo Station #18. Looking downstream from as-built Station ~10+05.

Photographs from Monumented Locations
Brown Branch Stream Restoration 2003
Stationing starts downstream and ascending upstream

Photo Station #19. Looking downstream from as-built Station ~8+30.

Photo Station #20. Looking downstream from as-built Station ~5+05.

Photo Station #21. Looking downstream from as-built Station ~3+25.

Photo Station #22. Looking downstream from as-built Station 1+60.

Project Name	Anita Alta 4-H Camp Brown Branch
Cross Section	#1
Feature	Riffle
Date	6/14/04
Crew	Bidelspach, Clinton

2004
2004 Survey

Station	Elevation	Notes
0.0	1233.73	Left Pin
0.3	1233.26	
7.4	1232.78	
15.5	1231.95	BKF
17.7	1230.69	
21.7	1230.22	
23.5	1229.99	
25.3	1229.90	
27.0	1229.92	
27.7	1229.98	
28.1	1230.31	
30.1	1230.92	
30.7	1232.00	
32.1	1234.18	
40.6	1234.51	
51.6	1234.51	
51.6	1234.9	Right Pin

2003
2003 Survey

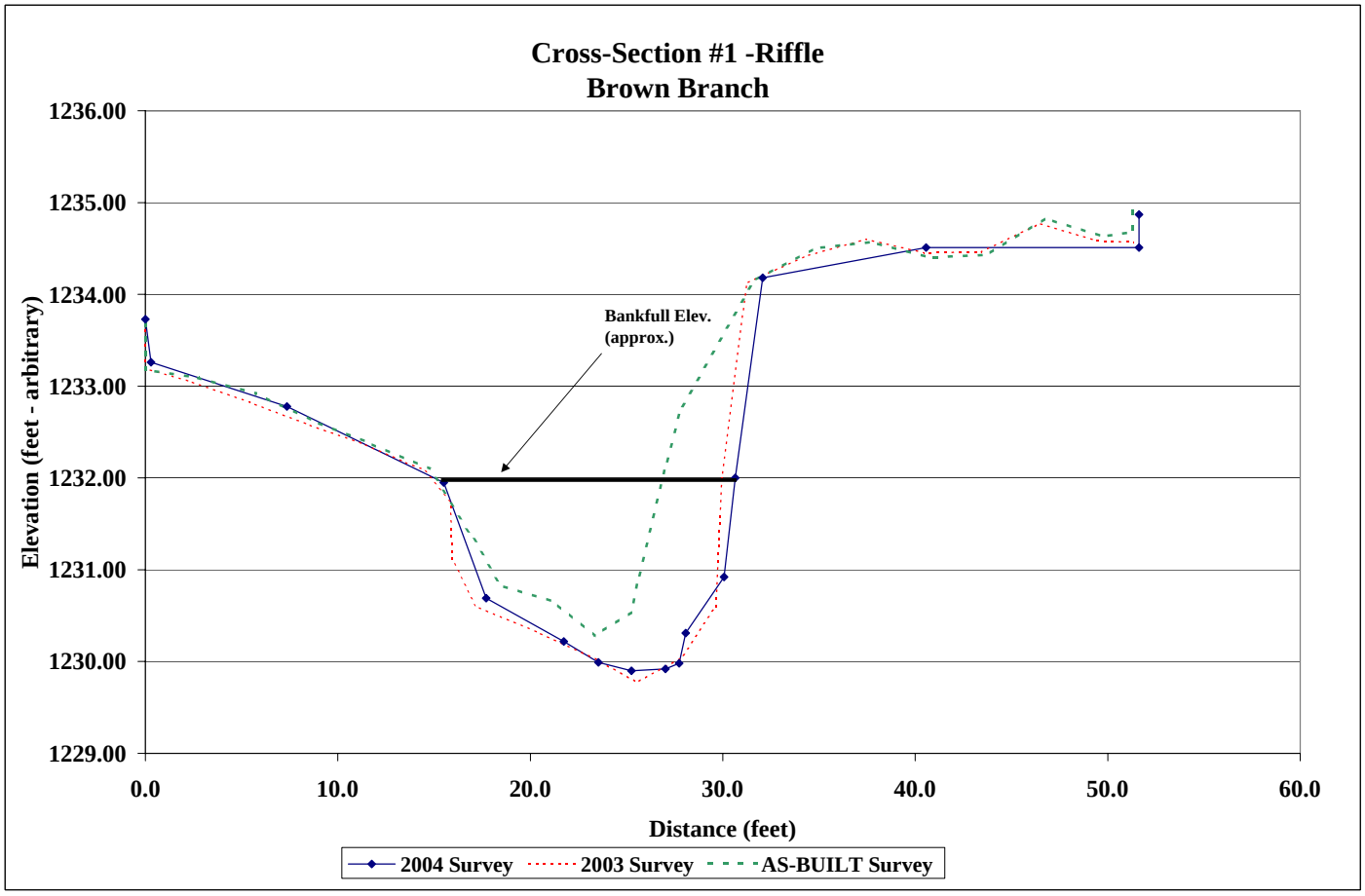
Station	Elevation	Notes
0.0	1233.69	Left Pin
0.0	1233.19	
2.5	1233.04	
5.5	1232.82	
8.5	1232.58	
11.5	1232.36	
13.5	1232.17	
14.5	1232.09	BKF
15.9	1231.74	
16.0	1231.11	
17.2	1230.60	
20.5	1230.31	
23.5	1230.02	
25.6	1229.77	
27.9	1230.04	
29.7	1230.60	
30.0	1232.00	
31.3	1234.12	
34.3	1234.41	
37.5	1234.60	
40.45	1234.45	
43.45	1234.46	
46.45	1234.77	
49.45	1234.58	
51.35	1234.57	Right Pin

AS-BUILT
AS-BUILT Survey

Station	Elevation	Notes
0.0	1233.69	Left Pin
0.0	1233.18	
2.8	1233.09	
5.8	1232.92	
8.8	1232.62	
11.8	1232.37	
14.8	1232.10	BKF
17.1	1231.33	
18.5	1230.83	
21.3	1230.65	
23.4	1230.28	
25.3	1230.54	
25.6	1230.84	
27.0	1232.10	
27.9	1232.77	
31.7	1234.15	
34.8	1234.50	
37.8	1234.57	
40.8	1234.40	
43.8	1234.43	
46.75	1234.83	
49.75	1234.63	
51.3	1234.68	
51.3	1234.91	Right Pin

Photo of Cross-Section #1 - Looking Downstream @ STA 3+32

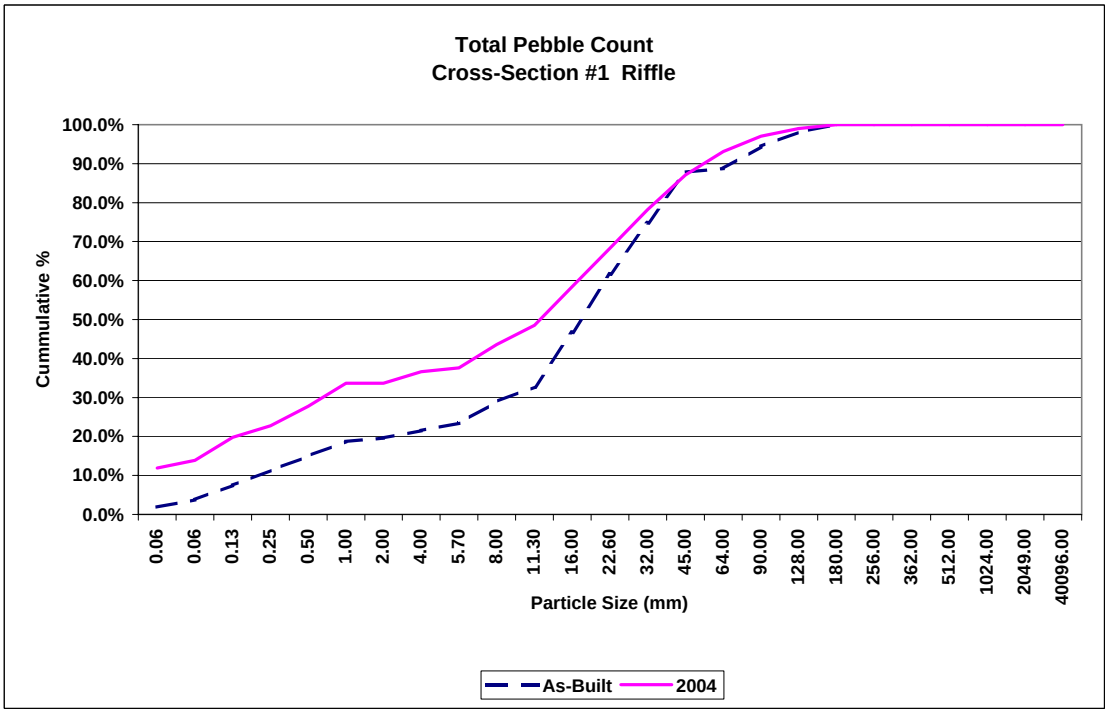
	2004	2003	AS-BUILT
Area	19.8	22.7	11.4
Width	15.2	14.1	10.0
Mean Depth	1.3	1.6	1.1
Max Depth	2.1	2.3	1.8
W/D	11.6	8.8	8.7



Project Name	Brown Branch
Cross Section	#1
Feature	Riffle
Date	6/3/04
Crew	Bidelspach, Clinton

			As-Built			2004			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	2	1.9%	1.9%	1	11	11.9%	11.9%
Sand	very fine sand	0.062	2	1.9%	3.7%	0	2	2.0%	13.9%
	fine sand	0.125	4	3.7%	7.5%	0	6	5.9%	19.8%
	medium sand	0.25	4	3.7%	11.2%	1	2	3.0%	22.8%
	course sand	0.50	4	3.7%	15.0%	0	5	5.0%	27.7%
	very course sand	1.0	4	3.7%	18.7%	3	3	5.9%	33.7%
Gravel	very fine gravel	2.0	1	0.9%	19.6%	0	0	0.0%	33.7%
	fine gravel	4.0	2	1.9%	21.5%	2	1	3.0%	36.6%
	fine gravel	5.7	2	1.9%	23.4%	1	0	1.0%	37.6%
	medium gravel	8.0	6	5.6%	29.0%	3	3	5.9%	43.6%
	medium gravel	11.3	4	3.7%	32.7%	3	2	5.0%	48.5%
	course gravel	16.0	15	14.0%	46.7%	3	7	9.9%	58.4%
	course gravel	22.6	16	15.0%	61.7%	3	7	9.9%	68.3%
	very course gravel	32	14	13.1%	74.8%	4	6	9.9%	78.2%
	very course gravel	45	14	13.1%	87.9%	3	6	8.9%	87.1%
Cobble	small cobble	64	1	0.9%	88.8%	2	4	5.9%	93.1%
	medium cobble	90	6	5.6%	94.4%	1	3	4.0%	97.0%
	large cobble	128	4	3.7%	98.1%	1	1	2.0%	99.0%
	very large cobble	180	2	1.9%	100.0%	0	1	1.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			107	100.0%		31	70	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.13	3.83	14.50	48.88	92.60



Project Name	Anita Alta 4-H Camp Brown Branch
Cross Section	#2
Feature	Pool
Date	6/14/04
Crew	Bidelspach, Clinton

Photo of Cross-Section #2 - Looking Downstream @ STA 11+39

2004
2004 Survey

Station	Elevation	Notes
0.0	1225.69	Left Pin
0.4	1225.28	
13.6	1222.58	BKF
24.4	1222.34	
24.9	1222.18	
28.6	1221.41	
33.4	1221.11	
33.9	1220.95	
35.5	1221.39	
36.7	1222.93	
40.2	1224.58	
48.0	1227.18	
55.0	1227.33	
55.1	1227.85	Right Pin

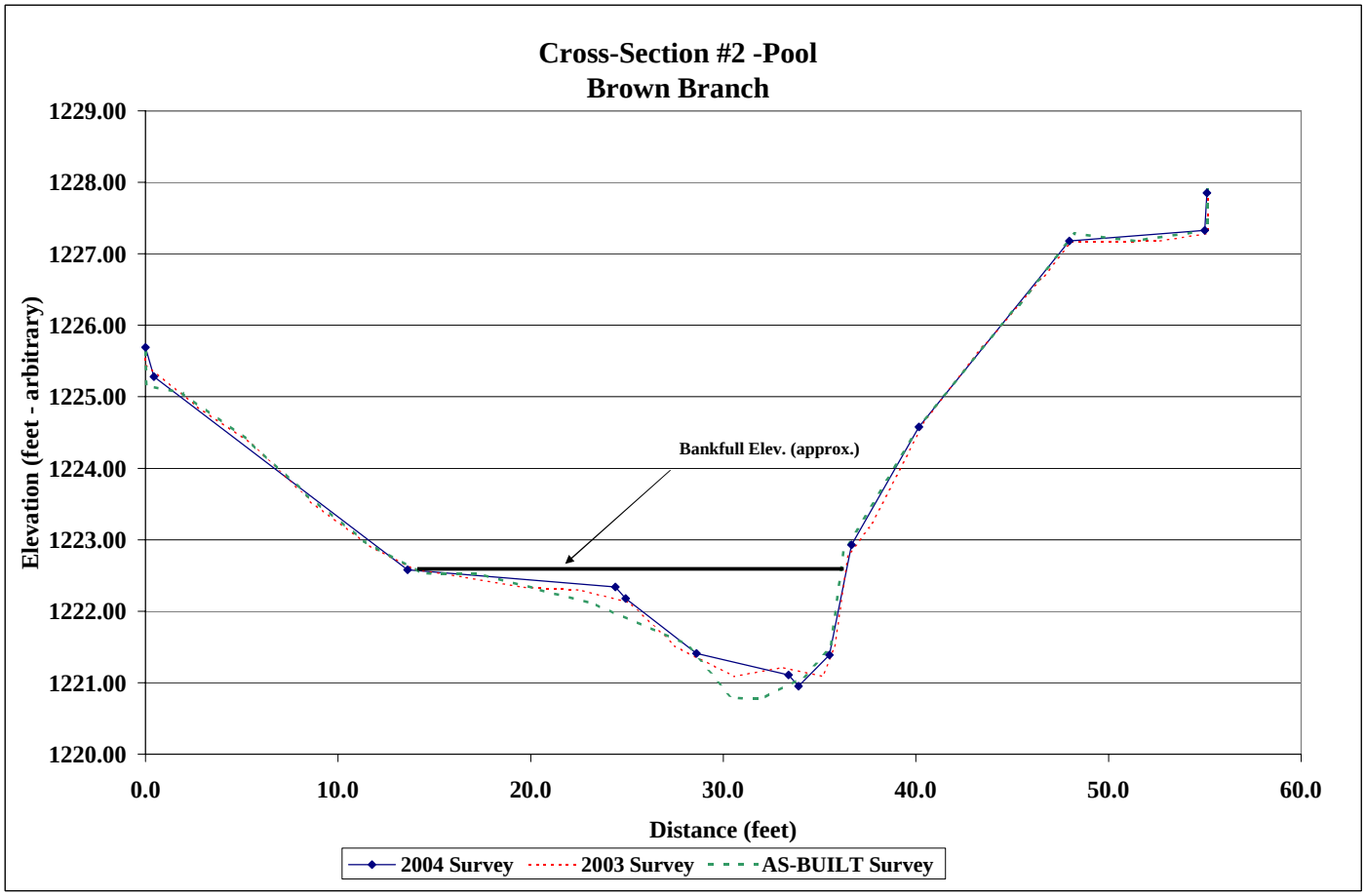
2003
2003 Survey

Station	Elevation	Notes
0.0	1225.64	Left Pin
0.0	1225.46	
2.6	1224.89	
5.6	1224.34	
8.6	1223.54	
11.6	1222.93	
14.0	1222.59	BKF
16.6	1222.48	
19.6	1222.34	
22.6	1222.30	
25.2	1222.12	
27.5	1221.52	
30.6	1221.09	
33.1	1221.22	
35.2	1221.09	
35.8	1221.50	
36.5	1222.79	
37.6	1223.17	
40.6	1224.72	
43.6	1225.74	
46.575	1226.67	
48.075	1227.17	
52.575	1227.18	
55.155	1227.29	
55.155	1227.91	Right Pin

AS-BUILT
AS-BUILT Survey

Station	Elevation	Notes
0.0	1225.63	Left Pin
0.1	1225.16	
2.0	1225.05	
5.4	1224.39	
8.4	1223.64	
11.4	1222.98	
14.4	1222.53	BKF
17.4	1222.52	
20.4	1222.31	
23.4	1222.10	
28.1	1221.54	
30.5	1220.79	
32.0	1220.77	
34.2	1221.08	
35.6	1221.48	
36.3	1222.84	
40.5	1224.70	
45.1	1226.19	
48.3	1227.28	
51.4	1227.18	
55.15	1227.33	
55.15	1227.91	Right Pin

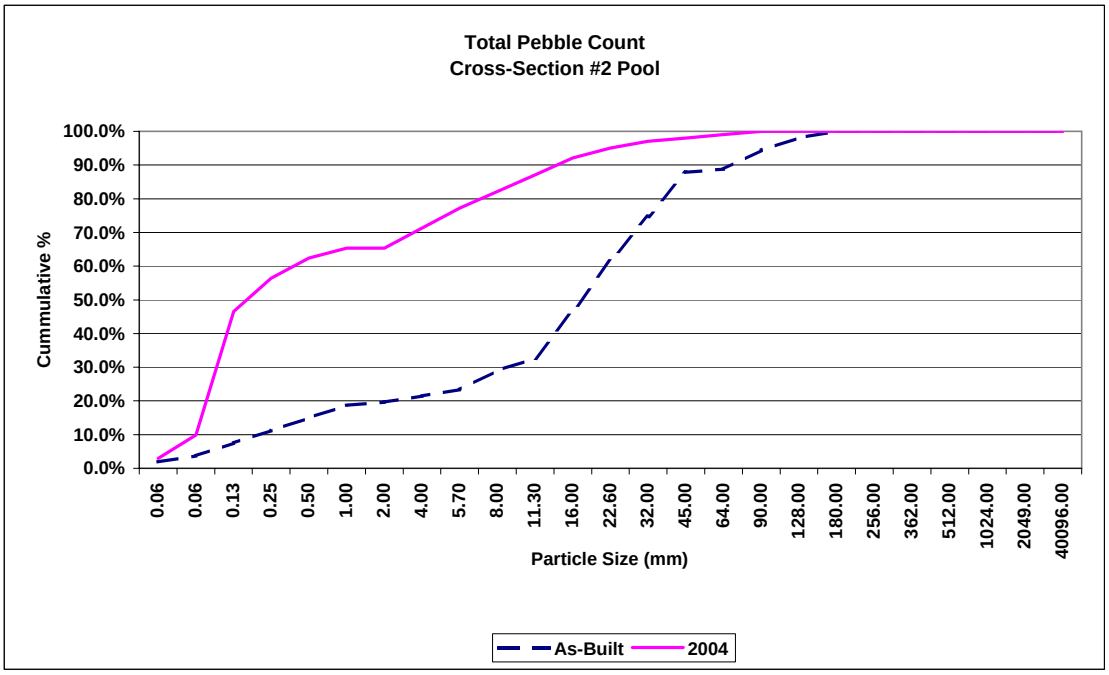
	2004	2003	AS-BUILT
Area	9.5	12.2	13.3
Width	23.1	22.5	21.9
Mean Depth	0.4	0.5	0.6
Max Depth	1.6	1.5	1.8
W/D	55.8	41.4	36.0



Project Name	Brown Branch
Cross Section	#2
Feature	Pool
Date	6/3/04
Crew	Bidelspach, Clinton

			As-Built			2004			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	2	1.9%	1.9%	3	0	3.0%	3.0%
Sand	very fine sand	0.062	2	1.9%	3.7%	4	3	6.9%	9.9%
	fine sand	0.125	4	3.7%	7.5%	2	35	36.6%	46.5%
	medium sand	0.25	4	3.7%	11.2%	0	10	9.9%	56.4%
	course sand	0.50	4	3.7%	15.0%	1	5	5.9%	62.4%
	very course sand	1.0	4	3.7%	18.7%	3	0	3.0%	65.3%
Gravel	very fine gravel	2.0	1	0.9%	19.6%	0	0	0.0%	65.3%
	fine gravel	4.0	2	1.9%	21.5%	5	1	5.9%	71.3%
	fine gravel	5.7	2	1.9%	23.4%	5	1	5.9%	77.2%
	medium gravel	8.0	6	5.6%	29.0%	3	2	5.0%	82.2%
	medium gravel	11.3	4	3.7%	32.7%	3	2	5.0%	87.1%
	course gravel	16.0	15	14.0%	46.7%	3	2	5.0%	92.1%
	course gravel	22.6	16	15.0%	61.7%	2	1	3.0%	95.0%
	very course gravel	32	14	13.1%	74.8%	1	1	2.0%	97.0%
	very course gravel	45	14	13.1%	87.9%	0	1	1.0%	98.0%
Cobble	small cobble	64	1	0.9%	88.8%	0	1	1.0%	99.0%
	medium cobble	90	6	5.6%	94.4%	0	1	1.0%	100.0%
	large cobble	128	4	3.7%	98.1%	0	0	0.0%	100.0%
	very large cobble	180	2	1.9%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			107	100.0%		35	66	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.11	0.16	0.25	11.12	27.17



Project Name	Anita Alta 4-H Camp Brown Branch
Cross Section	#3
Feature	Riffle
Date	6/14/04
Crew	Bidelspach, Clinton

2004
2004 Survey

Station	Elevation	Notes
0.0	1216.95	Left Pin
0.0	1216.61	
2.6	1216.94	
5.6	1217.02	
8.6	1217.14	
11.6	1217.50	
12.5	1217.54	
15.7	1215.25	
16.7	1214.23	
17.6	1213.85	
19.2	1213.57	
22.3	1214.24	
24.8	1214.88	
27.6	1215.39	BKF
30.6	1215.45	
35.6	1216.69	
41.3	1219.2	
41.3	1219.50	Right Pin

2003
2003 Survey

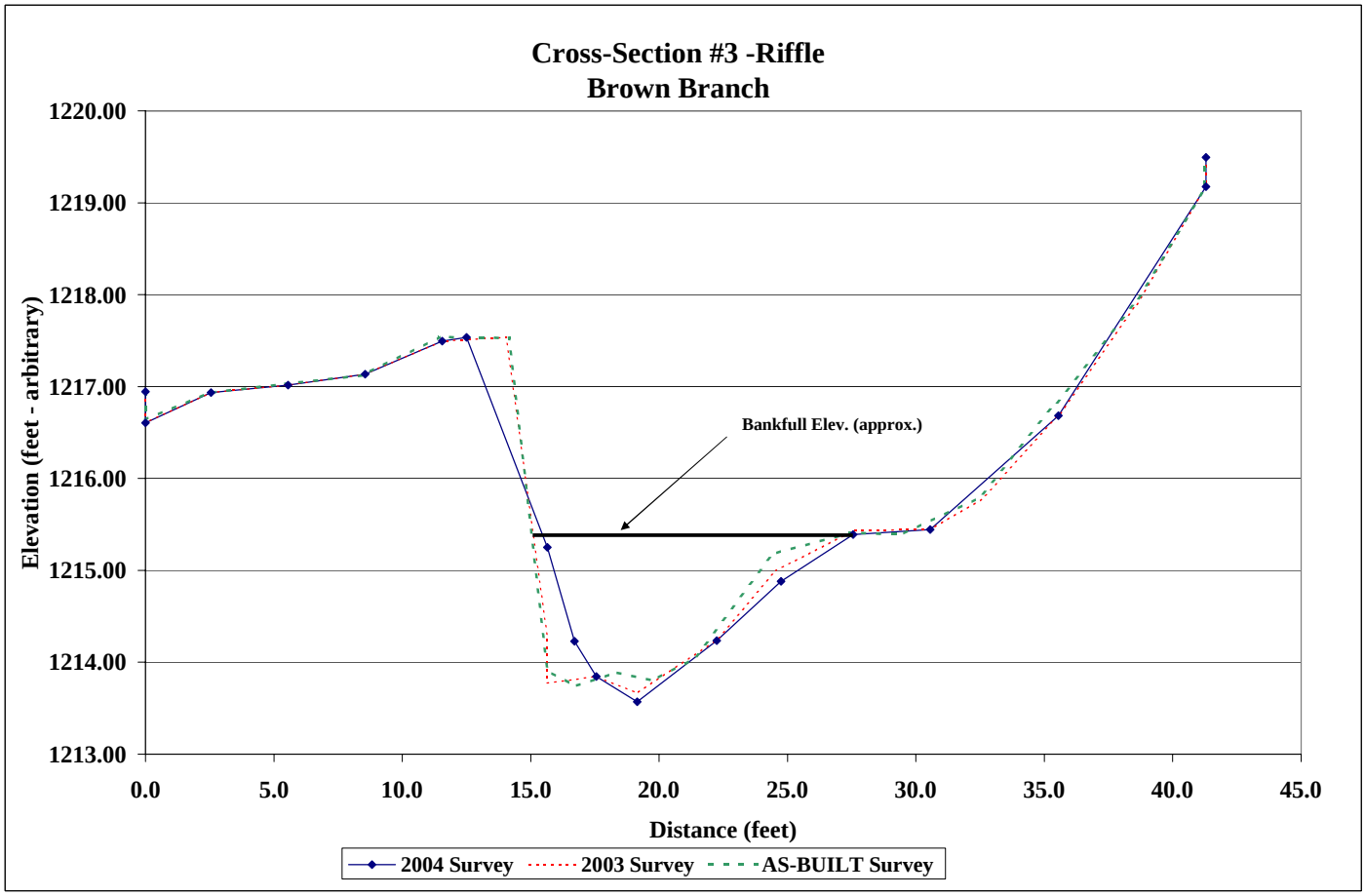
Station	Elevation	Notes
0.0	1216.95	Left Pin
0.0	1216.61	
2.6	1216.94	
5.6	1217.02	
8.6	1217.14	
11.6	1217.50	
14.1	1217.54	
15.7	1214.28	
15.7	1213.78	
17.6	1213.85	
19.2	1213.67	
22.3	1214.25	
24.6	1215.00	
27.6	1215.44	BKF
30.6	1215.45	
32.6	1215.78	
35.6	1216.69	
38.6	1217.88	
41.3	1219.18	
41.3	1219.50	Right Pin

AS-BUILT
AS-BUILT Survey

Station	Elevation	Notes
0.0	1216.94	Left Pin
0.0	1216.64	
2.5	1216.93	
5.5	1217.03	
8.5	1217.12	
11.5	1217.54	
14.2	1217.53	
15.7	1213.91	
16.8	1213.74	
18.4	1213.89	
19.8	1213.80	
21.4	1214.04	
24.5	1215.18	
27.5	1215.41	BKF
29.5	1215.39	
32.5	1215.79	
35.5	1216.82	
38.5	1217.87	
41.3	1219.14	
41.3	1219.49	Right Pin

Photo of Cross-Section #3 - Looking Downstream @ STA 20+13

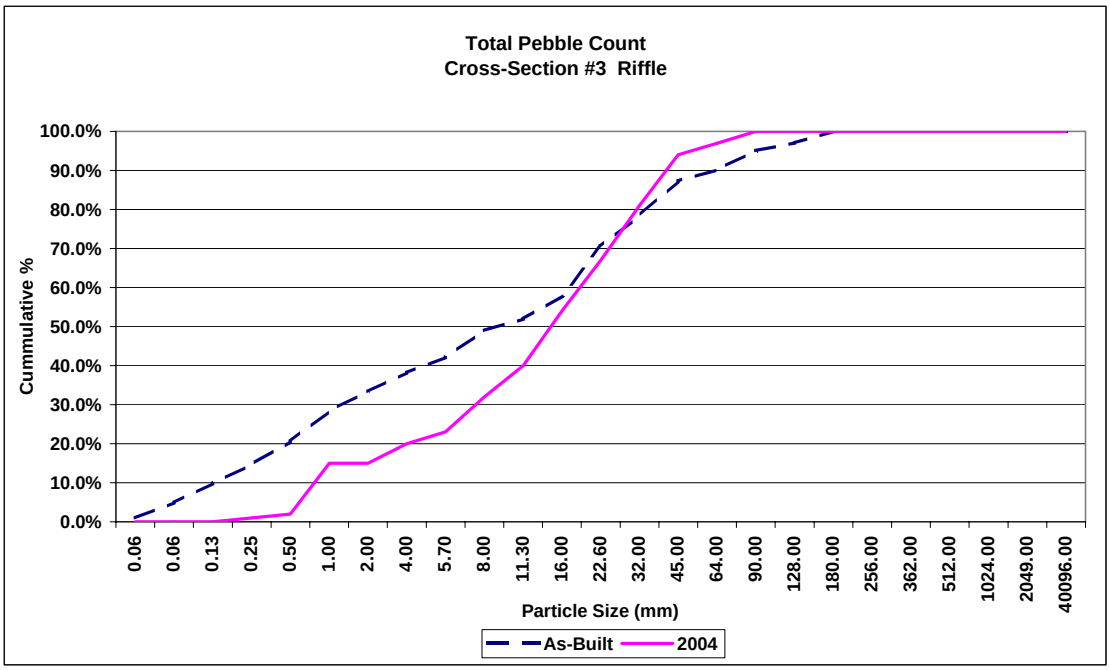
	2004	2003	AS-BUILT
Area	15.1	16.6	15.4
Width	14.9	14.9	16.8
Mean Depth	1.0	1.1	0.9
Max Depth	1.8	1.7	1.7
W/D	14.7	13.3	18.3



Project Name	Brown Branch
Cross Section	#3
Feature	Riffle
Date	6/3/04
Crew	Bidelspach, Clinton

			As-Built			2004			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	1	1.0%	1.0%	0	0	0.0%	0.0%
Sand	very fine sand	0.062	4	3.9%	4.9%	0	0	0.0%	0.0%
	fine sand	0.125	5	4.9%	9.8%	0	0	0.0%	0.0%
	medium sand	0.25	5	4.9%	14.7%	0	1	1.0%	1.0%
	course sand	0.50	6	5.9%	20.6%	0	1	1.0%	2.0%
	very course sand	1.0	8	7.8%	28.4%	7	6	13.0%	15.0%
Gravel	very fine gravel	2.0	5	4.9%	33.3%	0	0	0.0%	15.0%
	fine gravel	4.0	5	4.9%	38.2%	2	3	5.0%	20.0%
	fine gravel	5.7	4	3.9%	42.2%	1	2	3.0%	23.0%
	medium gravel	8.0	7	6.9%	49.0%	5	4	9.0%	32.0%
	medium gravel	11.3	3	2.9%	52.0%	4	4	8.0%	40.0%
	course gravel	16.0	6	5.9%	57.8%	7	7	14.0%	54.0%
	course gravel	22.6	13	12.7%	70.6%	6	7	13.0%	67.0%
	very course gravel	32	8	7.8%	78.4%	7	7	14.0%	81.0%
	very course gravel	45	9	8.8%	87.3%	7	6	13.0%	94.0%
Cobble	small cobble	64	3	2.9%	90.2%	2	1	3.0%	97.0%
	medium cobble	90	5	4.9%	95.1%	2	1	3.0%	100.0%
	large cobble	128	2	2.0%	97.1%	0	0	0.0%	100.0%
	very large cobble	180	3	2.9%	100.0%	0	0	0.0%	100.0%
Boulder	small boulder	256	0	0.0%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			102	100.0%		50	50	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	3.37	11.15	17.69	42.19	62.00



Project Name	Anita Alta 4-H Camp Brown Branch
Cross Section	#4
Feature	Pool
Date	6/14/04
Crew	Bidelspach, Clinton

Photo of Cross-Section #4 - Looking Downstream @ STA 26+34

	2004	2003	AS-BUILT
Area	23.2	22.5	21.9
Width	24.7	22.9	20.0
Mean Depth	0.9	1.0	1.1
Max Depth	1.9	2.1	1.9
W/D	26.2	23.3	18.3

2004
2004 Survey

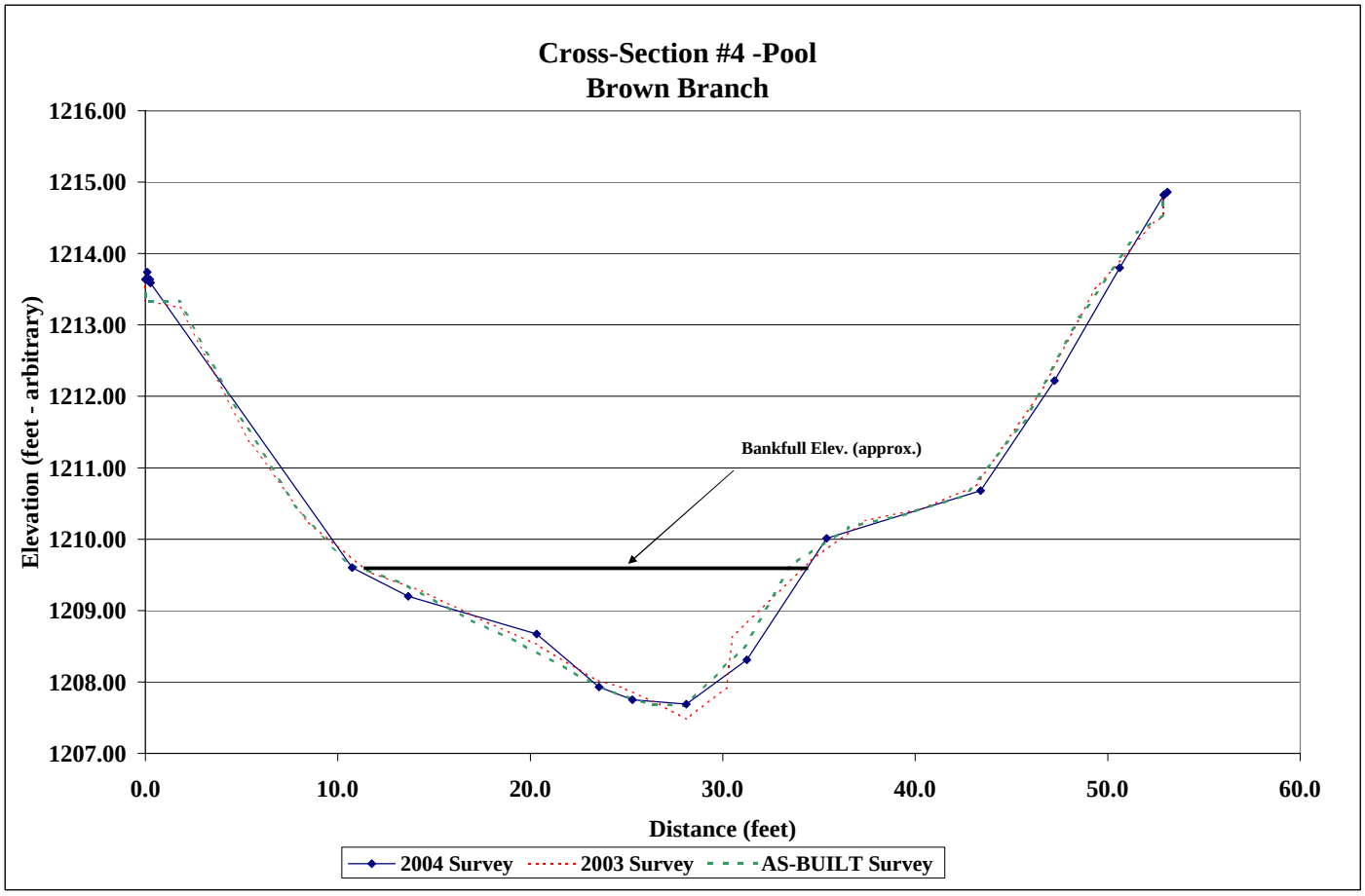
Station	Elevation	Notes
0.0	1213.64	Left Pin
0.1	1213.74	
0.2	1213.64	
0.3	1213.59	
0.3	1213.59	
10.7	1209.60	BKF
13.7	1209.20	
20.3	1208.67	
23.6	1207.93	
25.3	1207.75	
28.1	1207.69	
31.2	1208.31	
35.4	1210.01	
43.4	1210.68	
47.2	1212.22	
50.6	1213.80	
52.9	1214.8	
52.9	1214.82	
53.1	1214.86	Right Pin

2003
2003 Survey

Station	Elevation	Notes
0.0	1213.65	Left Pin
0.0	1213.34	
1.8	1213.24	
5.4	1211.37	
8.4	1210.25	
11.6	1209.54	BKF
14.4	1209.27	
17.4	1208.88	
20.4	1208.52	
23.4	1208.03	
24.8	1207.92	
26.7	1207.69	
28.1	1207.48	
30.2	1207.92	
30.5	1208.63	
34.5	1209.69	
37.4	1210.26	
40.4	1210.43	
43.1	1210.74	
46.4	1212.00	
49.4	1213.53	
52.4	1214.43	
52.9	1214.53	
52.9	1214.85	Right Pin

AS-BUILT
AS-BUILT Survey

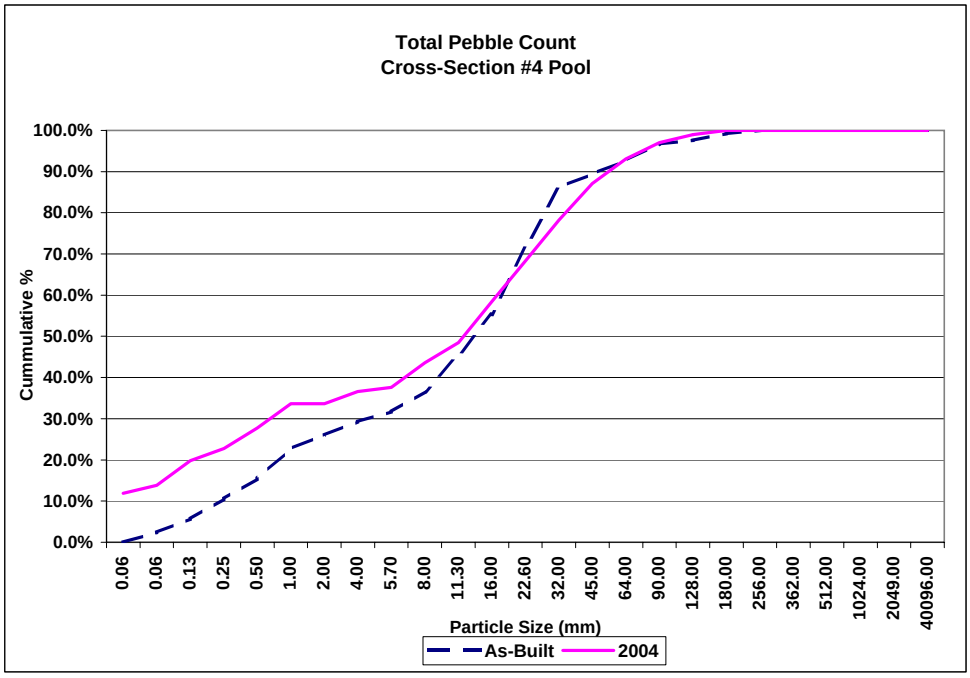
Station	Elevation	Notes
0.0	1213.65	Left Pin
0.0	1213.33	
1.8	1213.33	
5.3	1211.57	
8.1	1210.36	
10.6	1209.66	BKF
13.6	1209.36	
16.6	1208.91	
19.6	1208.53	
22.2	1208.15	
23.9	1207.90	
26.2	1207.69	
28.1	1207.67	
30.0	1208.18	
31.1	1208.47	
33.6	1209.63	
36.6	1210.17	
39.6	1210.35	
42.6	1210.61	
45.6	1211.60	
48.55	1213.11	
51.55	1214.29	
52.85	1214.54	
52.85	1214.85	Right Pin



Project Name	Brown Branch
Cross Section	#4
Feature	Pool
Date	6/3/04
Crew	Bidelspach, Clinton

			As-Built			2004			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	0	0.0%	0.0%	0	0	0.0%	0.0%
Sand	very fine sand	0.062	3	2.4%	2.4%	0	1	1.0%	1.0%
	fine sand	0.125	4	3.3%	5.7%	0	16	16.0%	17.0%
	medium sand	0.25	6	4.9%	10.6%	0	4	4.0%	21.0%
	course sand	0.50	6	4.9%	15.4%	0	3	3.0%	24.0%
	very course sand	1.0	9	7.3%	22.8%	4	4	8.0%	32.0%
Gravel	very fine gravel	2.0	4	3.3%	26.0%	0	0	0.0%	32.0%
	fine gravel	4.0	4	3.3%	29.3%	1	1	2.0%	34.0%
	fine gravel	5.7	3	2.4%	31.7%	0	0	0.0%	34.0%
	medium gravel	8.0	6	4.9%	36.6%	3	3	6.0%	40.0%
	medium gravel	11.3	11	8.9%	45.5%	3	2	5.0%	45.0%
	course gravel	16.0	12	9.8%	55.3%	5	6	11.0%	56.0%
	course gravel	22.6	20	16.3%	71.5%	5	6	11.0%	67.0%
	very course gravel	32	18	14.6%	86.2%	2	11	13.0%	80.0%
	very course gravel	45	4	3.3%	89.4%	2	10	12.0%	92.0%
Cobble	small cobble	64	4	3.3%	92.7%	0	4	4.0%	96.0%
	medium cobble	90	5	4.1%	96.7%	0	4	4.0%	100.0%
	large cobble	128	1	0.8%	97.6%	0	0	0.0%	100.0%
	very large cobble	180	2	1.6%	99.2%	0	0	0.0%	100.0%
Boulder	small boulder	256	1	0.8%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			123	100.0%		25	75	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.18	7.32	16.22	43.83	71.37



Project Name	Anita Alta 4-H Camp Brown Branch
Cross Section	#5
Feature	Riffle
Date	6/14/04
Crew	Bidelspach, Clinton

2004
2004 Survey

Station	Elevation	Notes
0.0	1196.58	Left Pin
0.0	1196.48	
19.2	1195.60	
25.2	1195.29	BKF
29.1	1195.07	
31.2	1194.27	
33.9	1194.41	
37.5	1194.42	
39.4	1194.12	
41.6	1193.86	
43.7	1193.98	
45.6	1194.59	
46.5	1195.72	
56.0	1196.58	
56.2	1196.95	Right Pin

2003
2003 Survey

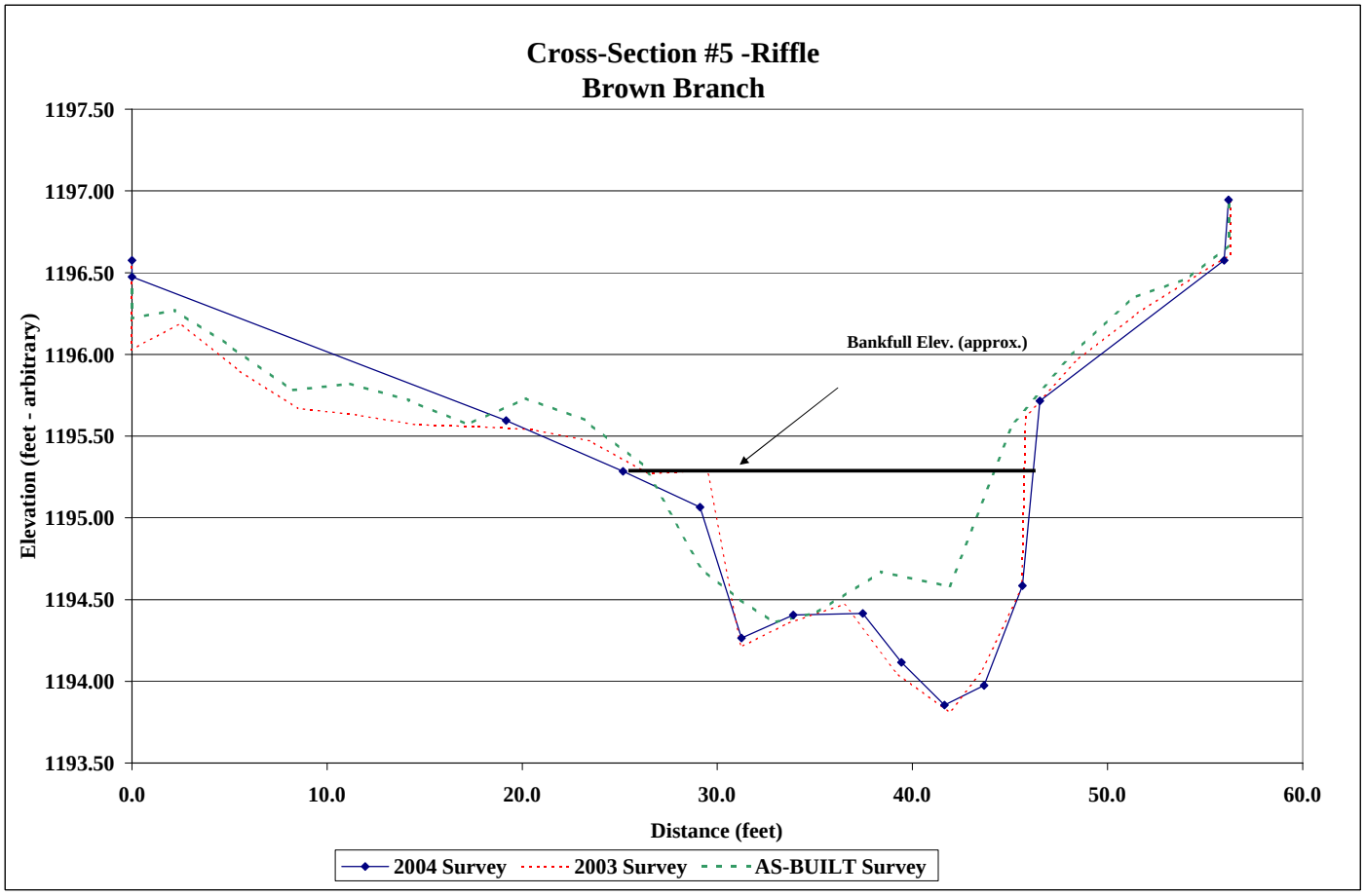
Station	Elevation	Notes
0.0	1196.58	Left Pin
0.0	1196.03	
2.5	1196.19	
5.5	1195.90	
8.5	1195.67	
11.5	1195.63	
14.5	1195.57	
17.5	1195.56	
20.5	1195.54	
23.5	1195.47	
26.5	1195.27	
29.5	1195.29	BKF
31.2	1194.21	
33.5	1194.35	
36.5	1194.47	
39.2	1194.05	
41.9	1193.81	
43.5	1194.05	
45.6	1194.57	
45.8	1195.62	
48.5	1195.97	
51.5	1196.25	
54.5	1196.48	
56.3	1196.61	
56.3	1196.94	Right Pin

AS-BUILT
AS-BUILT Survey

Station	Elevation	Notes
0.0	1196.58	Left Pin
0.0	1196.22	
2.2	1196.27	
5.2	1196.04	
8.2	1195.78	
11.2	1195.82	
14.2	1195.72	
17.2	1195.57	
20.2	1195.73	
23.2	1195.60	
26.2	1195.32	BKF
29.2	1194.69	
30.8	1194.53	
32.9	1194.36	
35.1	1194.42	
38.4	1194.67	
41.9	1194.58	
45.2	1195.59	
48.2	1196.00	
51.2	1196.34	
54.2	1196.47	
56.25	1196.67	
56.25	1196.94	Right Pin

Photo of Cross-Section #5 - Looking Downstream @ STA 43+23

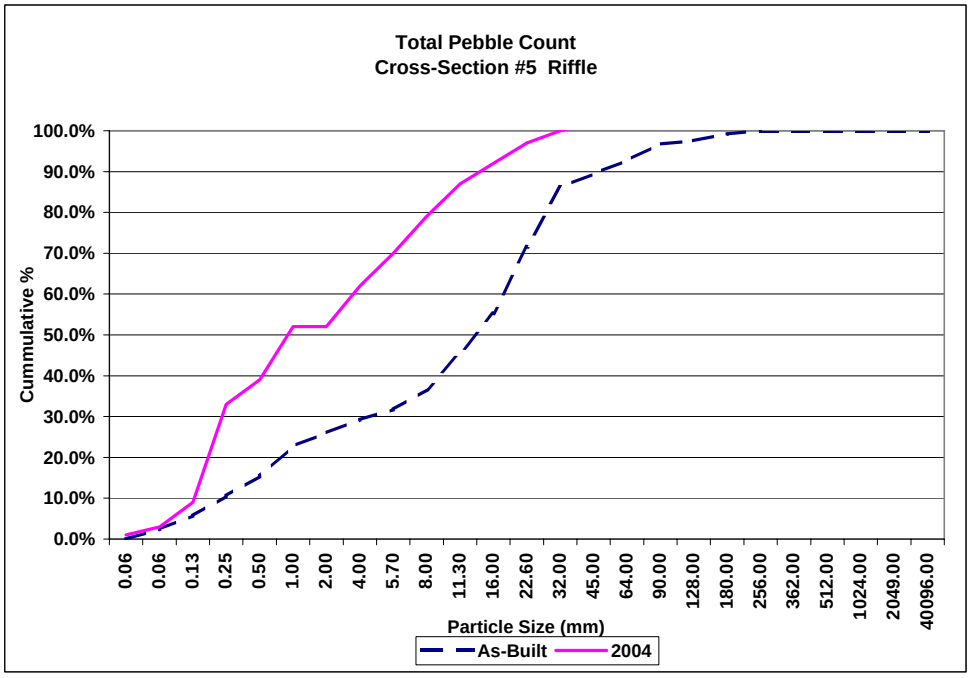
	2004	2003	AS-BUILT
Area	15.1	14.8	11.7
Width	15.3	14.6	16.0
Mean Depth	1.0	1.0	0.7
Max Depth	1.4	1.5	0.9
W/D	15.4	14.4	21.9



Project Name	Brown Branch
Cross Section	#5
Feature	Riffle
Date	6/3/04
Crew	Bidelspach, Clinton

			As-Built			2004			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	0	0.0%	0.0%	0	1	1.0%	1.0%
Sand	very fine sand	0.062	3	2.4%	2.4%	0	2	2.0%	3.0%
	fine sand	0.125	4	3.3%	5.7%	0	6	6.0%	9.0%
	medium sand	0.25	6	4.9%	10.6%	0	24	24.0%	33.0%
	course sand	0.50	6	4.9%	15.4%	1	5	6.0%	39.0%
	very course sand	1.0	9	7.3%	22.8%	3	10	13.0%	52.0%
G r a v e l	very fine gravel	2.0	4	3.3%	26.0%	0	0	0.0%	52.0%
	fine gravel	4.0	4	3.3%	29.3%	1	9	10.0%	62.0%
	fine gravel	5.7	3	2.4%	31.7%	0	8	8.0%	70.0%
	medium gravel	8.0	6	4.9%	36.6%	4	5	9.0%	79.0%
	medium gravel	11.3	11	8.9%	45.5%	3	5	8.0%	87.0%
	course gravel	16.0	12	9.8%	55.3%	4	1	5.0%	92.0%
	course gravel	22.6	20	16.3%	71.5%	4	1	5.0%	97.0%
	very course gravel	32	18	14.6%	86.2%	2	1	3.0%	100.0%
	very course gravel	45	4	3.3%	89.4%	2	0	2.0%	102.0%
Cobble	small cobble	64	4	3.3%	92.7%	1	0	1.0%	103.0%
	medium cobble	90	5	4.1%	96.7%	0	0	0.0%	103.0%
	large cobble	128	1	0.8%	97.6%	0	0	0.0%	103.0%
	very large cobble	180	2	1.6%	99.2%	0	0	0.0%	103.0%
Boulder	small boulder	256	1	0.8%	100.0%	0	0	0.0%	103.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	103.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	103.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	103.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	103.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	103.0%
TOTAL / %of whole count			123	100.0%		25	78	103.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.24	0.50	1.38	12.15	24.10

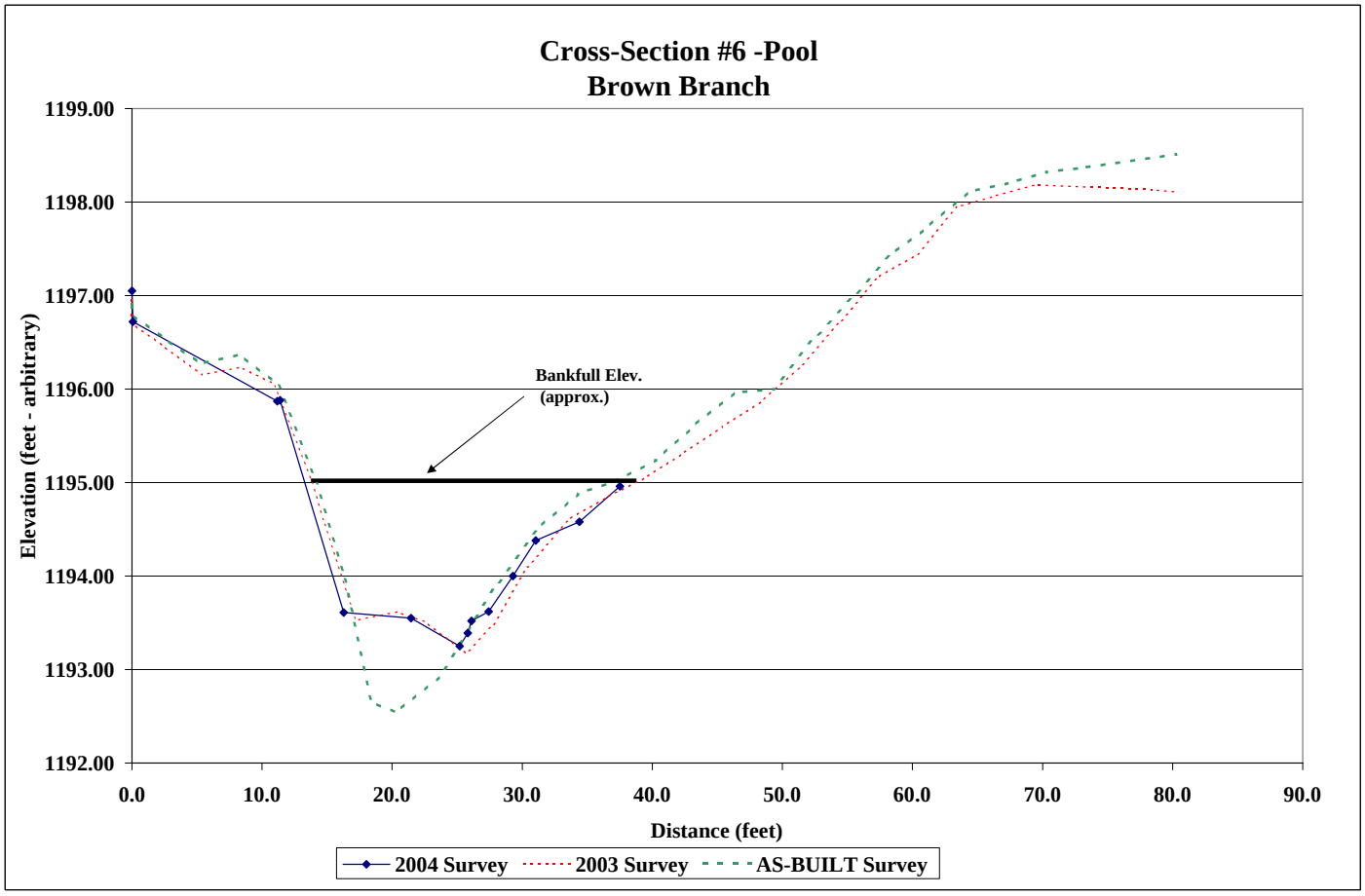


Project Name	Anita Alta 4-H Camp Brown Branch
Cross Section	#6
Feature	Pool
Date	6/14/04
Crew	Bidelspach, Clinton

2004			2003			AS-BUILT		
2004 Survey			2003 Survey			AS-BUILT Survey		
Station	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**	**Station**	**Elevation**	**Notes**
0.0	1197.05	Left Pin	0.0	1197.04	Left Pin	0.0	1197.06	Left Pin
0.1	1196.72		0.0	1196.71		0.0	1196.80	
11.2	1195.87		2.4	1196.47		2.3	1196.56	
11.4	1195.88		5.4	1196.16		5.3	1196.27	
16.3	1193.61		8.4	1196.24		8.3	1196.37	
21.5	1193.55		10.9	1196.06		11.3	1196.04	
25.2	1193.25		13.8	1195.03		14.1	1195.04	
25.8	1193.39		14.8	1194.57		16.3	1194.02	
26.1	1193.52		17.2	1193.53		18.4	1192.65	
27.4	1193.62		20.4	1193.62		20.3	1192.54	
29.3	1194.00		22.6	1193.51		23.6	1192.92	
31.0	1194.38		25.7	1193.18		28.0	1193.90	
34.4	1194.58		27.8	1193.49		31.3	1194.52	
37.5	1194.96	BKF	30.4	1194.10		34.3	1194.88	
			33.7	1194.62		37.3	1195.02	BKF
			36.4	1194.84		40.3	1195.24	
			39.4	1195.05	BKF	43.3	1195.62	
			42.4	1195.32		46.3	1195.96	
			45.4	1195.60		49.3	1196.00	
			48.4	1195.87		52.3	1196.52	
			51.4	1196.25		55.3	1196.96	
			54.4	1196.72		58.3	1197.43	
			57.4	1197.21		61.3	1197.75	
			60.4	1197.45		64.3	1198.11	
			63.4	1197.95		67.3	1198.20	
			66.4	1198.065		70.3	1198.32	
			69.4	1198.185		73.3	1198.37	
			78.4	1198.135		80.25	1198.51	
			80.3	1198.105	Right Pin	80.3	1198.485	Right Pin

Photo of Cross-Section #6 - Looking Downstream @ STA 44+37

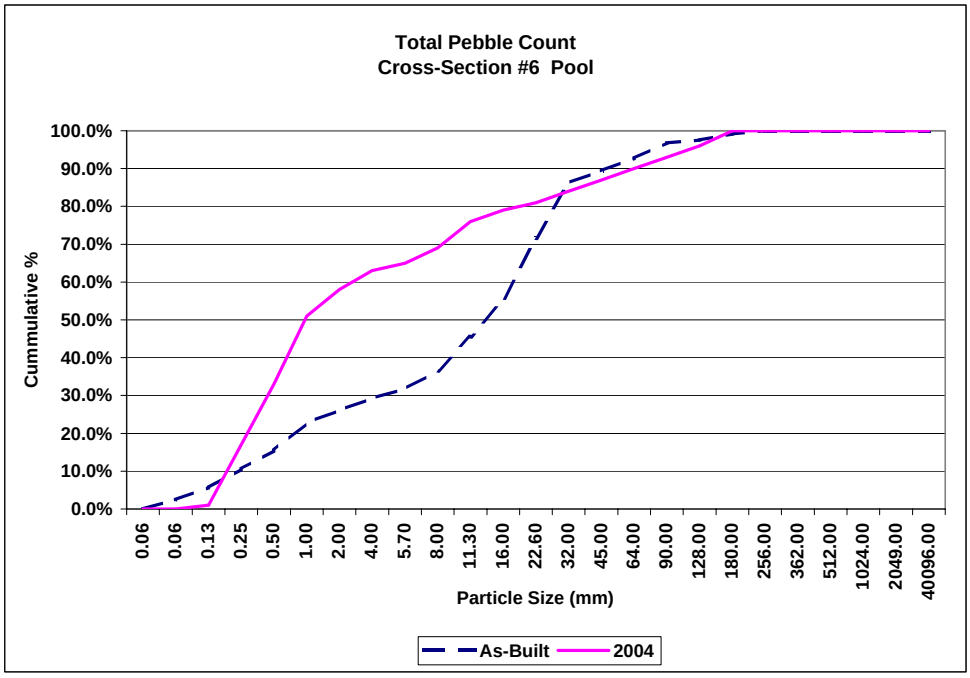
	2004	2003	AS-BUILT
Area	21.7	24.9	29.9
Width	21.3	21.6	18.0
Mean Depth	1.0	1.2	1.7
Max Depth	1.8	1.8	2.5
W/D	20.8	18.7	10.8



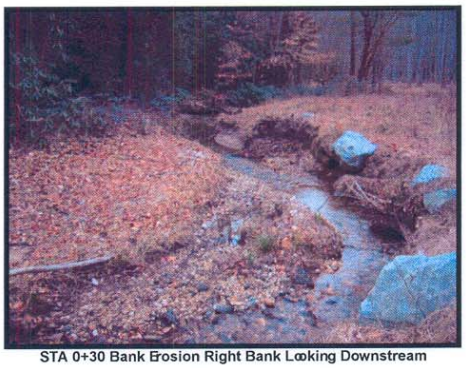
Project Name	Brown Branch
Cross Section	#6
Feature	Pool
Date	6/3/04
Crew	Bidelspach, Clinton

			As-Built			2004			
Description	**Material**	**Size (mm)**	**Riffle - Bed**	**%**	**Cum %**	**Riffle - Bed**	**Riffle - Bank**	**%**	**Cum %**
Silt/Clay	silt/clay	0.061	0	0.0%	0.0%	0	0	0.0%	0.0%
Sand	very fine sand	0.062	3	2.4%	2.4%	0	0	0.0%	0.0%
	fine sand	0.125	4	3.3%	5.7%	0	1	1.0%	1.0%
	medium sand	0.25	6	4.9%	10.6%	2	14	16.0%	17.0%
	course sand	0.50	6	4.9%	15.4%	2	14	16.0%	33.0%
	very course sand	1.0	9	7.3%	22.8%	13	5	18.0%	51.0%
G r a v e l	very fine gravel	2.0	4	3.3%	26.0%	6	1	7.0%	58.0%
	fine gravel	4.0	4	3.3%	29.3%	4	1	5.0%	63.0%
	fine gravel	5.7	3	2.4%	31.7%	2	0	2.0%	65.0%
	medium gravel	8.0	6	4.9%	36.6%	3	1	4.0%	69.0%
	medium gravel	11.3	11	8.9%	45.5%	2	5	7.0%	76.0%
	course gravel	16.0	12	9.8%	55.3%	2	1	3.0%	79.0%
	course gravel	22.6	20	16.3%	71.5%	0	2	2.0%	81.0%
	very course gravel	32	18	14.6%	86.2%	1	2	3.0%	84.0%
	very course gravel	45	4	3.3%	89.4%	1	2	3.0%	87.0%
Cobble	small cobble	64	4	3.3%	92.7%	2	1	3.0%	90.0%
	medium cobble	90	5	4.1%	96.7%	3	0	3.0%	93.0%
	large cobble	128	1	0.8%	97.6%	3	0	3.0%	96.0%
	very large cobble	180	2	1.6%	99.2%	4	0	4.0%	100.0%
Boulder	small boulder	256	1	0.8%	100.0%	0	0	0.0%	100.0%
	small boulder	362	0	0.0%	100.0%	0	0	0.0%	100.0%
	medium boulder	512	0	0.0%	100.0%	0	0	0.0%	100.0%
	large boulder	1024	0	0.0%	100.0%	0	0	0.0%	100.0%
	very large boulder	2049	0	0.0%	100.0%	0	0	0.0%	100.0%
Bedrock	bedrock	40096	0	0.0%	100.0%	0	0	0.0%	100.0%
TOTAL / %of whole count			123	100.0%		50	50	100.0%	

	d16	**d35**	**d50**	**d85**	**d95**
2004	0.36	0.83	1.46	38.50	139.00

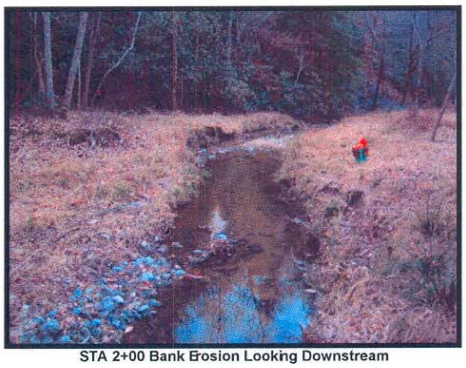


STA 0+25 Looking Upstream at Beginning of Project

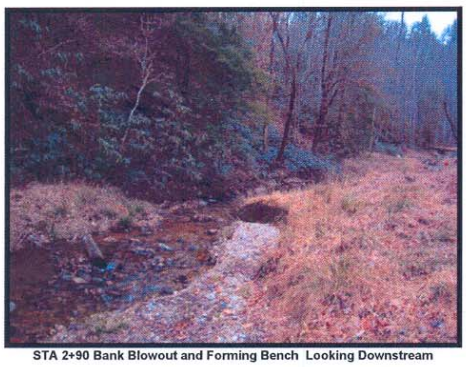


STA 0+30 Bank Erosion Right Bank Looking Downstream

STA 1+25 Down-cut Streambed at a Single Vane Looking Downstream



STA 2+00 Bank Erosion Looking Downstream



STA 2+90 Bank Blowout and Forming Bench Looking Downstream

STA 4+00 Bank Erosion Right Bank Looking Downstream

STA 6+75 Bank Erosion Left Bank Looking Downstream

STA 7+70 Point Bar and Bank Erosion Looking Upstream

STA 8+20 Riffle Looking Downstream

STA 9+70 Down-cut Log Sill Looking Downstream

STA 14+75 Looking Downstream @Bank Erosion

STA 16+50 Looking Downstream @ Single Log Vane and Bank Scour

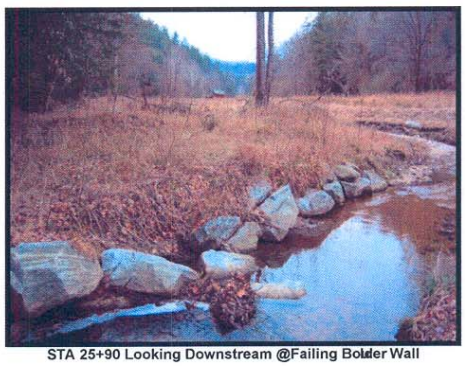
STA 18+50 Looking Downstream @Failing Boulder Wall

STA 20+50 Looking Downstream @ Wide Meander Bend with Exposed Toe Log

STA 20+70 Looking Downstream @Exposed Toe Log

STA 21+30 Looking Downstream @ Bank Erosion Tight Radius of Curvature

STA 23+10 Looking Downstream @A Good Point Bar

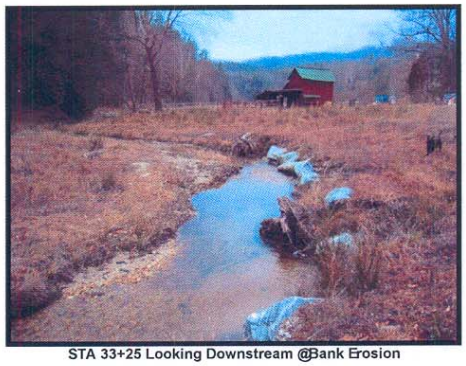


STA 25+90 Looking Downstream @Failing Boulder Wall

STA 28+50 Looking Downstream @ Bank Erosion Tight Radius of Curvature

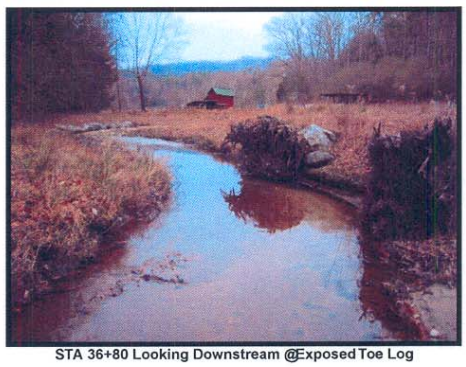
STA 29+00 Looking Downstream @Bank Erosion

STA 30+20 Looking @ Left Bank Rill and Gully Erosion



STA 33+25 Looking Downstream @Bank Erosion

STA 35+10 Looking Downstream @Bank Erosion



STA 36+80 Looking Downstream @Exposed Toe Log

STA 36+90 Downstream @ Bank Erosion

STA 37+40 Downstream @ Down-cut Log Vane

STA 38+50 Looking Downstream @Valley Bank Erosion

STA 39+70 Downstream @ Mid-Channel and Bank Erosion

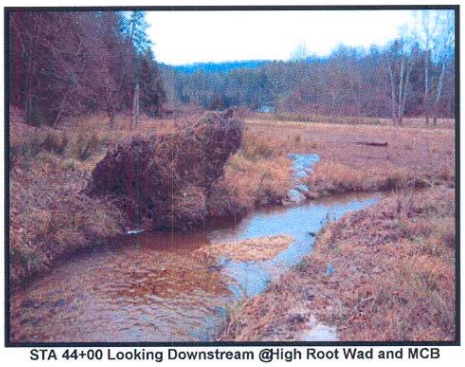
STA 39+90 Downstream @ Mid-Channel and Bank Erosion

STA 39+90 Downstream Erosion

STA 41+50 Looking Downstream @Lateral Channel Bar

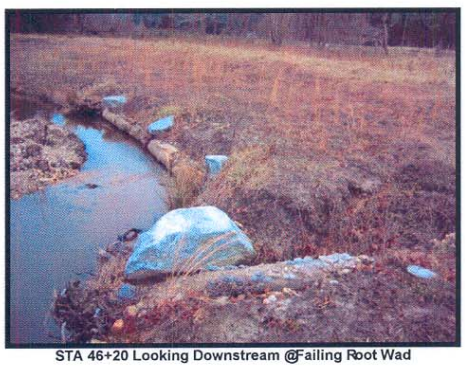
STA 42+10 Looking Downstream @Root Wad Scour

STA 43+10 Looking Downstream @Severe Mid-Channel Bar



STA 44+00 Looking Downstream @High Root Wad and MCB

STA 45+40 Looking Downstream @J-Hook and Boulder toe



STA 46+20 Looking Downstream @Failing Root Wad

STA 50+60 Looking Downstream @ Confluence with Mulberry Creek

OLD Station	Station	Elevation	Description
0	5142.5	1186.95	confluence with Mulberry Creek
12.6	5129.9	1187.46	BOR
31	5111.5	1187.99	MOR
55.2	5087.3	1188.33	TOR
57.8	5084.7	1187.79	pool D/S of rock vane
64	5078.5	1188.24	rock vane (but doesn't extend into flow this far)
69.8	5072.7	1188.08	along RW, no pool
89.8	5052.7	1187.80	D/S of J-vane rock
90.3	5052.2	1189.34	top of J-vane rock
91.8	5050.7	1188.41	U/S end J-vane, BOR
107.2	5035.3	1188.67	MOR
135.8	5006.7	1189.21	TOR
147	4995.5	1188.69	in pool
165.4	4977.1	1188.65	in pool
174.5	4968	1188.85	in pool
183.3	4959.2	1189.04	extended run
203.4	4939.1	1189.25	BOR, in bend
222.3	4920.2	1189.85	TOR, in bend
224.8	4917.7	1189.46	in pool
228.3	4914.2	1189.52	just D/S of J-vane
229.4	4913.1	1191.11	top of middle J-vane rock
230.5	4912	1189.93	BOR, U/S of J-vane
250.5	4892	1190.51	MOR
286.6	4855.9	1190.74	TOR
302.7	4839.8	1189.98	on rock vane, buried?
313.1	4829.4	1189.39	in pool along RW
327.7	4814.8	1189.71	in pool
338.7	4803.8	1190.15	in pool
344.2	4798.3	1190.37	D/S side J-vane
345.9	4796.6	1190.63	top of J-vane, BOR
364.3	4778.2	1190.73	TOR
376	4766.5	1190.62	in pool
390.4	4752.1	1190.65	in pool by RW
398.7	4743.8	1190.71	D/S end little bar
407.2	4735.3	1190.54	U/S end little bar
410.4	4732.1	1189.66	pool, deep part
412.2	4730.3	1190.24	bottom edge cross vane
414.3	4728.2	1191.30	cross vane, BOR
457.7	4684.8	1191.84	TOR
469.2	4673.3	1191.24	in pool at RW #2 of 2
490.2	4652.3	1191.40	in pool along LBP
503.2	4639.3	1191.30	pool at RW #1 of 2
527.4	4615.1	1191.95	BOR
538.7	4603.8	1192.31	D/S side J-vane, no pool, still riffley
540.4	4602.1	1192.95	top J-vane rock
541.7	4600.8	1192.24	U/S side J-vane
567.2	4575.3	1193.00	MOR
602.2	4540.3	1193.56	TOR, much loose sediment

626.9	4515.6	1193.14	rock vane, buried?, much loose sediment
639.9	4502.6	1192.29	RW #3 of 3, pool
658.8	4483.7	1192.90	RW #2 of 3, pool
673.5	4469	1192.48	RW #1 of 3, pool
691.5	4451	1193.14	pool
700.4	4442.1	1193.23	D/S edge rock J-vane
700.9	4441.6	1193.62	rock J-vane
707.2	4435.3	1193.69	bottom of bar
719.7	4422.8	1193.56	on U/S end small bar
724.4	4418.1	1193.39	in pool
726.5	4416	1193.51	D/S side log vane
727.2	4415.3	1194.18	on log vane
730	4412.5	1193.77	BOR
767.2	4375.3	1194.38	MOR
797.5	4345	1194.43	TOR
824.2	4318.3	1193.51	in pool, next to RW 3 of 3
854.8	4287.7	1193.36	in pool
860.2	4282.3	1193.66	in pool
880.7	4261.8	1193.62	in pool, next to RW 1 of 3
891.8	4250.7	1193.86	in pool
899.2	4243.3	1194.24	D/S side cross vane
899.8	4242.7	1194.92	cross vane, BOR
934.2	4208.3	1195.08	MOR
964.7	4177.8	1195.21	D/S side rock vane, TOR
967.2	4175.3	1195.08	rock vane
980.2	4162.3	1194.44	in pool
992.5	4150	1194.54	in pool
1000.3	4142.2	1194.79	pool at RW
1017.4	4125.1	1195.24	BOR
1027.5	4115	1195.20	D/S J-vane
1028.4	4114.1	1196.52	on J-vane rock
1030.1	4112.4	1195.49	U/S J-vane
1057.6	4084.9	1195.90	MOR
1090.9	4051.6	1196.28	TOR
1101.9	4040.6	1195.60	in pool
1112.5	4030	1195.71	in pool
1130.3	4012.2	1196.43	bottom bar in pool
1133.1	4009.4	1196.03	in pool
1138.6	4003.9	1196.36	top bar in pool
1144.9	3997.6	1195.72	D/S edge cross vane
1146.1	3996.4	1196.58	cross vane
1171.2	3971.3	1196.98	MOR
1200.1	3942.4	1197.22	TOR
1207.6	3934.9	1196.60	in pool
1215.5	3927	1196.31	in pool, end of LBP
1228.5	3914	1196.85	in pool
1235.4	3907.1	1197.37	BOR, in bend
1260.2	3882.3	1197.67	TOR, in bend
1271.5	3871	1196.42	in pool
1276.6	3865.9	1196.52	confluence with ephemeral trib below barn, in pool
1282.2	3860.3	1197.18	in pool
1296.7	3845.8	1197.91	D/S side log vane

1298.1	3844.4	1198.17	log vane BOR
1342.2	3800.3	1198.21	MOR
1372.2	3770.3	1198.84	big rock (bedrock?), MOR
1399	3743.5	1198.87	TOR
1407.2	3735.3	1198.15	in pool
1412	3730.5	1198.22	in pool
1415.7	3726.8	1199.08	BOR, local, in bend
1422.2	3720.3	1199.24	TOR, local, in bend
1425.1	3717.4	1198.86	in pool
1426.6	3715.9	1198.47	D/S side log vane
1427.9	3714.6	1199.58	exposed log vane
1449.6	3692.9	1199.50	MOR
1474.1	3668.4	1199.44	TOR
1487.9	3654.6	1199.07	pool
1501.7	3640.8	1199.16	pool
1518.2	3624.3	1199.61	pool
1567.4	3575.1	1199.89	BOR
1582.2	3560.3	1200.43	MOR
1609.1	3533.4	1200.81	MOR
1638.6	3503.9	1200.74	TOR
1646.9	3495.6	1200.03	pool
1652	3490.5	1200.23	pool
1661	3481.5	1200.55	D/S side cross vane
1662.7	3479.8	1200.83	cross vane
1664.3	3478.2	1200.93	BOR
1689	3453.5	1201.02	MOR
1713.6	3428.9	1200.99	TOR
1726.3	3416.2	1200.42	in pool
1733.5	3409	1200.51	in pool
1741.7	3400.8	1200.81	in pool
1748.5	3394	1201.31	BOR, local in bend
1754.8	3387.7	1201.37	TOR, local in bend
1765.6	3376.9	1200.79	pool, deep part near RW #1
1774.3	3368.2	1201.33	BOR
1784.5	3358	1201.75	D/S side log vane
1785.7	3356.8	1201.80	log vane
1812.3	3330.2	1201.87	MOR
1834.5	3308	1202.02	TOR
1851.7	3290.8	1201.49	mid pool
1867.9	3274.6	1201.49	mid pool
1879	3263.5	1201.63	mid pool
1886	3256.5	1202.33	BOR
1911.2	3231.3	1202.84	MOR
1938.9	3203.6	1203.02	TOR
1945.3	3197.2	1202.47	pool, deep part between 2 RWs
1949.2	3193.3	1202.76	pool
1958.9	3183.6	1203.20	BOR (mini)
1973.3	3169.2	1203.60	TOR (mini)
1974.5	3168	1203.07	pool, deep part
1978.3	3164.2	1203.42	D/S side log vane
1979.7	3162.8	1204.24	exposed log vane
2006.9	3135.6	1204.32	MOR

2032.3	3110.2	1204.52	TOR
2038.7	3103.8	1203.83	pool U/S of RW #2 in bend, deep part
2049.9	3092.6	1203.95	pool U/S of RW #1 in bend
2056.6	3085.9	1204.35	tributary confluence
2071.9	3070.6	1204.46	end of pool
2080.1	3062.4	1203.85	pool, deep part
2086.3	3056.2	1204.25	pool
2095.5	3047	1204.57	BOR, local in bend, along rock wall
2103.1	3039.4	1204.82	TOR, local in bend, along rock wall
2107.1	3035.4	1203.85	pool, deep part
2109.3	3033.2	1203.97	D/S side of cross vane
2110.5	3032	1205.55	cross vane
2151.2	2991.3	1205.85	MOR
2182.2	2960.3	1205.88	MOR
2207.6	2934.9	1206.16	TOR
2214.8	2927.7	1205.80	pool, deep part
2220.2	2922.3	1205.86	pool
2230.7	2911.8	1206.23	BOR
2255.9	2886.6	1207.31	top of middle log J-hook rock
2258.9	2883.6	1206.82	just U/S of log J-hook
2302.2	2840.3	1207.26	MOR
2327.2	2815.3	1207.48	TOR
2345	2797.5	1207.42	pool
2368.4	2774.1	1207.23	pool, deep part
2381.7	2760.8	1207.67	BOR
2391.4	2751.1	1207.72	D/S side of log vane
2393.6	2748.9	1207.94	log vane
2423.8	2718.7	1208.28	MOR
2453.9	2688.6	1208.60	TOR
2458.8	2683.7	1208.24	pool, deep part
2461.5	2681	1208.75	BOR, tiny intermediate riffle between RWs
2473.7	2668.8	1208.83	TOR, tiny intermediate riffle between RWs
2482.2	2660.3	1208.32	pool in front of RW
2485.7	2656.8	1208.71	in pool
2499.4	2643.1	1208.84	D/S edge log vane, BOR
2501.8	2640.7	1209.06	log vane
2501.8	2640.7	1208.35	pool, deep part
2532.7	2609.8	1209.26	MOR
2564	2578.5	1209.79	TOR
2572.9	2569.6	1209.58	in pool
2578.1	2564.4	1209.52	top pool, begin channel plug protection
2593.2	2549.3	1209.52	glide-ish, irregular section
2615.2	2527.3	1209.80	glide-ish, irregular section
2642.5	2500	1210.19	TOR, irregular section
2666.1	2476.4	1209.77	in glide, irregular section
2694.9	2447.6	1210.00	begin glide, irregular section
2697	2445.5	1209.80	in small pool along RW
2701.5	2441	1210.12	extended run
2711.2	2431.3	1210.24	extended run
2730.2	2412.3	1210.38	BOR
2752.7	2389.8	1210.79	MOR
2783.9	2358.6	1211.29	MOR

2805.4	2337.1	1211.60	TOR
2813.5	2329	1210.98	in pool
2818	2324.5	1211.47	BOR, mini riffle
2832.5	2310	1211.75	TOR, mini riffle
2839	2303.5	1211.27	in pool
2844.1	2298.4	1211.21	in pool
2850	2292.5	1211.87	BOR
2859.8	2282.7	1211.96	D/S of log vane
2861.9	2280.6	1212.53	on log vane
2892.2	2250.3	1212.89	MOR
2922.2	2220.3	1213.09	MOR
2952.4	2190.1	1213.22	MOR
2982.2	2160.3	1213.29	MOR
2996.4	2146.1	1213.41	TOR
3007.2	2135.3	1212.81	in pool
3022.2	2120.3	1212.67	in pool
3037.2	2105.3	1213.23	in pool
3052.2	2090.3	1213.07	in pool
3063.7	2078.8	1213.39	BOR
3082.2	2060.3	1213.50	MOR
3092.2	2050.3	1213.32	MOR
3123.2	2019.3	1213.57	MOR
3146.2	1996.3	1213.49	MOR
3172.2	1970.3	1213.95	MOR
3202.1	1940.4	1214.29	MOR
3211.2	1931.3	1214.54	MOR
3232.2	1910.3	1214.54	MOR
3262.2	1880.3	1214.88	MOR
3287.2	1855.3	1215.03	MOR
3314.2	1828.3	1215.41	TOR
3341.2	1801.3	1215.41	
3367.2	1775.3	1215.23	in elongate pool/run along pond
3385.7	1756.8	1215.59	BOR
3404.1	1738.4	1216.41	on buried log vane
3407.9	1734.6	1216.42	on bedrock, MOR
3423.4	1719.1	1216.62	MOR, along pond
3452.2	1690.3	1216.69	MOR, along pond
3482.2	1660.3	1216.77	MOR, along pond
3510.6	1631.9	1216.85	TOR
3515.5	1627	1216.39	in pool
3524.6	1617.9	1216.10	pool, deep part
3529.3	1613.2	1216.25	in pool
3539.6	1602.9	1216.99	BOR
3575.6	1566.9	1217.93	on bedrock, MOR
3599.7	1542.8	1218.05	TOR
3609.3	1533.2	1217.09	in pool
3615.5	1527	1217.58	in pool
3625.2	1517.3	1217.65	in pool
3630.8	1511.7	1217.51	in pool, deep part
3636.4	1506.1	1218.32	end of riffle
3643.7	1498.8	1218.16	D/S of log vane
3646	1496.5	1218.57	on log vane

3656	1486.5	1218.98	bedrock, MOR
3682.2	1460.3	1218.93	MOR
3702.4	1440.1	1218.87	MOR
3718	1424.5	1219.08	MOR
3740.2	1402.3	1219.24	MOR
3759.3	1383.2	1219.05	TOR
3766	1376.5	1218.99	in pool
3774.6	1367.9	1218.51	pool, deep part
3779.3	1363.2	1219.29	D/S edge log vane
3782.7	1359.8	1219.79	log vane, BOR
3796.7	1345.8	1219.67	MOR
3815.8	1326.7	1219.89	TOR
3842.1	1300.4	1219.89	on bedrock, long run, through slight bend
3858.7	1283.8	1220.30	long run, through slight bend
3877.4	1265.1	1220.29	BOR
3902.3	1240.2	1220.58	on bedrock, MOR
3925.6	1216.9	1220.79	MOR
3945.7	1196.8	1220.79	MOR
3961.2	1181.3	1221.18	TOR, on bedrock
3966.9	1175.6	1220.91	in pool
3974.9	1167.6	1220.44	in pool
3982.2	1160.3	1220.83	in pool
3987.5	1155	1220.71	in pool
3996.2	1146.3	1220.75	below rock vane
3999.1	1143.4	1221.19	rock vane
4039	1103.5	1221.53	TOR
4051.7	1090.8	1221.45	glide
4064.6	1077.9	1220.88	in pool
4073.8	1068.7	1220.99	in pool
4082.5	1060	1221.15	in pool
4088.6	1053.9	1221.30	in pool
4095.5	1047	1221.69	BOR
4113.8	1028.7	1222.23	MOR, bedrock
4132.6	1009.9	1222.26	TOR
4136.3	1006.2	1221.88	confluence with creek
4138	1004.5	1221.42	pool, deep part
4143.7	998.8	1222.45	BOR
4167.7	974.8	1223.07	MOR
4188.2	954.3	1223.14	bottom log vane
4190.2	952.3	1223.32	top log vane
4203.7	938.8	1223.39	TOR
4227.4	915.1	1223.21	in pool
4237.3	905.2	1223.09	pool, deep part
4247.8	894.7	1223.56	BOR
4282.2	860.3	1224.05	MOR
4315.7	826.8	1224.38	TOR
4318.8	823.7	1223.75	pool, deep part
4320.7	821.8	1224.03	bottom of structure
4321.9	820.6	1225.26	top of cross vane, BOR
4349.5	793	1225.27	TOR
4358.1	784.4	1225.34	in glide
4369.7	772.8	1224.63	in pool

4373.3	769.2	1224.31	in pool, deep
4380.4	762.1	1225.48	BOR
4391.9	750.6	1225.74	confluence with inflowing wetland oxbow
4402.2	740.3	1225.91	MOR
4423.9	718.6	1226.53	MOR
4446.3	696.2	1226.59	TOR
4460	682.5	1226.56	in glide
4465.2	677.3	1225.96	in pool
4471.9	670.6	1225.50	deep part of pool
4479.4	663.1	1226.52	top of pool, lots of sediment
4486.9	655.6	1226.59	BOR, lots of sediment
4508.9	633.6	1226.85	MOR
4537.3	605.2	1227.17	TOR
4540.4	602.1	1227.04	end pool
4547.6	594.9	1225.98	bottom of cross vane D/S
4549.8	592.7	1227.96	top of cross vane
4582.2	560.3	1228.09	MOR
4602.9	539.6	1228.32	MOR
4637.2	505.3	1228.69	bedrock outcrop
4669	473.5	1229.36	MOR at large rock, placed along L/B
4695.8	446.7	1230.13	MOR
4721.3	421.2	1230.71	TOR
4726.5	416	1230.22	in pool, along RW
4729.8	412.7	1230.08	in pool, along RW
4733.8	408.7	1231.03	bottom bar (in pool zone)
4743.7	398.8	1231.09	top bar (in pool zone)
4748.9	393.6	1230.78	D/S edge log vane
4750.3	392.2	1231.03	log vane, BOR
4766.1	376.4	1231.18	TOR
4776.7	365.8	1230.91	deep part, short pool
4789.5	353	1231.18	BOR
4816.2	326.3	1231.80	MOR
4836.6	305.9	1232.16	TOR
4841.4	301.1	1231.81	in short pool
4846	296.5	1231.93	drop D/S of log vane
4847.1	295.4	1233.06	on log vane
4891.6	250.9	1233.66	MOR
4930.2	212.3	1234.20	TOR
4952.2	190.3	1233.74	mid pool
4970.2	172.3	1233.68	pool, deep part
4981.2	161.3	1234.47	BOR
4995.9	146.6	1234.31	buried log vane
5025.2	117.3	1234.68	TOR
5041.7	100.8	1234.08	mid pool
5053.2	89.3	1233.92	pool, deep part
5061.8	80.7	1235.15	BOR
5089.2	53.3	1235.19	TOR
5110.2	32.3	1235.22	mid pool
5120.2	22.3	1234.92	in pool, deep part
5126.2	16.3	1235.70	bottom of small bar in pool
5132.2	10.3	1235.78	top of small bar in pool
5142.2	0.3	1234.76	pool, deep part

5142.5	0	1236.01	cross vane

Point	Station	Elevation	Description
5	1.47	1236.27	(R)
7	6.06	1235.96	(V)
9	9.4	1233.95	(P)
13	13.86	1234.62	(G)
17	24.76	1235.71	(R)
14	25.16	1235.71	(R)
20	37.79	1234.89	(P)
23	39.79	1235.51	(R)
24	40.1	1235.65	(R)
25	53.9	1235.02	(T)
28	57.56	1234.27	(M)
31	83.91	1235.2	(R)
34	97.95	1234.64	(T)
38	112.36	1234.02	(T)
40	134	1234.33	(R)
63	141.99	1234.63	(LV)
42	144.01	1233.8	(P)
45	150.16	1233.97	(T)
62	155.57	1234.29	(LV)
48	157.46	1233.42	(P)
58	174.6	1233.77	(T)
64	185.88	1233.55	(T)
4301	221.39	1233.59	(R)
4299	236.27	1233.04	(U)
4297	245.91	1232.99	(T)
4293	261.37	1233.01	(R)
4295	266.72	1232.72	(U)
4291	277.18	1232.4	(T)
4289	288.07	1232.76	(R)
2272	291.89	1232.41	(T)
4287	293.54	1232.21	(LV)
2270	293.74	1232.23	(LV)
2274	299.34	1232.13	(T)
2276	311.98	1231.8	(T)
2278	319.79	1231.8	(R)
4285	320.44	1231.8	(T)
2288	330.22	1231.64	(T)
4281	335.53	1231.08	(T)
2290	349.36	1231.16	(T)
4279	356.24	1230.7	(T)
2293	356.36	1230.62	(T)
2295	363.68	1230.96	(T)
2297	369.2	1231	(R)
2299	383.91	1230.5	(T)
2301	390.43	1229.78	(P)
2303	393.31	1229.98	(LV)
2304	396.77	1229.69	(T)
2306	408.18	1229.89	(T)
2308	426.54	1229.93	(R)
2310	440.86	1229.43	(T)
2312	456.82	1229.24	(T)
2314	471.53	1229.32	(R)
2316	486.46	1228.96	(U)
2318	489.04	1228.31	(T)
2320	496.18	1228.26	(T)
2322	504.49	1228.63	(BED)
2326	508.63	1228.46	(BED)
2324	510.66	1227.81	(T)
2995	514.89	1227.85	(T)
2991	524.1	1227.27	(P)
2993	531.15	1227.66	(G)
2989	547.38	1227.99	(T)
2987	572.66	1228	(T)
2985	591.86	1227.99	(RV)
2983	595.78	1226.31	(SP)
2981	606.84	1227.75	(T)
2979	619.79	1227.46	(T)
76	629.94	1227.67	(T)
74	642.27	1227.4	(R)
79	651.55	1226.99	(M)
81	656.46	1227.38	(R)
83	660.46	1227.29	(U)
85	663.67	1226.71	(M)
87	671.49	1226.61	(T)
89	676.77	1227.15	(R)

Point	Station	Elevation	Description
10	1.62	1236.37	Water
11	5.91	1236.21	Water
12	8.76	1235.96	Water
16	14.3	1235.98	Water
18	24.68	1235.86	Water
22	37.91	1235.58	Water
26	53.97	1235.38	Water
29	57.59	1235.34	Water
32	84.17	1235.4	Water
35	98.33	1234.96	Water
39	112.22	1234.48	Water
41	134.22	1234.54	Water
43	144.07	1234.2	Water
46	150.37	1234.18	Water
49	157.09	1234.15	Water
51	165.96	1234.02	Water
54	166.01	1234.15	Water
59	174.88	1233.98	Water
61	202.83	1233.94	Water
4302	221.35	1233.88	Water
4300	236.19	1233.24	Water
4298	245.91	1233.25	Water
4294	261.36	1233.21	Water
4296	267.7	1233.04	Water
4292	279	1232.98	Water
2273	291.81	1232.84	Water
2271	293.72	1232.59	Water
4288	294.59	1232.44	Water
2275	299.34	1232.42	Water
2277	312.01	1232.18	Water
4286	321.45	1232.08	Water
2289	330.27	1231.85	Water
4282	336.49	1231.49	Water
4278	346.77	1231.45	Water
2291	349.41	1231.52	Water
2294	356.3	1231.43	Water
2296	363.57	1231.38	Water
2298	369.15	1231.32	Water
2300	384.15	1230.79	Water
2302	390.21	1230.48	Water
2305	396.57	1230.48	Water
2307	408.27	1230.39	Water
2309	426.65	1230.19	Water
2311	441.01	1229.96	Water
2313	457.01	1229.77	Water
2315	471.55	1229.59	Water
2317	486.81	1229.21	Water
2319	489.31	1229.1	Water
2321	496.53	1229.12	Water
2323	504.44	1229.03	Water
2327	508.27	1228.61	Water
2325	510.81	1228.45	Water
2996	514.61	1228.5	Water
2992	524.41	1228.41	Water
2994	531.19	1228.42	Water
2990	547.56	1228.46	Water
2988	573.74	1228.33	Water
2986	591.93	1228.19	Water
2984	593.19	1228	Water
2982	607.28	1228.04	Water
2980	619.95	1227.91	Water
77	630.11	1227.94	Water
75	642.62	1227.69	Water
80	651.59	1227.66	Water
82	656.53	1227.65	Water
84	660.26	1227.38	Water
86	662.8	1227.44	Water
88	671.07	1227.32	Water
90	676.2	1227.37	Water
92	680.99	1227.32	Water
94	691.1	1227.18	Water
96	696.77	1227.24	Water
98	705.71	1227.04	Water
100	712.44	1226.69	Water
102	727.38	1226.7	Water

Point	Station	Elevation	Description
6	5.61	1238.94	LBKF
8	27.02	1237.94	LBKF
21	42.99	1236.31	LBKF
27	78.07	1238.5	LBKF
36	113.01	1237.41	LBKF
44	145.79	1237.18	LBKF
47	180.02	1236.5	LBKF
57	230.53	1235.12	LBKF
4267	241.81	1237.38	LBKF
4264	243.31	1234.7	LBKF
4265	243.31	1234.7	LBKF
4269	278.8	1234.8	LBKF
2354	300.27	1232.98	LBKF
4271	301.96	1234.39	LBKF
4272	313.55	1234.37	LBKF
2353	317.85	1233.18	LBKF
4274	332.61	1233	LBKF
2351	336.77	1233.18	LBKF
2348	349.53	1234.26	LBKF
4276	353.95	1233.86	LBKF
2345	378.03	1232.18	LBKF
2343	394.8	1231.65	LBKF
2341	420.89	1231.77	LBKF
2339	439.39	1232.23	LBKF
2330	491.4	1232.17	LBKF
2328	504.03	1231.8	LBKF
2999	518.22	1231.25	LBKF
3001	550.93	1230.37	LBKF
3002	572.63	1230.37	LBKF
3004	602.57	1230.51	LBKF
3008	634.75	1234.77	LBKF
3006	637.61	1229.32	LBKF
402	658.47	1230.3	LBKF
401	658.61	1230.4	LBKF
399	667.65	1231.38	LBKF
397	684.33	1232.32	LBKF
396	695.21	1231.29	LBKF
394	703.58	1230.98	LBKF
393	724.46	1228.71	LBKF
391	745.15	1227.13	LBKF
389	774.73	1226.35	LBKF
387	808.97	1226.52	LBKF
385	845.96	1226.45	LBKF
383	889.94	1225.07	LBKF
381	929.78	1224.82	LBKF
379	949.5	1225.05	LBKF
377	967.41	1224.8	LBKF
375	989.3	1225.84	LBKF
373	1013.25	1225.03	LBKF
371	1035.27	1225	LBKF
369	1064.91	1224.8	LBKF
364	1155.47	1222.62	LBKF
363	1196.22	1222.01	LBKF
361	1231.09	1221.83	LBKF
359	1257.82	1224.2	LBKF
356	1285.66	1223.97	LBKF
354	1290.02	1224.15	LBKF
352	1295.8	1222.53	LBKF
350	1306.78	1223.29	LBKF
348	1329.87	1221.12	LBKF
346	1363.52	1220.64	LBKF
344	1383.27	1220.72	LBKF
342	1416.83	1220.82	LBKF
340	1432.01	1220.89	LBKF
338	1440.46	1221.17	LBKF
336	1450.64	1221.05	LBKF
334	1485.33	1220.15	LBKF
332	1509.58	1219.56	LBKF
330	1547.12	1220.06	LBKF
328	1579.94	1220.55	LBKF
326	1611.07	1220.12	LBKF
324	1637.51	1219.6	LBKF
322	1659.56	1220.58	LBKF
320	1694.49	1218.41	LBKF
1393	1700.8	1218.53	LBKF

91	681.95	1226.9	(T)
93	690.66	1227.1	(R)
95	697.18	1226.85	(T)
97	706.14	1226.9	(R)
99	712.02	1226.29	(T)
101	726.77	1226.32	(T)
103	742.85	1226.47	(T)
105	753.78	1226.38	(T)
107	759.77	1225.83	(T)
109	763.37	1225.93	(T)
111	770.69	1225.36	(T)
112	778.97	1225.23	(M)
114	788.05	1225.7	(R)
116	795.34	1225.4	(T)
118	808.86	1225.5	(R)
120	817.31	1225.22	(RV)
122	819.76	1223.22	(M)
124	826.79	1224.25	(T)
126	835.3	1224.23	(T)
128	842.93	1224.64	(R)
130	847.93	1223.94	(M)
132	858.44	1224.53	(R)
134	872.31	1224.4	(T)
136	882.31	1224.22	(T)
138	902	1224.05	(T)
140	917.21	1223.74	(T)
142	933.18	1223.84	(T)
143	944.86	1223.38	(T)
145	946.25	1223.74	(LV)
147	951.2	1223.14	(T)
151	953.92	1222.9	(T)
155	958.58	1223.18	(G)
153	963.88	1223.37	(R)
157	972.9	1223.33	(T)
159	996.67	1222.92	(U)
161	1010.04	1222.48	(T)
163	1015.92	1222.31	(T)
165	1019.72	1222.34	(T)
169	1028.14	1222.12	(T)
167	1032.76	1222.04	(M)
171	1036.44	1222.43	(T)
173	1041	1222.61	(R)
175	1055.94	1222.14	(U)
177	1059.07	1221.78	(T)
179	1065.45	1221.89	(T)
181	1081.21	1221.87	(T)
189	1150.34	1221.37	(T)
193	1155.62	1221.39	(G)
196	1162.27	1221.61	(R)
197	1170.51	1221.45	(U)
199	1173.38	1221.35	(T)
201	1180.18	1221.38	(T)
203	1189.21	1221.01	(T)
205	1196.08	1220.74	(T)
208	1212.61	1221.09	(T)
210	1234.81	1221.36	(T)
212	1244.37	1221.29	(R)
214	1255.1	1220.97	(T)
216	1259.86	1220.76	(U)
220	1267.83	1220.57	(T)
218	1272.34	1220.8	(TP)
224	1283.37	1220.41	(TM)
222	1288.32	1220.55	(TG)
228	1294.24	1220.92	(BR)
226	1297.68	1220.69	(T)
231	1309.76	1220.51	(T)
229	1321.03	1220.73	(TR)
235	1332.44	1220.25	(T)
233	1343.21	1220.29	(TU)
237	1354.11	1220.45	(LV)
239	1357.5	1219.86	(T)
243	1359.78	1219	(SP)
241	1364.25	1219.32	(T)
247	1370.31	1219.87	(TR)
245	1374.73	1219.84	(TU)
251	1384.97	1219.13	(TM)
249	1392.92	1219.49	(TG)
253	1400.58	1219.85	(TR)
255	1423.65	1219.5	(T)
104	742.99	1226.59	Water
106	754.17	1226.48	Water
108	760.43	1226.27	Water
110	763.7	1226.18	Water
113	778.87	1225.88	Water
115	788.04	1225.83	Water
117	795.34	1225.74	Water
119	808.83	1225.69	Water
121	817.28	1225.61	Water
123	819.75	1224.93	Water
125	826.78	1224.9	Water
127	835.31	1224.86	Water
129	842.93	1224.8	Water
131	847.93	1224.75	Water
133	858.63	1224.73	Water
135	872.32	1224.57	Water
137	882.57	1224.5	Water
139	902.5	1224.29	Water
141	917.57	1224.04	Water
144	944.9	1223.88	Water
146	946.46	1223.91	Water
148	951.12	1223.82	Water
152	953.88	1223.73	Water
156	958.46	1223.75	Water
154	963.94	1223.7	Water
158	972.9	1223.56	Water
160	996.7	1223.05	Water
162	1009.84	1222.84	Water
164	1016.29	1222.8	Water
166	1019.77	1222.77	Water
170	1028.16	1222.78	Water
168	1032.64	1222.8	Water
172	1036.44	1222.77	Water
174	1041.12	1222.76	Water
176	1055.96	1222.4	Water
178	1058.5	1222.39	Water
180	1065.67	1222.32	Water
182	1081.73	1222.33	Water
190	1149.86	1221.99	Water
194	1155.49	1221.91	Water
195	1162.28	1221.89	Water
198	1170.52	1221.78	Water
200	1173.06	1221.7	Water
207	1189.01	1221.48	Water
204	1189.2	1221.48	Water
206	1196.07	1221.46	Water
209	1212.63	1221.48	Water
211	1234.68	1221.44	Water
215	1254.94	1221.15	Water
217	1260.43	1221.1	Water
221	1268.12	1221.07	Water
219	1272.37	1221.04	Water
225	1283.21	1220.98	Water
223	1288.39	1221.05	Water
227	1297.58	1220.93	Water
232	1309.77	1220.79	Water
230	1320.94	1220.84	Water
236	1332.12	1220.64	Water
234	1342.99	1220.49	Water
238	1353.97	1220.48	Water
240	1357.07	1220.18	Water
244	1359.36	1220.07	Water
242	1364.36	1220.1	Water
248	1370.2	1220.18	Water
246	1374.85	1220.08	Water
252	1385.55	1220.09	Water
250	1392.69	1220.01	Water
254	1400.67	1220.05	Water
256	1423.84	1219.78	Water
258	1434.92	1219.73	Water
260	1445.18	1219.64	Water
262	1454.95	1219.58	Water
264	1461.96	1219.5	Water
268	1470.07	1219.47	Water
266	1477.18	1219.43	Water
270	1483.73	1219.42	Water
274	1484.61	1219.23	Water
272	1489.46	1219.15	Water
276	1492.63	1218.99	Water
1391	1725.89	1218.42	LBKF
1389	1748.09	1217.25	LBKF
1387	1785.24	1216.82	LBKF
1386	1828.03	1217.2	LBKF
1381	1857.91	1216.85	LBKF
1379	1889.02	1216.75	LBKF
1377	1915.85	1216.79	LBKF
1368	2035.85	1216.22	LBKF
1366	2054.23	1219.9	LBKF
1364	2077.22	1215.76	LBKF
1361	2110.88	1215.58	LBKF
1359	2141.15	1215.47	LBKF
1354	2179.7	1214.96	LBKF
1350	2209.17	1215.04	LBKF
1348	2253.92	1214.95	LBKF
1346	2283.37	1214.11	LBKF
1342	2323.8	1213.48	LBKF
1332	2384.07	1212.5	LBKF
1329	2415.08	1212.16	LBKF
1327	2435.74	1212.6	LBKF
1325	2483.87	1211.57	LBKF
1321	2549.29	1212.62	LBKF
1319	2559.93	1212.25	LBKF
1314	2632.65	1210.79	LBKF
3187	2645.21	1211.45	LBKF
3185	2667.42	1210.51	LBKF
3183	2697.55	1210.27	LBKF
3181	2725.84	1209.39	LBKF
3179	2734.06	1211.63	LBKF
3177	2748.5	1212.07	LBKF
3175	2757.74	1211.57	LBKF
3173	2773.38	1211.24	LBKF
3171	2788.54	1211.22	LBKF
3167	2805.06	1209.86	LBKF
3166	2826.94	1210.17	LBKF
3164	2853	1209.36	LBKF
3162	2882.31	1208.72	LBKF
3160	2927.69	1208.6	LBKF
3156	2974.68	1208.36	LBKF
3152	3018.71	1207.77	LBKF
3150	3030.93	1207.75	LBKF
3148	3043.47	1207.04	LBKF
3146	3063.56	1208	LBKF
3144	3081.59	1207.49	LBKF
3142	3097.88	1205.84	LBKF
3138	3123.06	1206.13	LBKF
3136	3146.82	1205.6	LBKF
2433	3173.31	1204.85	LBKF
2432	3199.01	1204.25	LBKF
2431	3227.98	1204.29	LBKF
2430	3243.78	1205.07	LBKF
2428	3273.88	1204.71	LBKF
2429	3285.48	1204.2	LBKF
2427	3317.55	1203.58	LBKF
2426	3349.6	1203.67	LBKF
2425	3393.33	1202.93	LBKF
2423	3440.74	1202.93	LBKF
2424	3453.01	1203.16	LBKF
2422	3466.97	1202.14	LBKF
2421	3476.68	1202.58	LBKF
2420	3534.21	1201.78	LBKF
712	3585.5	1203.82	LBKF
714	3600.2	1203.06	LBKF
716	3620.41	1202.84	LBKF
718	3661.88	1201.12	LBKF
720	3685.01	1200.53	LBKF
722	3705.63	1200.57	LBKF
724	3718.48	1200.84	LBKF
726	3753.85	1200.89	LBKF
727	3774.98	1200.52	LBKF
729	3793.85	1200.27	LBKF
731	3827.66	1200.13	LBKF
733	3849.48	1202.57	LBKF
735	3859.9	1200.5	LBKF
737	3876.88	1200.02	LBKF
739	3896.81	1199.91	LBKF
740	3925.23	1199.92	LBKF
741	3964.48	1198.22	LBKF
742	3987.11	1198.02	LBKF

257	1434.89	1219.41	(T)
259	1444.87	1219.3	(T)
261	1454.86	1219.45	(TR)
263	1461.75	1219.22	(TU)
267	1470.06	1218.77	(TM)
265	1477.26	1219.06	(T)
269	1483.42	1219.04	(T)
273	1484.53	1218.98	(T)
271	1489.35	1218.98	(LV)
275	1492.37	1218.59	(T)
277	1498.96	1218.52	(T)
279	1510.86	1218.1	(TM)
281	1519.92	1218.14	(T)
283	1523.35	1218.33	(T)
285	1534.49	1217.69	(T)
287	1542.78	1217.98	(T)
289	1564.28	1218.14	(T)
291	1571.2	1218.36	(BR)
296	1574.92	1217.3	(T)
292	1586.44	1217.82	(TR)
294	1594.58	1217.26	(T)
298	1602.9	1217.33	(TU)
302	1606.4	1216.71	(TP)
300	1614.25	1216.58	(TM)
304	1619.52	1217.15	(TG)
306	1625.86	1217.37	(T)
308	1631	1217.4	(TR)
310	1635.51	1217.24	(TU)
312	1651.03	1217.25	(T)
314	1664.84	1217.4	(TR)
316	1684.58	1217.28	(T)
1184	1709.47	1217.07	(T)
318	1712.43	1216.99	(T)
1182	1729.14	1216.59	(T)
1181	1729.32	1216.57	(BED)
1180	1729.35	1217.35	(BED)
1186	1741.73	1214.48	(MP)
1188	1755.03	1216.17	(TR)
1190	1769.56	1215.28	(T)
1192	1784.58	1215.55	(T)
1194	1802.75	1215.6	(T)
1197	1847.92	1215.38	(TR)
1199	1892.14	1215.15	(T)
1201	1914.58	1214.57	(T)
1203	1926.43	1214.79	(RV)
1207	1928.92	1214.96	(RV)
1205	1933.4	1213.97	(MP)
1209	1949.76	1214.19	(T)
1211	1970.33	1214.17	(T)
1213	1997.64	1214.56	(TR)
1226	2033.54	1214.49	(T)
1228	2054.15	1214.23	(T)
1230	2066	1214.19	(T)
1232	2082.61	1213.97	(U)
1234	2101.86	1213.78	(P)
1236	2119.22	1212.87	(MP)
1238	2133.13	1213.89	(TR)
1240	2169.14	1213.82	(T)
1242	2208.53	1213.26	(T)
1244	2216.14	1213.06	(T)
1246	2243.47	1212.81	(T)
1248	2270.91	1212.62	(LV)
1250	2293.39	1212.12	(P)
1252	2301.98	1211.87	(MP)
1254	2318.95	1211.15	(MP)
1256	2336.44	1212	(TR)
1258	2360.92	1211.78	(T)
1260	2379.61	1211.6	(T)
1262	2391.69	1211.14	(P)
1264	2397.41	1210.34	(MP)
1266	2413.03	1211	(TR)
1268	2427.28	1211	(P)
1270	2435.14	1209.86	(MP)
1274	2460.87	1210.62	(P)
1276	2467.62	1210.15	(MP)
1278	2486.57	1210.79	(TR)
1280	2499.77	1210.25	(P)
1284	2520.92	1210.5	(TR)
1287	2553.36	1209.88	(P)

278	1498.91	1218.92	Water
280	1511.04	1218.65	Water
282	1519.83	1218.7	Water
284	1523.66	1218.61	Water
286	1535.46	1218.66	Water
288	1543.09	1218.54	Water
290	1564.08	1218.65	Water
297	1574.97	1217.97	Water
293	1586.23	1217.96	Water
295	1594.67	1217.76	Water
299	1602.92	1217.64	Water
303	1606.67	1217.63	Water
301	1614.49	1217.68	Water
305	1619.55	1217.64	Water
307	1625.62	1217.65	Water
309	1630.89	1217.69	Water
311	1635.58	1217.68	Water
313	1651.18	1217.64	Water
315	1665.07	1217.62	Water
317	1684.76	1217.51	Water
1185	1709.59	1217.27	Water
319	1712.5	1217.27	Water
1183	1729.2	1216.79	Water
1187	1741.64	1216.2	Water
1189	1755.22	1216.17	Water
1191	1769.61	1215.86	Water
1193	1784.4	1215.83	Water
1195	1802.87	1215.78	Water
1196	1824.51	1215.59	Water
1198	1847.79	1215.53	Water
1200	1891.83	1215.28	Water
1202	1914.78	1215.08	Water
1204	1926.43	1215.12	Water
1208	1928.97	1215.12	Water
1206	1933.59	1214.8	Water
1210	1949.7	1214.8	Water
1212	1970.48	1214.86	Water
1214	1997.51	1214.78	Water
1227	2034.26	1214.66	Water
1229	2053.99	1214.47	Water
1231	2066.17	1214.41	Water
1233	2082.86	1214.19	Water
1235	2101.84	1214.19	Water
1237	2118.16	1214.14	Water
1239	2132.81	1214.07	Water
1241	2168.66	1213.95	Water
1243	2208.88	1213.5	Water
1245	2216.36	1213.31	Water
1247	2243.52	1213.14	Water
1249	2271.23	1212.91	Water
1251	2293.52	1212.38	Water
1253	2302.37	1212.31	Water
1255	2318.96	1212.27	Water
1257	2336.46	1212.33	Water
1259	2360.94	1211.95	Water
1261	2379.65	1211.75	Water
1263	2391.85	1211.44	Water
1265	2398.21	1211.37	Water
1267	2413.06	1211.41	Water
1269	2427.77	1211.41	Water
1271	2435.44	1211.17	Water
1275	2460.18	1211.08	Water
1277	2465.44	1210.94	Water
1279	2486.69	1210.92	Water
1281	2499.94	1210.8	Water
1283	2507.93	1210.76	Water
1285	2520.86	1210.64	Water
1286	2536.04	1210.38	Water
1289	2564.65	1210.42	Water
1291	2569	1210.38	Water
1293	2598.45	1209.91	Water
1295	2618.48	1209.69	Water
1297	2634.85	1209.54	Water
1299	2641.44	1209.26	Water
2880	2641.44	1209.26	Water
3043	2645.41	1209.67	Water
3045	2657.05	1209.62	Water
3047	2671.42	1209.61	Water
3051	2703.77	1209.05	Water

854	4022.3	1198.85	LBKF
853	4051.02	1199.63	LBKF
852	4072.29	1199.24	LBKF
851	4106.73	1198.68	LBKF
850	4158.55	1198.1	LBKF
849	4177.27	1197.96	LBKF
848	4199.22	1196.74	LBKF
847	4220.17	1196.52	LBKF
846	4245.25	1196.61	LBKF
845	4268.73	1195.58	LBKF
844	4297.62	1195.82	LBKF
843	4340.56	1196.19	LBKF
842	4357.86	1196.23	LBKF
841	4372.98	1195.34	LBKF
839	4404.95	1196.78	LBKF
838	4427.7	1196.7	LBKF
827	4438.79	1196.37	LBKF
823	4498.47	1195.34	LBKF
824	4539.07	1195.21	LBKF
825	4578.4	1194.55	LBKF
822	4578.9	1193.92	LBKF
821	4600.98	1194.58	LBKF
820	4639.04	1195.12	LBKF
819	4674.14	1194.66	LBKF
818	4691.81	1194.57	LBKF
816	4747.52	1192.51	LBKF
815	4769.39	1192.03	LBKF
814	4825.8	1192.12	LBKF
813	4863.78	1193.47	LBKF
810	4877.02	1191.74	LBKF
807	4929.75	1191.47	LBKF
806	4971.62	1190.27	LBKF
804	5006.76	1189.97	LBKF
800	5009.34	1190.88	LBKF
799	5034.49	1189.68	LBKF
30	73.8	1237.73	RBKF
37	126.86	1237.21	RBKF
52	175.19	1236.85	RBKF
55	200.32	1236.28	RBKF
56	224.32	1235.48	RBKF
4266	243.67	1235.28	RBKF
4268	274.27	1235.37	RBKF
2352	303.47	1234.39	RBKF
4270	309.34	1234.71	RBKF
4273	315.37	1233.49	RBKF
2350	322.67	1234.2	RBKF
4277	346.7	1231.21	RBKF
4275	348.01	1232.25	RBKF
2349	356.02	1233.94	RBKF
2346	380.03	1233.91	RBKF
2342	424.85	1234.28	RBKF
2340	437.76	1233.88	RBKF
3391	437.76	1233.88	RBKF
2338	448.99	1233.11	RBKF
2332	478.14	1230.57	RBKF
2331	488.13	1230.44	RBKF
2998	517.19	1230.45	RBKF
3000	531.34	1229.88	RBKF
3003	558.08	1229.61	RBKF
3005	591.21	1228.65	RBKF
3009	617.35	1232.42	RBKF
3007	617.78	1229.72	RBKF
403	645.81	1229.38	RBKF
400	673.01	1228.36	RBKF
398	714.7	1227.93	RBKF
395	751.52	1227.99	RBKF
392	767.56	1229.28	RBKF
390	795.38	1228.02	RBKF
406	820.18	1228.07	RBKF
388	829.55	1226.57	RBKF
384	864.7	1225.77	RBKF
386	864.74	1225.71	RBKF
407	867.59	1228.12	RBKF
382	888.37	1226.16	RBKF
380	914.41	1225.53	RBKF
378	937.83	1225	RBKF
376	966.66	1224.3	RBKF

1288	2564.31	1209.37	(MP)
1290	2568.98	1210.17	(TR)
1292	2598.43	1209.41	(T)
1294	2618.55	1209.5	(T)
1296	2634.87	1209.28	(P)
1298	2641.23	1208.46	(MP)
2879	2641.23	1208.46	(MP)
3042	2645.8	1208.64	(LV)
3044	2657.06	1208.58	(M)
3046	2671.21	1209.23	(R)
3048	2694.5	1208.91	(T)
3052	2722.5	1208.34	(T)
3054	2729.1	1208.19	(T)
3056	2742.08	1208.33	(R)
3060	2751.05	1208.04	(T)
3058	2758.37	1207.51	(T)
3062	2763.86	1207.06	(M)
3064	2780.66	1208.17	(T)
3066	2792.07	1208.08	(R)
3068	2804.92	1208.04	(T)
3070	2820.78	1207.89	(T)
3072	2836.16	1207.68	(T)
3074	2851.08	1207.43	(T)
3076	2862.1	1206.78	(LV)
3078	2865.02	1206.8	(T)
3080	2880.15	1206.81	(U)
3082	2892.61	1206.5	(T)
3084	2902.36	1206.22	(M)
3086	2914.85	1206.67	(T)
3088	2933.03	1206.74	(T)
3090	2956.03	1206.93	(R)
3092	2976.73	1206.75	(T)
3096	3004.31	1206.19	(RV)
3094	3010.39	1204.6	(M)
3098	3023.6	1205.32	(T)
3100	3034.14	1205.06	(T)
3102	3047.62	1205.27	(R)
3104	3058.42	1205.29	(T)
3106	3070.3	1204.74	(P)
3110	3076.59	1204.31	(M)
3108	3082.02	1204.94	(R)
3112	3094.3	1204.67	(T)
3114	3105.7	1204.52	(T)
3116	3126.78	1204.12	(T)
3118	3132.51	1203.94	(LV)
3120	3134.26	1203.97	(T)
3122	3140.92	1203.75	(R)
3124	3150.75	1203.65	(T)
3128	3155.75	1203.84	(T)
3126	3167.23	1203.3	(P)
3130	3175.04	1202.92	(M)
3132	3188.07	1203.41	(T)
2406	3198.75	1203.52	(TR)
2404	3230.87	1203.23	(T)
2405	3231.05	1203.65	(T)
2402	3241.41	1202.39	(T)
2400	3251.43	1202.27	(MP)
2398	3281.53	1203.18	(R)
2395	3318.33	1202.57	(T)
2391	3324.48	1202.84	(LV)
2393	3338.16	1201.92	(T)
2386	3343.76	1201.18	(MP)
2389	3353.96	1202.14	(T)
2382	3367.49	1202.04	(T)
2384	3380.72	1201.36	(MP)
2378	3389.07	1201.65	(G)
2380	3401.81	1201.92	(TR)
2374	3432.7	1201.9	(T)
2376	3438.79	1201.52	(RV)
2370	3445.31	1200.75	(SP)
2372	3457.87	1201.18	(T)
2368	3486.64	1201.35	(TR)
2367	3531.23	1201.48	(T)
2366	3531.27	1200.97	(T)
2364	3559.74	1200.75	(T)
691	3561.93	1200.71	(T)
2095	3561.93	1200.71	(T)
695	3576.43	1200.63	(R)
2099	3576.43	1200.63	(R)

3053	2722.45	1208.86	Water
3055	2730.29	1208.79	Water
3057	2742.01	1208.61	Water
3061	2751.16	1208.53	Water
3059	2758.52	1208.58	Water
3063	2763.59	1208.59	Water
3065	2780.68	1208.46	Water
3069	2804.66	1208.35	Water
3071	2820.59	1208.3	Water
3073	2836.64	1207.94	Water
3075	2850.54	1207.79	Water
3077	2861.83	1207.6	Water
3079	2865.05	1207.55	Water
3081	2880.04	1207.51	Water
3083	2892.74	1207.34	Water
3085	2902.08	1207.26	Water
3087	2915.09	1207.25	Water
3089	2932.61	1207.23	Water
3091	2956.09	1207.15	Water
3093	2976.56	1207.02	Water
3097	3004.33	1206.23	Water
3095	3010.1	1205.82	Water
3099	3023.72	1205.69	Water
3101	3034.21	1205.69	Water
3103	3047.5	1205.66	Water
3105	3058.81	1205.58	Water
3107	3070.2	1205.3	Water
3111	3076.37	1205.34	Water
3109	3082.02	1205.3	Water
3113	3094.17	1205.07	Water
3115	3106.2	1205.04	Water
3117	3126.8	1204.46	Water
3119	3132.72	1204.37	Water
3121	3134.44	1204.38	Water
3123	3141.3	1204.31	Water
3125	3151.1	1204.27	Water
3129	3155.84	1204.15	Water
3127	3167.51	1204.06	Water
3131	3174.8	1204.12	Water
3133	3188.49	1204.05	Water
2407	3199.19	1203.96	Water
2403	3241.6	1203.51	Water
2401	3251.81	1203.45	Water
2399	3281.72	1203.47	Water
2397	3281.74	1203.24	Water
2396	3318.33	1202.91	Water
2392	3324.35	1202.9	Water
2394	3338.22	1202.7	Water
2387	3343.99	1202.38	Water
2388	3344.02	1202.77	Water
2390	3354.59	1202.78	Water
2383	3367.72	1202.55	Water
2385	3380.75	1202.28	Water
2379	3389.14	1202.4	Water
2381	3401.98	1202.27	Water
2375	3432.78	1202.09	Water
2377	3438.79	1201.96	Water
2371	3445.63	1201.74	Water
2373	3457.93	1201.7	Water
2369	3486.6	1201.57	Water
2365	3560.03	1201.19	Water
692	3561.86	1200.88	Water
2096	3561.86	1200.88	Water
696	3576.35	1200.84	Water
2100	3576.35	1200.84	Water
700	3589.91	1200.45	Water
702	3595.03	1200.42	Water
706	3608	1200.41	Water
710	3614.69	1200.49	Water
708	3623.14	1200.42	Water
704	3637.49	1200.43	Water
698	3651.72	1200.12	Water
694	3666.4	1200.04	Water
686	3671.25	1199.97	Water
690	3675.43	1199.68	Water
688	3677.1	1199.7	Water
684	3686.21	1199.68	Water
682	3694.55	1199.71	Water
680	3700.83	1199.72	Water

374	1008.45	1224.05	RBKF
372	1036.44	1223.47	RBKF
370	1056.19	1222.79	RBKF
368	1112.91	1223.22	RBKF
365	1126.16	1224.45	RBKF
362	1151.57	1224.99	RBKF
360	1172.34	1225.93	RBKF
358	1191.27	1223.82	RBKF
357	1217.02	1223.26	RBKF
426	1223.87	1222.66	RBKF
355	1252.9	1222.52	RBKF
353	1280.23	1222.56	RBKF
351	1297.95	1222.07	RBKF
349	1321.94	1222.05	RBKF
427	1328.95	1221.92	RBKF
347	1346.82	1223.24	RBKF
428	1366.58	1221.62	RBKF
345	1368.66	1223.52	RBKF
343	1390.08	1221.6	RBKF
429	1404.42	1222.04	RBKF
341	1424.86	1220.81	RBKF
339	1446.3	1220.6	RBKF
430	1462.11	1222.74	RBKF
337	1470.73	1221.41	RBKF
335	1494.87	1220.66	RBKF
331	1528.52	1220.95	RBKF
329	1547.06	1220.49	RBKF
327	1574.31	1219.5	RBKF
325	1616.26	1218.54	RBKF
323	1657.54	1219.23	RBKF
321	1683.2	1218.28	RBKF
1394	1705.16	1218.13	RBKF
1392	1724.39	1218.21	RBKF
1390	1750	1219.82	RBKF
1388	1784.52	1218.59	RBKF
1385	1838.34	1218.28	RBKF
1384	1852.96	1216.69	RBKF
1382	1894.8	1216.23	RBKF
1380	1930.48	1216.15	RBKF
1378	1965.57	1215.96	RBKF
1376	2012.2	1217.58	RBKF
1374	2046.09	1217.46	RBKF
1371	2092.46	1217.45	RBKF
1369	2118.08	1218.39	RBKF
1367	2118.91	1217.43	RBKF
1365	2150.03	1215.89	RBKF
1363	2173.15	1216.45	RBKF
1362	2173.2	1216.45	RBKF
1360	2198.02	1215.89	RBKF
1357	2233.57	1215.22	RBKF
1355	2259.56	1216.66	RBKF
1353	2263.17	1214.74	RBKF
1349	2302.63	1213.9	RBKF
1345	2333.22	1214.18	RBKF
1340	2367.06	1214.82	RBKF
1338	2384.96	1213.33	RBKF
1335	2397.41	1213.84	RBKF
1330	2405.96	1213.35	RBKF
1328	2420.03	1212.68	RBKF
1326	2431.55	1212.49	RBKF
1324	2453.27	1213.2	RBKF
1323	2491.85	1213.27	RBKF
1322	2519.87	1212.73	RBKF
1320	2557.39	1211.65	RBKF
1318	2589.91	1211.84	RBKF
1313	2618.35	1211.87	RBKF
3180	2652.91	1211.62	RBKF
3178	2668.44	1211.63	RBKF
3176	2696.21	1211.16	RBKF
3174	2718.34	1210.2	RBKF
3172	2756.96	1209.45	RBKF
3170	2786.8	1209.97	RBKF
3168	2819.9	1210.01	RBKF
3165	2855.25	1211.08	RBKF
3161	2892.33	1210.95	RBKF
3157	2925.06	1209.77	RBKF
3155	2946.4	1208.96	RBKF
3153	2974.68	1207.78	RBKF
3151	2999.26	1207.42	RBKF

699	3589.87	1200.13	(R)
701	3595.09	1199.65	(M)
705	3607.95	1199.73	(T)
709	3614.78	1199.79	(T)
707	3623.32	1199.87	(T)
703	3638.04	1200.19	(R)
697	3651.79	1199.87	(T)
693	3665.55	1199.9	(R)
685	3671.35	1199.96	(LV)
689	3675.93	1199.27	(T)
683	3685.72	1199.32	(T)
681	3694.71	1198.3	(M)
678	3701.09	1199.48	(BR)
677	3714.36	1199.49	(BR)
675	3716.95	1199	(T)
673	3727.29	1199	(T)
671	3740.84	1198.45	(T)
669	3749.88	1198.69	(T)
668	3763.29	1198.99	(R)
664	3796.93	1198.25	(T)
663	3798.27	1198.63	(LV)
666	3799.41	1197.87	(T)
661	3810.58	1197.96	(R)
659	3830.31	1197.83	(T)
657	3852.39	1197.48	(T)
655	3860.74	1197.12	(T)
653	3873.22	1197.54	(R)
651	3887.3	1197.47	(R)
647	3906.52	1197.17	(T)
645	3919.09	1197.66	(R)
643	3937.16	1197.13	(T)
641	3951.07	1197.12	(RV)
640	3951.42	1197.11	(U)
638	3973.78	1196.34	(T)
636	3987.21	1195.66	(M)
634	3997.82	1196.01	(M)
632	4006.24	1197.13	(T)
630	4019.1	1196.57	(U)
628	4029.35	1195.86	(T)
626	4041.41	1196.09	(T)
624	4051.21	1196.56	(R)
621	4064.52	1196.02	(T)
619	4069.34	1195.65	(T)
617	4076.25	1196.11	(R)
613	4089.79	1195.75	(U)
615	4097.22	1195.2	(M)
609	4109.19	1195.27	(M)
607	4120.39	1195.74	(R)
605	4128.58	1195.06	(M)
603	4131.5	1195.58	(T)
601	4139.63	1195.58	(R)
597	4147.91	1195.53	(U)
599	4162.01	1194.62	(M)
595	4170.16	1195.17	(T)
593	4173.93	1195.5	(T)
591	4191.05	1195.41	(RV)
589	4196.11	1193.24	(SP)
588	4203.88	1194.28	(T)
586	4210.93	1194.34	(T)
584	4217.02	1195.06	(G)
582	4235.8	1195.43	(R)
578	4252.54	1195.12	(R)
580	4259.88	1194.75	(P)
576	4262.94	1193.35	(P)
574	4275.11	1194.68	(G)
572	4288.29	1194.92	(T)
570	4315.6	1194.55	(R)
568	4326.23	1194.21	(T)
567	4328.82	1193.88	(M)
565	4340.3	1194.21	(T)
563	4352.45	1193.8	(U)
561	4357.62	1193.68	(T)
559	4372.95	1194.04	(T)
557	4385.4	1193.97	(T)
555	4394.76	1193.43	(T)
553	4413.86	1192.92	(M)
551	4432.29	1193.72	(T)
549	4443.64	1193.89	(R)
547	4459.14	1193.48	(U)
679	3713.47	1199.6	Water
676	3716.86	1199.37	Water
674	3727.02	1199.25	Water
672	3740.77	1199.14	Water
670	3749.85	1199.16	Water
665	3797.02	1198.38	Water
667	3799.22	1198.19	Water
662	3811.08	1198.21	Water
660	3829.89	1197.97	Water
658	3852.51	1197.9	Water
656	3860.29	1197.88	Water
654	3873.63	1197.83	Water
652	3887.18	1197.71	Water
650	3891.92	1197.74	Water
648	3906.09	1197.75	Water
646	3919.22	1197.7	Water
644	3937.12	1197.42	Water
642	3951.04	1197.22	Water
639	3973.76	1197.26	Water
637	3987.18	1197.23	Water
635	3997.91	1197.25	Water
633	4006.82	1197.26	Water
631	4019.22	1196.79	Water
629	4029.53	1196.74	Water
627	4041.65	1196.76	Water
623	4050.09	1196.71	Water
625	4050.56	1196.71	Water
622	4064.56	1196.41	Water
620	4069.65	1196.4	Water
618	4076.33	1196.35	Water
614	4090.02	1195.96	Water
616	4097.65	1195.99	Water
612	4104.06	1195.96	Water
610	4109.2	1195.96	Water
608	4120.35	1195.91	Water
606	4128.8	1195.91	Water
604	4131.5	1195.93	Water
602	4139.7	1195.81	Water
598	4147.93	1195.7	Water
600	4162.5	1195.68	Water
596	4170.15	1195.69	Water
594	4173.93	1195.63	Water
592	4190.86	1195.56	Water
590	4196.33	1195.55	Water
587	4211.09	1195.53	Water
585	4217.4	1195.55	Water
583	4235.92	1195.56	Water
579	4251.94	1195.23	Water
581	4259.77	1195.19	Water
577	4262.41	1195.13	Water
575	4275.51	1195.19	Water
573	4288.47	1195.16	Water
571	4315.26	1194.82	Water
569	4326.46	1194.55	Water
566	4339.83	1194.5	Water
564	4352.55	1194.3	Water
562	4357.68	1194.33	Water
560	4372.96	1194.29	Water
558	4385.68	1194.19	Water
556	4395.01	1194.09	Water
554	4414.75	1194.09	Water
552	4432.69	1194.07	Water
550	4443.33	1194.02	Water
548	4459.33	1193.69	Water
546	4481.75	1193.67	Water
544	4493	1193.51	Water
542	4503.9	1193.45	Water
540	4507.64	1193.53	Water
536	4514.09	1193.47	Water
538	4539.63	1192.79	Water
534	4555.98	1192.72	Water
532	4562.89	1192.5	Water
528	4585.73	1192.54	Water
524	4593.96	1192.52	Water
522	4611.4	1192.52	Water
520	4624.18	1192.45	Water
518	4633.32	1192.51	Water
516	4651.58	1191.94	Water
514	4656.87	1191.91	Water
3147	3014.58	1206.78	RBKF
3145	3050.13	1206.21	RBKF
3143	3073.89	1206.23	RBKF
3139	3106.01	1206.03	RBKF
3137	3128.16	1206.12	RBKF
3135	3152.82	1207.24	RBKF
2408	3175.07	1207.34	RBKF
2409	3194	1205.84	RBKF
3460	3194	1205.84	RBKF
2411	3275.5	1203.74	RBKF
2412	3315.4	1204.74	RBKF
2414	3364.05	1204.88	RBKF
2415	3392.74	1204.42	RBKF
2416	3432.57	1203.87	RBKF
2417	3468.55	1202.53	RBKF
2418	3496.54	1202.32	RBKF
2419	3527.45	1201.71	RBKF
711	3581.86	1201.81	RBKF
713	3643.33	1202.26	RBKF
717	3681.92	1202.6	RBKF
721	3707.04	1201.66	RBKF
725	3763.96	1200.58	RBKF
728	3819.46	1200.36	RBKF
730	3867.92	1198.92	RBKF
732	3894.43	1198.92	RBKF
734	3926.62	1199.49	RBKF
736	3959.24	1200.04	RBKF
738	3983.4	1200.81	RBKF
743	4005.9	1199.44	RBKF
744	4045.12	1198.65	RBKF
745	4102.75	1196.98	RBKF
746	4141.48	1197.19	RBKF
747	4168.21	1197.43	RBKF
748	4189.94	1197.64	RBKF
749	4209.73	1197.85	RBKF
750	4246.08	1198.06	RBKF
751	4266.73	1197.55	RBKF
753	4333.34	1196.23	RBKF
768	4342.12	1196.23	RBKF
769	4368	1195.54	RBKF
770	4400.13	1195.44	RBKF
771	4415.11	1195.31	RBKF
772	4439.15	1194.88	RBKF
773	4467.25	1195.07	RBKF
774	4494.51	1195.98	RBKF
775	4519.07	1196.41	RBKF
776	4553.15	1196.2	RBKF
777	4572.64	1194.97	RBKF
778	4610.61	1194.98	RBKF
780	4650.62	1193.97	RBKF
781	4677.28	1193.2	RBKF
782	4707.56	1192.82	RBKF
783	4734.48	1193.12	RBKF
784	4755.97	1193.59	RBKF
786	4770.84	1193.35	RBKF
785	4785.01	1193.53	RBKF
787	4815.08	1193.4	RBKF
788	4859.78	1191.93	RBKF
789	4884.33	1191.53	RBKF
790	4910.06	1191.47	RBKF
791	4936.93	1190.62	RBKF
793	4988.59	1190.89	RBKF
794	5006.75	1192.61	RBKF
795	5036.88	1190.76	RBKF
797	5067.27	1189.04	RBKF

545	4481.57	1193.46	(R)
543	4492.8	1193.17	(T)
541	4503.86	1193.18	(T)
539	4507.56	1192.82	(T)
535	4514.09	1193.24	(T)
537	4539.56	1192.43	(T)
533	4556.1	1192.42	(R)
531	4562.64	1192.2	(U)
527	4585.72	1191.75	(T)
523	4594.25	1192.24	(T)
521	4610.93	1191.23	(M)
519	4624.33	1192.2	(T)
517	4634.34	1192.2	(R)
515	4651.67	1191.56	(U)
513	4657	1191.37	(M)
510	4662.96	1191.77	(T)
512	4664.3	1191.75	(RV)
508	4667.19	1190.38	(SP)
506	4677.18	1191.13	(T)
504	4703.28	1191.56	(T)
502	4713.25	1191.3	(T)
500	4724.46	1191.47	(R)
498	4740.8	1191.07	(T)
496	4760.54	1191.13	(U)
494	4766.97	1190.54	(P)
492	4777.81	1190.36	(M)
490	4791.14	1190.95	(T)
488	4802.4	1191.17	(R)
486	4821.46	1190.61	(T)
484	4823.47	1190.26	(M)
482	4826.91	1190.37	(T)
480	4839.94	1190.4	(T)
478	4848.45	1190.33	(T)
476	4853.78	1189.51	(M)
474	4866.78	1190.15	(R)
472	4887.48	1189.63	(U)
470	4903.94	1189.08	(P)
466	4921.55	1189	(M)
468	4928.7	1189.35	(T)
464	4935.09	1189.74	(R)
462	4945.23	1189.48	(T)
458	4981.27	1189.1	(R)
456	4986.36	1188.5	(U)
452	4989.73	1187.78	(M)
454	4996.16	1188.82	(T)
450	5005.14	1188.66	(M)
448	5008.8	1188.3	(T)
446	5021.51	1188.73	(R)
444	5065.74	1187.88	(T)
442	5070.84	1187.58	(LV)

511	4663.17	1191.89	Water
509	4667.3	1191.73	Water
507	4677.34	1191.76	Water
505	4704.66	1191.77	Water
503	4712.86	1191.77	Water
501	4724.04	1191.72	Water
499	4741.19	1191.59	Water
497	4760.74	1191.44	Water
495	4767.24	1191.43	Water
493	4778.03	1191.42	Water
491	4791	1191.38	Water
489	4802.41	1191.33	Water
487	4821.57	1190.85	Water
485	4823.71	1190.73	Water
483	4826.88	1190.74	Water
481	4839.84	1190.74	Water
479	4848.61	1190.43	Water
477	4853.76	1190.29	Water
475	4867.14	1190.43	Water
473	4888.23	1189.97	Water
471	4904.08	1189.87	Water
467	4921.9	1189.92	Water
469	4928.94	1189.94	Water
465	4935.23	1189.9	Water
463	4945.32	1189.66	Water
459	4981.08	1189.36	Water
457	4986.61	1189.04	Water
453	4990.32	1189.05	Water
455	4996.13	1189.05	Water
451	5004.99	1188.96	Water
449	5008.9	1188.97	Water
447	5021.13	1188.97	Water
445	5066.11	1188.18	Water
443	5071.54	1188.07	Water