Briles Stream Restoration Monitoring Report Year 1 of 5 (2009)

Randolph County, North Carolina

USGS HUC: 03040103

Project ID No. 047

Prepared for:

NCDENR-Ecosystem Enhancement Program
1652 Mail Service Center
Raleigh, North Carolina 27699-1652

Submitted November 2009
Revised April 2010

Executive Summary

The Briles Site Stream Restoration site is situated within the USGS hydrologic unit **03040103** and is in a portion of the NCDWQ Priority Sub-basin 03-07-09. The site is located on an 87-acre parcel owned by Mr. and Mrs. Kenneth Briles. It is located southeast of the intersection of Ross Wood Road and Pleasant Grove Road in Trinity, Randolph County, North Carolina. The primary land uses on the property include rangeland (pasture), a chicken egg farm, and forest. The project stream, UT to Jackson Creek, became impaired from poor grazing management and human impacts.

KCI Associates of NC designed the restoration plans and restoration was completed in late 2007 and early 2008. Kimley Horn and Associates (KHA) performed stream and riparian monitoring in the spring and summer of 2009 for this Year 1 Monitoring Report. During the monitoring process KHA assessed eight (8) vegetation quads. The vegetation averaged 480 stems/acre, with two (2) of the eight (8) vegetation quads below the success criteria of 320 stems/acre. This most likely is due to the increased amounts of herbaceous plants that have out-competed the planted stems in small areas inside the easement.

A visual assessment and geomorphic survey were completed for the site, both of which indicated that the project reaches were performing mostly within established success criteria ranges. No significant bank erosion was recorded, and the geomorphic measurements are within the range of the design parameters.

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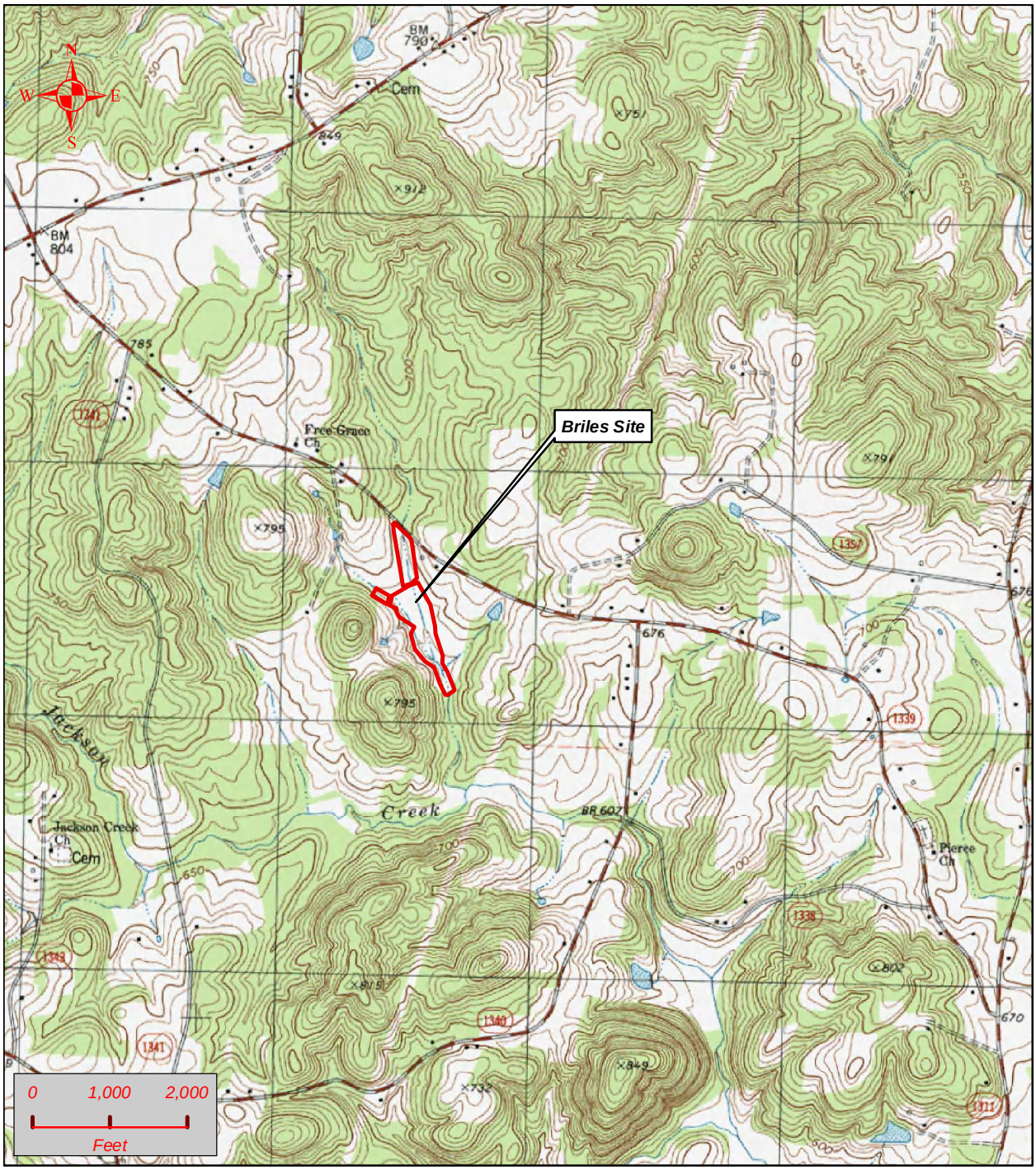

Title	Project Setting

Prepared For: Ecosystem Enhancement Program	**Project**	Briles Stream Restoration Monitoring Year 1 – 2009 Randolph County, North Carolina	
	Date	**Project Number**	**Figure**
	4/30/10	047	1

Kimley-Horn and Associates, Inc.

Title	Current Conditions Plan View Upper (2007 Aerial courtesy of NC One Map)
Prepared For: Ecosystem Enhancement Program	**Project** Briles Stream Restoration Monitoring Year 1 – 2009 Randolph County, North Carolina

Date	Project Number	Figure
4/30/10	047	2

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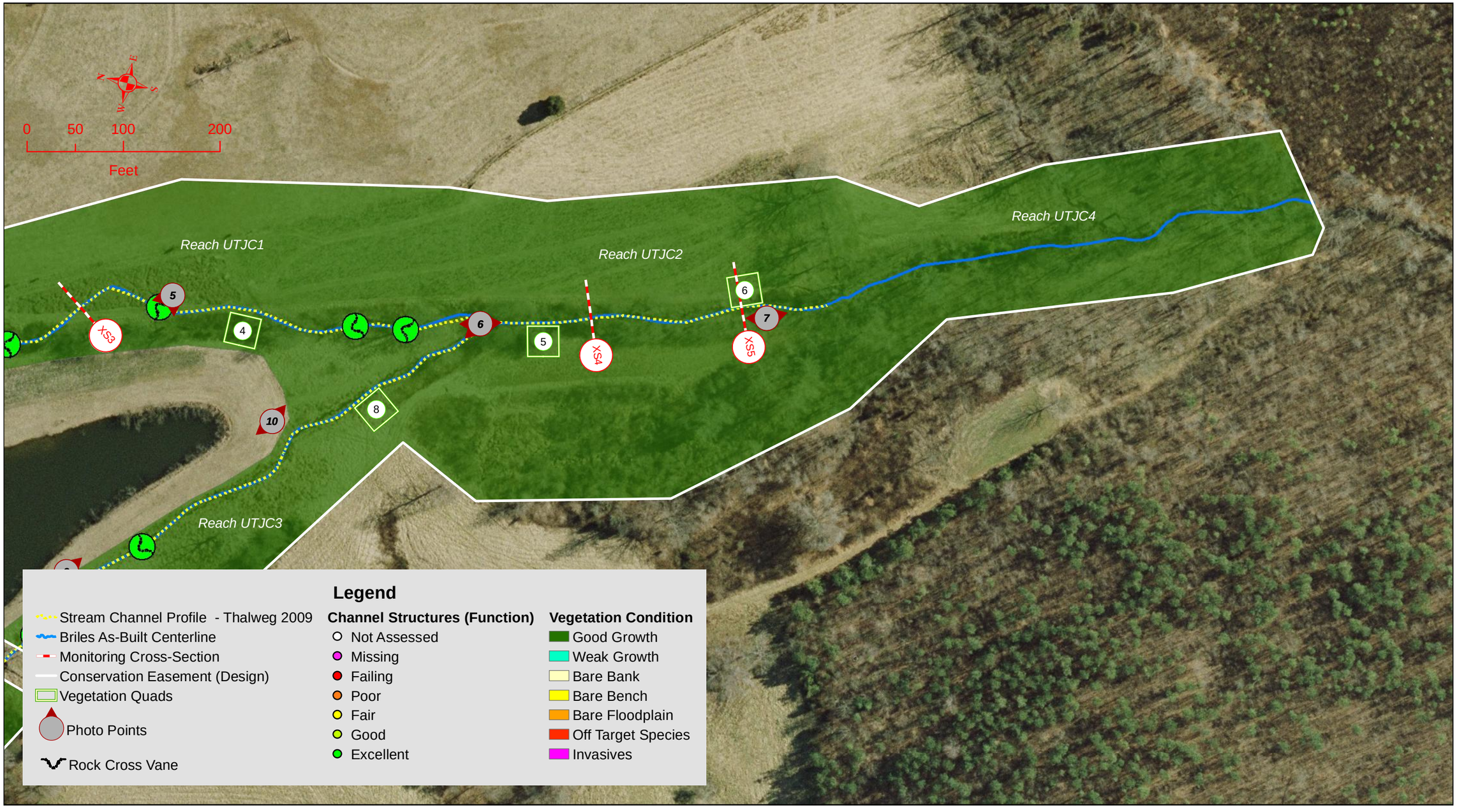

Title	Current Conditions Plan View Lower (2007 Aerial courtesy of NC One Map)
Prepared For: Ecosystem Enhancement Program	**Project** Briles Stream Restoration Monitoring Year 1 – 2009 Randolph County, North Carolina

Date	Project Number	Figure
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PROJECT TABLES

Table I. Project Restoration Components Briles Stream Restoration Site (EEP Project #047)								
Project Segment / Reach ID	**Existing Footage**	**Type**	**Approach**	**Project Footage**	**Mitigation Ratio**	**Mitigation Units**	**Stationing**	**Comment**
UTJC1	1,375 lf	R	P2	1,425 lf	1.0	1,425	10+00 - 24+25	Project length includes a 17-foot wide ford crossing easement exception
UTJC2	355 lf	R	P3	362 lf	1.0	362	24+47 - 28+09	
UTJC3	820	E1	P3	817 lf	1.5	545	50+00 - 58+17	Project length includes a 36-foot wide ford crossing easement exception
UTJC4	508	P	-	508 lf	5.0	102	28+88 - 33+96	
Mitigation Unit Summations								
Stream (lf)	**Riparian Wetland (Ac)**		**Nonriparian Wetland (Ac)**		**Total Wetland (Ac)**		**Buffer (Ac)**	**Comment**
2,393	0		0		0		0	

Table II. Project Activity and Reporting History Briles Stream Restoration Site (EEP Project #047)		
Activity or Report	**Data Collection Complete**	**Completion or Delivery**
Feasibility Study	2003	May 03
Restoration Plan	2003/2004	Dec 05
Final Design - Construction Plans	N/A	Sep 06
Construction	N/A	Nov 07
Temporary seed mix applied to entire project area	N/A	Nov 07
Mitigation Plan / As-Built (Year 0 Monitoring - Baseline)	Dec 07	Jan 08
Year 1 Monitoring Annual Report	Mar 09	Nov 09

Table III. Project Contact Table Briles Stream Restoration Site (EEP Project #047)	
Design Firm	KCI Associates of NC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 783-9214 Fax: (919) 783-9266
Construction Contractor	L-J, Inc. 220 Stoneridge Dr., Ste. 405 Columbia, SC 29210 Contact: Mr. Richard Goodwin Phone: (803) 929-1181 Fax: (803) 929-7625
Planting Contractor	Habitat Assessment and Restoration Program, Inc. 9305-D Monroe Road Charlotte, NC 28270 Contact: Alan Peoples Phone: (704) 975-0881 Fax: (704) 841-2447
Seed Mix Sources	Evergreen Seed Company 6125 NC HWY 55 Fuquay Varina, NC 27526 Phone: (919) 567-1333
Nursery Stock Suppliers	Foggy Mountain Nursery 13213 HWY 88 W. Creston, NC 28615 Phone: (919) 524-5304
Monitoring Performers	
MY-00	KCI Associates of NC Landmark Center II, Suite 220 4601 Six Forks Rd. Raleigh, NC 27609 Contact: Mr. Adam Spiller Phone: (919) 783-9214 Fax: (919) 783-9266
MY-01	Kimley Horn and Associates, Inc. 3001 Weston Parkway Cary, NC 27513 Contact: Daren Pait, P.E. Phone: (919) 678-4155 Fax: (919) 677-2050

Table IV. Project Background Table Briles Stream Restoration Site (EEP Project #047)	
Project County	Randolph County
Physiographic Region	Piedmont
Ecoregion	Carolina Slate Belt
Project River Basin	Yadkin
USGS HUC for Project and Reference	03040103 (Briles Site) 03020201 (Richland Creek) 03040103 (UT Back Creek) 03040101 (UT Fisher River)
NCDWQ Sub-basin for Project and Reference	03-07-09 (Briles Site) 03-04-02 (Richland Creek) 03-07-09 (UT Back Creek) 03-07-02 (UT Fisher River)
Drainage Area	UT1- 0.4 sq. mi. UT2-0.6 sq. mi.
Stream Order	UT1- First Order UT2-Second Order
Watershed Type (Rural, Urban, Developing, etc.)	Rural
Watershed LULC Distribution — Urban	2%
Ag-Row Crop	12%
Ag-Livestock	13%
Forested	72%
Water/Wetlands	<1%
Watershed impervious cover (%)	<1%
Rosgen Classification of As-built	C4 (UTJC1) B4c (UTJC2 and UT1)
Reference Site ID	Richland Creek UT Back Creek UT Fisher River
NCDWQ AU/Index Number	13-2-2 (Jackson Creek)
NCDWQ Classification for Project	C
Within EEP Watershed Plan?	No
Any portion of the project segment upstream of a 303d listed segment?	Yes, Uwharrie River
Reasons for 303d Listing or Stressor	Low dissolved oxygen
Total project acreage of easement	13.3 Acres
Total vegetated acreage within easement	4.8 Acres
Total planted acerage	8.5 Acres
WRC Class (Warm, Cool, Cold)	warm
Trout Designation	no
Species of concern, endangered etc.	N/A
Pre-construction Beaver activity?	No
Dominant Soil Types	Georgeville Silty Clay Loam
% of Project Easement Fenced	0%

Table V. Verification of Bankfull Events			
Briles Stream Restoration Site (EEP Project #047)			
Date of Data Collection	**Date of Occurrence**	**Method**	**Photo #**
N/A	N/A	The only bankfull rackline noted as of October 2008 was observed on Sandy Creek. No bankfull rack lines were observed on the restored reaches.	N/A

*Note: Crest gauge not installed on site

Table VI. Categorical Stream Feature Visual Stability Assessment						
Briles Stream Restoration Site (EEP Project #047)						
Reach UT1						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
A. Riffles	--	100%	--	--	--	--
B. Pools	--	100%	--	--	--	--
C. Thalweg	--	100%	--	--	--	--
D. Meanders	--	100%	--	--	--	--
E. Bed General	--	100%	--	--	--	--
F. Bank Condition	--	100%	--	--	--	
G. Vanes / J Hooks etc.	--	100%	--	--	--	--
H. Wads and Boulders	--	100%	--	--	--	--
Reach UT2						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
A. Riffles	--	100%	--	--	--	--
B. Pools	--	100%	--	--	--	--
C. Thalweg	--	100%	--	--	--	--
D. Meanders	--	100%	--	--	--	--
E. Bed General	--	100%	--	--	--	--
F. Bank Condition	--	100%	--	--	--	
G. Vanes / J Hooks etc.	--	100%	--	--	--	--
H. Wads and Boulders	--	100%	--	--	--	--
Reach UT3						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
A. Riffles	--	100%	--	--	--	--
B. Pools	--	100%	--	--	--	--
C. Thalweg	--	100%	--	--	--	--
D. Meanders	--	100%	--	--	--	--
E. Bed General	--	100%	--	--	--	--
F. Bank Condition	--	100%	--	--	--	
G. Vanes / J Hooks etc.	--	100%	--	--	--	--
H. Wads and Boulders	--	100%	--	--	--	--
Reach UT4						
Feature	**Initial**	**MY-01**	**MY-02**	**MY-03**	**MY-04**	**MY-05**
A. Riffles	--	100%	--	--	--	--
B. Pools	--	100%	--	--	--	--
C. Thalweg	--	100%	--	--	--	--
D. Meanders	--	100%	--	--	--	--
E. Bed General	--	100%	--	--	--	--
F. Bank Condition	--	100%	--	--	--	
G. Vanes / J Hooks etc.	--	100%	--	--	--	--
H. Wads and Boulders	--	100%	--	--	--	--

Table VII(a). Baseline Stream Summary UTJC Upstream
Briles Stream Restoration Site (EEP Project #047)

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built				
Dimension -Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Med	Max	n
Bankfull Width (ft)	8.5	15.2	11.7	28.8	4	9.0	13.1	12.6	18.0	6	15.4		13.4	13.8		14.2	2
Floodprone Width (ft)	20	42	44	60	4	13	114	150	200	6	>35		38	43		>48	2
Bankfull Mean Depth (ft)	0.6	1.4	1.4	2.2	4	0.9	1.2	1.2	1.5	6	1.1		1.1	1.2		1.2	2
Bankfull Max Depth (ft)	1.5	2.0	1.8	2.8	4	1.3	1.6	1.6	2	6	1.5		1.9	2.0		2.0	2
Bankfull Cross Sectional Area (ft^2)	15.1	17.6	18.2	18.8	4	10.4	15.3	13.5	22.3	6	17.0		15.9	16.1		16.2	2
Width/Depth Ratio	3.8	16.3	8.2	44.9	4	7.6	11.5	9.7	18	6	14.0		11.3	11.9		12.4	2
Entrenchment Ratio	1.8	3.5	3.7	4.7	4	1.3	7.5	8.4	14.4	6	>2.2		2.7	3.1		>3.5	2
Bank Height Ratio	1.0	1.7	1.9	1.8	4	1.0	1.0	1.0	1.0	6	1.0		1.0	1.0		1.0	2
Bankfull Velocity (fps)	1.8	3.0	3.2	3.6	4	4	5.1	4.7	6.8	6	3.0	3.8					
Pattern																	
Channel Beltwidth (ft)	50					75			135		77		31	51	56	60	5
Radius of Curvature (ft)	25			57		14.5			26.8		20	50	28	41	42	55	14
Rc:Bankfull width (ft/ft)	0.9			6.7		1			1.6		1.5	3.2	2.0	3.0	3.0	4.0	
Meander Wavelength (ft)	50			100		70			148		105	170	78	92	91	110	6
Meander Width Ratio	1.7			5.9		3.6			13		5		2.2	3.7	4.1	4.3	
Profile																	
Riffle Length (ft)													20	46	44	115	19
Riffle Slope (ft/ft)	0.0040			0.0120		0.0030			0.0760		0.0050	0.0120	0.0014	0.0095	0.0102	0.0163	19
Pool Length (ft)						28			108		15	30	7	12	10	27	17
Pool Spacing (ft)						38			181		46	154	50	82	78	157	17
Substrate and Transport Parameters																	
SC% / Sa% / G% / C% / B% / Be%	14% / 27% / 47% / 7% / - / 5%												47% / 30% / 19% / 1% / - / 3%				
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)	0.3 / 1.2 / 6.1 / 10.6 / 61.9 / - / -												0.062 / 0.062 / 0.101 / 4.6 / 25 / - / -				
Reach Shear Stress (competency) lb/ft^2																	
Additional Reach Parameters																	
Channel length (ft)	1,375										1,446		1,432				
Drainage Area (SM)	0.51					0.9 - 0.63					0.51		0.51				
Rosgen Classification	G4c/E4/C4/5					C4					C4		C4				
Bankfull Discharge (cfs)	50 - 65					60 - 140					50		50				
Sinuosity	1					1.5					1.2		1.1				
Water Surface Slope (ft/ft)	0.004 - 0.012					0.007 - 0.012					0.005		0.0063				
BF slope (ft/ft)											0.005		0.0057				

Table VII(b). Baseline Stream Summary UTJC Downstream
Briles Stream Restoration Site (EEP Project #047)

Parameter	Pre-Existing Condition					Reference Reach(es) Data					Design		As-built				
Dimension -Riffle	Min	Mean	Med	Max	n	Min	Mean	Med	Max	n	Min	Max	Min	Mean	Med	Max	n
Bankfull Width (ft)		22.9			1	9.0	9.5		10.0	2	14.3			15.8			1
Floodprone Width (ft)		37			1	13	17		21	2	19	32		>60			1
Bankfull Mean Depth (ft)		0.8			1	1.1	1.2		1.2	2	1.2			1.3			1
Bankfull Max Depth (ft)		2.2			1	1.3	1.4		1.5	2	2.5			2.3			1
Bankfull Cross Sectional Area (ft^2)		18.8			1	10.4	10.6		10.7	2	17.0			19.8			1
Width/Depth Ratio		27.9			1	8.0	10.0		12.0	2	12.0			12.6			1
Entrenchment Ratio		1.6			1	1.3	1.8		2.3	2	2.3			>3			1
Bank Height Ratio		2			1	1.0	1.0		1.0	2	1.0			1.0			1
Bankfull Velocity (fps)		2.1			1	4.1	4.3		4.5	2	3.0	3.8					
Pattern																	
Channel Beltwidth (ft)	50					45					70		28	29		30	2
Radius of Curvature (ft)	25			57		13			42		28	100	44	53	48	66	3
Rc:Bankfull width (ft/ft)	0.9			6.7		1.3			4.4		2.0	7.0	2.8	3.4	3.0	4.2	
Meander Wavelength (ft)	50			100		96			136		72	215	45	63		81	2
Meander Width Ratio	1.7			5.9		4.5			5.0		5.0		1.7	1.8		1.9	
Profile																	
Riffle Length (ft)													17	150		232	2
Riffle Slope (ft/ft)	0.0040			0.0120		0.0100			0.0200		0.0050	0.0120	0.0054	0.0056		0.0057	2
Pool Length (ft)						3			25		15	30	8	11		14	2
Pool Spacing (ft)						30			59		28	86		256			1
Substrate and Transport Parameters																	
SC% / Sa% / G% / C% / B% / Be%	14% / 27% / 47% / 7% / - / 5%												34% / 40% / 26% / - / - / -				
d16 / d35 / d50 / d84 / d95 / di^p / di^{sp} (mm)	0.3 / 1.2 / 6.1 / 10.6 / 61.9 / - /-												0.062 / 0.067 / 0.17 / 5.5 / 18 / - /-				
Reach Shear Stress (competency) lb/ft^2																	
Additional Reach Parameters																	
Channel length (ft)	365										362		353				
Drainage Area (SM)	0.51					0.38					0.62		0.62				
Rosgen Classification	G4c/E4/C4/5					B4c					B4c		C4				
Bankfull Discharge (cfs)	50 - 65					42-46					65		65				
Sinuosity	1					1.2					1.1		1.05				
Water Surface Slope (ft/ft)	0.004 - 0.012					0.013					0.06		0.0047				
BF slope (ft/ft)											0.06		0.0043				

Table VIII. Morphology and Hydraulic Monitoring Summary
Briles Stream Restoration Site (EEP Project #047)

Parameter	Cross-Section 1 Riffle			Cross-Section 2 Pool			Cross-Section 3 Riffle			Cross-Section 4 Riffle			Cross-Section 5 Pool		
Dimension	MY0	MY1	MY2	MY0	MY1	MY2	MY0	MY1	MY2	MY0	MY1	MY2	MY0	MY1	MY2
Current Bankfull Width (ft)	13.4	14.58	-	15.9	17.62	-	14.2	14.12	-	15.8	14.97	-	14.0	12.67	-
Current Floodprone Width (ft)	>48	48.4	-	-	58.58	-	38	43.09	-	>60	61.96	-	-	58.71	-
Current Bankfull Mean Depth (ft)	1.2	1.1	-	1.2	1.28	-	1.1	1.27	-	2.3	1.35	-	1.5	1.44	-
Current Bankfull Max Depth (ft)	1.9	1.98	-	2.2	2.46	-	2.0	2.55	-	1.3	2.58	-	3.5	2.51	-
Current Bankfull Cross Sectional Area (ft^2)	15.9	16.01	-	18.9	22.5	-	16.2	17.92	-	19.8	20.21	-	21.4	18.24	-
Current Bankfull Width/Depth Ratio	11.3	7.4	-	-	7.2	-	12.4	5.5	-	12.6	5.8	-	-	5	-
Current Bankfull Entrenchment Ratio	>3.5	3.3	-	-	3.3	-	2.7	3.1	-	>3.0	4.1	-	-	4.6	-
Current Bankfull Bank Height Ratio	1.0	1.5	-	-	1.2	-	1.0	1.9	-	1.0	1.6	-	-	1.4	-
As-built Bkf Elevation Width (ft)	13.4	13.4	-	15.9	15.9	-	14.2	14.2	-	15.8	15.8	-	14	14	-
As-built Bkf Elevation Floodprone Width (ft)	>48	>48	-	-	-	-	38	38	-	>60	>60	-	-	-	-
As-built Bkf Elevation Mean Depth (ft)	1.2	1.2	-	1.2	1.2	-	1.1	1.1	-	2.3	2.3	-	1.5	1.5	-
As-built Bkf Elevation Max Depth (ft)	1.9	1.9	-	2.2	2.2	-	2.0	2.0	-	1.3	1.3	-	3.5	3.5	-
As-built Bkf Elevation Cross Sectional Area (ft^2)	15.9	15.9	-	18.9	18.9	-	16.2	16.2	-	19.8	19.8	-	21.4	21.4	-
As-built Bkf Elevation Width/Depth Ratio	11.3	11.3	-	-	-	-	12.4	12.4	-	12.6	12.6	-	-	-	-
As-built Bkf Elevation Entrenchment Ratio	>3.5	>3.5	-	-	-	-	2.7	2.7	-	>3.0	>3.0	-	-	-	-
As-built Bkf Elevation Bank Height Ratio	1.0	1.0	-	-	-	-	1.0	1.0	-	1.0	1.0	-	-	-	-
Cross Sectional Area between cross-section end pins (ft^2)*	67	67	-	84	84	-	146	146	-	86	86	-	82	82	-
Substrate															
d50 (mm)	0.14	31	-	0.27	62.7	-	0.062	11.17	-	0.17	42.24	-	0.062	15.25	-
d84 (mm)	7.1	5.02	-	5.6	3.63	-	2.1	1.05	-	5.5	3.53	-	0.7	0.37	-
Channel Length (ft)	1,446									1,808					
Sinuosity	1.1									1.05					
Water Surface Slope (ft/ft)	0.0063									0.0047					
BF Slope (ft/ft)	0.0057									0.0043					
Rosgen Classification	C4									C4					

*Area taken from lowest pin elevation

APPENDIX A
VEGETATION MONITORING DATA

Table AI. Vegetative Metadata	
Briles Stream Restoration Site (EEP Project #047)	
Report Prepared By	Joshua Allen
Date Prepared	11/5/2009 8:21
database name	cvs-eep-entrytool-v2.2.6-workshop2009.mdb
database location	K:\RAL_Environmental\011795 Briles Monitoring BRILE\MY 2009
computer name	DD81056
file size	66236416
DESCRIPTION OF WORKSHEETS IN THIS DOCUMENT----------	
Metadata	Description of database file, the report worksheets, and a summary of project(s) and project data.
Proj, planted	Each project is listed with its PLANTED stems per acre, for each year. This excludes live stakes.
Proj, total stems	Each project is listed with its TOTAL stems per acre, for each year. This includes live stakes, all planted stems, and all natural/volunteer stems.
Plots	List of plots surveyed with location and summary data (live stems, dead stems, missing, etc.).
Vigor	Frequency distribution of vigor classes for stems for all plots.
Vigor by Spp	Frequency distribution of vigor classes listed by species.
Damage	List of most frequent damage classes with number of occurrences and percent of total stems impacted by each.
Damage by Spp	Damage values tallied by type for each species.
Damage by Plot	Damage values tallied by type for each plot.
Planted Stems by Plot and Spp	A matrix of the count of PLANTED living stems of each species for each plot; dead and missing stems are excluded.
PROJECT SUMMARY----------	
Project Code	47
project Name	Briles
Description	
River Basin	
length(ft)	
stream-to-edge width (ft)	
area (sq m)	
Required Plots (calculated)	
Sampled Plots	8

Table AII. Vegetation Vigor by Species								
Briles Stream Restoration Site (EEP Project #047)								
	Species	**4**	**3**	**2**	**1**	**0**	**Missing**	**Unknown**
	Betula nigra	5	2			1	7	
	Cornus amomum	26	9			8	2	
	Fraxinus nigra	1						
	Fraxinus pennsylvanica	6	9	1		6	4	
	Quercus pagoda	7	1			2	1	
	Quercus phellos					1	1	
	Salix nigra	3						
	Salix sericea	11	1			1		
	Sambucus canadensis	7	2			1	2	
	Liriodendron tulipifera	3					5	
	Platanus occidentalis	2					1	
TOT:	**11**	**71**	**24**	**1**		**20**	**23**	

Table AIII. Vegetation Damage by Species
Briles Stream Restoration Site (EEP Project #047)

	Species	All Damage Categories	(no damage)	Deer
	Betula nigra	15	14	1
	Cornus amomum	45	45	
	Fraxinus nigra	1	1	
	Fraxinus pennsylvanica	26	26	
	Liriodendron tulipifera	8	8	
	Platanus occidentalis	3	3	
	Quercus pagoda	11	11	
	Quercus phellos	2	2	
	Salix nigra	3	3	
	Salix sericea	13	13	
	Sambucus canadensis	12	12	
TOT:	**11**	**139**	**138**	**1**

Table AIV. Vegetation Damage by Plot
Briles Stream Restoration Site (EEP Project #047)

	plot	All Damage Categories	(no damage)	Deer
	047-01-0001-year:1	14	14	
	047-01-0002-year:1	27	27	
	047-01-0003-year:1	11	10	1
	047-01-0004-year:1	21	21	
	047-01-0005-year:1	23	23	
	047-01-0006-year:1	13	13	
	047-01-0007-year:1	21	21	
	047-01-0008-year:1	9	9	
TOT:	**8**	**139**	**138**	**1**

Table AV. Planted Stem Count by Plot and Species
Briles Stream Restoration Site (EEP Project #047)

	Species	Total Planted Stems	# plots	avg# stems	plot 047-01-0001-year:1	plot 047-01-0002-year:1	plot 047-01-0003-year:1	plot 047-01-0004-year:1	plot 047-01-0005-year:1	plot 047-01-0006-year:1	plot 047-01-0007-year:1	plot 047-01-0008-year:1
	Betula nigra	7	3	2.33	2	2	3					
	Cornus amomum	35	7	5	3	5		4	11	2	4	6
	Fraxinus nigra	1	1	1	1							
	Fraxinus pennsylvanica	16	8	2	1	1	2	1	4	4	2	1
	Liriodendron tulipifera	3	3	1	1			1	1			
	Platanus occidentalis	2	1	2				2				
	Quercus pagoda	8	5	1.6			2	1	1	3	1	
	Salix nigra	3	2	1.5		2		1				
	Salix sericea	12	4	3		2		7	1		2	
	Sambucus canadensis	9	3	3	1	3					5	
TOT:	**10**	**96**	**10**		**9**	**15**	**7**	**17**	**18**	**9**	**14**	**7**

Table AVI. Vegetative Problem Areas			
Briles Stream Restoration Site (EEP Project #047)			
Feature/Issue	**Station # / Range**	**Probable Cause**	**Photo #**
2009			
Bare Bank	N/A	N/A	
Bare Bench	N/A	N/A	
Bare Flood Plain	N/A	N/A	
Invasive/Exotic Populations	N/A	N/A	

Table AVII. Planted and Total Stem Counts
Briles Stream Restoration Site (EEP Project #047)

Scientific Name	Common Name	Species Type	Current Plot Data (MY1 2009)																									Annual Means					
			047-01-0001			047-01-0002			047-01-0003			047-01-0004			047-01-0005			047-01-0006			047-01-0007			047-01-0008			MY1 (2009)			MY0 (2007)		
			Pw/oL	P-all	T	Pw/oL	P-all	T	Pw/oL	P-all	T	Pw/oL	P-all	T	Pw/oL	P-all	T	Pw/oL	P-all	T	Pw/oL	P-all	T	Pw/oL	P-all	T	Pw/oL	P-all	T	Pw/oL	P-all	T
Betula nigra	river birch	Tree		2	2		2	2		3	3																		7	7		15	15
Cornus amomum	silky dogwood	Shrub	1	3	3	2	5	5				3	4	4	9	11	11		2	2	3	4	4		6	6	18	35	35	25	44	44
Fraxinus nigra	black ash	Tree		1	1																							1	1		1	1
Fraxinus pennsylvanica	green ash	Tree		1	1		1	1		2	2		1	1		4	4		4	4		2	2		1	1		16	16		26	26
Liriodendron tulipifera	tuliptree	Tree		1	1								1	1		1	1											3	3		8	8
Platanus occidentalis	American sycamore	Tree											2	2														2	2		3	3
Quercus pagoda	cherrybark oak	Tree								2	2		1	1		1	1		3	3		1	1					8	8		11	11
Quercus phellos	willow oak	Tree																													2	2
Salix nigra	black willow	Tree				2	2	2				1	1	1													3	3	3	3	3	3
Salix sericea	silky willow	Shrub Tree				2	2	2				7	7	7	1	1	1				2	2	2				12	12	12	11	11	11
Sambucus canadensis	Common Elderberry	Shrub Tree	1	1	1	3	3	3													4	5	5				8	9	9	11	11	11
Stem count			2	9	9	9	15	15	0	7	7	11	17	17	10	18	18	0	9	9	9	14	14	0	7	7	41	96	96	50	135	135
size (ares)			1			1			1			1			1			1			1			1			8			8		
size (ACRES)			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.02			0.20			0.20		
Species count			2	6	6	4	6	6	0	3	3	3	7	7	2	5	5	0	3	3	3	5	5	0	2	2	4	10	10	4	11	11
Stems per ACRE			80.94	364.2	364.2	364.2	607	607	0	283.3	283.3	445.2	688	688	404.7	728.4	728.4	0	364.2	364.2	364.2	566.6	566.6	0	283.3	283.3	207.4	485.6	485.6	252.9	682.9	682.9

VQ1: Vegetation Quad 1
Taken: 2007

VQ1: Vegetation Quad 1
Taken: 2009

VQ2: Vegetation Quad 2
Taken: 2007

VQ2: Vegetation Quad 2
Taken: 2009

VQ3: Vegetation Quad 3
Taken: 2007

VQ3: Vegetation Quad 3
Taken: 2009

VQ4: Vegetation Quad 4
Taken: 2007

VQ4: Vegetation Quad 4
Taken: 2009

VQ5: Vegetation Quad 5
Taken: 2007

VQ5: Vegetation Quad 5
Taken: 2009

VQ6: Vegetation Quad 6
Taken: 2007

VQ6: Vegetation Quad 6
Taken: 2009

VQ7: Vegetation Quad 7
Taken: 2007

VQ7: Vegetation Quad 7
Taken: 2009

VQ8: Vegetation Quad 8
Taken: 2007

VQ8: Vegetation Quad 8
Taken: 2009

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APPENDIX B
STREAM MONITORING DATA

Table B1. Stream Problem Areas					
Briles Stream Restoration Site (EEP Project #047)					
Feature Issue	**Reach**	**Stations**	**Description**	**Suspected Cause**	**Photo number**
2009					
Aggradation/Bar Formation	N/A				
Bank scour	N/A				
Engineered structures – back or arm scour Etc.	N/A				

Table B2. Visual Morphological Stability Assessment									
Briles Stream Restoration Site (EEP Project #047)									
Reach UTJC1 (Surveyed Length = 1,425 lf)									
Feature Category	**Metric (per As-built and reference baselines)**		**(# Stable) Number Performing as Intended**	**Total number per As-built***	**Total Number / feet in unstable state**			**% Perform in Stable Condition**	**Feature Perform. Mean or Total**
A. Riffles	1	Present?	12	12		NA		100%	100%
	2	Armor stable (e.g. no displacement)?	12	12		NA		100%	
	3	Facet grade appears stable?	12	12		NA		100%	
	4	Minimal evidence of embedding/fining?	12	12		NA		100%	
	5	Length appropriate?	12	12		NA		100%	
B. Pools	1	Present? (e.g not subject to severe aggrad. or migrat.?)	12	12		NA		100%	100%
	2	Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	12	12		NA		100%	
	3	Length appropriate?	12	12		NA		100%	
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	12	12		NA		100%	100%
	2	Downstream of meander (glide/inflection) centering?	12	12		NA		100%	
D. Meanders	1	Outer bend in state of limited/controlled erosion?	12	12		NA		100%	100%
	2	Of those eroding, # w/concomitant point bar formation?	12	12		NA		100%	
	3	Apparent Rc within spec?	12	12		NA		100%	
	4	Sufficient floodplain access and relief?	12	12		NA		100%	
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	0	/	0	100%	100%
	2	Channel bed degradation – areas of increasing down-cutting or head cutting?	--	--	0	/	0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0	/	0	100%	100%
G. Vanes	1	Free of back or arm scour?	6	6		NA		100%	100%
	2	Height appropriate?	6	6		NA		100%	
	3	Angle and geometry appear appropriate?	6	6		NA		100%	
	4	Free of piping or other structural failures?	6	6		NA		100%	
H. Wads/ Boulders	1	Free of scour?	--	--		NA		100%	100%
	2	Footing stable?	--	--		NA		100%	
Reach UTJC2 (Surveyed Length = 362 lf)									
Feature Category	**Metric (per As-built and reference baselines)**		**(# Stable) Number Performing as Intended**	**Total number per As-built***	**Total Number / feet in unstable state**			**% Perform in Stable Condition**	**Feature Perform. Mean or Total**
A. Riffles	1	Present?	2	2		NA		100%	100%
	2	Armor stable (e.g. no displacement)?	2	2		NA		100%	
	3	Facet grade appears stable?	2	2		NA		100%	
	4	Minimal evidence of embedding/fining?	2	2		NA		100%	
	5	Length appropriate?	2	2		NA		100%	
B. Pools	1	Present? (e.g not subject to severe aggrad. or migrat.?)	2	2		NA		100%	100%
	2	Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	2	2		NA		100%	
	3	Length appropriate?	2	2		NA		100%	
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	2	2		NA		100%	100%
	2	Downstream of meander (glide/inflection) centering?	2	2		NA		100%	
D. Meanders	1	Outer bend in state of limited/controlled erosion?	2	2		NA		100%	100%
	2	Of those eroding, # w/concomitant point bar formation?	2	2		NA		100%	
	3	Apparent Rc within spec?	2	2		NA		100%	
	4	Sufficient floodplain access and relief?	2	2		NA		100%	
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	0	/	0	100%	100%
	2	Channel bed degradation – areas of increasing down-cutting or head cutting?	--	--	0	/	0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0	/	0	100%	100%
G. Vanes	1	Free of back or arm scour?	--	--		NA		100%	100%
	2	Height appropriate?	--	--		NA		100%	
	3	Angle and geometry appear appropriate?	--	--		NA		100%	
	4	Free of piping or other structural failures?	--	--		NA		100%	
H. Wads/ Boulders	1	Free of scour?	--	--		NA			100%
	2	Footing stable?	--	--		NA			

Table B2. Visual Morphological Stability Assessment									
Briles Stream Restoration Site (EEP Project #047)									
Reach UTJC3 (Surveyed Length = 817 lf)									
Feature Category		**Metric (per As-built and reference baselines)**	**(# Stable) Number Performing as Intended**	**Total number per As-built***	**Total Number / feet in unstable state**			**% Perform in Stable Condition**	**Feature Perform. Mean or Total**
A. Riffles	1	Present?	7	7		NA		100%	100%
	2	Armor stable (e.g. no displacement)?	7	7		NA		100%	
	3	Facet grade appears stable?	7	7		NA		100%	
	4	Minimal evidence of embedding/fining?	7	7		NA		100%	
	5	Length appropriate?	7	7		NA		100%	
B. Pools	1	Present? (e.g not subject to severe aggrad. or migrat.?)	7	7		NA		100%	100%
	2	Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	7	7		NA		100%	
	3	Length appropriate?	7	7		NA		100%	
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	7	7		NA		100%	100%
	2	Downstream of meander (glide/inflection) centering?	7	7		NA		100%	
D. Meanders	1	Outer bend in state of limited/controlled erosion?	7	7		NA		100%	100%
	2	Of those eroding, # w/concomitant point bar formation?	7	7		NA		100%	
	3	Apparent Rc within spec?	7	7		NA		100%	
	4	Sufficient floodplain access and relief?	7	7		NA		100%	
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	0	/	0	100%	100%
	2	Channel bed degradation – areas of increasing down-cutting or head cutting?	--	--	0	/	0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0	/	0	100%	100%
G. Vanes	1	Free of back or arm scour?	3	4		NA		75%	75%
	2	Height appropriate?	3	4		NA		75%	
	3	Angle and geometry appear appropriate?	3	4		NA		75%	
	4	Free of piping or other structural failures?	3	4		NA		75%	
H. Wads/ Boulders	1	Free of scour?	--	--		NA			100%
	2	Footing stable?	--	--		NA			
Reach UTJC4 (Surveyed Length = 508 lf)									
Feature Category		**Metric (per As-built and reference baselines)**	**(# Stable) Number Performing as Intended**	**Total number per As-built***	**Total Number / feet in unstable state**			**% Perform in Stable Condition**	**Feature Perform. Mean or Total**
A. Riffles	1	Present?	--	--		NA			100%
	2	Armor stable (e.g. no displacement)?	--	--		NA			
	3	Facet grade appears stable?	--	--		NA			
	4	Minimal evidence of embedding/fining?	--	--		NA			
	5	Length appropriate?	--	--		NA			
B. Pools	1	Present? (e.g not subject to severe aggrad. or migrat.?)	--	--		NA			100%
	2	Sufficiently deep (Max Pool D:Mean Bkf >1.6?)	--	--		NA			
	3	Length appropriate?	--	--		NA			
C. Thalweg	1	Upstream of meander bend (run/inflection) centering?	--	--		NA			100%
	2	Downstream of meander (glide/inflection) centering?	--	--		NA			
D. Meanders	1	Outer bend in state of limited/controlled erosion?	--	--		NA			100%
	2	Of those eroding, # w/concomitant point bar formation?	--	--		NA			
	3	Apparent Rc within spec?	--	--		NA			
	4	Sufficient floodplain access and relief?	--	--		NA			
E. Bed General	1	General channel bed aggradation areas (bar formation)	--	--	0	/	0	100%	100%
	2	Channel bed degradation – areas of increasing down-cutting or head cutting?	--	--	0	/	0	100%	
F. Bank	2	Actively eroding, wasting, or slumping bank	--	--	0	/	0	100%	100%
G. Vanes	1	Free of back or arm scour?	--	--		NA		100%	100%
	2	Height appropriate?	--	--		NA		100%	
	3	Angle and geometry appear appropriate?	--	--		NA		100%	
	4	Free of piping or other structural failures?	--	--		NA		100%	
H. Wads/ Boulders	1	Free of scour?	--	--		NA			100%
	2	Footing stable?	--	--		NA			

* This number may not be accurate. No design issues, were noticed in the stream, therefore the features in the visual assessment were determined to be at 100%.

Permanent Photo PP1a
Taken: 2007

Permanent Photo PP1a
Taken: 2009

Permanent Photo PP1b
Taken: 2007

Permanent Photo PP1b
Taken: 2009

Permanent Photo PP2a
Taken On: 2007

Permanent Photo PP2a
Taken On: 2009

Permanent Photo PP2b
Taken: 2007

Permanent Photo PP2b
Taken: 2009

Permanent Photo PP3a
Taken On: 2007

Permanent Photo PP3a
Taken On: 2009

Permanent Photo PP3b
Taken On: 2007

Permanent Photo PP3b
Taken On: 2009

Permanent Photo PP4a
Taken: 2007

Permanent Photo PP4a
Taken: 2009

Permanent Photo PP4b
Taken: 2007

Permanent Photo PP4b
Taken: 2009

Permanent Photo PP5a
Taken: 2007

Permanent Photo PP5a
Taken: 2009

Permanent Photo PP5b
Taken: 2007

Permanent Photo PP5b
Taken: 2009

Permanent Photo PP5c
Taken: 2007

Permanent Photo PP5c
Taken: 2009

Permanent Photo PP6a
Taken: 2007

Permanent Photo PP6a
Taken: 2009

Permanent Photo PP6b
Taken: 2007

Permanent Photo PP6b
Taken: 2009

Permanent Photo PP6c
Taken On: 2007

Permanent Photo PP6c
Taken On: 2009

Permanent Photo PP7a
Taken On: 2007

Permanent Photo PP7a
Taken On: 2009

Permanent Photo PP7b
Taken On: 2007

Permanent Photo PP7b
Taken On: 2009

Permanent Photo PP8a
Taken On: 2007

Permanent Photo PP8a
Taken On: 2009

Permanent Photo PP8b
Taken On: 2007

Permanent Photo PP8b
Taken On: 2009

Permanent Photo PP9a
Taken On: 2007

Permanent Photo PP9a
Taken On: 2009

Permanent Photo PP9b
Taken On: 2007

Permanent Photo PP9b
Taken On: 2009

Permanent Photo PP10a
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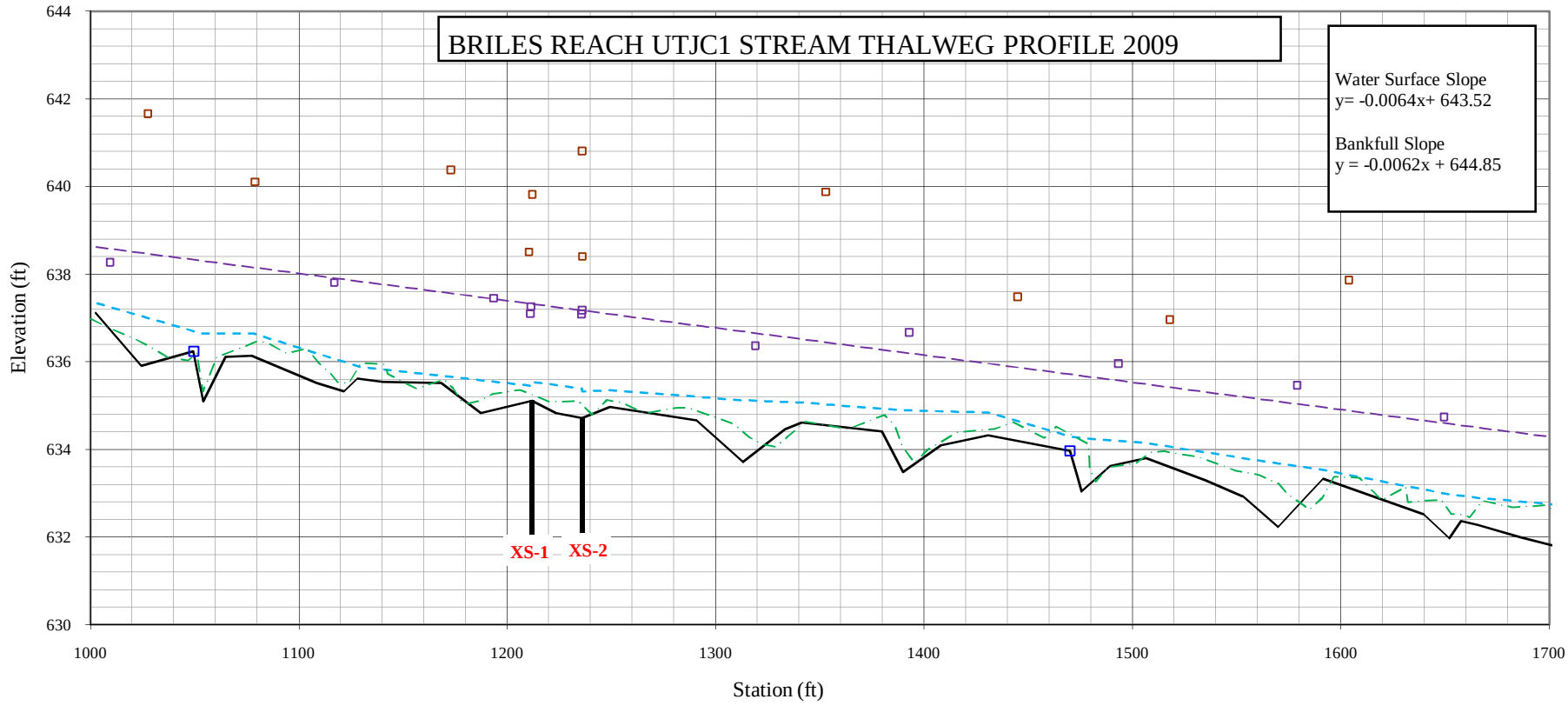
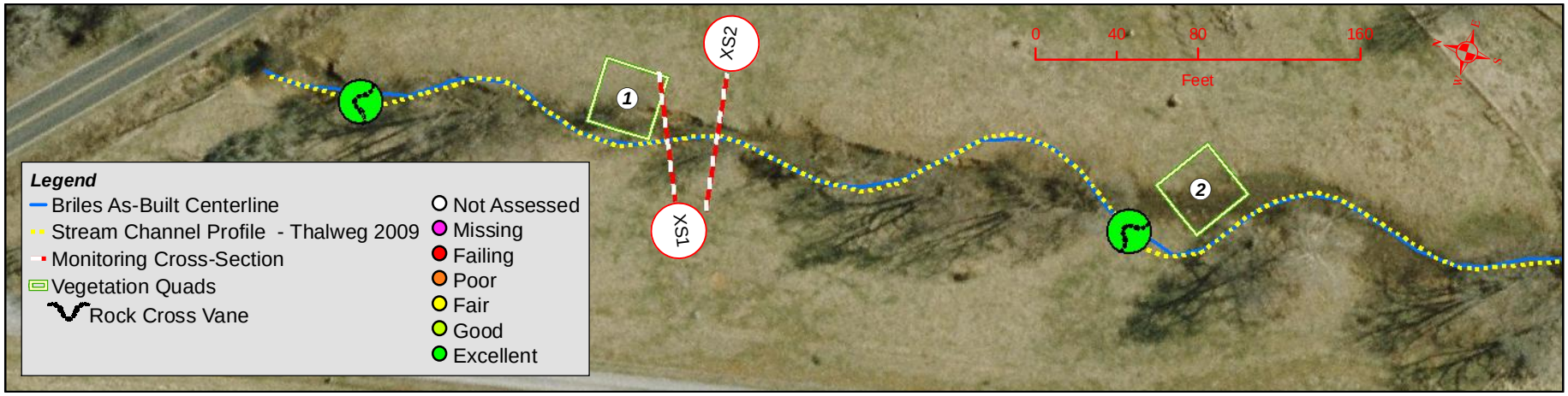
Permanent Photo PP10a
Taken On: 2009

Permanent Photo PP10b
Taken On: 2007

Permanent Photo PP10b
Taken On: 2009





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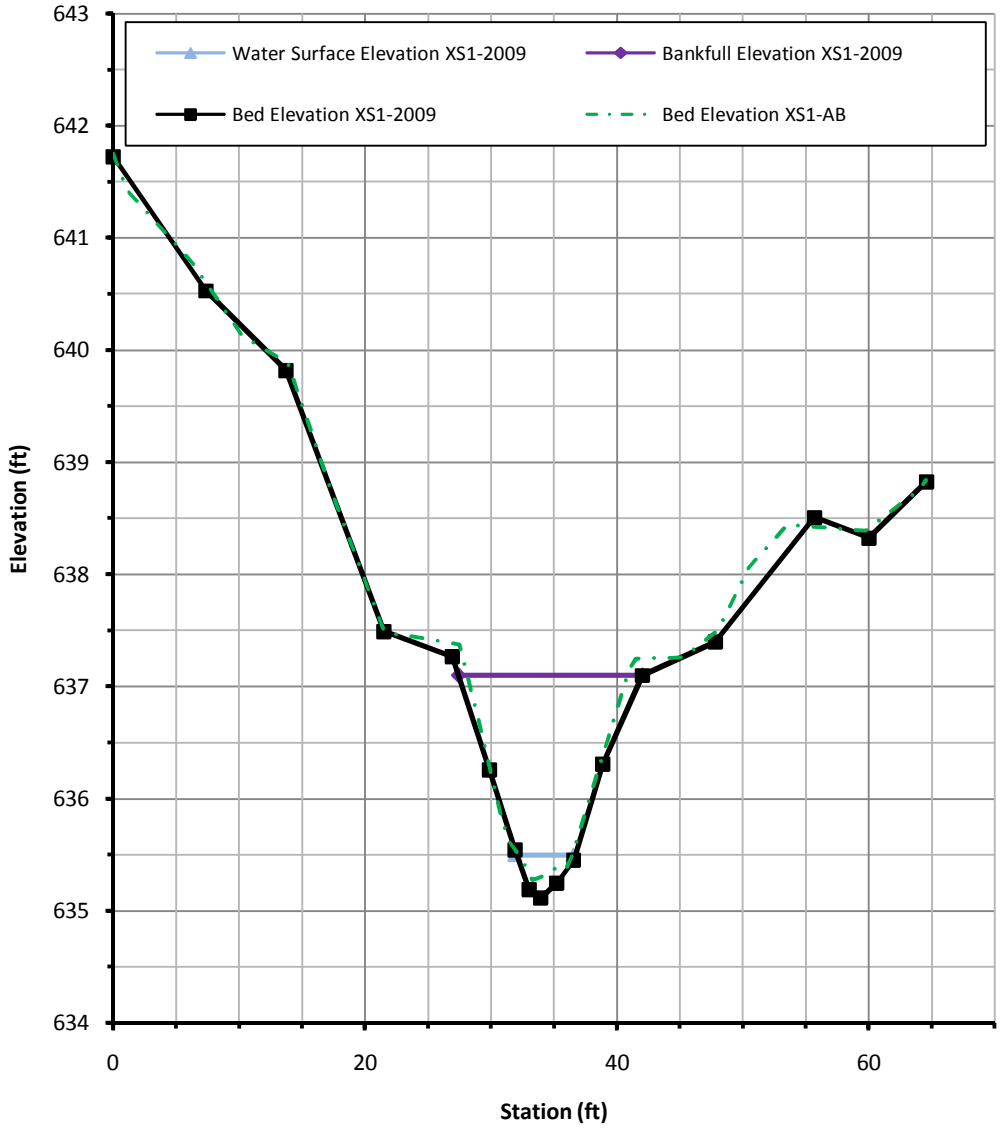

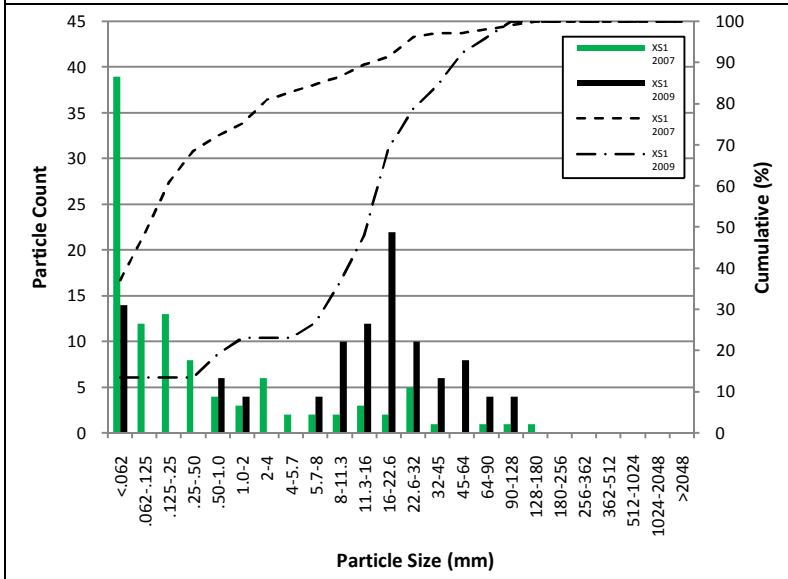

ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS1	2007	AB	RIFFLE	13.4	15.9	1.2
XS1	2009	MY1	RIFFLE	14.6	16.0	1.1

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS1	2007	AB	0.07	5.02
XS1	2009	MY1	11.73	31.00

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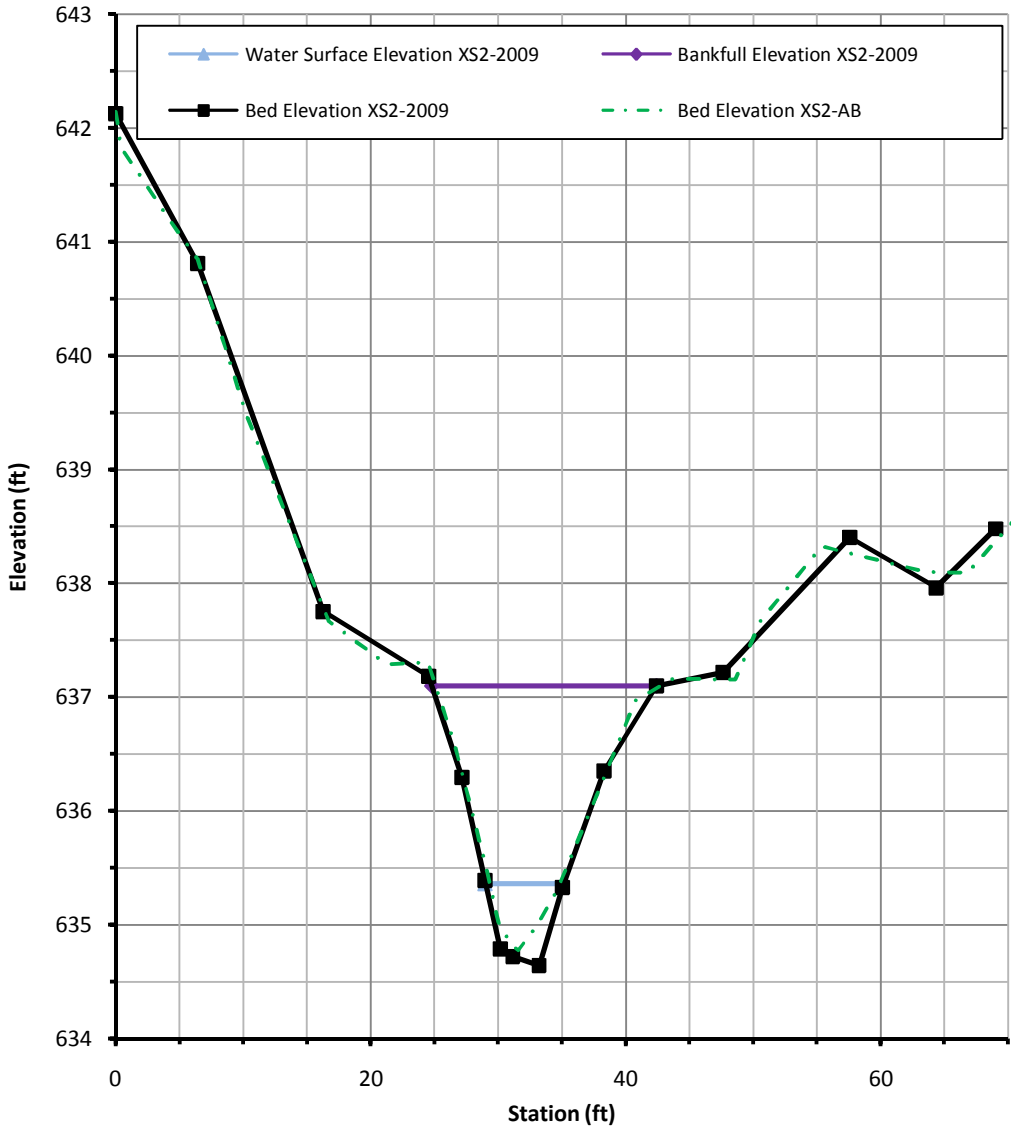
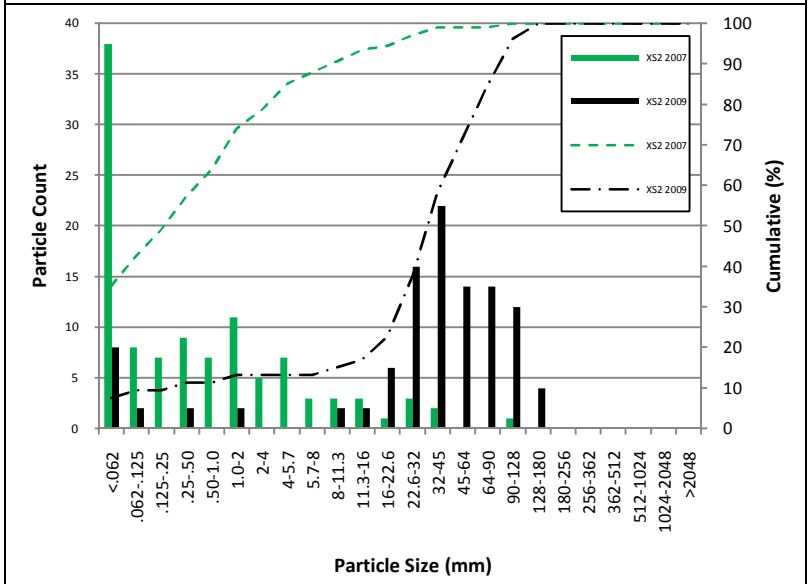
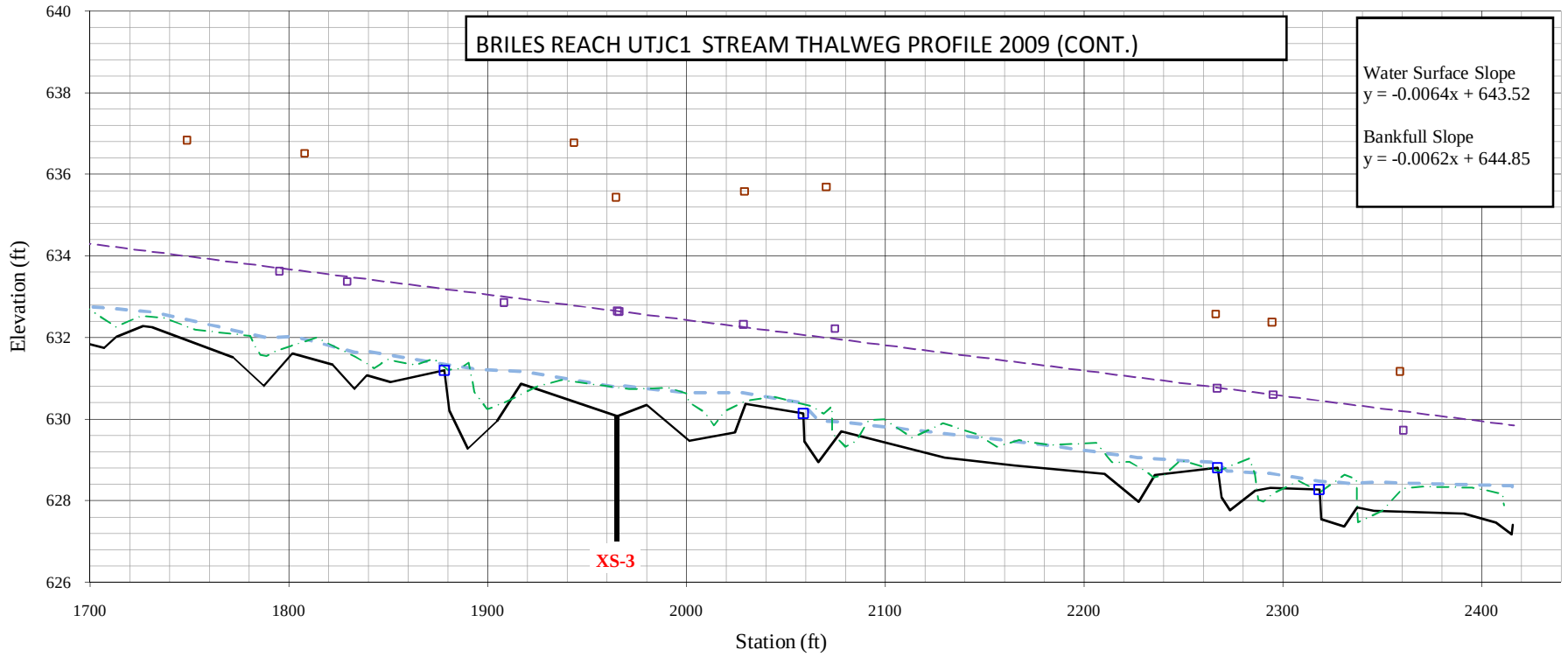
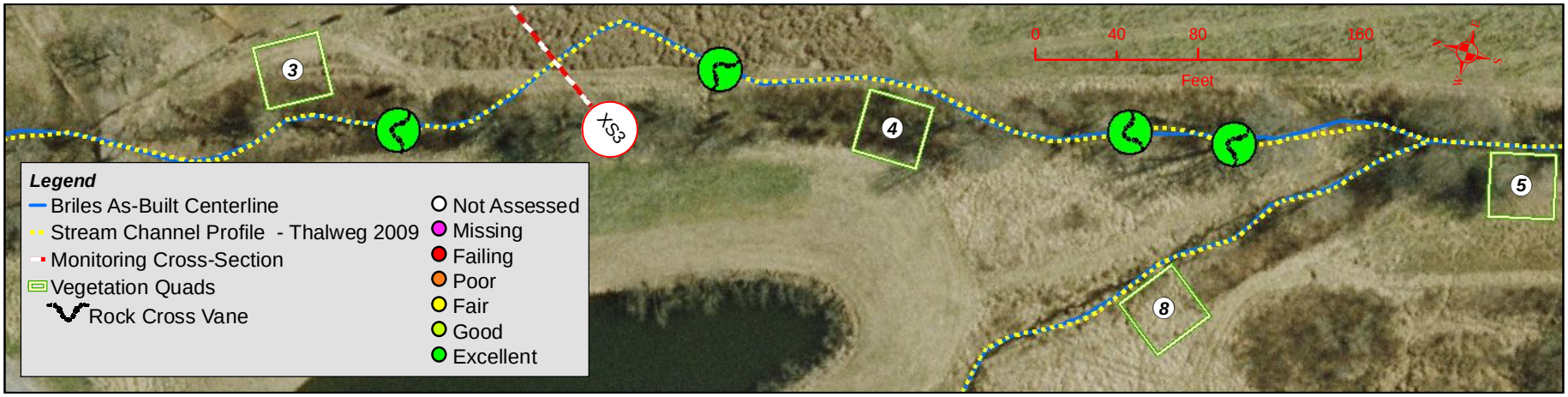




ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS2	2007	AB	POOL	15.9	18.9	1.2
XS2	2009	MY1	POOL	17.6	22.5	1.3

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS2	2007	AB	0.14	3.63
XS2	2009	MY1	28.15	62.7





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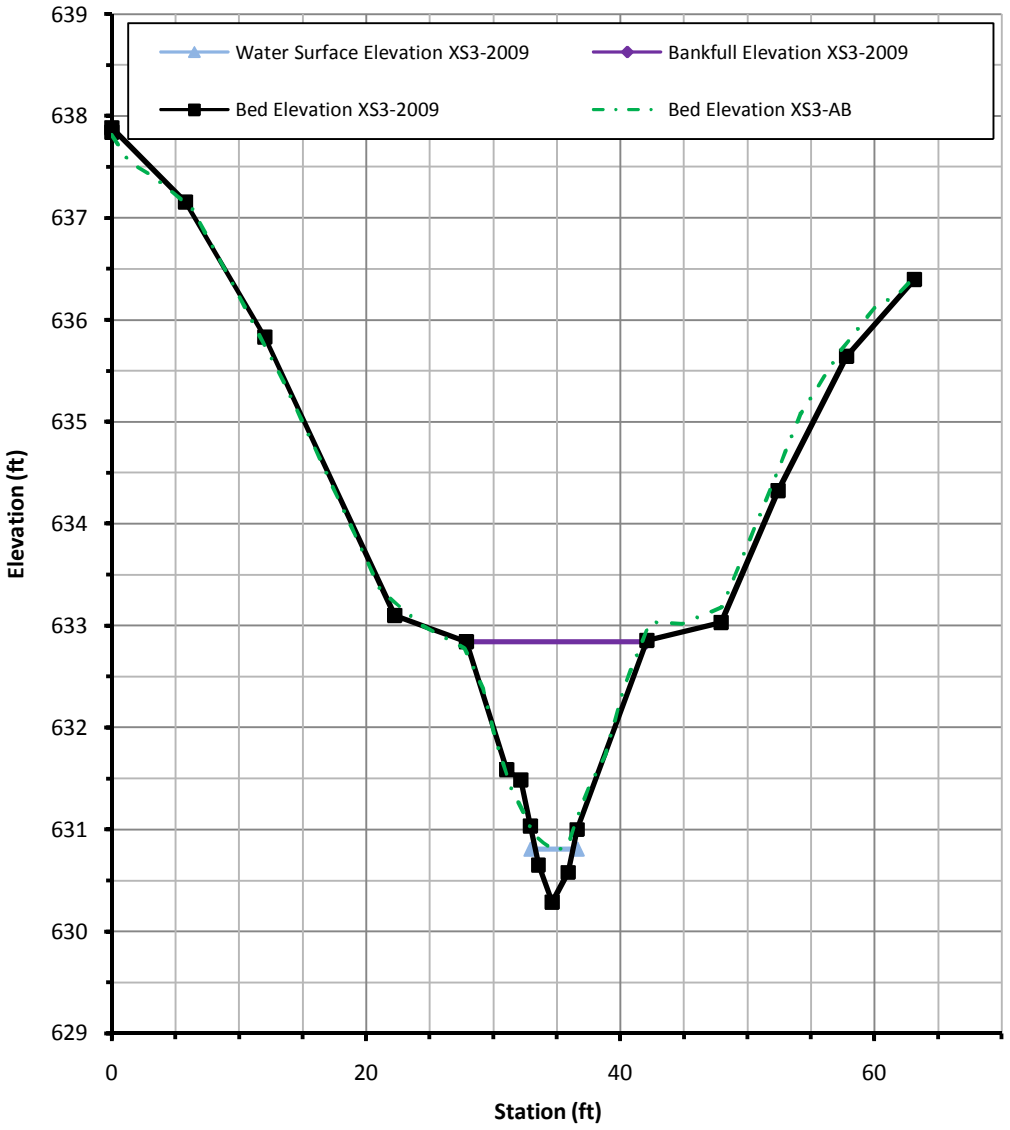
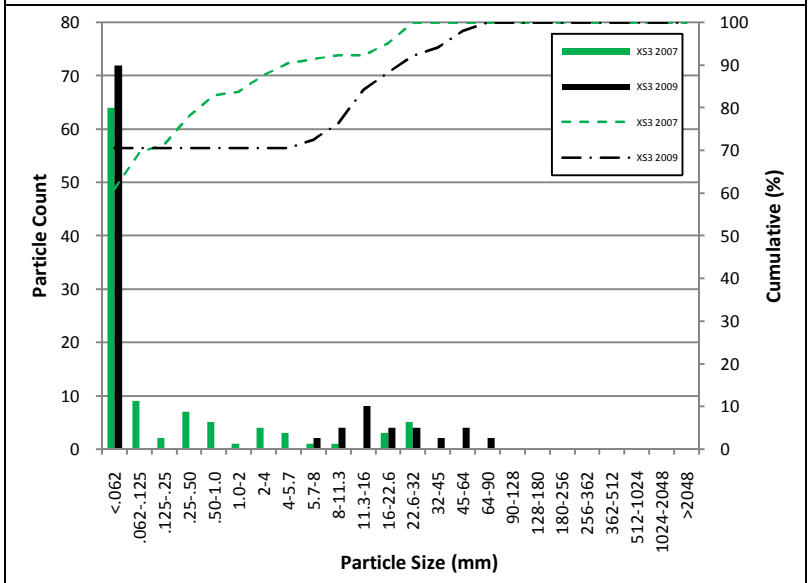
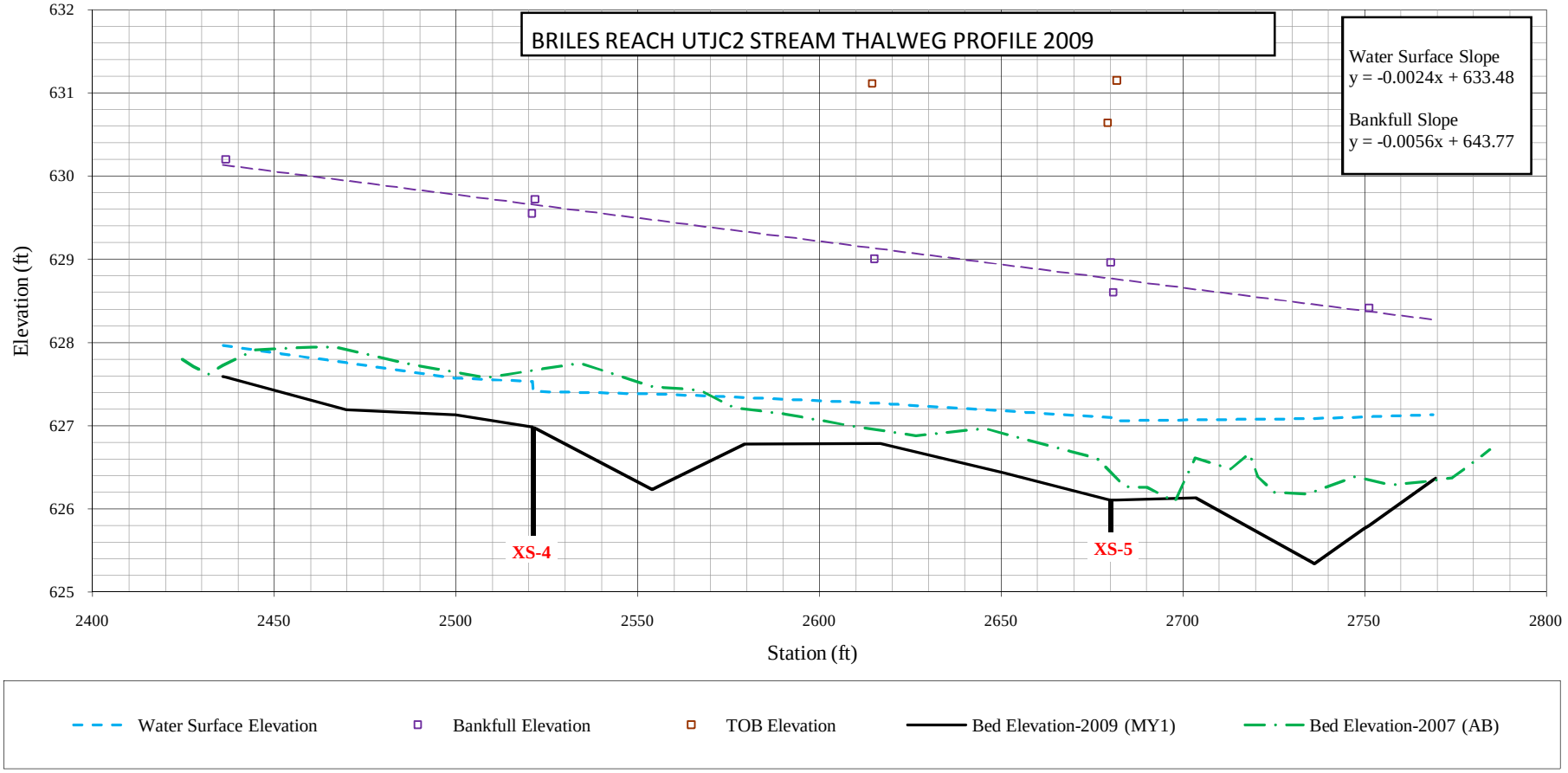
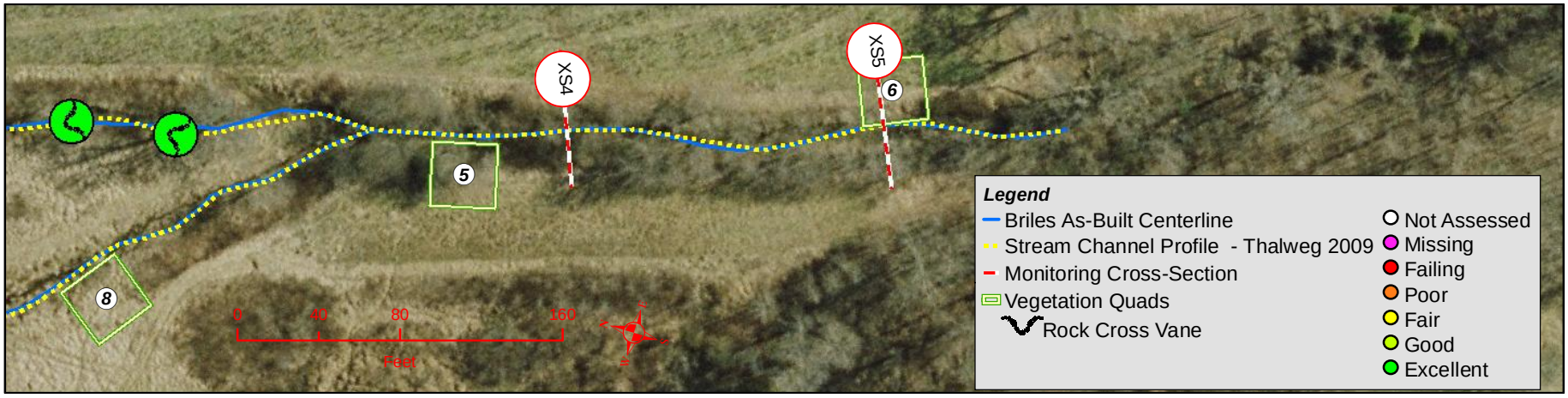




ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS3	2007	AB	POOL	14.2	16.2	1.1
XS3	2009	MY1	POOL	14.1	17.9	1.3

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS3	2007	AB	--	1.05
XS3	2009	MY1	--	11.17





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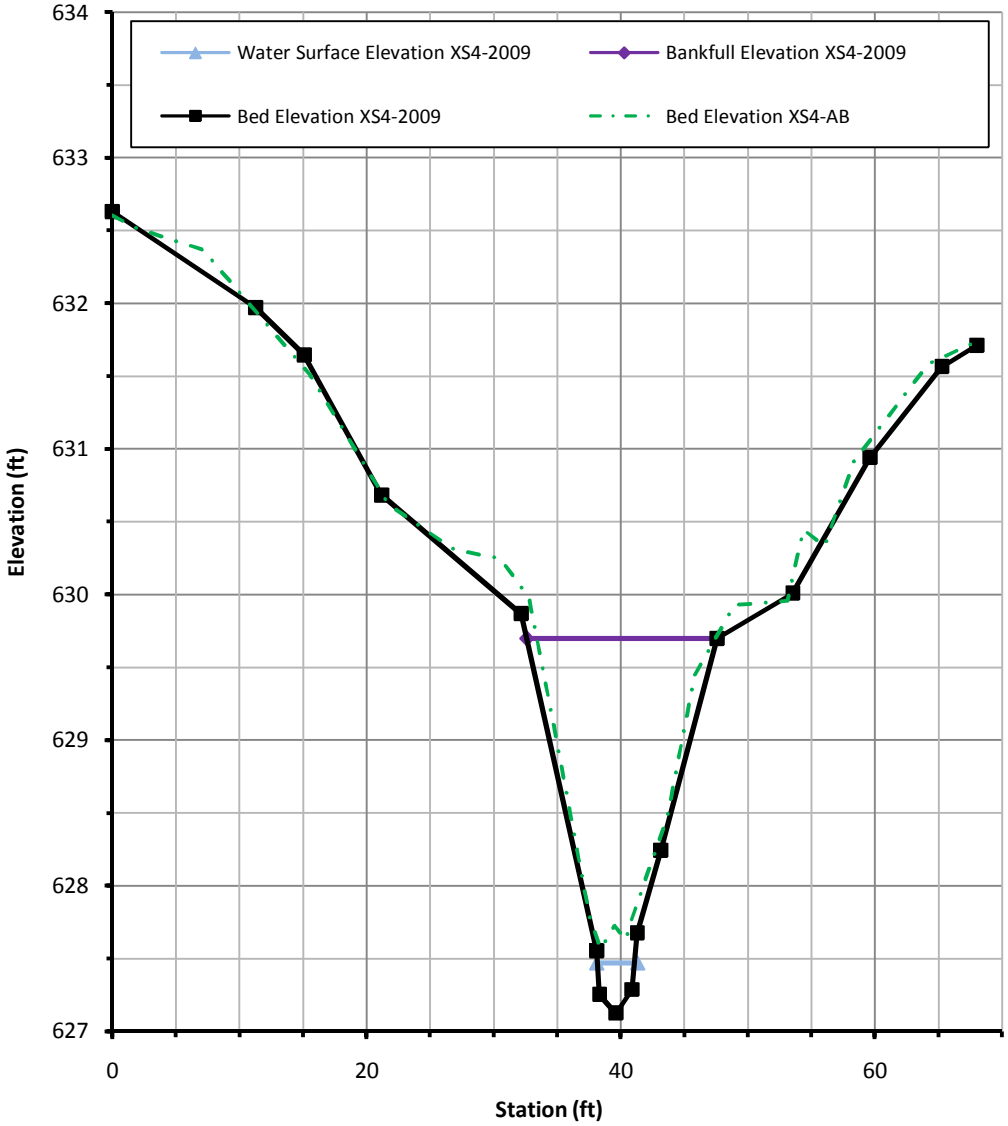

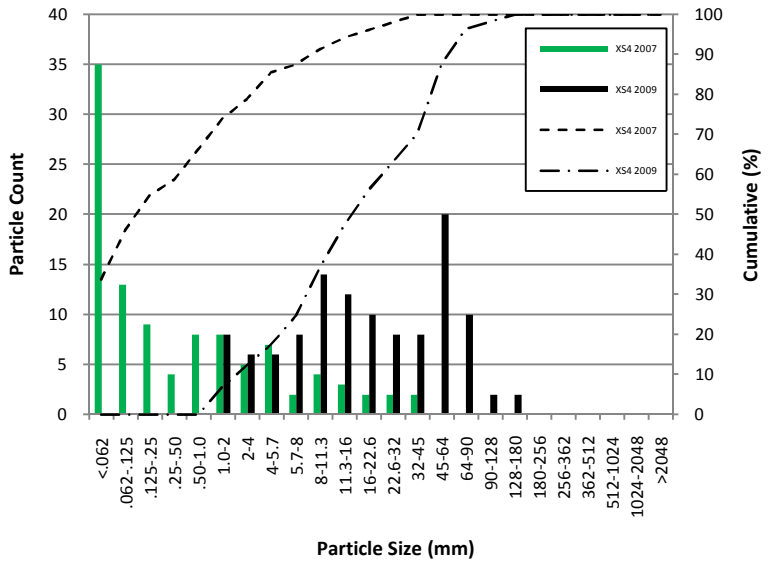

ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS4	2007	AB	RIFFLE	15.8	19.8	1.3
XS4	2009	MY1	RIFFLE	15.0	20.2	1.4

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS4	2007	AB	0.09	3.53
XS4	2009	MY1	12.71	42.24

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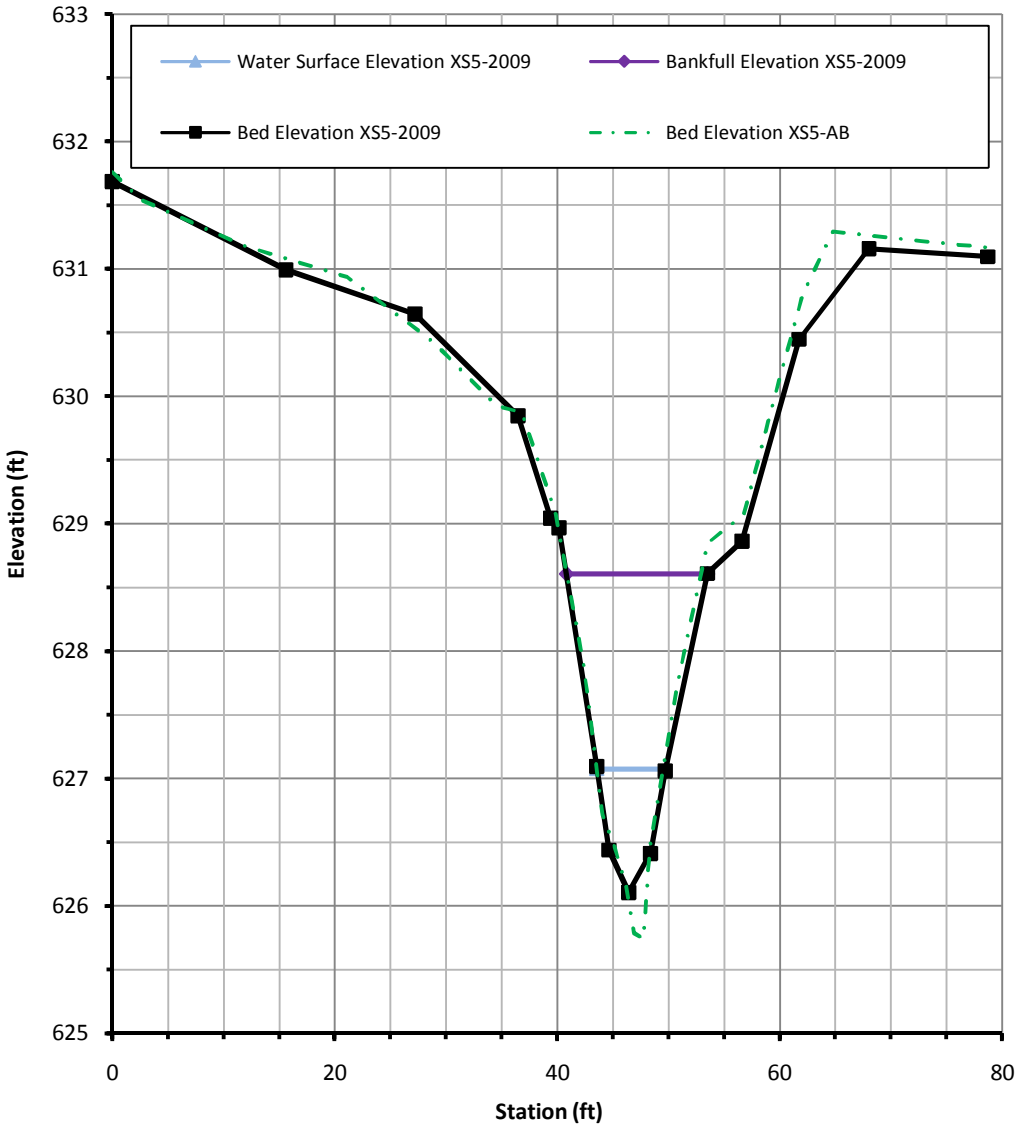
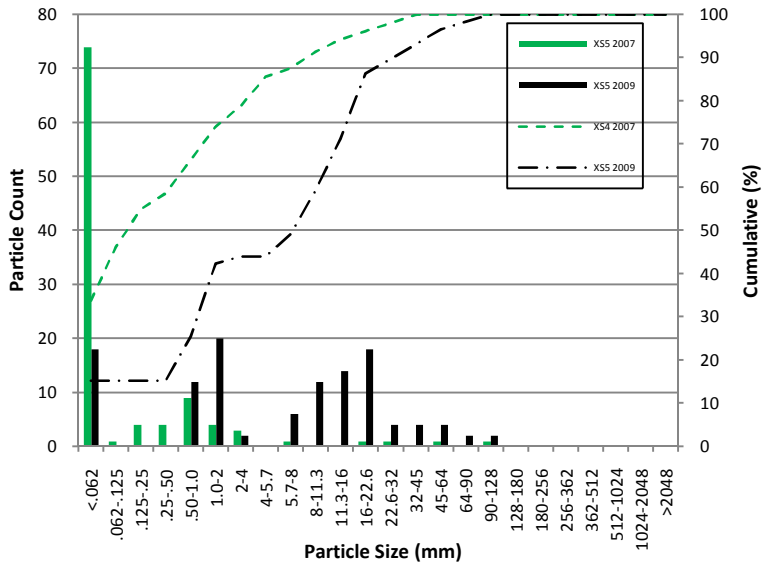
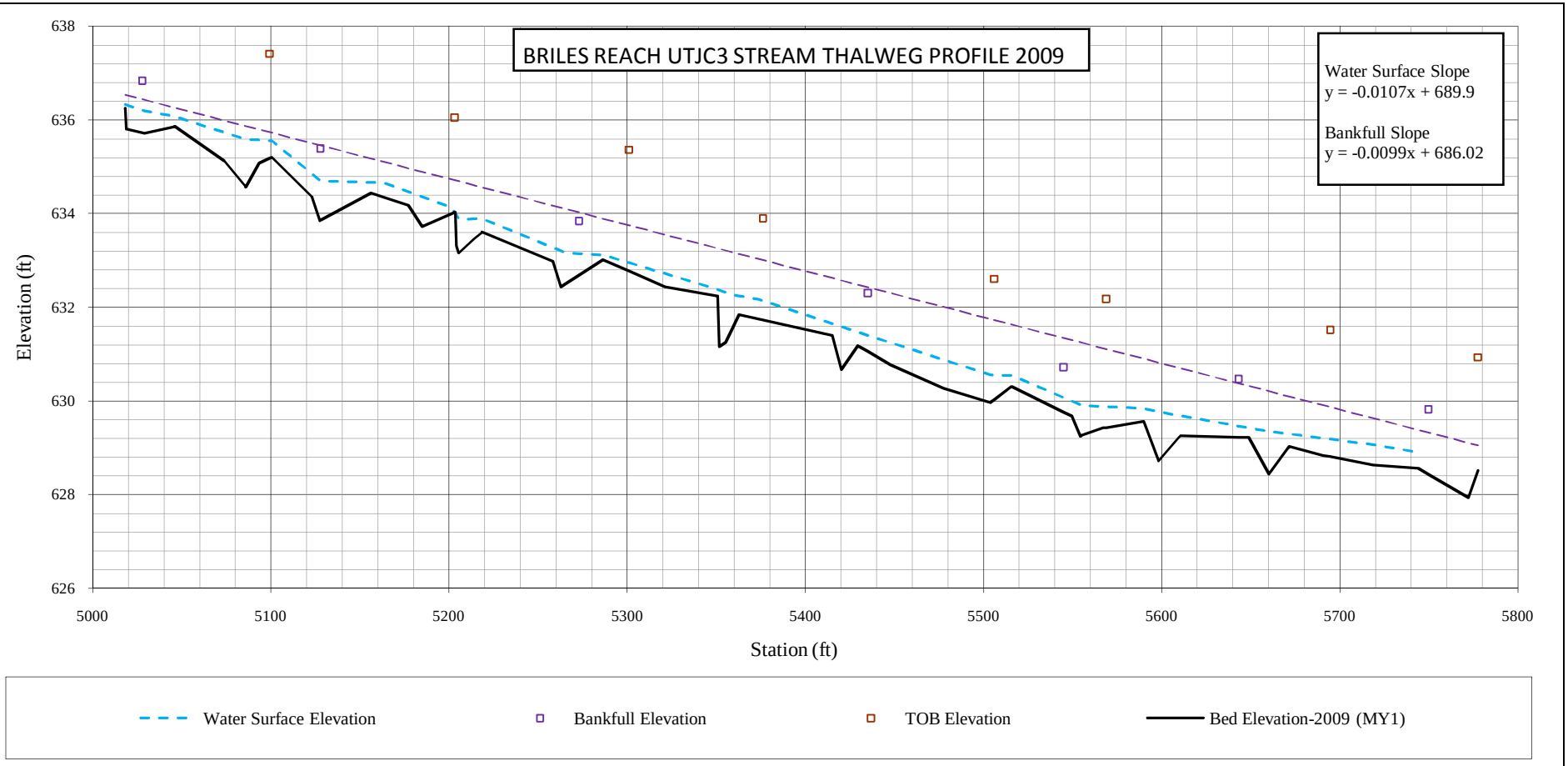




ID	YEAR	PHASE	FACET TYPE	Wbkf	Abkf	Dbkf
XS5	2007	AB	RIFFLE	14.0	21.4	1.5
XS5	2009	MY1	RIFFLE	12.7	18.2	1.4

ID	YEAR	PHASE	d50 (mm)	d84 (mm)
XS5	2007	AB	--	0.37
XS5	2009	MY1	5.89	15.25



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