

**APPENDIX C**

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**DIAGNOSTIC  
GEOMORPHIC  
SURVEY FORM**

*Representative Example for Potash Brook*

# DIAGNOSTIC GEOMORPHIC FIELD SURVEY FORM

## TITLE PAGE

**PROJECT TITLE:** VERMONT

**PROJECT No:** 68005

**DATE OF SURVEY:**

**YR:** 98 **MO:** 10 **DY:** 16

**WATERCOURSE NAME:** POTASH BROOK

**STATION NUMBER:** POT 1

**STATION LOCATION:** QUEEN CITY PARK ROAD 0.5 to 0.6 miles from Confluence

**FIELD CREW MEMBERS:**

Craig MacLAE	Bob Kort
Lori Berg	Jim Pease
Mike Fischer	

**STREAM TYPE:**

**HISTORIC  
CHANNEL**

**EXISTING  
CHANNEL**

ALLUVIAL (AL)  
ROCK BED (RB)  
ROCK CONTROLLED (RC)


ALCAP

exposed below outcrop  
v/s of SECTION 1.

**RAPID GEOMORPHIC ASSESSMENT**

**Table 1. Rapid Geomorphic Assessment Form**

FORM/ PROCESS	GEOMORPHIC INDICATOR		PRESENT		FACTOR VALUE
	No.	Description	No	Yes	
Evidence of Aggradation (AI)	1	Lobate bar	✓		4 7
	2	Coarse material in riffles embedded	✓		
	3	Siltation in pools		✓	
	4	Medial bars		✓	
	5	Accretion on point bars	✓		
	6	Poor longitudinal sorting of bed materials		✓	
	7	Deposition in the overbank zone		✓	
Evidence of Degradation (DI)	1	Exposed bridge footing(s)	/		5 11
	2	Exposed sanitary/storm sewer/pipeline/etc.	/		
	3	Elevated stormsewer outfall(s)	/		
	4	Undermined gabion baskets/concrete aprons/etc.	/		
	5	Scour pools d/s of culverts/stormsewer outlets	/		
	6	Cut face on bar forms	✓		
	7	Head cutting due to knick point migration	✓		
	8	Terrace cut through older bar material		✓	
	9	Suspended armor layer visible in bank	✓		
	10	Channel worn into undisturbed overburden/bedrock	✓		
Evidence of Widening (WI)	1	Fallen/leaning trees/fence posts/etc.		✓	6 7
	2	Occurrence of Large Organic Debris		✓	
	3	Exposed tree roots		✓	
	4	Basal scour on inside meander bends		✓	
	5	Basal scour on both sides of channel through riffle		✓	
	6	Gabion baskets/concrete walls/armor stone/etc. out flanked	/		
	7	Length of basal scour >50% through subject reach		✓	
	8	Exposed length of previously buried pipe/cable/etc.	/		
	9	Fracture lines along top of bank	✓		
	10	Exposed building foundation	/		
Evidence of Planimetric Form Adjustment (PI)	1	Formation of cuto(s)		✓	4 7
	2	Evolution of single thread channel to multiple channel	✓		
	3	Evolution of pool-riffle form to low bed relief form		✓	
	4	Cutoff channel(s)	✓		
	5	Formation of island(s)	✓		
	6	Thalweg alignment out of phase with meander geometry		✓	
	7	Bar forms poorly formed/reworked/removed		✓	
<b>STABILITY INDEX (SI) = (AI+DI+WI+PI)/m</b>			<b>SI= 0.58</b>		

**GEOMORPHIC INDICATORS OF  
BANK EROSION PROCESSES**

**Table 2. Field Indicators of Bank Erosion Processes**

INDICATOR		Present
<b>Shear Dominated Fluvial Forms</b>		
1. Smoothed banks remaining after the passage of a flood flow		
2. Frequent bank overhangs along the length of the channel (may have straight tension cracks parallel to but set back from the top of bank)		
3. Cantilever failure of the banks resulting in largely intact blocks of bank material lying at the bank toe (often grasses continue to grow on the block)		
<b>Falling Stage Dominated Fluvial Forms</b>		
4. Deep seated failures, typically occur as rotation slumps, arc shaped bank cross-section profile		
5. Arc shaped plan form (may have arc shaped tension cracks in the tableland near the top of bank but set back further from the edge of bank than noted for surficial failures)		
6. Failure material in the form of a slurry (bank materials having lost their original structure)		
<b>Non-Fluvial Processes</b>		
Physical Weathering	7. Expansion-Contraction, e.g. freeze-thaw/wet-dry: cracks and sloughing of a thin veneer of surficial material	
	8. Ice gouging/plucking: e.g. striations-groves in bank material / fractured	
	9. Cavitation pressure: e.g. concave form of riser portion of knickpoint	
	10. Soil piping: e.g. multiple small diameter tunnels (pockets) extending into the bank – often form a row along the interface between two stratigraphic units	
Bio-Weathering	11. Livestock trampling of banks/cropped grasses amounts taller weeds	
	12. Borrowing animals	
Chemical Weathering	13. Presence of solutional forms	
Aeolean Weathering	14. Dunes, ripples, drift features	
Pluvial Weathering	15. Pot marks and rivulets down bank face	

**HYDRAULIC GEOMETRY**

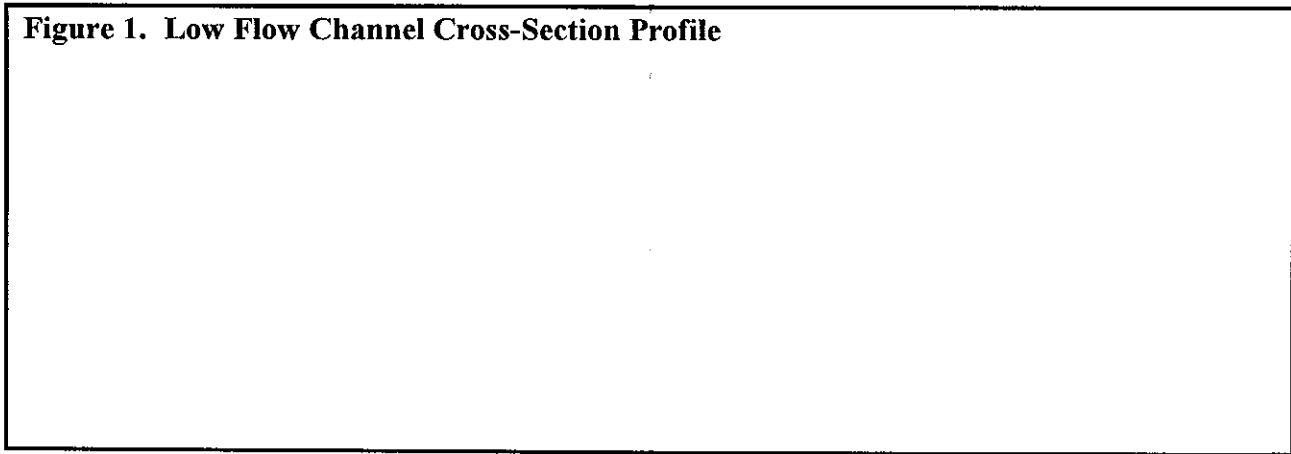
**Table 3. Bankfull Depth**

Indicator	Left Bank			Right Bank		
	Sub-Inset	Inset	Active	Sub-Inset	Inset	Active
Top-of-Bank						
Inflection Point						
Terrace						
Change in Bar Material						
Top of Point Bar						
Presence of Lichens						
Water Stains						
Wormholes						
Bird Nests						
Animal Burrows						
Other						

**DISCHARGE MEASUREMENTS**

**Table 4 Manning's Roughness Coefficient**

X (m)	t (sec)	v (m/s)	A (m <sup>2</sup> )	Q (m <sup>3</sup> /s)	n	
					Measured	Predicted



**CHANNEL PLAN FORM GEOMETRY**

**Figure 2. Planimetric Form Sketch**







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<b>CHANNEL HYDRAULIC PARAMETERS</b>
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**SOIL CONSISTENCE: DEFINITION OF TERMS**

<b>X1 (STICKNESS):</b>	<b>VERY MOIST CONDITION</b>
0 = NON-STICKY	Almost no adhesion of soil materials to fingers (Sa)
1 = SLIGHTLY STICKY	Soil material adheres to one finger but the other finger remains clean
2 = STICKY	Soil material adheres to both fingers and thumb, stretches somewhat
3 = VERY STICKY	Soil material strongly adheres to both thumb and finger but bulk of material remains intact, stretches
4 = EXTREMELY STICKY	Soil material preferentially adheres to hand, thumb and finger, soil material structure becomes incoherent
<b>X2 (PLASTICITY):</b>	<b>MOIST CONDITION</b>
0 = NON-PLASTIC	No "wire" (thread or bead) can be formed by rolling the material between the palms of the hands
1 = SLIGHTLY PLASTIC	Only short wires (L < 1 cm) of $\phi > 2$ mm can be formed
2 = PLASTIC	Longer wires (2 ≤ L ≤ 3 cm) of $\phi > 2$ mm can be formed
3 = VERY PLASTIC	Long wires (L > 3 cm) and $\phi \leq 2$ mm can be formed and moderate pressure is required to deform a block of molded materials
4 = EXTREMELY PLASTIC	Long wires (L > 3 cm) and $\phi \leq 2$ mm can be formed and much pressure is required to deform a block of molded materials
<b>X3 (FIRMNESS):</b>	<b>DRY CONDITION</b>
0 = LOOSE	Soil material is non-coherent (comprised primarily of individual grains) and finger can penetrate bank easily.
1 = VERY SOFT	Soil material is comprised of loose aggregates which crush with gentle pressure between the thumb and finger (friable), finger penetrates intact material with moderate pressure.
2 = SOFT	Moderate thumb and finger pressure required to crush aggregates, finger penetrates intact material with difficulty (between 1 <sup>st</sup> and 2 <sup>nd</sup> joint).
3 = FIRM	Strong thumb and finger pressure is required to crush aggregates and finger can only dent intact materials.
4 = STIFF	Aggregates cannot be broken by thumb and finger pressure and intact material can only be dented with finger nail.

The above consistence tests are for soil material moisture content at or slightly above the "field moisture capacity" (gravitational water) with the exception of the FIRMNESS test which is a dry soil condition. The tests are not to particles of diameter equal to or exceeding fine gravel.

**GLOSSARY OF TERMS**

Cl = Clay	Si = Silt	Sa = Sand	Gr = Gravel	Co = Cobble	Bo = Boulder
Lm = Loam	Al = Alluvium	Rk = Rock	Bl = Black	Br = Brown	Gr = Grey
Bl = Blue	Mt = Mottled	Ca = Coarse	Fn = Fine	Md = Medium	Lft = Left
Rht = Right	u/s = Upstream	Mu = Muck	MI = Marl	Dt = Detritus	d/s = Downstream
$\tau$ = boundary shear stress		CRT = Critical	PI = Plasticity Index		

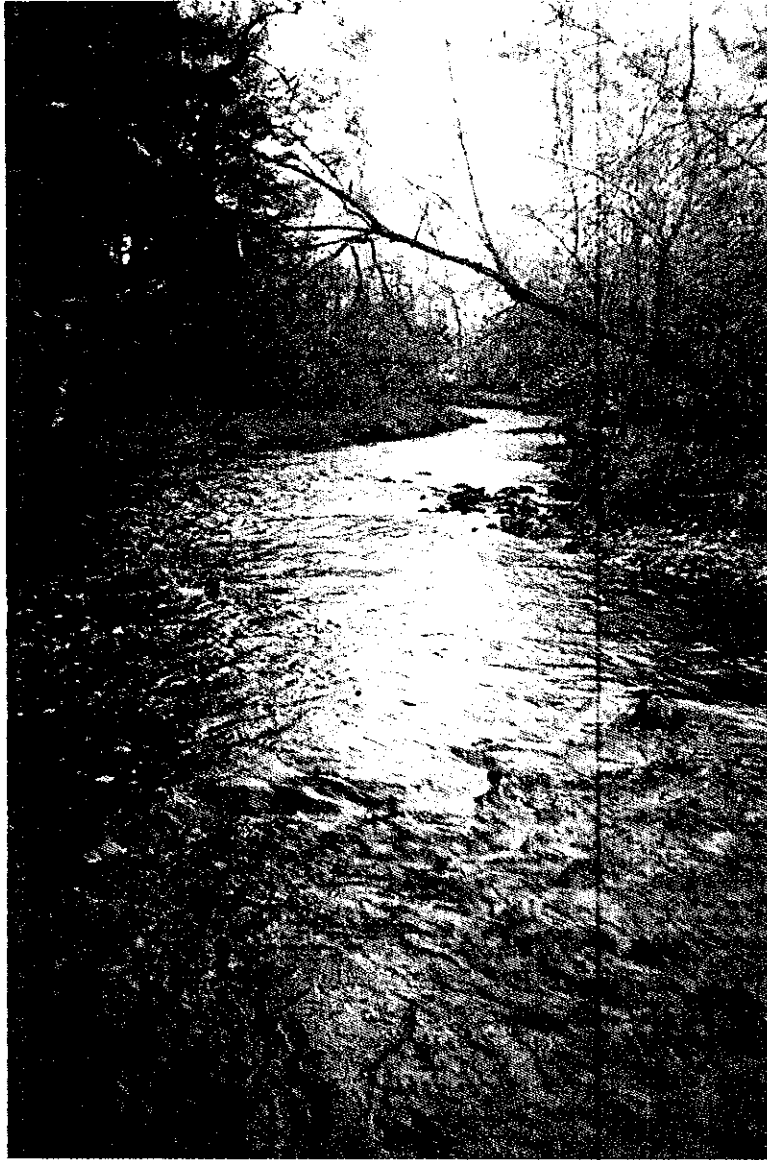
View of Channel Looking u/s

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Notes:

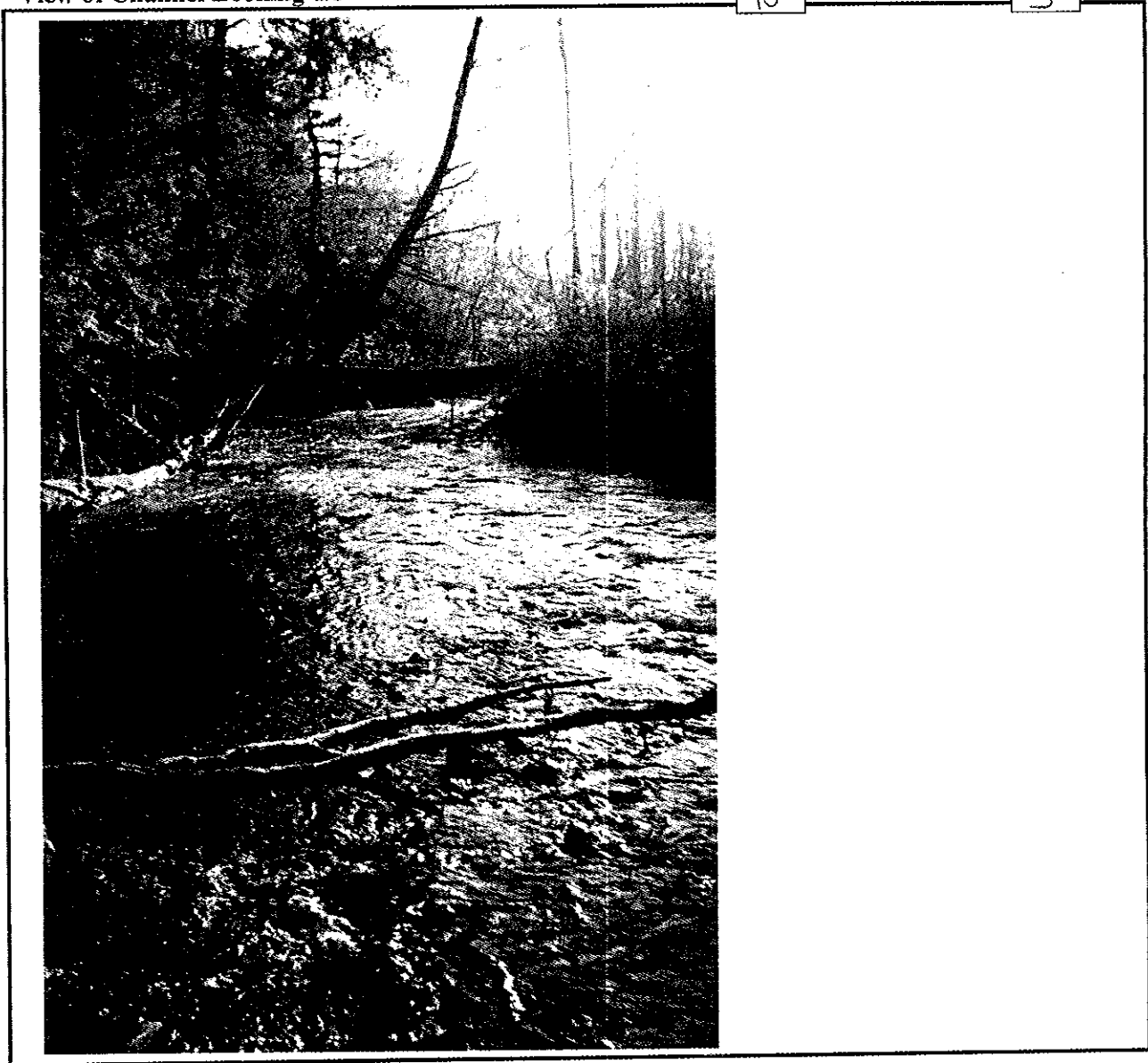
View of Channel Looking d/s

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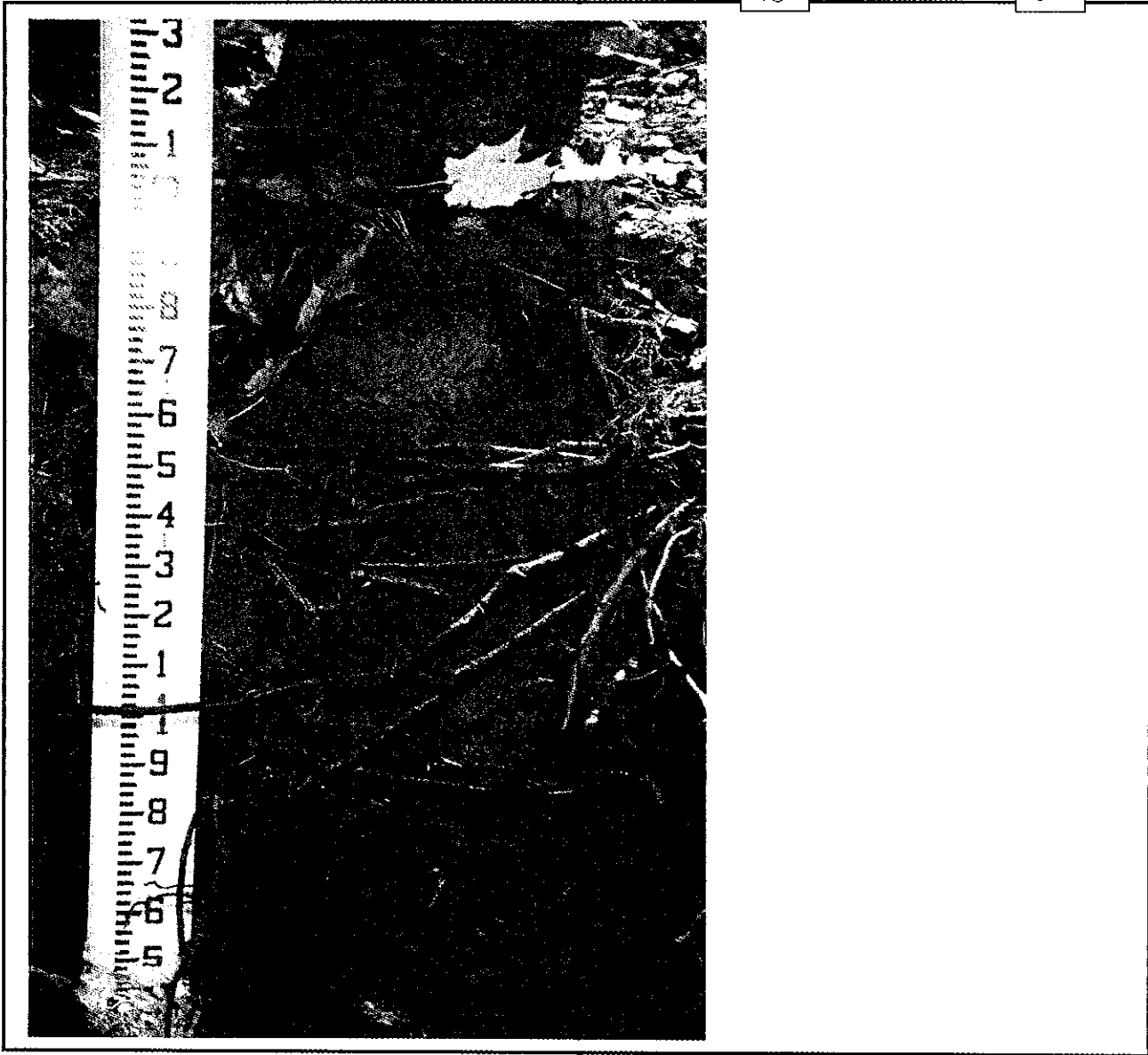


Notes:

View of LEFT Bank

Roll No.: 10

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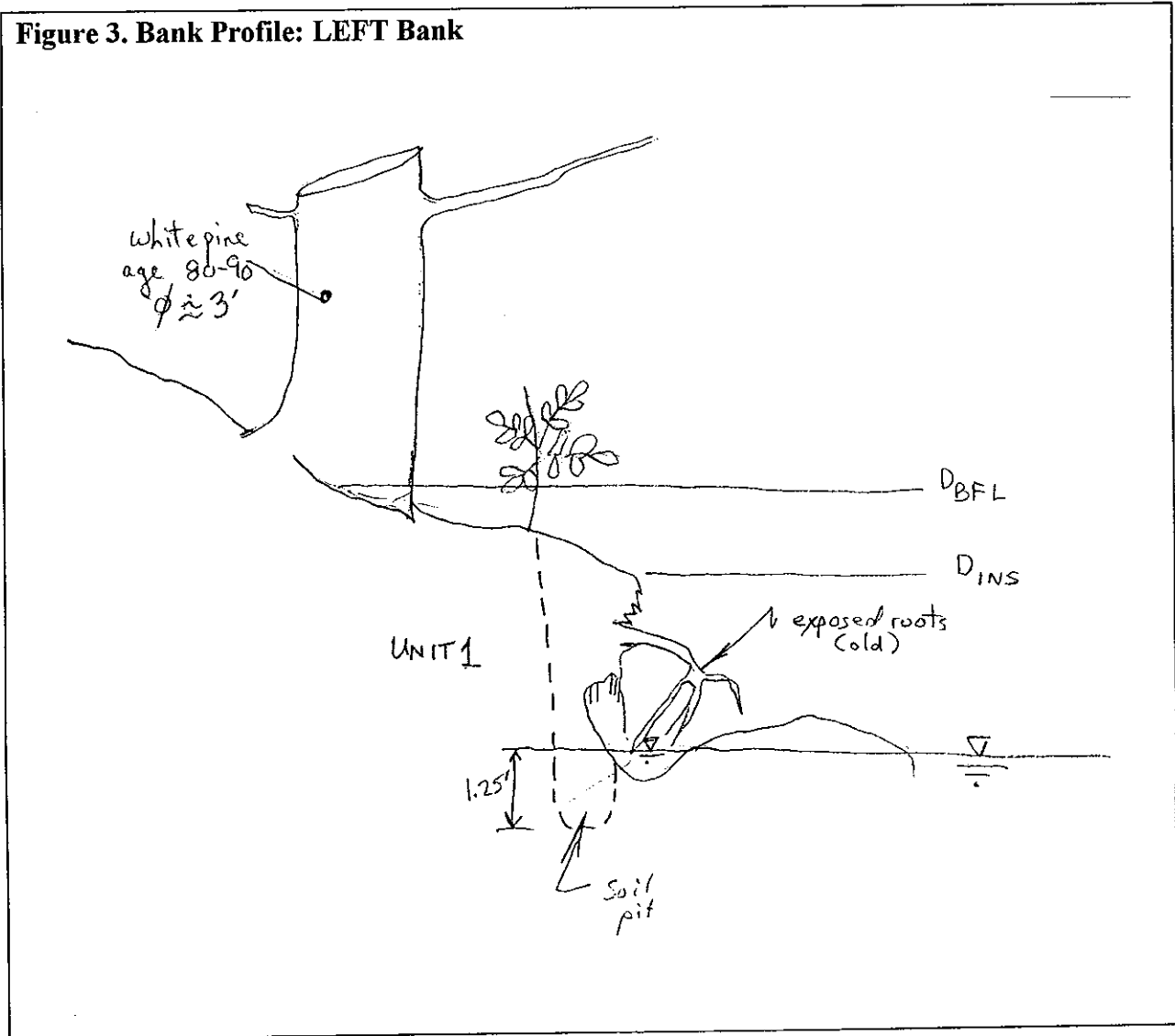
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**BANK MATERIAL COMPOSITION**

**Table 7. LEFT Side (View looking u/s)**

Unit No.:	SCORE				PARTICLE SIZE (%)				Soil Class	PI	$\tau_{CRT}$
	X1	X2	X3	$\Sigma$	Gr	Sa	Si	Cl			
1	2	2	2	4					SiLm with Sn Indusins		

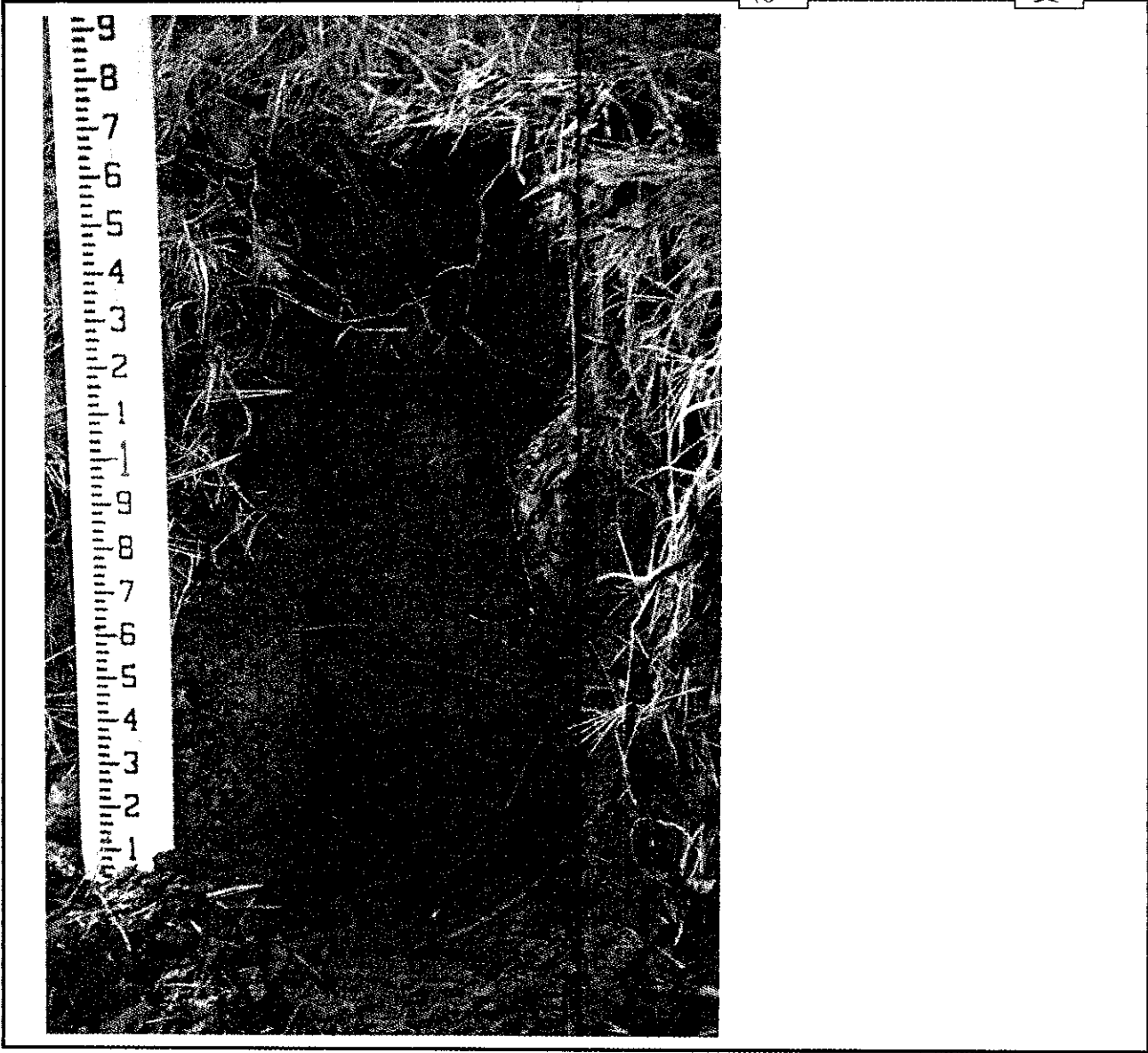
**Figure 3. Bank Profile: LEFT Bank**



View of RIGHT Bank

Roll No.: 10

Photo No.: 2



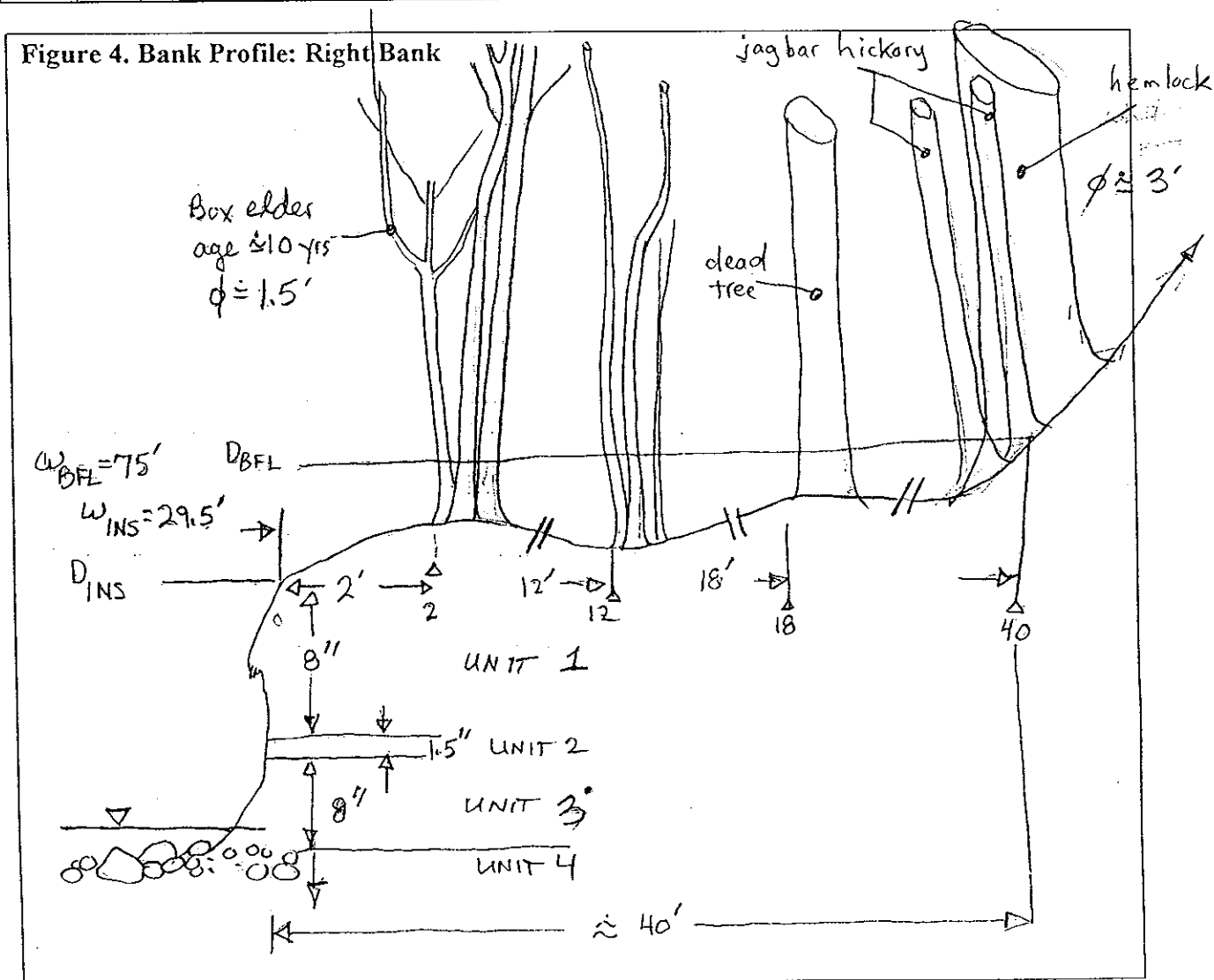
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**BANK MATERIAL COMPOSITION CONT'D**

**Table 8. RIGHT Side (View looking u/s)**

Unit No.:	SCORE				PARTICLE SIZE (%)				Soil Class	PI	τ <sub>CRT</sub>
	X1	X2	X3	Σ	Gr	Sa	Si	Cl			
1		3	1	4					Si Ln with SA Inclusions		
2	<del>    </del>	<del>    </del>	<del>    </del>	<del>    </del>					Ca Sn lens		
3	<del>    </del>	<del>    </del>	<del>    </del>	<del>    </del>					Si Sn		
4	<del>    </del>	<del>    </del>	<del>    </del>	<del>    </del>					Gr Co in Si Sn matrix		

**Figure 4. Bank Profile: Right Bank**



5  
2  
7

**BED MATERIAL COMPOSITION**

\* Measured in feet

Table 9. Substrate Composition: Transect I

OBS No.	Material Type	Location	Particle Size			OBS No.:	Material Type	Location	Particle Size		
			l	w	h				l	w	h
1	LB	LB	.8'	.7'	.7'	36		RB	1.9'	1.4'	.7'
2		LB	.7'	.6'	.26'	37	unstable low ↓	LB	4.4'	2.0'	1.5'
3		LB	1'	1'	---	38		LB	.64'	.40'	.30'
4		LB	.74'	.32'	.3'	39		LB	2.45'	1.90'	1.1'
5		1/3 CR	1.6'	1.2'	.6'	40		LB	.52'	.20'	.20'
6		1/3 CR	.45'	.26'	.17'	41		1/3 CR	1.20'	1.6'	.65'
7		1/2 CR	.40'	.32'	.20'	42		1/3 CR	1.10'	.90'	.58'
8		1/2 CR	.34'	.25'	.20'	43		1/2 CR	.42'	.32'	.26'
9		1/2 CR	.22'	.18'	.10'	44		1/2 CR	.70'	.30'	.65'
10		1/2 CR	.16'	.11'	.50'	45		1/2 CR	.60'	.55'	.21'
11		1/2 CR	.51'	.60'	.17'	46		2/3 CR	.68'	.43'	.23'
12		1/2 CR	.38'	.36'	.20'	47		2/3 CR	.38'	.17'	.11'
13		1/2 CR	.15'	.16'	.15'	48		2/3 CR	.88'	.35'	.20'
14		1/2 CR	.45'	.34'	.22'	49		2/3 CR	.55'	.40'	.36'
15		2/3 CR	.42'	.24'	.11'	50	heavy rock →	2/3 CR	.32'	.30'	.21'
16	MEDIA SAX →	2/3 CR	.54'	.50'	.34'	51	↓	2/3 CR	.75'	.51'	.50'
17	MEDIA SAX	2/3 CR	.24'	.22'	.15'	52		2/3 CR	.55'	.57'	.20'
18		RB	.36'	.25'	.14'	53		RB	.48'	.22'	.15'
19		RB	.40'	.30'	.21'	54		LB	.50'	.25'	.17'
20		RB	.40'	.20'	.19'	55	↓	LB	.29'	.25'	.23'
21		RB	.32'	.33'	.09'	56					
22		LB	.44'	.23'	.22'	57					
23		LB	.41'	.20'	.21'	58					
24		LB	.36'	.24'	.15'	59					
25		LB	.40'	.32'	.70'	60					
26		RB	1.0'	.76'	.31'	61					
27		RB	.74'	.10'	.27'	62					
28		LB	.42'	.34'	.10'	63					
29		LB	.18'	.25'	.10'	64					
30		RB	.15'	.20'	.10'	65					
31		LB	.17'	.15'	.08'	66					
32		RB	.34'	.30'	.19'	67					
33		RB	.20'	.13'	.38'	68					
34		RB	.14'	.18'	.08'	69					
35		LB	.42'	.25'	.24'	70					

10/1/01

**BED MATERIAL COMPOSITION CONT'D**

Table 10. Substrate Composition: Transect 2 MEASURED IN 1/10" ft.

OBS No.	Material Type	Location	Particle Size			OBS No.:	Material Type	Location	Particle Size		
			l	w	h				l	w	h
1		Rb	2.7	2.1	0.6	36			4.5	2.7	2.0
2			4.0	2.1	0.9	37			3.0	2.3	1.8
3			5.0	2.4	1.8	38			4.5	4.0	2.0
4			5.5	3.3	3.0	39			15.0	13.0	6.0
5			3.6	3.2	1.7	40			19.0	6.0	4.5
6			4.0	3.0	2.9	41			4.0	2.0	2.5
7		1/8	3.5	3.1	1.8	42		5/8	7.0	7.0	3.5
8			9.0	6.0	1.6	43			5.5	3.5	2.5
9			7.0	4.6	2.2	44			3.6	2.5	1.2
10			5.5	4.0	3.8	45			7.0	4.5	3.5
11			3.1	2.7	1.5	46			4.8	3.2	2.6
12			2.2	0.8	0.3	47			2.8	1.3	0.7
13			0.6	0.5	0.4	48			2.7	2.4	1.7
14			1.6	1.2	1.1	49			5.5	4.8	3.0
15			0.8	0.7	0.5	50			5.0	3.0	2.5
16		1/4 across	0.4	0.3	0.11	51		3/4	5.5	3.1	1.2
17			0.4	0.3	0.3	52		W RAR	4.7	4.5	2.8
18			4.4	2.8	3.2	53			3.0	1.7	1.5
19			1.0 → 1.1	0.7	0.3	54			5.0	2.0	2.5
20			1.3	0.7	0.5	55			1.5	1.2	1.2
21			1.0	0.9	0.5	56			2.0	1.7	1.4
22			4.8	4.0	2.7	57			4.0	2.0	1.7
23			4.0	3.5	2.7	58			2.2	1.5	1.1
24			4.5	3.5	2.5	59			2.9	1.6	1.2
25			4.1	3.1	2.3	60			2.8	2.2	1.5
26			5.0	5.0	2.8	61			1.0	0.8	0.4
27			9.0	5.0	3.0	62		1/8	3.7	2.5	1.6
28		3/8	10.0	7.0	5.0	63			3.7	1.8	1.6
29			6.0	2.5	2.2	64			2.7	2.6	1.5
30			18.0	9.0	4.0	65			3.3	3.3	1.6
31			11.0	7.0	4.0	66			1.7	1.4	1.0
32			8.0	7.2	3.5	67			0.9	0.9	0.3
33			8.5	7.0	3.7	68			3.2	2.7	0.5
34			4.7	3.6	2.2	69			2.2	0.9	0.3
35		1/2	9.0	7.0	2.5	70			0.0	0.6	0.2

GRAVEL MATRIX

D

BANKHOLE ESTIMATE = 4.6 #

View of Channel BED

Roll No.: 10

Photo No.: 6



Notes:

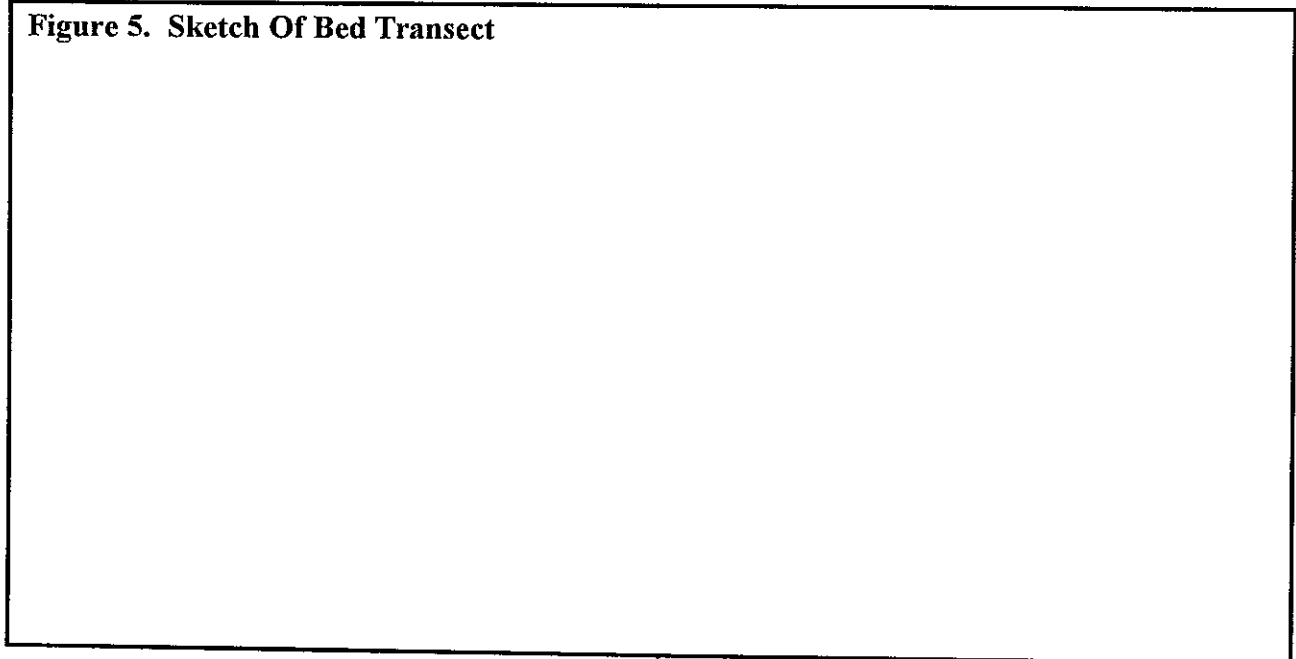
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**PEBBLE COUNT MASS CURVE &  
PARTICLE DISTRIBUTION PARAMETRICS**

**Table 11. Composition of (Intact Bed Material)**

SUBSTRATUM CLASS		Degree of Compaction	AERIAL COVERAGE (%)
Silty-Clay		Loose/soft/firm/stiff/cemented	
Clayey-Silt		Loose/soft/firm/stiff/cemented	
Sandy-Silt		Loose/soft/firm/stiff/cemented	
Silty Sand		Loose/soft/firm/stiff/cemented	
Gravel in Silty-Sand Matrix		Loose/soft/firm/stiff/cemented	
Cobbles in Sandy-Gravel Matrix		Loose/imbricated/cemented Imbeddedness (<25;25-50;>50%)	
Boulders & Cobbles in Sandy-Gravel Matrix		Loose/imbricated/cemented Imbeddedness (<25;25-50;>50%)	
Boulders & Cobbles		Loose/imbricated/cemented Imbeddedness (<25;25-50;>50%)	
Rock	Sandstone	Soft/Hard Fractured/Friable	
	Shale (mudstone-siltstone)	Soft/Hard/ Fractured/Friable	
	Interbedded Shale-Limestone	Thinly Bedded	
		Thickly Bedded	
	Limestone	Massive/Soft/ Hard/Fractured	
Metamorphic/Igneous	Massive Fractured		

**Figure 5. Sketch Of Bed Transect**

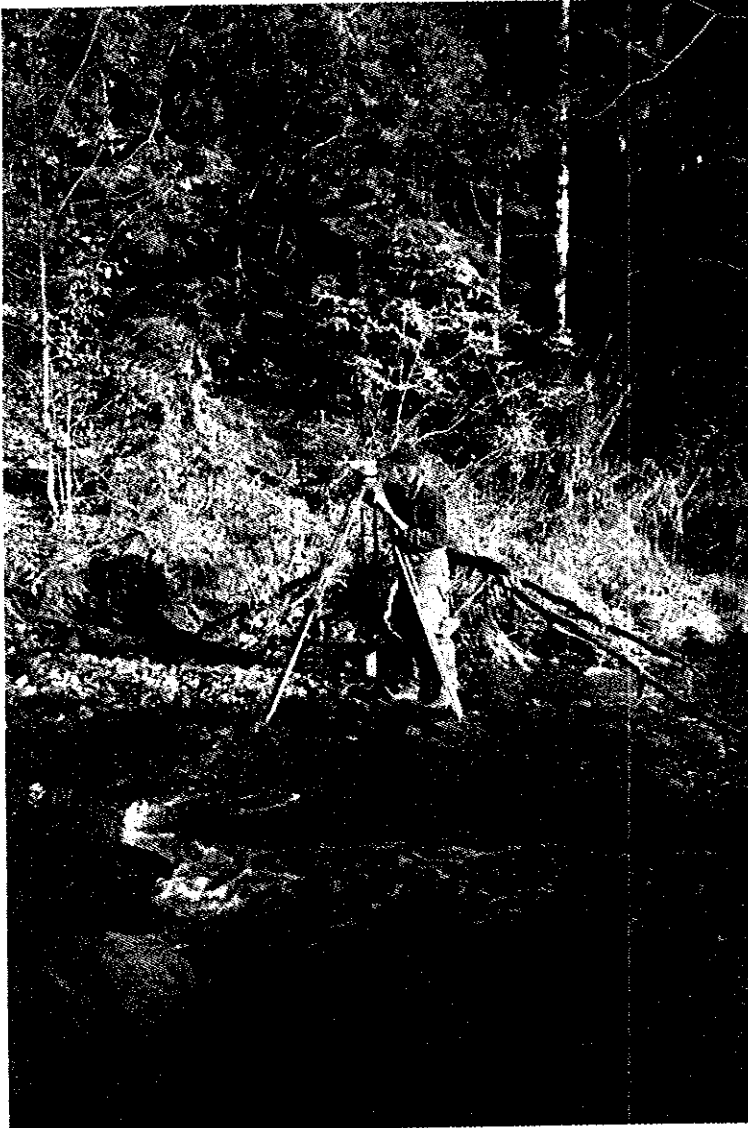


Special Features

Roll No.:



Photo No.:



Notes:

No special features - just an extra photo.

**Large Organic Debris**

<b>Quantity</b>		$L \geq W_{INS} =$		11	m																			
No. of Pieces		0-50m u/s : $N_{U/S}$		5	0-50m d/s : $N_{D/S}$ 6																			
		Total, $N = N_{U/S} + N_{D/S}$		11																				
Number, $N_i$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
X (+:u/s, -:d/s)	0.6	1.3	1.6	1.5	1.0	0.2	0.6	1.2	1.4	1.2	1.8													
<b>Orientation</b>																								
Perpendicular																								
Obtuse	✓	✓				✓	✓																	
Parallel			✓	✓	✓			✓	✓	✓	✓													
<b>Location</b>																								
Instream		✓				✓	✓				✓													
On Bank		✓				✓	✓				✓													
Overbank	✓	✓	✓	✓	✓	✓		✓	✓															

**Debris Jams**

<b>Quantity</b>		No. of Jams		0-50m u/s : $M_{U/S}$		2	0-50m d/s : $M_{D/S}$		1															
		Total, $M = M_{U/S} + M_{D/S}$				2																		
Number, $M_i$	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
X (+:u/s, -:d/s)	1.3	5.2																						
<b>Function</b>																								
Sediment Trapping	✓	✓																						
$D_S \leq 1/4 D_{INS}$																								
$D_S = 1/4$ to $1/2$																								
$D_S = 1/2$ to $3/4$																								
$D_S = 3/4$ to 1																								
<b>Span</b>																								
• Complete																								
Side Vent																								
Under Flow	✓	✓																						
Over Flow																								
• Incomplete																								
$1/4 W_{INS}$																								
$1/4$ to $1/2 W_{INS}$																								
$1/2$ to $3/4 W_{INS}$																								
<b>Age</b>																								
Very Young																								
Recent																								
Moderate	✓	✓																						
Old																								
<b>Integrity</b>																								
Very Solid																								
Solid																								
Moderate	✓	✓																						
Weak																								

**Bankfull Measurements**

Location	Bankfull		Inset		Water Level	
	W <sub>BFL</sub> (ft)	D <sub>BFL</sub> (ft)	W <sub>INS</sub> (ft)	D <sub>INS</sub> (ft)	W <sub>WL</sub> (ft)	D <sub>WL</sub> (ft)
U/S +50m 200ft	69'	4.6	20.7	2.22	14.9	1.6
U/S +25m 100 ft.	83'	4.6	22.7	2.8	10.5	1.7
0	75'	4.6	29.3	2.95	8.6	1.5
D/S -25m 100 ft	115 ft	9.2	25.3	4.85	23.3	1.4
D/S -50m 200ft	Spill		35.2	3.7	24.4	1.2

**Riffle Lines**

Number, K <sub>i</sub>	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24
X (+:u/s, -:d/s)	187	160	152	125	101	10	5	0	15	63	78	97	111	142	170									
<b>Complete Riffle Line</b>				✓	✓						✓	✓												
<b>Orientation</b>																								
Diagonal			✓	✓	✓					✓		✓	✓											
Perpendicular	✓	✓					✓	✓	✓		✓			✓	✓									
V-Shape	✓	✓					✓				✓													
Complex																								
<b>Partial Riffle Line</b>																								
1/4 W <sub>INS</sub>																								
1/4 - 1/2 W <sub>INS</sub>																								
1/2 - 3/4 W <sub>INS</sub>	✓	✓	✓				✓	✓	✓	✓				✓	✓	✓								

# **APPENDIX F**

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## **SITE BY SITE SUMMARY OF HISTORICAL CROSS-SECTION INFORMATION**

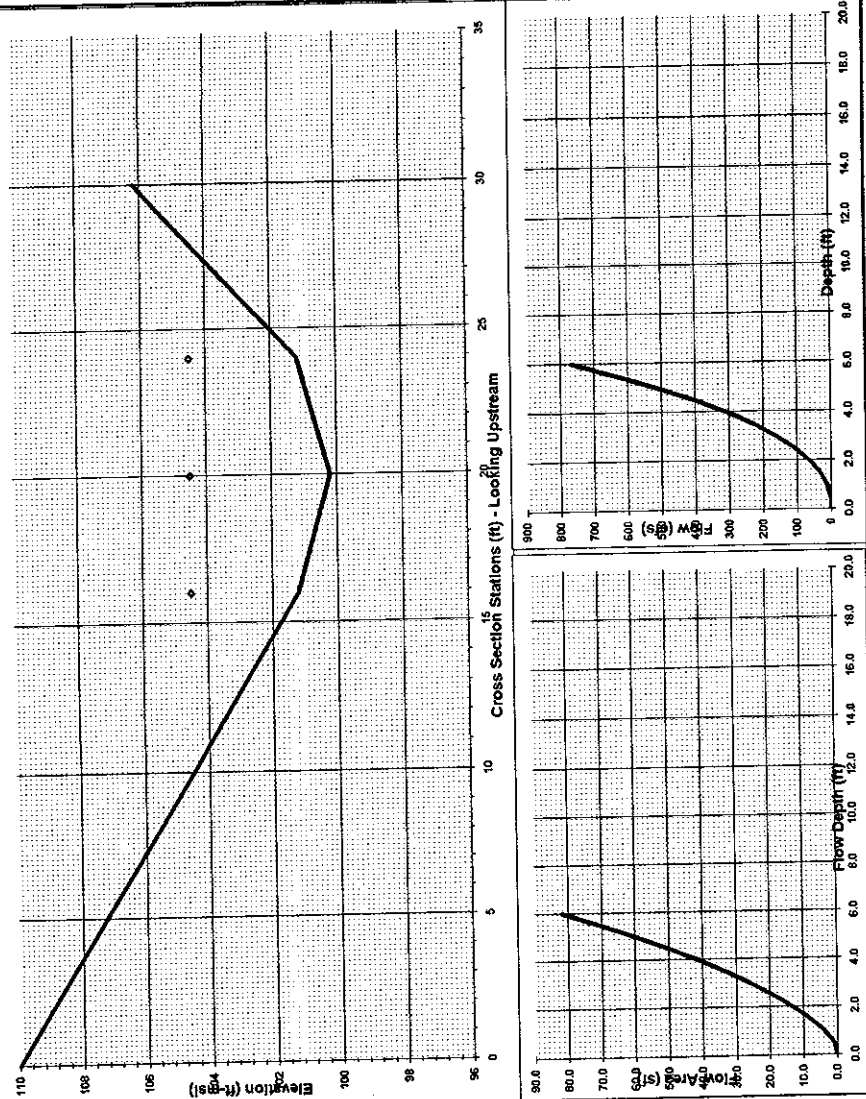
## APPENDIX F: SITE BY SITE SUMMARY OF HISTORIC CROSS-SECTION SURVEY DATA

Basin	Site	Historic Land Use		Historic Survey Data Summary										Quality of Historic Data **			
		Type of Disturbance	TIMP (%)	Date of Survey (year)	No. of Sections Selected	No. of Possible Sections	(t)	Degree of Offset (°/Rank)	Channel Geometry (Rank)	Planform Location (Rank)	No. of Ordinates (No./Rank)						
Cold	CLD4	Ref.	1														
	CLD5	Ref.	1														
Dowsville	DOW1	Logging		N/a													
	DOW2	Logging	2	1937	1	1	19.5(1)	0-10°(1)	3	3	8(3)						2.50
	DOW3	Logging	2	1937			19.5(1)										
Gould	GLD6	Ref.	<2														
	MOO1	Urban	9	1954	1	>10	19.1(2)	0-10°(1)	2	3	10(2)						4.00
Moon	MOO2	Urban	8	1954			19.8(2)										
	POT1	Urban	15	1961	1	>3	14.1(4)	0-10°(1)	3	3	5(3)						10.00
Potash	POT2	Urban	15	1961	1		14.1(4)	0-10°(1)	2	3	6(3)						9.00
	POT3	Urban	15	1955	1		12.1(4)	0-10°(1)	3	2	6(3)						9.00
	ROA1	Resort	2	1953	1	1	25.0(1)	0-10°(1)	2	2	9(2)						1.75
Roaring	ROA2	Resort	2	1953			25.0(1)										
	RBT1	Resort		N/a	0	1											
	SMI1	Ref.	<2														
Smith	SMI2	Ref.	<2														
	SMI3	Ref.	<2														
	STB7	Urban	10	1961	1		41.7(2)	0-10°(1)	2	3	10(2)						4.00
Stevens	STB8	Urban	9	1977	1	3	40.2(2)	0-10°(1)	3	2	7(3)						4.50
	STB9	Urban	12	1975	1		33.1(4)	0-10°(1)	3	2	8(3)						9.00
	TEN1	Urban	2	1922	1	>3	4.5(1)	0-10°(1)	2	3	9(2)						2.00
Tenney Little	WBL1	Resort	2	1972	1		32.0(1)	0-10°(1)	2	3	9(2)						2.00
	WBL2	Resort	2	1972	1	5	32.0(1)	0-10°(1)	3	3	12(2)						2.25
	WBL3	Resort	2	1963	1		40.9(1)	0-10°(1)	3	2	8(3)						2.25
											AVERAGE (Quality of Data Indicator $\psi$ )			4.79			

Most Desirable: Rank = 1, c = 1; Desirable: Rank = 2, c = 1; Marginal: Rank = 3, c = 1; Unacceptable: c = 0  
 Degree of Offset =  $\alpha$ ; Channel Geometry =  $\beta$ ; Planform Location =  $\phi$ ; Number of Ordinates =  $\xi$ ; Area Weighted Average Age of Disturbance =  $\epsilon$   
 \*\*Quality of Historic Data =  $c[(\alpha + \beta + \phi + \xi)/4] \epsilon$

**Cross Section No. 3**  
**Pot1 - Spreadsheet 2: Historical - @ Hwy #7**  
**Channel Type : / Reference No.:**

Water Surface Elevation (ft-ansl)	Flow Rate (cfs)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Hydraulic Radius (ft)	Top Width (ft)	Average Velocity (fps)	Weighted Mannings n	Critical Depth (ft)
100.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
100.7	2	4.1	0.243	4.0	1.7	0.037	0.2	0.2
101.2	11	8.2	0.485	8.0	2.7	0.037	0.4	0.4
101.7	33	33	0.932	9.5	3.9	0.037	0.7	0.7
102.2	65	11.9	1.137	11.0	4.8	0.037	1.0	1.0
102.7	108	13.7	1.416	12.5	5.6	0.037	1.3	1.3
103.2	163	15.5	1.678	14.0	6.3	0.037	1.6	1.6
103.7	209	17.3	1.928	15.5	6.9	0.037	1.9	1.9
104.2	309	19.2	2.171	17.1	7.4	0.037	2.2	2.2
104.7	402	21.0	2.407	18.6	8.0	0.037	2.4	2.4
105.2	509	22.8	2.639	20.1	8.5	0.037	2.7	2.7
105.7	631	24.6	2.867	21.6	8.9	0.037	3.0	3.0
106.2	768	26.4	3.092	23.1	9.4	0.037	3.3	3.3



Average channel velocity and critical depth calculations do not apply above overbank elevation. <sup>1</sup>

Station No.	Range	Flow Area (ft <sup>2</sup> )	Flow Depth (ft)	Wetted Perimeter (ft)	Topwidth (ft)
0 to 16	16 to 20	20 to 24	24 to 30		
0.037	0.037	0.037	0.037	0.037	0.037
110	101.2	106.2	101.2	106.2	0
0	1.6	24.0	24.0	0.0	0.0
10.0	15.2	15.2	6.6	0.0	0.0
6.9	4.1	4.1	5.2	0.0	0.0
6.9	4.0	4.0	4.0	0.0	0.0

Cross Section Skew Angle (deg) = 0

Station No.	Range	Mannings n	Relative Elevation (ft-ansl)	Station (ft)	Flow Area (ft <sup>2</sup> )	Wetted Perimeter (ft)	Topwidth (ft)
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0
0	0	0	0	0	0	0	0

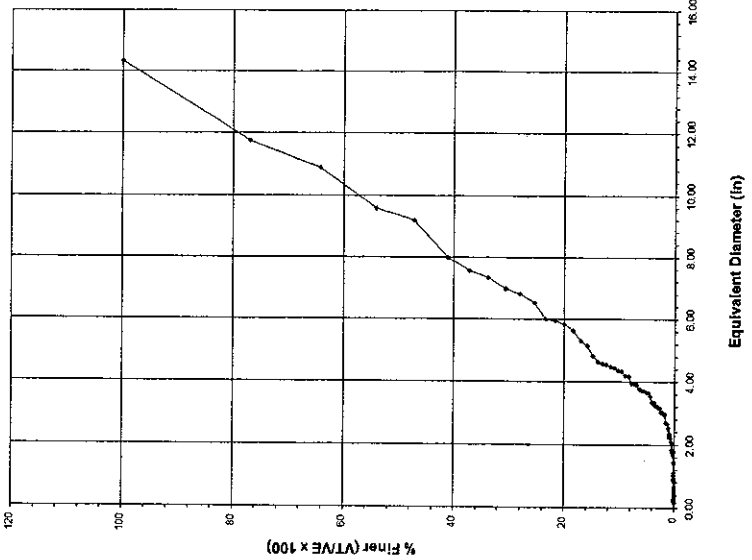
**Bankfull Depth Hydraulic Conditions and Cross Section Data**

Bankfull Flow Elevation (ft-ansl)	104.51
Channel Slope (ft/ft)	0.0121
Max. Critical Depth Elevation (ft-ansl)	106.2
Maximum Evaluated Elevation (ft-ansl)	106.2
Depth of Flow (ft)	4.31
Weighted Mannings n	0.037
Total Flow Area (ft <sup>2</sup> )	47.0
Wetted Perimeter (ft)	20.3
Hydraulic Radius (ft)	2.318
Mannings Flow (cfs)	364.7
Average Channel Velocity (fps)	7.8
Topwidth (ft)	13.0
Critical Depth "y <sub>c</sub> " (ft)	2.3
y <sub>c</sub> Elevation (ft-ansl)	102.5

\* Note: All input data are displayed in boxed areas.  
<sup>1</sup> Flow rates and velocities are based on Mannings equation.  
<sup>2</sup> Weighted Mannings n is the product of the Mannings n and wetted perimeter for each cross section segment divided by the total wetted perimeter for a specific flow depth.  
<sup>3</sup> Critical depth is based on  $Q^2g = A^3/T^3$  where A = topwidth x critical depth.  
<sup>4</sup> Maximum elevation evaluated for critical depth. Critical depth is not considered applicable, using equation (see note 3), when flow depth exceeds overbank elevation.

**Pebble Count Results - Cross-Section Number 3**  
**Pot1**  
**Wastewater Line Sheet No.**

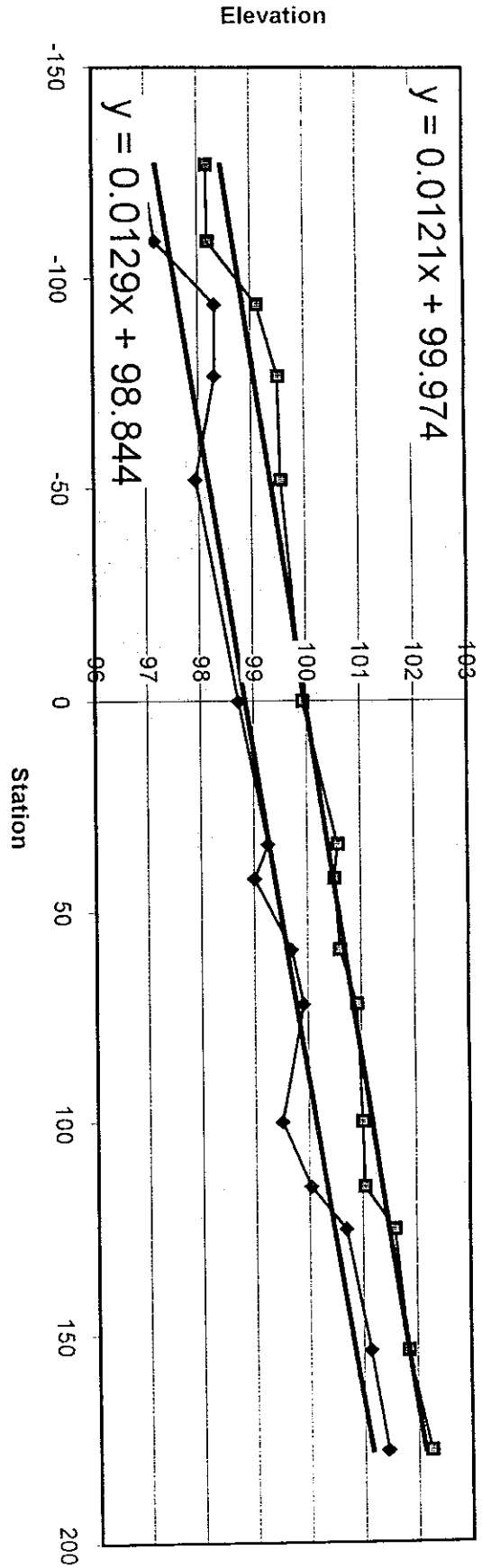
Data Sorted by Equivalent Diameter in Ascending Order																																							
Unsorted Raw Data <small>(Sorting at the base of Channel)</small>					Roundness					Flatness					Equivalent Radius					Equivalent Diameter					Equivalent Volume					Cumulative Volume					V <sub>n</sub> /V <sub>t</sub> x 100				
Dimension 1 Length (in)	Dimension 2 Length (in)	Dimension 3 Length (in)	Dimension 1 Length (in)	Dimension 2 Length (in)	Dimension 3 Length (in)	Major Axis Length "L" (in)	Major Axis Length "W" (in)	Breadth "H" (in)	Roundness	Flatness	Equivalent Radius (in)	Equivalent Diameter (in)	Equivalent Volume (V <sub>n</sub> ) (in <sup>3</sup> )	Cumulative Volume (V <sub>n</sub> ) (in <sup>3</sup> )	V <sub>n</sub> /V <sub>t</sub> x 100																								
3.60	2.40	0.84	0.17	0.22	0.10	0.22	0.17	0.10	1.26	2.00	0.89	0.17	0.00	0.00	0.00																								
0.95	0.64	0.72	0.20	0.18	0.10	0.20	0.18	0.10	1.18	2.00	0.09	0.17	0.00	0.00	0.00																								
0.95	1.20	0.31	0.12	0.12	0.12	0.24	0.18	0.12	1.22	1.75	0.10	0.20	0.00	0.01	0.00																								
0.89	0.38	0.36	0.18	0.18	0.18	0.19	0.18	0.18	0.92	1.03	0.10	0.21	0.00	0.01	0.00																								
0.92	1.44	0.72	0.26	0.22	0.12	0.26	0.22	0.12	1.23	2.00	0.11	0.22	0.00	0.01	0.00																								
0.96	0.54	0.31	0.22	0.22	0.12	0.30	0.22	0.12	1.34	2.15	0.11	0.22	0.00	0.02	0.00																								
0.93	0.58	0.38	0.24	0.19	0.12	0.32	0.29	0.12	1.28	2.55	0.13	0.25	0.01	0.02	0.00																								
0.98	0.41	0.30	0.24	0.46	0.20	0.13	0.46	0.20	1.74	2.50	0.13	0.26	0.01	0.03	0.00																								
0.98	0.26	0.22	0.12	0.29	0.18	0.29	0.26	0.18	1.06	1.53	0.14	0.27	0.01	0.04	0.00																								
0.91	0.19	0.13	0.60	0.19	0.13	0.60	0.19	0.13	2.14	3.00	0.14	0.28	0.01	0.04	0.00																								
0.91	0.61	0.72	0.20	0.38	0.40	0.11	0.40	0.38	1.37	3.61	0.14	0.28	0.01	0.05	0.00																								
0.92	0.46	0.43	0.24	0.16	0.46	0.46	0.24	0.16	1.56	2.23	0.15	0.29	0.01	0.06	0.00																								
0.93	0.18	0.19	0.18	0.50	0.29	0.13	0.50	0.29	1.66	3.00	0.15	0.30	0.01	0.07	0.00																								
0.94	0.54	0.41	0.26	0.48	0.36	0.12	0.48	0.36	1.54	3.50	0.16	0.31	0.01	0.08	0.00																								
0.95	0.50	0.29	0.13	0.43	0.30	0.17	0.43	0.30	1.36	2.18	0.16	0.32	0.01	0.09	0.00																								
0.91	0.65	0.60	0.41	0.43	0.29	0.18	0.43	0.29	1.35	2.00	0.16	0.32	0.01	0.11	0.00																								
0.92	0.29	0.26	0.18	0.50	0.41	0.12	0.50	0.41	1.52	3.60	0.17	0.33	0.01	0.12	0.00																								
0.96	0.43	0.30	0.17	0.48	0.24	0.23	0.48	0.24	1.42	1.58	0.17	0.34	0.01	0.13	0.00																								
0.99	0.43	0.30	0.25	0.35	0.30	0.26	0.35	0.30	1.60	1.17	0.17	0.35	0.02	0.15	0.00																								
0.92	0.48	0.24	0.23	0.41	0.30	0.24	0.41	0.30	1.17	1.48	0.17	0.35	0.02	0.16	0.00																								
0.92	0.38	0.40	0.11	0.49	0.24	0.25	0.49	0.25	1.40	1.55	0.18	0.36	0.02	0.18	0.00																								
0.92	0.53	0.29	0.26	0.30	0.26	0.20	0.60	0.26	1.66	2.12	0.18	0.36	0.02	0.20	0.00																								
0.92	0.49	0.24	0.26	0.41	0.36	0.23	0.41	0.36	1.12	1.86	0.18	0.37	0.02	0.21	0.00																								
0.92	0.43	0.29	0.16	0.54	0.31	0.20	0.54	0.31	1.47	2.09	0.18	0.37	0.02	0.23	0.01																								
0.92	0.48	0.38	0.18	0.38	0.36	0.25	0.38	0.36	1.04	1.48	0.19	0.37	0.02	0.25	0.01																								
0.92	1.20	0.91	0.37	0.53	0.28	0.26	0.53	0.28	1.38	1.52	0.19	0.38	0.02	0.27	0.01																								
0.92	0.28	0.12	0.32	0.59	0.32	0.22	0.59	0.32	1.48	2.08	0.19	0.38	0.02	0.29	0.01																								
0.95	0.50	0.41	0.12	0.48	0.36	0.25	0.48	0.36	1.20	1.67	0.20	0.40	0.02	0.31	0.01																								
0.92	0.30	0.12	0.50	0.40	0.30	0.29	0.50	0.30	1.26	1.40	0.20	0.40	0.02	0.34	0.01																								
0.92	0.16	0.24	0.12	0.46	0.43	0.24	0.46	0.43	1.11	1.85	0.20	0.41	0.02	0.36	0.01																								
0.92	0.20	0.18	0.10	0.62	0.34	0.24	0.62	0.34	1.49	2.00	0.21	0.42	0.03	0.38	0.01																								
0.91	0.36	0.23	0.59	0.38	0.24	0.58	0.38	0.24	1.35	2.00	0.21	0.42	0.03	0.42	0.01																								
0.91	0.24	0.16	0.46	0.41	0.26	0.54	0.41	0.26	1.23	1.80	0.22	0.44	0.03	0.45	0.01																								
0.92	0.17	0.22	0.10	0.50	0.38	0.31	0.50	0.38	1.13	1.42	0.22	0.44	0.03	0.48	0.01																								
0.92	0.50	0.30	0.29	0.46	0.36	0.36	0.46	0.36	1.07	1.17	0.22	0.45	0.03	0.51	0.01																								
0.98	2.28	1.68	0.84	0.64	0.24	0.66	0.44	0.24	1.41	2.30	0.23	0.47	0.04	0.55	0.01																								
0.97	5.28	2.40	1.80	0.96	0.72	0.96	0.72	0.12	1.94	7.00	0.25	0.48	0.04	0.59	0.01																								
0.98	0.77	0.48	0.36	0.81	0.72	0.20	0.72	0.61	0.20	1.42	3.26	0.25	0.51	0.05	0.61	0.01																							
0.98	2.64	2.28	1.32	1.06	0.42	1.06	0.42	0.24	1.97	3.08	0.27	0.54	0.06	0.69	0.02																								
0.94	0.62	0.34	0.24	0.82	0.28	0.82	0.52	0.28	1.48	2.41	0.28	0.55	0.06	0.75	0.02																								
0.94	1.44	1.92	0.78	0.88	0.38	0.88	0.89	0.38	1.58	1.77	0.28	0.56	0.06	0.82	0.02																								
0.94	0.91	1.32	1.08	0.70	0.77	0.48	0.88	0.38	1.73	2.29	0.29	0.58	0.07	0.89	0.02																								
0.94	0.50	0.38	0.31	0.68	0.48	0.43	0.66	0.48	1.33	1.32	0.29	0.58	0.07	0.96	0.02																								
0.94	0.84	0.36	0.72	0.48	0.38	0.84	0.48	0.38	1.38	1.72	0.30	0.61	0.08	1.04	0.02																								
0.94	0.72	0.66	0.37	0.65	0.60	0.41	0.65	0.60	1.06	1.53	0.31	0.61	0.09	1.12	0.02																								
0.94	0.82	0.52	0.28	1.20	1.20	0.12	1.20	1.20	10.00	10.00	0.32	0.63	0.09	1.21	0.03																								
0.94	0.46	0.20	0.13	0.77	0.66	0.37	0.72	0.66	0.37	1.18	1.85	0.33	0.64	0.09	1.31	0.03																							
0.94	1.05	0.42	0.24	0.84	0.72	0.31	0.84	0.72	1.29	2.50	0.33	0.65	0.10	1.41	0.03																								
0.94	0.66	0.48	0.43	0.72	0.60	0.48	0.72	0.60	1.07	1.38	0.34	0.67	0.11	1.51	0.03																								
0.94	0.38	0.36	0.25	0.84	0.39	0.72	0.84	0.39	1.21	2.17	0.34	0.68	0.11	1.63	0.04																								
0.91	0.80	0.61	0.41	0.90	0.61	0.41	0.90	0.61	1.31	1.85	0.34	0.69	0.12	1.75	0.04																								
0.92	0.66	0.44	0.24	1.20	0.91	0.37	1.20	0.91	1.31	1.85	0.34	0.69	0.12	1.75	0.04																								
0.92	0.58	0.32	0.58	0.92	1.20	0.91	0.92	1.20	2.84	2.84	0.42	0.84	0.21	1.96	0.04																								
0.94	0.80	0.26	0.20	1.32	1.08	0.36	1.08	1.08	3.27	3.00	0.42	0.85	0.22	2.18	0.05																								
0.94	0.35	0.30	0.28	0.96	0.86	0.36	1.32	0.96	1.51	3.17	0.44	0.87	0.24	2.42	0.05																								
0.94	3.24	2.52	0.72	1.44	1.08	0.36	1.44	1.08	1.44	1.08	0.44	0.89	0.25	2.67	0.05																								
0.97	4.80	1.08	1.32	1.20	0.36	1.32	1.20	0.36	1.40	3.50	0.47	0.93	0.29	2.96	0.06																								
0.97									1.40	3.50	0.47	0.94	0.30	3.26	0.07																								



Equivalent Diam. (mm)				Pot1			
G. Mean	16th	50th	84th	Shr Dev	N	Slope	Average Roundness
1.34	5.173904	9.35	11.63351	2.69	125	0.0121	1.39
34.07	131.42	237.45	295.49	68.21			Average Flatness
			5.67E+09	6.36E+09			2.33
			0.047	0.047			Bankfull Estimate (ft)
			224.80	242.54			3.4
			1.896	6.712			
			6.221	6.712			

LONGITUDINAL PROFILE :

Pot1



Slope Calculations	Points	Station	Bottom Elev	Water Elev
Select two data point numbers to determine slope	94	72	98.31	99.91
			99.11	100.91

Slope from Thalweg Bottom Profile: 0.0096

Slope from Water Surface Profile: 0.0121

Riffle Geometry	Points	Station	Bottom Elev	Water Elev
Select two or three data point numbers to assess riffle distance				
Average Riffle Distance				

Pool Geometry	Points	Station	Bottom Elev	Water Elev
Select two or three data point numbers to assess pool distance				
Average Pool Distance				

SLOPE FOR FLOW CALCS: 0.0121

0061	4.20	3.80	3.48	1.92	1.44	1.04	0.72	0.52	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01	0.01
0062	4.80	3.72	2.18	1.44	1.04	0.72	0.52	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01	0.01	0.01
0063	10.80	7.20	1.92	2.28	1.68	1.28	0.88	0.64	0.48	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01
0064	8.40	5.52	2.64	1.92	1.44	1.04	0.72	0.52	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01	0.01
0065	6.80	4.80	4.56	1.80	1.44	1.04	0.72	0.52	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01	0.01
0066	3.72	3.24	1.80	0.96	0.80	0.68	0.56	0.48	0.40	0.32	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01
0067	1.32	0.96	0.36	2.04	1.68	1.28	0.88	0.64	0.48	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01
0068	0.72	0.96	0.48	3.36	2.52	1.88	1.32	0.96	0.72	0.52	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02
0069	1.92	1.44	0.48	2.64	1.92	1.44	1.04	0.72	0.52	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01
0070	0.96	0.84	0.12	2.28	1.92	1.44	1.04	0.72	0.52	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02	0.01
0071	0.48	0.36	0.36	3.60	2.40	0.94	0.84	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02
0072	0.48	0.36	0.36	3.60	2.40	0.94	0.84	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08	0.06	0.04	0.03	0.02
0073	5.28	3.36	3.84	3.84	3.24	2.64	2.04	1.68	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0074	1.32	1.20	0.36	2.40	2.04	1.68	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08	0.06	0.04
0075	1.56	0.84	0.80	3.24	2.88	2.28	1.92	1.56	1.20	0.96	0.80	0.64	0.48	0.36	0.24	0.16	0.12	0.08	0.06
0076	1.20	1.08	0.80	3.24	2.88	2.28	1.92	1.56	1.20	0.96	0.80	0.64	0.48	0.36	0.24	0.16	0.12	0.08	0.06
0077	5.76	4.80	2.04	4.80	4.00	3.20	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0078	4.80	4.20	2.24	3.80	3.20	2.60	2.00	1.40	1.08	0.80	0.64	0.48	0.36	0.24	0.16	0.12	0.08	0.06	0.04
0079	5.40	4.20	1.80	3.80	3.20	2.60	2.00	1.40	1.08	0.80	0.64	0.48	0.36	0.24	0.16	0.12	0.08	0.06	0.04
0080	4.92	3.72	2.76	4.80	4.00	3.20	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0081	6.00	6.00	2.16	4.44	3.84	3.24	2.64	2.04	1.68	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12
0082	10.80	4.32	3.00	6.00	4.44	3.24	2.04	1.44	1.08	0.80	0.64	0.48	0.36	0.24	0.16	0.12	0.08	0.06	0.04
0083	10.80	4.32	3.00	6.00	4.44	3.24	2.04	1.44	1.08	0.80	0.64	0.48	0.36	0.24	0.16	0.12	0.08	0.06	0.04
0084	5.40	2.76	2.16	4.32	3.84	3.24	2.64	2.04	1.68	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12
0085	18.00	15.80	7.20	8.80	8.00	7.20	6.40	5.60	4.80	4.00	3.20	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48
0086	22.80	7.20	5.40	6.00	5.40	4.80	4.20	3.60	3.00	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24
0087	4.80	2.40	1.56	5.40	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0088	8.40	8.40	4.20	5.40	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0089	6.60	3.00	1.80	6.60	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0090	4.32	3.00	1.44	6.60	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0091	8.40	5.40	4.20	4.92	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0092	5.76	3.84	3.84	4.92	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0093	3.28	1.56	0.84	7.20	6.00	5.40	4.80	4.20	3.60	3.00	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36
0094	3.28	2.88	2.04	6.60	5.40	4.80	4.20	3.60	3.00	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24
0095	6.00	3.60	3.00	6.00	3.60	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00	3.00
0096	6.80	3.72	1.44	6.00	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0097	5.84	5.40	3.36	6.00	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0098	2.04	2.04	1.80	6.00	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0099	6.00	2.40	1.80	6.00	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08
0100	8.40	5.40	4.20	4.92	4.20	3.24	2.40	1.80	1.32	1.04	0.88	0.72	0.60	0.48	0.36	0.24	0.16	0.12	0.08

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