

**Appendix E:
HEC-RAS Output - Natural/ Unrestricted
Conditions, Existing Conditions, Proposed
Conditions
South Utoy Creek**

SouthUtoyCreek.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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X   X  XXXXXX   XXXX       XXXX       XX       XXXX
X   X  X       X   X       X   X       X   X       X
X   X  X       X   X       X   X       X   X       X
XXXXXXXX XXXX   X           XXX XXXX   XXXXXX   XXXX
X   X  X       X   X       X   X       X   X       X
X   X  X       X   X       X   X       X   X       X
X   X  XXXXXX   XXXX       X   X       X   X       XXXXX
```

PROJECT DATA

Project Title: South Utoy Creek
Project File : SouthUtoyCreek.prj
Run Date and Time: 3/17/2014 2:18:07 PM

Project in English units

Project Description:

Flood Insurance Restudy for Fulton County, GA
Flooding Source: South Utoy
Creek
Model Date: January 2010 -Edited March 2014
Mapping Partner:
PBS&J
Modeler: Rebecca Riggs, PE, CFM - Edited Benjamin Pickering II, PE

PLAN DATA

Plan Title: Conspan 01165
Plan File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study Data\Proposed Analysis
Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\South Utoy Creek\A-J\Simulations\SouthUtoyCreek.p02

Geometry Title: Conspan 01165
Geometry File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study
Data\Proposed Analysis Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\South Utoy
Creek\A-J\Simulations\SouthUtoyCreek.g04

Flow Title : Flow 04
Flow File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study
Data\Proposed Analysis Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\South Utoy
Creek\A-J\Simulations\SouthUtoyCreek.f04

Plan Summary Information:

Number of:	Cross Sections =	11	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	2	Lateral Structures =	0

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculation tolerance	=	0.01
Maximum number of iterations	=	20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computation Options

Critical depth computed only where necessary	
Conveyance Calculation Method:	At breaks in n values only
Friction Slope Method:	Average Conveyance
Computational Flow Regime:	Subcritical Flow

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FLOW DATA

Flow Title: Flow 04
 Flow File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study Data\Proposed Analysis
 Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\South Utoy Creek\A-J\Simulations\SouthUtoyCreek.f04

Flow Data (cfs)

River	Reach	RS	100Yr	5Yr	10Yr	
25Yr	50Yr	500Yr	FW-M4			
southutoycreek	50	2981.919		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	2679.912		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	2560.417		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	2392.796		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	2000		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	1653.432		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	1283.438		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	1008.862		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	614.851		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	537.0376		7156	2910	3761
5016	6067	9687	7156			
southutoycreek	50	8.5107		7156	2910	3761
5016	6067	9687	7156			

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
southutoycreek	50	100Yr		Known WS = 804.49
southutoycreek	50	5Yr		Known WS = 799.47
southutoycreek	50	10Yr		Known WS = 800.7
southutoycreek	50	25Yr		Known WS = 802.17
southutoycreek	50	50Yr		Known WS = 803.31
southutoycreek	50	500Yr		Known WS = 806.9
southutoycreek	50	FW-M4		Known WS = 805.49

GEOMETRY DATA

Geometry Title: Conspan 01165
 Geometry File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study Data\Proposed
 Analysis Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\South Utoy
 Creek\A-J\Simulations\SouthUtoyCreek.g04

CROSS SECTION

RIVER: southutoycreek
 REACH: 50 RS: 2981.919

INPUT

Description: B

Station Elevation Data num= 194

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9318.21	8169323.407	8169333.451	8169343.494	815.962	89353.537	815.6393			
9361.656	815.3811	9363.588	815.318	79373.623	814.992	59383.666	814.667	49393.709	814.3438
9403.753	814.026	59413.796	811.299	19423.839	809.188	49433.882	808.091	69443.925	808
9453.968	8089464.011	8089469.669	8089474.054	8089484.098	808				
9494.141	8089504.184	8089514.227	8089524.27	8089534.313	808				
9539.845	8089544.519	8089554.923	8089563.379	8089565.327	808				

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9575.732	8089586.136807.3591	9596.54806.04099599.602805.42689606.945804.0417
9617.349804.26919627.753	804.1799635.825	8049638.158 8049648.562 804
9658.966804.35079669.371804.80369672.048804.76139679.775804.58369690.179		804
9700.584806.58179708.271809.64939710.988810.77039721.392		8129731.797 812
9742.201	8129744.494	8129752.605 812 9763.01 8129773.414 812
9780.717	8129783.818	8129794.223 8129804.627 8129815.031 812
9816.94	8129825.436	8129826.732 812 9837.94 8129838.417 812
9850.743	8129854.431	8129863.546 8129870.445 8129876.349 812
9886.459	8129889.152	8129901.955810.56079902.473810.43589914.758807.4759
9918.488806.77559927.561805.59219934.502805.06619940.364804.59349950.516802.9974		
9953.167802.3409	9965.97 797.989 9966.53797.83279978.773	796 9986.24 792.72
9988.33	792.4610000.25 793.1810003.21 793.5510003.82	793.7310005.68 794.5
10019.98	797.610029.99802.005210030.59802.181610042.79803.8235	10046.6 804
10055.59	80410062.61	80410068.39 80410078.63 804 10081.2 804
10094	80410094.64	804 10106.8 80410110.66 80410119.61 804
10126.67	80410132.41	80410142.68 80410145.21 80410158.02 804
10158.7	80410170.82	80410174.71 80410183.62 80410190.73 804
10196.43	80410206.74	80410209.23 80410222.03 80410222.75 804
10234.83	80410238.77	80410247.64 80410254.78 80410260.44 804
10270.8	80410273.24	80410286.05 80410298.85 804
10302.83804.022210311.65804.259810318.84804.814310324.46805.196810334.85805.8625		
10337.26806.027710350.06807.453810350.87807.589310362.86811.238310366.88813.4987		
10375.67818.4099	10382.9822.356110388.47825.176410398.91830.254610401.27831.2956	
10414.08	83210414.92	83210426.88 83210430.94832.137310439.68832.5938
10446.95833.0999	10451.9833.399810454.18833.463810458.95	833.57910469.16833.5708
10479.37834.147110489.58834.590610499.79835.8338	10503.9836.0174	10510836.0913
10520.21836.534810530.41837.051510540.62837.548710550.83837.883610553.61838.0616		
10561.04838.286610571.25838.616510581.46838.973410591.67839.670410601.87840.0423		
10603.33840.106910612.08840.305310622.29840.7257	10632.5841.116110642.71841.6401	
10652.92841.996110653.04	84210663.13842.002410673.34842.422910683.54842.7476	
10693.75843.077510702.76843.622410703.96843.671310714.17843.857310724.38843.9011		
10734.59843.9744	10744.8844.253710752.48844.3222	10755 844.34610765.21844.5601
10775.42844.723410785.63845.216910795.84845.764810796.93845.7848		

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
9318.21	.19940.364	.065 10046.6 .1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
9940.364	10046.6	274.7351	302.006402.9232		.3		.5
Ineffective Flow	num=	1					
Sta L	Sta R	Elev	Permanent				
9318.219797.668			F				

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	809.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.100	0.065	0.100
W.S. Elev (ft)	809.57	Reach Len. (ft)	274.74	302.01	402.92
Crit W.S. (ft)		Flow Area (sq ft)	106.23	1191.40	1632.49
E.G. Slope (ft/ft)	0.001159	Area (sq ft)	931.97	1191.40	1632.49
Q Total (cfs)	7156.00	Flow (cfs)	113.24	4549.40	2493.37
Top Width (ft)	737.39	Top Width (ft)	320.37	106.24	310.79
Vel Total (ft/s)	2.44	Avg. Vel. (ft/s)	1.07	3.82	1.53
Max Chl Dpth (ft)	17.11	Hydr. Depth (ft)	3.10	11.21	5.25
Conv. Total (cfs)	210169.5	Conv. (cfs)	3325.7	133614.4	73229.4
Length Wtd. (ft)	319.28	Wetted Per. (ft)	34.74	109.64	311.24
Min Ch El (ft)	792.46	Shear (lb/sq ft)	0.22	0.79	0.38
Alpha	1.69	Stream Power (lb/ft s)	10796.93	0.00	0.00
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	134.31	89.71	62.75
C & E Loss (ft)	0.11	Cum SA (acres)	25.25	6.85	15.14

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #10Yr

E.G. Elev (ft)	805.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.	0.100	0.065	0.100
W.S. Elev (ft)	805.22	Reach Len. (ft)	274.74	302.01	402.92
Crit W.S. (ft)		Flow Area (sq ft)	2.46	729.27	328.69
E.G. Slope (ft/ft)	0.003407	Area (sq ft)	88.03	729.27	328.69
Q Total (cfs)	3761.00	Flow (cfs)	0.98	3441.49	318.54
Top Width (ft)	486.82	Top Width (ft)	102.33	106.24	278.25
Vel Total (ft/s)	3.55	Avg. Vel. (ft/s)	0.40	4.72	0.97

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Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 9322.677 .075 9953.58 .0610046.47 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9953.5810046.47 130.6893119.495798.23132 .3 .5
 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 9322.677 9792.88 815.31 F
 1003310457.55 809.35 F

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	809.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.54	Wt. n-Val.	0.075	0.060	
W.S. Elev (ft)	808.64	Reach Len. (ft)	130.69	119.50	98.23
Crit W.S. (ft)	799.18	Flow Area (sq ft)	47.48	1205.93	
E.G. Slope (ft/ft)	0.001623	Area (sq ft)	147.94	1318.72	174.61
Q Total (cfs)	7156.00	Flow (cfs)	46.98	7109.02	
Top Width (ft)	545.70	Top Width (ft)	239.28	92.89	213.53
Vel Total (ft/s)	5.71	Avg. Vel. (ft/s)	0.99	5.90	
Max Chl Dpth (ft)	17.00	Hydr. Depth (ft)	1.40	15.18	
Conv. Total (cfs)	177617.9	Conv. (cfs)	1166.1	176451.8	
Length Wtd. (ft)	119.50	Wetted Per. (ft)	34.41	83.97	
Min Ch El (ft)	791.64	Shear (lb/sq ft)	0.14	1.46	
Alpha	1.06	Stream Power (lb/ft s)	10457.55	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	130.90	81.01	54.39
C & E Loss (ft)		Cum SA (acres)	23.48	6.16	12.71

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #10Yr

E.G. Elev (ft)	804.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.075	0.060	
W.S. Elev (ft)	804.65	Reach Len. (ft)	130.69	119.50	98.23
Crit W.S. (ft)	796.70	Flow Area (sq ft)	0.05	888.35	
E.G. Slope (ft/ft)	0.001258	Area (sq ft)	0.05	947.27	0.01
Q Total (cfs)	3761.00	Flow (cfs)	0.01	3760.99	
Top Width (ft)	93.61	Top Width (ft)	0.50	92.89	0.22
Vel Total (ft/s)	4.23	Avg. Vel. (ft/s)	0.15	4.23	
Max Chl Dpth (ft)	13.01	Hydr. Depth (ft)	0.11	11.19	
Conv. Total (cfs)	106021.9	Conv. (cfs)	0.2	106021.6	
Length Wtd. (ft)	119.50	Wetted Per. (ft)	0.55	83.97	
Min Ch El (ft)	791.64	Shear (lb/sq ft)	0.01	0.83	
Alpha	1.00	Stream Power (lb/ft s)	10457.55	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	54.65	61.57	18.85
C & E Loss (ft)		Cum SA (acres)	18.73	6.09	8.07

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	811.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.	0.075	0.060	0.100
W.S. Elev (ft)	810.90	Reach Len. (ft)	130.69	119.50	98.23
Crit W.S. (ft)	800.75	Flow Area (sq ft)	246.51	1528.39	857.91
E.G. Slope (ft/ft)	0.001395	Area (sq ft)	954.10	1528.39	857.91
Q Total (cfs)	9687.00	Flow (cfs)	242.07	8642.06	802.87
Top Width (ft)	983.82	Top Width (ft)	499.97	92.89	390.96
Vel Total (ft/s)	3.68	Avg. Vel. (ft/s)	0.98	5.65	0.94
Max Chl Dpth (ft)	19.26	Hydr. Depth (ft)	1.53	16.45	2.19
Conv. Total (cfs)	259378.9	Conv. (cfs)	6481.5	231399.7	21497.7
Length Wtd. (ft)	119.50	Wetted Per. (ft)	161.24	101.11	391.75
Min Ch El (ft)	791.64	Shear (lb/sq ft)	0.13	1.32	0.19
Alpha	2.11	Stream Power (lb/ft s)	10457.55	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	183.61	94.13	82.62
C & E Loss (ft)		Cum SA (acres)	25.08	6.16	16.63

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

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water surface was used.

CULVERT

RIVER: southutoycreek
 REACH: 50 RS: 2645.586

INPUT
 Description: Research Center Drive (Survey Utoy SUT_0400)
 Distance from Upstream XS = .5
 Deck/Roadway Width = 70
 Weir Coefficient = 2.6
 Upstream Deck/Roadway Coordinates

num= 60											
Sta	Hi	Cord	Lo Cord	Sta	Hi	Cord	Lo Cord	Sta	Hi	Cord	Lo Cord
9300	809			9520.05	809			9524.51	809		
9530.27	809			9541.9	809			9544.06	809		
9553.54	809			9563.61	809			9565.18	809		
9576.82	809			9583.16	809.05			9585.09	809.07		
9588.95	809.09			9598.7	809.15			9602.3	809.18		
9613.79	809.24			9615.65	809.25			9628.88	809.27		
9629	809.27			9631.28	809.26			9642.1	809.25		
9644.38	809.25			9655.14	809.29			9659.96	809.3		
9668.18	809.4			9675.54	809.63			9681.22	809.88		
9691.12	809.99			9847.58	811.36			9909.88	810.94		
9962.26	810.24			10013.06	809.87			10075.32	809.35		
10126.61	809.38			10181.58	810.16			10249.88	810		
10259.89	810			10269.9	810			10279.92	810		
10284.17	810			10289.92	810			10299.92	810		
10309.92	810			10319.92	810			10329.92	810		
10339.92	810.3			10349.92	810.82			10359.92	811.3		
10369.92	812			10379.92	812			10389.92	812		
10399.92	812			10409.92	812			10419.92	812.28		
10429.92	812.8			10439.92	813.21			10449.92	813.61		
10459.92	813.97			10469.92	814			10477.27	814		

Upstream Bridge Cross Section Data

Station Elevation Data num= 142									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9322.677	816	9325.79	8169335.822	8169345.855	8169355.887	816			
9356.261	816	9365.92	8169375.952	8169385.984815	71679396.017815	3594			
9406.049815	00689416.082814	65879426.114814	31529436.147813	92839446.179812	4694				
9456.211810	35329466.244	808.1399476.276808	03089480.751808	06269486.309	808.134				
9496.341808	18719506.374808	20849516.406808	22199526.438808	20679536.471808	0883				
9546.503808	01589556.536	8089562.097	808	9569.82	8089570.459	808			
9581.638	8089589.222808	02899593.457808	03499605.275808	13239607.985808	1588				
9617.093	808.2489626.748808	29079628.912808	2888	9640.73808	25049645.511808	2412			
9652.549808	23549664.274808	41999664.367808	42319676.185808	95189683.037809	2584				
9688.004809	48059699.822	809.9869701.801	810	9711.64	8109720.564	810			
9723.459	8109735.277	8109739.327	8109747.095	810	9758.09	810			
9758.914	8109770.732	8109776.853	8109782.551	810	9792.84	810			
9798.42	8109805.357	8109815.046	8109817.874	8109820.228	810				
9829.128	8109837.038	8109840.089	810	9851.05	8109861.461	810			
9862.011	8109872.971	8109883.932	8109885.885	8109894.893	810				
9905.854	8109910.308	809.7759916.815808	91569927.776807	86129934.731807	6595				
9938.737	807.4339949.698	806.091	9953.58	804.439959.154801	99399960.659801	2639			
9967	794.3	9979.47	791.66	10003.5	791.6410026.73	791.69	10033	794.3	
10037.38799	344510046.47	804.5210048.35805	588610049.09	805.82610058.81	807.92				
10060.29807	940210069.24807	766610079.67807	885510090.09	80810095.57	808				
10100.52	80810110.95807	969510121.38807	787210130.84807	7118	10131.8807	6609			
10135.58807	4886	10142807.404810152.07807	447310162.14807	564810172.21807	6517				
10182.28	80810192.34	80810202.41	80810210.19	80810212.48807	9931				
10222.55807	881110232.61808	480810242.68809	035710252.75809	652410262.82	810				
10272.89	81010282.95	81010293.02	81010296.39	81010303.09809	8625				
10313.16809	635110323.23809	527310333.29809	521310343.36809	511910353.43809	3457				
10363.5808	965710373.57	808.39710382.59808	066710383.63808	0225	10393.7808	6484			
10403.77810	051610413.84810	581510423.91810	647610433.97810	817410444.04811	0606				
10454.11811	901910457.55812	1485							

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
9322.677	.075	9953.58	.0610046.47		.1

Bank Sta: Left Right Coeff Contr. Expan.

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9953.5810046.47 .3
 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 9322.677 9792.88 815.31 F
 1003310457.55 809.35 F

Downstream Deck/Roadway Coordinates
 num= 60

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
9300		809			9520.05		809			9524.51		809		
9530.27		809			9541.9		809			9544.06		809		
9553.54		809			9563.61		809			9565.18		809		
9576.82		809			9583.16		809.05			9585.09		809.07		
9588.95		809.09			9598.7		809.15			9602.3		809.18		
9613.79		809.24			9615.65		809.25			9628.88		809.27		
9629		809.27			9631.28		809.26			9642.1		809.25		
9644.38		809.25			9655.14		809.29			9659.96		809.3		
9668.18		809.4			9675.54		809.63			9681.22		809.88		
9691.12		809.99			9847.58		811.36			9909.88		810.94		
9962.26		810.24			10013.06		809.87			10075.32		809.35		
10126.61		809.38			10181.58		810.16			10249.88		810		
10259.89		810			10269.9		810			10279.92		810		
10284.17		810			10289.92		810			10299.92		810		
10309.92		810			10319.92		810			10329.92		810		
10339.92		810.3			10349.92		810.82			10359.92		811.3		
10369.92		812			10379.92		812			10389.92		812		
10399.92		812			10409.92		812			10419.92		812.28		
10429.92		812.8			10439.92		813.21			10449.92		813.61		
10459.92		813.97			10469.92		814			10477.27		814		

Downstream Bridge Cross Section Data

Station Elevation Data num= 131

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev						
9325.173	836.11	9330.4	8369340.887	8369351	375835.42769351	947835	4098								
9361.862834	89489372.349	834.6869382	837834.21239385	136834	14399393	324833	9009								
9403.811833	81439414.299833	31569418	324832.85119424	786832	01129435	274830	4336								
9445.761828	60649451.513828	29219456	248827.88699466	736826	98569477	223826	6244								
9484.702	826.073	9487.71	8269498.198825	02549508	685823	81019517	891823	1455							
9519.173823	0351	9529.66822	17299540.147821	82839550	635821	7934	9551.08821	7777							
9561.122821	16839571	609820	31359582	097819	71089584	269	819	5969592	584819	1768					
9603.071818	65579613	559818	14459617	458817	97229624	046817	72089634	534817	1117						
9645.021816	48039650	646	816	239655	508	8169665	996815	36379676	483814	7036					
9683.835814	2417	9686.97	814	0439697	458813	47559707	945	812	799717	024	812	206			
9718.433812	1142	9728.92811	42679739	407810	72979749	895810	12499750	213810	0263						
9760.382807	34969770	869805	73979781	357	8049783	402	8049791	844	804						
9794.303804	18529801	352804	35369812	441803	17299817	441802	4491	9819	4802	3419					
9828.781	8029829	373	8029840	269802	36739851	165804	47419853	965804	6856						
9862.061805	40679872	957805	48069879	148805	52499883	852805	5357	9893	85	802	64				
9949.101	803	359962	174	791	739964	848	791	49980	053	791	789984	607	792	42	
9986.975	793	27	10005	2	793	3410013	32	792	110024	27	792	6810033	59	793	75
10049.77	804	7310064	69805	330510073	02805	653110076	02805	657810087	35805	1176					
10094.32804	775810098	67	804	54310107	03804	201110109	87804	060310117	54804	0249					
10120.7	80410131	53	80410142	35	80410143	61	80410153	18	804						
10164.01	80410169	69804	212710174	84804	572210185	67805	295810195	76804	9614						
10196.49804	949210207	32804	858810218	15	804	87810221	83805	605210228	98807	2974					
10239.81809	527610247	91	81010250	63	810	10251	9	81010260	74	810					
10270.75	81010280	75	810	10289	7810	397710290	76810	445610300	77810	9609					
10310.78811	427810320	79811	8126	10330	8811	9988	10340	8	81210350	81	812				
10360.82	81210370	83	81210380	84	81210390	84812	280510400	85812	6818						
10406.36812	9026														

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 9325.173 .0759949.101 .0610049.77 .1

Bank Sta: Left Right Coeff Contr. Expan.
 9949.10110049.77 .3 .5
 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 9325.173 9917 807 F
 1008310406.36 807 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95

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Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name Shape Rise Span
 Culvert #1 Box 12 10
 FHWA Chart # 8 - flared wingwalls
 FHWA Scale # 1 - Wingwall flared 30 to 75 deg.
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef
 .5 70 .011 .011 0 .4 1

Number of Barrels = 6
 Upstream Elevation = 794.37

Centerline Stations
 Sta. Sta. Sta. Sta. Sta. Sta.
 9972 9983 9994 10006 10017 10028

Downstream Elevation = 794.1
 Centerline Stations
 Sta. Sta. Sta. Sta. Sta. Sta.
 9972 9983 9994 10006 10017 10028

CROSS SECTION

RIVER: southutoycreek
 REACH: 50 RS: 2560.417

INPUT

Description: Survey SUT_0300

Station Elevation Data num= 131

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9325.173	836.11	9330.4	8369340.887	8369351.375	835.427	69351.947	835.409	835.409	835.409	835.409	835.409
9361.862	834.894	89372.349	834.686	9382.837	834.212	39385.136	834.143	99393.324	833.900	939.900	939.900
9403.811	833.814	39414.299	833.315	69418.324	832.851	19424.786	832.011	29435.274	830.433	69435.274	830.433
9445.761	828.606	49451.513	828.292	19456.248	827.886	99466.736	826.985	69477.223	826.624	477.223	826.624
9484.702	826.073	9487.71	8269498.198	825.025	49508.685	823.810	19517.891	823.145	519.173	823.145	519.173
9519.173	823.035	9529.668	822.172	99540.147	821.828	39550.635	821.793	9551.088	821.777	561.122	821.777
9561.122	821.168	39571.609	820.313	59582.097	819.710	89584.269	819.596	99592.584	819.176	603.071	818.655
9603.071	818.655	79613.559	818.144	59617.458	817.972	29624.046	817.720	89634.534	817.117	645.021	816.480
9645.021	816.480	39650.646	816.239	655.508	8169665.996	815.363	79676.483	814.703	683.835	814.241	9686.97
9683.835	814.241	9686.97	814.043	9697.458	813.475	59707.945	812.799	717.024	812.206	9718.433	812.114
9718.433	812.114	9728.928	811.426	79739.407	810.729	79749.895	810.124	99750.213	810.026	9760.382	807.349
9760.382	807.349	69770.869	805.739	79781.357	8049783.402	8049791.844	804	9794.303	804.185	29801.352	804.353
9828.781	8029829.373	8029840.269	802.367	39851.165	804.474	19853.965	804.685	862.061	805.406	79872.957	805.480
9862.061	805.406	79872.957	805.480	69879.148	805.524	99883.852	805.535	79893.85	802.64	9949.101	803.359
9949.101	803.359	962.174	791.739	964.848	791.499	80.053	791.789	9984.607	792.42	9986.975	793.27
10049.77	793.27	10005.2	793.341	10013.32	792.110	024.27	792.681	10033.59	793.75	10094.328	804.775
10094.328	804.775	810098.67	804.543	10107.038	804.201	110109.878	804.060	310117.548	804.024	10120.7	804.101
10120.7	804.101	131.53	804.101	142.35	804.101	143.61	804.101	153.18	804	10164.01	804.101
10164.01	804.101	69.698	804.212	710174.848	804.572	2210185.678	805.295	810195.768	804.961	10196.498	804.949
10196.498	804.949	210207.328	804.858	810218.15	804.878	10221.838	805.605	210228.988	807.297	10239.818	809.527
10239.818	809.527	7610247.91	810.102	50.63	810	10251.9	810.102	60.74	810	10270.75	810.102
10270.75	810.102	80.75	810	10289.781	810.397	710290.768	810.445	610300.778	810.960	10310.788	811.427
10310.788	811.427	810320.798	811.812	10330.881	811.998	10340.8	812.103	50.81	812	10360.82	812.103
10360.82	812.103	70.83	812.103	80.84	812.103	90.848	812.280	510400.858	812.681	10406.368	812.902
10406.368	812.902										

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9325.173	.0759949	101	.0610049	77	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9949.101 10049.77 169.3019 167.621 203.519 .3 .5
 Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
9325.173	9917	807	F
1008310406.36	807		F

CROSS SECTION OUTPUT Profile #100Yr

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		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.37	Wt. n-Val.	0.075	0.060	0.100
Vel Head (ft)	0.43	Reach Len. (ft)	169.30	167.62	203.52
W.S. Elev (ft)	806.93	Flow Area (sq ft)	121.64	1273.46	54.30
Crit W.S. (ft)	799.11	Area (sq ft)	584.65	1273.46	398.02
E.G. Slope (ft/ft)	0.001782	Flow (cfs)	247.28	6861.49	47.23
Q Total (cfs)	7156.00	Top Width (ft)	186.01	100.67	177.67
Top Width (ft)	464.35	Avg. Vel. (ft/s)	2.03	5.39	0.87
Vel Total (ft/s)	4.94	Hydr. Depth (ft)	3.79	12.65	1.63
Max Chl Dpth (ft)	15.53	Conv. (cfs)	5857.5	162529.9	1118.6
Conv. Total (cfs)	169506.1	Wetted Per. (ft)	32.10	108.85	33.26
Length Wtd. (ft)	170.15	Shear (lb/sq ft)	0.42	1.30	0.18
Min Ch El (ft)	791.40	Stream Power (lb/ft s)	10406.36	0.00	0.00
Alpha	1.15	Cum Volume (acre-ft)	130.90	80.80	54.39
Frctn Loss (ft)	0.45	Cum SA (acres)	22.85	5.90	12.27
C & E Loss (ft)	0.11				

Warning: Multiple water surfaces were found that could balance the energy equation. The program selected the water surface

whose main channel velocity head was the closest to the previously computed cross section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #10Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	804.24	Wt. n-Val.	0.075	0.060	
Vel Head (ft)	0.23	Reach Len. (ft)	169.30	167.62	203.52
W.S. Elev (ft)	804.01	Flow Area (sq ft)	27.84	979.65	
Crit W.S. (ft)	796.87	Area (sq ft)	117.29	979.65	0.48
E.G. Slope (ft/ft)	0.001252	Flow (cfs)	17.74	3743.26	
Q Total (cfs)	3761.00	Top Width (ft)	114.88	99.61	44.98
Top Width (ft)	259.47	Avg. Vel. (ft/s)	0.64	3.82	
Vel Total (ft/s)	3.73	Hydr. Depth (ft)	0.87	9.83	
Max Chl Dpth (ft)	12.61	Conv. (cfs)	501.4	105805.0	
Conv. Total (cfs)	106306.4	Wetted Per. (ft)	32.10	107.57	
Length Wtd. (ft)	167.63	Shear (lb/sq ft)	0.07	0.71	
Min Ch El (ft)	791.40	Stream Power (lb/ft s)	10406.36	0.00	0.00
Alpha	1.04	Cum Volume (acre-ft)	54.65	61.40	18.85
Frctn Loss (ft)	0.35	Cum SA (acres)	18.56	5.82	8.02
C & E Loss (ft)	0.12				

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.98	Wt. n-Val.	0.075	0.060	0.100
Vel Head (ft)	0.27	Reach Len. (ft)	169.30	167.62	203.52
W.S. Elev (ft)	808.70	Flow Area (sq ft)	921.35	1451.51	719.49
Crit W.S. (ft)	800.49	Area (sq ft)	921.35	1451.51	719.49
E.G. Slope (ft/ft)	0.001198	Flow (cfs)	1778.78	6997.97	910.25
Q Total (cfs)	9687.00	Top Width (ft)	193.86	100.67	186.03
Top Width (ft)	480.56	Avg. Vel. (ft/s)	1.93	4.82	1.27
Vel Total (ft/s)	3.13	Hydr. Depth (ft)	4.75	14.42	3.87
Max Chl Dpth (ft)	17.30	Conv. (cfs)	51381.7	202143.0	26293.5
Conv. Total (cfs)	279818.2	Wetted Per. (ft)	195.09	108.85	186.55
Length Wtd. (ft)	174.34	Shear (lb/sq ft)	0.35	1.00	0.29
Min Ch El (ft)	791.40	Stream Power (lb/ft s)	10406.36	0.00	0.00
Alpha	1.80	Cum Volume (acre-ft)	183.61	92.87	82.62
Frctn Loss (ft)	0.32	Cum SA (acres)	24.04	5.90	15.98
C & E Loss (ft)	0.11				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

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water surface was used.

CROSS SECTION

RIVER: southutoycreek
 REACH: 50 RS: 2392.796

INPUT

Description:

Station Elevation Data		num=		90	
Sta	Elev	Sta	Elev	Sta	Elev
9677.094	8209677.672	8209688.194	8209698.716	8209704.854	820
9709.237	8209719.759	8209730.281	8209737.007	8209740.803	820
9751.325	8209761.846	8209769.161	8209772.368	8209782.89	820
9793.412	8209801.314	8209803.934	8209814.455	8209824.977	820
9833.468	8209835.499	8209846.021	8209856.543	8209865.621	820
9867.065	817.169	9877.586	814.578	989888.108	811.854
9909.152	809.476	9919.674	807.729	9925.441	807.737
9938.774	806.794	9950.473	806.995	3.418	805.344
9973.873	798.042	19985.573	791.262	9987.51	791.01
10020.677	971	1710030.478	801.689	210032.378	802.523
10052.1	80410055.24	80410065.24	80410075.24	80410085.24	804
10095.24	80410105.25	80410115.25	80410125.25	80410135.25	804
10145.25	80410155.25	80410165.26	80410175.26	80410185.26	804
10195.26	80410205.26	80410215.26	80410225.26	80410235.27	804
10245.27	80410255.27	80410265.27	80410275.27	804.492	10285.27
10295.288	05.234	910305.288	05.555	10315.288	05.916
10345.288	06.692	910355.288	06.916	10365.298	06.981
10395.298	09.859	210405.298	11.905	610415.298	15.469

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
9677.094	.075	9962.173	.075	10032.37	.08

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	9962.173	10032.37		390.086	5392.795	.1		.3

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	806.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.81	Wt. n-Val.	0.075	0.060	0.080
W.S. Elev (ft)	806.00	Reach Len. (ft)	390.09	392.80	322.41
Crit W.S. (ft)		Flow Area (sq ft)	19.61	798.22	522.97
E.G. Slope (ft/ft)	0.004265	Area (sq ft)	19.61	798.22	522.97
Q Total (cfs)	7156.00	Flow (cfs)	34.71	6174.05	947.24
Top Width (ft)	368.39	Top Width (ft)	11.70	70.20	286.49
Vel Total (ft/s)	5.34	Avg. Vel. (ft/s)	1.77	7.73	1.81
Max Chl Dpth (ft)	15.15	Hydr. Depth (ft)	1.68	11.37	1.83
Conv. Total (cfs)	109571.4	Conv. (cfs)	531.4	94536.0	14504.0
Length Wtd. (ft)	381.93	Wetted Per. (ft)	12.25	76.33	286.62
Min Ch El (ft)	790.85	Shear (lb/sq ft)	0.43	2.78	0.49
Alpha	1.83	Stream Power (lb/ft s)	10433.62	0.00	0.00
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)	129.73	76.81	52.24
C & E Loss (ft)	0.20	Cum SA (acres)	22.46	5.57	11.19

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
 This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #10Yr

E.G. Elev (ft)	803.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.61	Wt. n-Val.	0.075	0.060	0.080
W.S. Elev (ft)	803.16	Reach Len. (ft)	390.09	392.80	322.41
Crit W.S. (ft)		Flow Area (sq ft)	0.86	598.91	1.61
E.G. Slope (ft/ft)	0.004121	Area (sq ft)	0.86	598.91	1.61
Q Total (cfs)	3761.00	Flow (cfs)	0.56	3759.56	0.89
Top Width (ft)	77.51	Top Width (ft)	2.26	70.20	5.05
Vel Total (ft/s)	6.25	Avg. Vel. (ft/s)	0.64	6.28	0.55
Max Chl Dpth (ft)	12.31	Hydr. Depth (ft)	0.38	8.53	0.32
Conv. Total (cfs)	58590.5	Conv. (cfs)	8.6	58568.0	13.8

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Length Wtd. (ft)	390.23	Wetted Per. (ft)	2.39	76.33	5.09
Min Ch El (ft)	790.85	Shear (lb/sq ft)	0.09	2.02	0.08
Alpha	1.01	Stream Power (lb/ft s)	10433.62	0.00	0.00
Frctn Loss (ft)	1.04	Cum Volume (acre-ft)	54.42	58.36	18.85
C & E Loss (ft)	0.13	Cum SA (acres)	18.33	5.50	7.90

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.

This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	808.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.	0.075	0.060	0.080
W.S. Elev (ft)	807.90	Reach Len. (ft)	390.09	392.80	322.41
Crit W.S. (ft)		Flow Area (sq ft)	67.16	931.28	1133.00
E.G. Slope (ft/ft)	0.003241	Area (sq ft)	67.16	931.28	1133.00
Q Total (cfs)	9687.00	Flow (cfs)	100.21	6958.25	2628.54
Top Width (ft)	462.11	Top Width (ft)	43.50	70.20	348.42
Vel Total (ft/s)	4.54	Avg. Vel. (ft/s)	1.49	7.47	2.32
Max Chl Dpth (ft)	17.05	Hydr. Depth (ft)	1.54	13.27	3.25
Conv. Total (cfs)	170169.8	Conv. (cfs)	1760.3	122234.3	46175.2
Length Wtd. (ft)	375.83	Wetted Per. (ft)	44.13	76.33	348.59
Min Ch El (ft)	790.85	Shear (lb/sq ft)	0.31	2.47	0.66
Alpha	2.01	Stream Power (lb/ft s)	10433.62	0.00	0.00
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)	181.69	88.29	78.29
C & E Loss (ft)	0.15	Cum SA (acres)	23.58	5.57	14.73

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: southutoycreek

REACH: 50 RS: 2000

INPUT

Description:

Station	Elevation	Data	num=	210	Sta	Elev	Sta	Elev	Sta	Elev
9250838	22469260	185838	39149262	607838	43019273	177838	5987	9278	27838	6799
9286	17838	80479293	933838	92889299	162839	01179309	596839	17889312	155839	2184
9325	148839	42799325	259839	4297	9338	14839	63729340	922839	68289351	133839
9356	585839	93319364	125	8409372	248	8409377	118	8409387	911	840
9390	111	8409403	103	8409403	575	8409416	096	8409419	238	840
9429	088	8409434	901	8409442	081	8409450	564	8409455	074	840
9466	227	8409468	066	8409481	059	8409481	89	8409494	051	840
9497	553	8409507	044	8409513	216	8409520	037	8409528	879	840
9533	029	8409544	542	8409546	022839	95549559	014839	45839560	206839	3916
9572	007838	69659575	869838	3608	9585837	78329591	532837	51029597	992837	2418
9607	195836	91389610	985836	76459622	858836	30059623	977836	2594	9636	97
9638	521835	98249649	963835	21829654	184834	87529662	955	833	3289669	847831
9675	948828	5699	9685	51823	7316	9688	94821	84899701	173814	09829701
9714	926808	57619716	836807	92379727	918804	6395	9732	5803	63359740	911
9748	163802	05719753	903801	63989763	826800	92119766	896800	71339779	489800	0095
9779	889	8009792	881	8009795	152	8009805	874	8009810	815	800
9818	866	8009826	478	8009831	859	8009842	141	8009844	852	800
9857	804	8009857	844	8009870	837799	99549873	467	8009883	829	800
9889	131	8009896	822	8009904	794	8009909	815	8009920	457	800
9922	807	800	9935	8	800	9936	12	8009948	792	800
9961	785	798	8979967	446799	02539974	778796	7225	9980	15	791
10016	1	790	210020	91	791	3110026	75794	3463	10030	1795
10045	76	80010052	73800	133210061	42800	465210065	73800	640910077	09801	1051
10078	72801	171810091	71801	257110092	75801	2462	10104	7801	121410108	41801
10117	7800	821410124	08800	602510130	69800	573110139	74800	515710143	68800	4663
10155	4800	145610156	67800	156510169	67800	899610171	07801	035410182	66802	2488

SouthUtoyCreek.rep

10186.73802.717410195.65803.706110202.39804.509510208.64805.197710218.06805.9275
 10221.64806.102710233.72807.080910234.63807.210410247.62809.702310249.38810.0845
 10260.61812.538310265.04813.695810273.61816.177510280.71817.7437 10286.6818.7631
 10296.37820.505210299.59820.990510312.03822.852410312.59822.906410325.58 823.985
 10327.7 82410338.57 82410343.36 82410351.56 82410359.02 824
 10364.56823.798510374.69823.874410377.55824.070210390.35824.810510390.54824.8273
 10403.53827.773710406.01828.174410416.53828.383210421.68829.082810429.52830.6749
 10437.34832.203410442.51 833.144 10453837.0228 10455.5837.8175 10468.5837.8578
 10468.67837.855610481.49837.600610484.33837.559110494.48837.546510499.99837.6384
 10507.47 83810515.65838.237710520.47 838.40710531.32839.312910533.46839.5566
 10546.45840.577410546.98840.614610559.44841.466710562.64841.684910572.44842.8547
 10578.31843.497810585.43843.918810593.97 844.34410598.42 844.4910609.63844.9141
 10611.42844.980410624.41845.4829 10625.3845.5179 10637.4845.948610640.96846.0546
 10650.39 846.33810656.62846.485910663.39846.621110672.29846.835110676.38846.9274
 10687.95847.154510689.37847.187810702.36847.359910703.61847.388610715.36847.5669
 10719.27847.663310728.35 847.88510734.94847.958210741.34 848 10750 848

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 9250 .0859951.783 .06510039.74 .085

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9951.78310039.74 333.4372346.5684358.5162 .1 .3

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.085	0.065	0.085
W.S. Elev (ft)	805.73	Reach Len. (ft)	333.44	346.57	358.52
Crit W.S. (ft)		Flow Area (sq ft)	1190.52	1032.85	765.18
E.G. Slope (ft/ft)	0.001098	Area (sq ft)	1190.52	1032.85	765.18
Q Total (cfs)	7156.00	Flow (cfs)	2075.63	3900.12	1180.25
Top Width (ft)	491.25	Top Width (ft)	227.54	87.96	175.75
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)	1.74	3.78	1.54
Max Chl Dpth (ft)	15.53	Hydr. Depth (ft)	5.23	11.74	4.35
Conv. Total (cfs)	215985.8	Conv. (cfs)	62647.7	117715.2	35622.8
Length Wtd. (ft)	345.08	Wetted Per. (ft)	227.96	92.78	176.07
Min Ch El (ft)	790.20	Shear (lb/sq ft)	0.36	0.76	0.30
Alpha	1.58	Stream Power (lb/ft s)	10750.00	0.00	0.00
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	124.31	68.56	47.47
C & E Loss (ft)	0.02	Cum SA (acres)	21.39	4.85	9.48

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #10Yr

E.G. Elev (ft)	802.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.085	0.065	0.085
W.S. Elev (ft)	802.42	Reach Len. (ft)	333.44	346.57	358.52
Crit W.S. (ft)		Flow Area (sq ft)	462.87	741.74	238.40
E.G. Slope (ft/ft)	0.001850	Area (sq ft)	462.87	741.74	238.40
Q Total (cfs)	3761.00	Flow (cfs)	594.70	2916.05	250.25
Top Width (ft)	439.51	Top Width (ft)	207.15	87.96	144.40
Vel Total (ft/s)	2.61	Avg. Vel. (ft/s)	1.28	3.93	1.05
Max Chl Dpth (ft)	12.22	Hydr. Depth (ft)	2.23	8.43	1.65
Conv. Total (cfs)	87436.7	Conv. (cfs)	13825.8	67793.0	5818.0
Length Wtd. (ft)	344.94	Wetted Per. (ft)	207.24	92.78	144.54
Min Ch El (ft)	790.20	Shear (lb/sq ft)	0.26	0.92	0.19
Alpha	1.81	Stream Power (lb/ft s)	10750.00	0.00	0.00
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	52.34	52.32	17.96
C & E Loss (ft)	0.04	Cum SA (acres)	17.40	4.78	7.35

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	807.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.085	0.065	0.085
W.S. Elev (ft)	807.66	Reach Len. (ft)	333.44	346.57	358.52

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Crit W.S. (ft)		Flow Area (sq ft)	1636.96	1202.98	1129.69
E.G. Slope (ft/ft)	0.000920	Area (sq ft)	1636.96	1202.98	1129.69
Q Total (cfs)	9687.00	Flow (cfs)	3168.20	4603.92	1914.88
Top Width (ft)	519.27	Top Width (ft)	234.07	87.96	197.25
Vel Total (ft/s)	2.44	Avg. Vel. (ft/s)	1.94	3.83	1.70
Max Chl Dpth (ft)	17.46	Hydr. Depth (ft)	6.99	13.68	5.73
Conv. Total (cfs)	319347.9	Conv. (cfs)	104444.8	151775.8	63127.3
Length Wtd. (ft)	345.22	Wetted Per. (ft)	234.76	92.78	197.67
Min Ch El (ft)	790.20	Shear (lb/sq ft)	0.40	0.74	0.33
Alpha	1.47	Stream Power (lb/ft s)	10750.00	0.00	0.00
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	174.06	78.67	69.92
C & E Loss (ft)	0.02	Cum SA (acres)	22.34	4.85	12.71

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: southutoycreek
REACH: 50

RS: 1653.432

INPUT

Description: A

Station Elevation Data

num= 144

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9486.829838	6359.9491	12838.52859502	974838.21149503	974838.19619514	828	838			
9522.597	8389526.682	8389538.536	838	9541.22	838	9550.39	838		
9559.843	8389562.244837	97789574.098837	47149578.465837	16439585.952	836.68				
9597.088836	02529597.806	836	9609.66	8369615.711	8369621.514	836			
9633.368	8369634.333	8369645.222	8369652.956	8369657.076835	9118				
9668.93834	94159671.579834	60029680.784832	84459690.202829	79279692.638828	7399				
9704.492823	10329708.824821	48489716.346819	18879727.447816	10079728.201815	8835				
9740.055811	1186	9746.07808	66759751.909806	30799763.763801	51839764.692801	1456			
9775.617797	93859783.315797	78859787.471797	73229799.325797	58859801.938797	5573				
9811.179797	4471	9820.56797	33529823.033797	30579834.887797	16439839.183797	1131			
9846.741797	02299857.806796	89099858.595796	88089870.449796	74019876.429796	6687				
9882.303796	59539894.157796	45739895.051796	44669906.011796	31599913.674796	2244				
9917.865796	17579929.719	796.0339932	297796.0279941	573795.03169950	919793.4183				
9953.427792	99859965.281790	85299969.542790	1025	9977.36	789.69	9979.06	789.5		
9985.88	789.8910024	55790.229810025	41790.587310036	41794.871410044	03	797.235			
10048.26798	318510060.11799	371210062.66799	490610071.97	80010081.28	800				
10083.82	80010095.68	800	10099.9	80010107.53	80010118.52	800			
10119.38	80010131.24	80010137.15	80010143.09	80010154.95	800				
10155.77	800	10166.8	80010174.39	80010178.65	80010190.51	800			
10193.01	80010202.36	80010205.15	80010212.88	800	10223	800			
10228.48	80010233.11	80010243.22	80010253.34	80010263.45	800				
10273.56	80010283.68	80010293.79800	062910295.42800	227810303.91801	0949				
10314.02802	350710324.13803	441110334.25805	116110344.36807	744710354.47811	1967				
10362.36	813.86910364	59814.6043	10374.7817	053910384.81819	475810394.93820	2873			
10405.04822	065110415.15824	117510425.27826	308710429.31827	277110435.38828	8673				
10445.49831	715310455.61834	635210465.72	838.52910475	83842.501410485	95	845.535			
10496.06848	201210496.25848	250710506.17850	892410516.29853	5682	10526.4	855.757			
10536.52857	265310546.63858	673210556.74860	511910563.19861	339310566.86861	7668				
10576.97	86210587.08	862	10597.2	86210604.12	862				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9486.829	.099932	297	.06510044	03	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	9932.297	10044.03		379.0372369	9936	362.339	.1 .3

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.090	0.065	0.100
W.S. Elev (ft)	805.57	Reach Len. (ft)	379.04	369.99	362.34
Crit W.S. (ft)		Flow Area (sq ft)	1443.03	1541.14	1548.67
E.G. Slope (ft/ft)	0.000382	Area (sq ft)	1443.03	1541.14	1548.67
Q Total (cfs)	7156.00	Flow (cfs)	1867.08	3921.96	1366.97
Top Width (ft)	582.28	Top Width (ft)	178.57	111.73	291.98
Vel Total (ft/s)	1.58	Avg. Vel. (ft/s)	1.29	2.54	0.88

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Max Chl Dpth (ft)	16.07	Hydr. Depth (ft)	8.08	13.79	5.30
Conv. Total (cfs)	365896.8	Conv. (cfs)	95466.3	200535.5	69895.0
Length Wtd. (ft)	371.27	Wetted Per. (ft)	179.90	113.49	292.56
Min Ch El (ft)	789.50	Shear (lb/sq ft)	0.19	0.32	0.13
Alpha	1.66	Stream Power (lb/ft s)	10604.12	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	114.23	58.32	37.95
C & E Loss (ft)	0.00	Cum SA (acres)	19.84	4.06	7.55

CROSS SECTION OUTPUT Profile #10Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.31	Wt. n-Val.	0.090	0.065	0.100
Vel Head (ft)	0.06	Reach Len. (ft)	379.04	369.99	362.34
W.S. Elev (ft)	802.25	Flow Area (sq ft)	863.10	1169.72	610.65
Crit W.S. (ft)		Area (sq ft)	863.10	1169.72	610.65
E.G. Slope (ft/ft)	0.000417	Flow (cfs)	855.92	2585.51	319.57
Q Total (cfs)	3761.00	Top Width (ft)	170.34	111.73	269.17
Top Width (ft)	551.25	Avg. Vel. (ft/s)	0.99	2.21	0.52
Vel Total (ft/s)	1.42	Hydr. Depth (ft)	5.07	10.47	2.27
Max Chl Dpth (ft)	12.75	Conv. (cfs)	41925.4	126646.1	15653.5
Conv. Total (cfs)	184225.0	Wetted Per. (ft)	171.03	113.49	269.50
Length Wtd. (ft)	371.24	Shear (lb/sq ft)	0.13	0.27	0.06
Min Ch El (ft)	789.50	Stream Power (lb/ft s)	10604.12	0.00	0.00
Alpha	1.78	Cum Volume (acre-ft)	47.27	44.71	14.47
Frctn Loss (ft)	0.10	Cum SA (acres)	15.95	3.99	5.65
C & E Loss (ft)	0.01				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.59	Wt. n-Val.	0.090	0.065	0.100
Vel Head (ft)	0.07	Reach Len. (ft)	379.04	369.99	362.34
W.S. Elev (ft)	807.52	Flow Area (sq ft)	1794.51	1758.15	2123.01
Crit W.S. (ft)		Area (sq ft)	1794.51	1758.15	2123.01
E.G. Slope (ft/ft)	0.000374	Flow (cfs)	2606.34	4832.42	2248.25
Q Total (cfs)	9687.00	Top Width (ft)	183.38	111.73	299.45
Top Width (ft)	594.56	Avg. Vel. (ft/s)	1.45	2.75	1.06
Vel Total (ft/s)	1.71	Hydr. Depth (ft)	9.79	15.74	7.09
Max Chl Dpth (ft)	18.02	Conv. (cfs)	134714.1	249773.8	116205.5
Conv. Total (cfs)	500693.3	Wetted Per. (ft)	185.09	113.49	300.28
Length Wtd. (ft)	371.27	Shear (lb/sq ft)	0.23	0.36	0.17
Min Ch El (ft)	789.50	Stream Power (lb/ft s)	10604.12	0.00	0.00
Alpha	1.58	Cum Volume (acre-ft)	160.93	66.89	56.53
Frctn Loss (ft)	0.12	Cum SA (acres)	20.74	4.06	10.67
C & E Loss (ft)	0.00				

CROSS SECTION

RIVER: southutoycreek

REACH: 50

RS: 1283.438

INPUT

Description:

Station	Elevation	Data	num=	176						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
9346.735	8329351.127		8329357.568		8329363.642		8329374.198		832	
9376.158	8329388.674		8329390.828		8329401.189		8329407.458		832	
9413.705	8329424.088		832 9426.22		8329438.736		8329440.718		832	
9451.252	8329457.347		8329463.767		8329473.977		8329476.283		832	
9488.798	8329490.607		8329501.314		8329507.237		832 9513.83		832	
9523.867	8329526.345		8329538.861		8329540.497		8329551.376		832	
9557.127	8329563.892		8329573.756		8329576.408		8329588.923		832	
9590.386831	93929601.439830	68159607.016829	69259613.954828	61959623.646826	9927					
9626.47826	54929638.986824	32169640.276824	04169651.501820	92329656.906818	0239					
9664.017	814.2329673	536808.83789676	532807.21429689	048805.20569690	166805.1341					
9701.564804	30019706.795803	88139714.079802	81319723.425801	72769726.595801	6278					
9739.11801	20289740.055801	16759751.626800	80879756.685800	67029764.142800	5206					
9773.315	800.3319776	657800.24619789	173799.99439789	945799.96449801	688799.6146					
9806.575799	42659814.204798	91369823.205798	3248 9826.72798	10939839.235	798					

SouthUtoyCreek.rep

9839.834797.99829851.751797.98939856.464797.89599864.266797.67289873.094797.1507
 9876.782 796.8939889.298796.02759889.724796.01399901.813795.93379906.354795.7574
 9914.329795.44329922.984795.10229926.844794.9343 9939.36794.45749939.614794.4485
 9951.876793.34819956.244792.58069964.391790.94069972.873789.1515 9984.11 788.78
 9985.38 788.65 9989.85 789.08 9991 789.3310022.76789.479810026.97 790
 10039.39 79010039.48 790 10052 79010056.02790.058710064.52790.3598
 10072.65790.699210077.03790.870410089.28791.391210089.55791.401810102.06792.4591
 10105.91793.533310114.58796.158210122.54798.713110127.09800.096410139.17800.7943
 10139.61800.820110152.13801.5188 10155.8801.712210164.64802.531210172.43803.5759
 10177.16804.334510188.02806.413710188.75 806.56210190.56806.907810200.46809.2483
 10209.8811.704710212.17812.344910223.87814.573510229.03815.351510235.58 816.134
 10247.28 817.87810248.27818.041910258.99819.808710267.51821.5284 10270.7822.1501
 10282.4824.391710286.74825.104310294.11826.068310305.81827.113610305.98827.1295
 10317.52827.986810325.22828.502310329.22828.817610340.93829.800610344.45830.1554
 10352.64830.963810363.69832.013610364.34832.075210376.05 833.1810382.93833.9983
 10387.75834.681310399.46837.592910402.16838.024910411.17838.7561 10421.4839.6212
 10422.87839.707910434.58840.634210440.64841.258510446.28841.985810457.99843.5235
 10459.87843.7524 10469.7844.941110479.11846.0105 10481.4846.276710493.11 847.727
 10498.35848.399710504.81849.238810516.52850.788310517.58850.941610528.23852.7247
 10536.82854.039410539.93854.470510551.64855.734610556.06856.419610563.34 857.503
 10575.05859.658910575.29859.707710586.76861.841410594.53 861.96610598.46 862
 10598.78 862

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 9346.735 .099939.614 .06510114.58 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9939.61410114.58 280.2758274.5756284.1626 .1 .3

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.090	0.065	0.100
W.S. Elev (ft)	805.46	Reach Len. (ft)	280.28	274.58	284.16
Crit W.S. (ft)		Flow Area (sq ft)	1609.22	2567.79	280.81
E.G. Slope (ft/ft)	0.000250	Area (sq ft)	1609.22	2567.79	280.81
Q Total (cfs)	7156.00	Flow (cfs)	1444.98	5543.37	167.65
Top Width (ft)	495.62	Top Width (ft)	252.17	174.97	68.48
Vel Total (ft/s)	1.61	Avg. Vel. (ft/s)	0.90	2.16	0.60
Max Chl Dpth (ft)	16.81	Hydr. Depth (ft)	6.38	14.68	4.10
Conv. Total (cfs)	452222.4	Conv. (cfs)	91315.6	350312.3	10594.6
Length Wtd. (ft)	277.30	Wetted Per. (ft)	252.55	176.13	69.40
Min Ch El (ft)	788.65	Shear (lb/sq ft)	0.10	0.23	0.06
Alpha	1.47	Stream Power (lb/ft s)	10598.78	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	100.95	40.87	30.34
C & E Loss (ft)	0.01	Cum SA (acres)	17.96	2.84	6.05

CROSS SECTION OUTPUT Profile #10Yr

E.G. Elev (ft)	802.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.090	0.065	0.100
W.S. Elev (ft)	802.16	Reach Len. (ft)	280.28	274.58	284.16
Crit W.S. (ft)		Flow Area (sq ft)	833.97	1989.49	86.86
E.G. Slope (ft/ft)	0.000202	Area (sq ft)	833.97	1989.49	86.86
Q Total (cfs)	3761.00	Flow (cfs)	476.09	3257.15	27.77
Top Width (ft)	440.90	Top Width (ft)	219.90	174.97	46.04
Vel Total (ft/s)	1.29	Avg. Vel. (ft/s)	0.57	1.64	0.32
Max Chl Dpth (ft)	13.51	Hydr. Depth (ft)	3.79	11.37	1.89
Conv. Total (cfs)	264377.1	Conv. (cfs)	33466.2	228959.2	1951.7
Length Wtd. (ft)	276.65	Wetted Per. (ft)	220.09	176.13	46.71
Min Ch El (ft)	788.65	Shear (lb/sq ft)	0.05	0.14	0.02
Alpha	1.42	Stream Power (lb/ft s)	10598.78	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	39.88	31.30	11.56
C & E Loss (ft)	0.00	Cum SA (acres)	14.25	2.77	4.34

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	807.47	Element	Left OB	Channel	Right OB
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Vel Head (ft)	0.07	Wt. n-Val.	0.090	0.065	0.100
W.S. Elev (ft)	807.40	Reach Len. (ft)	280.28	274.58	284.16
Crit W.S. (ft)		Flow Area (sq ft)	2108.47	2906.16	422.84
E.G. Slope (ft/ft)	0.000271	Area (sq ft)	2108.47	2906.16	422.84
Q Total (cfs)	9687.00	Flow (cfs)	2288.14	7083.06	315.80
Top Width (ft)	516.44	Top Width (ft)	263.42	174.97	78.05
Vel Total (ft/s)	1.78	Avg. Vel. (ft/s)	1.09	2.44	0.75
Max Chl Dpth (ft)	18.75	Hydr. Depth (ft)	8.00	16.61	5.42
Conv. Total (cfs)	588874.8	Conv. (cfs)	139096.6	430580.5	19197.7
Length Wtd. (ft)	277.87	Wetted Per. (ft)	263.98	176.13	79.17
Min Ch El (ft)	788.65	Shear (lb/sq ft)	0.13	0.28	0.09
Alpha	1.46	Stream Power (lb/ft s)	10598.78	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	143.94	47.08	45.94
C & E Loss (ft)	0.02	Cum SA (acres)	18.80	2.84	9.10

CROSS SECTION

RIVER: southutoycreek
 REACH: 50 RS: 1008.862

INPUT

Description:

Station Elevation Data		num= 256		Sta Elev		Sta Elev		Sta Elev								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev							
8724.824824	25318734.469823	9822	8738.17823	70998745.308823	08368756.148822	0696										
8764.087821	59178766.987821	45548777	826821.07298788	666821.15478790	004821.1804											
8799.505821	31488810.344821	34668815	921	821.2428821	184821.16718832	023821	1201									
8841.839821	21058842.863821	21678853	702821.00748864	541820.10748867	756	820										
8875.381819	8096	8886.22818	78288893.673816	68878897.059815	71938907.899814	3296										
8918.738	814.027	8919.59	8148929.577	8148940.417814	24478945.507814	1061										
8951.256814	17588962.096814	49158971	424814.58718972	935814.64248983	774815.1605											
8994.614814	91928997.342814	66719005	453814.49789016	292814.06289023	259	814										
9027.132	8149037.971	814	9048.81	8149049.176	814	9059.65	814									
9070.489	8149075.093	8149081	328	8149092.168813	9005	9101.01813	4538									
9103.007813	34159112.057	812.8339113	716812.75799123	765812.75189133	813812	8959										
9143.862812	80669153.911812	70349155	427812.69739163	959812.65359174	008812	5727										
9184.056812	39559194.105812	10229204	154	8129214.202811	83769224	251811	1625									
9234.3809	71329244.348808	86229254	397808.4573	9257.18808	40489264	446808	2702									
9274.494808	27189284.543808	43689294	592808.3365	9304.64	807.9159314	689807	4656									
9324.738807	06389334.786806	61539339	506806.27929342	467806	17869346	443806	0324									
9357.98805	31139359	524805	17119372	605803	65329373	492803	51689385	686801	7275							
9389.004801	50479398	766800	85889404	516	800.4719411	847800	20499420	028800	1096							
9422.243	8009423	995	8009435	355	8009439	456	8009448	467	800							
9454.916	8009461	579	8009470	377799	94829474	691799	93489485	838	799	615						
9487.803799	53469500	916799	06589501	298799	05419514	028798	26899516	759798	1396							
9527.14	798	9532.22	7989540	252	7989547	681	7989553	364	798							
9563.141	7989566	476	7989578	602	7989579	588	798	9592	7	798						
9594.063	7989605	812797	99389609	523797	95169618	924797	81099624	984797	7202							
9632.036797	63229640	445797	54199645	148797	52119655	905797	4734	9658	26797	4629						
9671.366797	40489671	372797	40489684	484797	35429686	827797	35699697	596797	4352							
9702.287797	46989710	708797	53189717	748797	5641	9723	82797	50649733	209797	4378						
9736.932797	38689748	669796	51259750	044796	38519763	156	796	9764	13	796						
9776.268	7969779	591	796	9789.38	7969795	051	7969802	492	796							
9810.512	7969815	604	7969825	973	7969828	716	7969841	433	796							
9841.828	796	9854.94	7969856	894	7969868	053	7969872	355	796							
9881.165	7969887	816	7969894	277	7969903	276	7969907	389796	2307							
9918.737798	92729920	501799	33329933	613	8009934	198	8009946	725	800							
9949.658	8009959	837796	62629965	119793	53839972	949789	6653	9977	16	789	06					
9988.33	788	21	9989	33	788	1310002	88	788	810015	63	790	04	10025	4793	6709	
10026	96794	127210038	51797	247910042	42	797	80310051	62	798	60910057	88798	9779				
10064	73799	381310073	34799	721210077	85	799	869	10088	8799	879510090	96799	8481				
10104	07	799	63310104	27799	629410117	18799	434310119	73799	395910130	29799	2363					
10135	19799	162410143	41799	036210150	65798	927210156	52798	835310166	11	798	692					
10169	63798	640210181	57798	461210182	74798	444110195	85798	243410197	03798	2257						
10208	97798	037510212	49798	008910222	08	79810227	95	79810235	19	798						
10243	41	798	10248	3	79810258	87	79810261	41	79810274	33	798					
10274	53	79810287	64	79810289	79	79810300	75798	303610305	25798	5112						
10313	86799	093610320	71799	356910326	97799	451810336	18799	490210340	09799	4877						
10351	64799	4745	10353	2799	478510366	31799	6991	10367	1799	718510379	42800	1698				
10382	56800	288310392	53800	998310398	02801	459310405	65802	379510413	48803	6028						
10418	76804	466810428	94806	162110431	87806	6863	10444	4809	400410444	98809	5595					
10458	09813	099110459	86813	581310471	21816	824710475	32818	020410484	32820	5576						
10490	78822	290710497	43823	885410506	24825	800210510	54826	6984	10521	7828	9838					

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10523.65829,387910536.77832,113310537.16832,197110549.88834,868110552.62835.4424
 10562.99 837.7210568.09838.9048 10576.1 841.05410583.55843,181410589.21844.8998
 10589.23 844.903

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 8724.824 .0959946.725 .06510073,34 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9946.72510073.34 246.5609394.0111542,1083 .3 .5
 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 8724.824 9659.26 806.56 F
 10282.1310589.23 806.59 F

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.095	0.065	0.100
W.S. Elev (ft)	805.40	Reach Len. (ft)	246.56	394.01	542.11
Crit W.S. (ft)	798.28	Flow Area (sq ft)	2451.01	1449.49	1401.50
E.G. Slope (ft/ft)	0.000322	Area (sq ft)	4289.78	1449.49	2150.72
Q Total (cfs)	7156.00	Flow (cfs)	2866.23	2961.04	1328.74
Top Width (ft)	1067.80	Top Width (ft)	590.16	126.62	351.02
Vel Total (ft/s)	1.35	Avg. Vel. (ft/s)	1.17	2.04	0.95
Max Chl Dpth (ft)	17.27	Hydr. Depth (ft)	8.53	11.45	6.71
Conv. Total (cfs)	399070.5	Conv. (cfs)	159841.5	165129.0	74100.0
Length Wtd. (ft)	380.67	Wetted Per. (ft)	287.90	130.29	208.81
Min Ch El (ft)	788.13	Shear (lb/sq ft)	0.17	0.22	0.13
Alpha	1.34	Stream Power (lb/ft s)	10589.23	0.00	0.00
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	81.97	28.21	22.41
C & E Loss (ft)	0.10	Cum SA (acres)	15.25	1.89	4.68

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #10Yr

E.G. Elev (ft)	802.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.095	0.065	0.100
W.S. Elev (ft)	802.09	Reach Len. (ft)	246.56	394.01	542.11
Crit W.S. (ft)	794.77	Flow Area (sq ft)	1498.21	1029.82	709.46
E.G. Slope (ft/ft)	0.000402	Area (sq ft)	2381.94	1029.82	1020.95
Q Total (cfs)	3761.00	Flow (cfs)	1410.75	1872.62	477.63
Top Width (ft)	1019.96	Top Width (ft)	563.48	126.62	329.87
Vel Total (ft/s)	1.16	Avg. Vel. (ft/s)	0.94	1.82	0.67
Max Chl Dpth (ft)	13.96	Hydr. Depth (ft)	5.21	8.13	3.40
Conv. Total (cfs)	187609.1	Conv. (cfs)	70372.0	93411.6	23825.5
Length Wtd. (ft)	375.73	Wetted Per. (ft)	287.90	130.29	208.81
Min Ch El (ft)	788.13	Shear (lb/sq ft)	0.13	0.20	0.09
Alpha	1.51	Stream Power (lb/ft s)	10589.23	0.00	0.00
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	29.54	21.78	7.95
C & E Loss (ft)	0.08	Cum SA (acres)	11.73	1.82	3.11

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	807.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.095	0.065	0.100
W.S. Elev (ft)	807.38	Reach Len. (ft)	246.56	394.01	542.11
Crit W.S. (ft)	799.06	Flow Area (sq ft)	5492.07	1699.66	2855.47
E.G. Slope (ft/ft)	0.000168	Area (sq ft)	5492.07	1699.66	2855.47
Q Total (cfs)	9687.00	Flow (cfs)	4715.63	2792.21	2179.16
Top Width (ft)	1118.12	Top Width (ft)	629.79	126.62	361.71
Vel Total (ft/s)	0.96	Avg. Vel. (ft/s)	0.86	1.64	0.76

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Max Chl Dpth (ft)	19.25	Hydr. Depth (ft)	8.72	13.42	7.89
Conv. Total (cfs)	746980.9	Conv. (cfs)	363630.0	215312.2	168038.8
Length Wtd. (ft)	347.26	Wetted Per. (ft)	630.60	130.29	362.30
Min Ch El (ft)	788.13	Shear (lb/sq ft)	0.09	0.14	0.08
Alpha	1.36	Stream Power (lb/ft s)	10589.23	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	119.49	32.56	35.25
C & E Loss (ft)	0.02	Cum SA (acres)	15.92	1.89	7.67

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: southutoycreek
 REACH: 50 RS: 614.851

INPUT

Description: Survey SUT_0200

Station Elevation Data		num= 238									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8664.778	820.8670.08		8208680.814		820.0498688.036		8208691.547		819.967		
8702.281	819.7218713.015		819.7258715.557		819.748723.748		819.7688734.482		819.412		
8743.078	819.0158745.216		818.9198755.949		818.3898766.683		817.7928770.599		817.002		
8777.417	816.004.8788.15		815.6618798.119		814.968798.884		814.8998809.618		814.315		
8820.351	814.8825.64		8148831.085		814.0978841.819		814.0418852.552		814		
8853.161	8148863.286		814.8874.02		8148880.682		8148884.753		814		
8895.487	8148906.221		8148908.202		8148916.954		8148927.688		814		
8935.723	8148938.422		8148949.155		8148959.889		8148963.244		813.86		
8970.623	813.4078981.356		812.78990.765		812.191.8992.09		812.1129002.824		811.601		
9013.557	811.2089018.286		810.9129024.291		810.5589035.025		810.1049036.474		810.078		
9045.21	810.9055.31		809.834.9065.41		809.376.9075.51		809.12.9083.6		808.962		
9085.609	808.939095.709		808.8419105.809		808.6139115.909		808.2259126.009		807.867		
9136.108	807.4719146.208		807.1099154.904		806.8019156.308		806.7569166.408		806.539		
9176.508	806.3689186.608		806.1959196.707		805.9089206.807		805.5689216.907		805.184		
9223.165	804.9559225.088		804.8899227.066		804.8339237.322		804.5279247.577		804.05		
9257.833	8049268.088		803.5969270.164		803.4669278.344		802.8079288.599		802.153		
9298.855	801.8689309.111		801.947.9315.24		801.9759319.366		8029329.622		802		
9339.877	8029350.133		8029360.316		801.8739360.388		801.879370.644		800.783		
9380.899	800.3519391.155		800.0769401.411		8009405.392		8009411.666		800		
9421.922	8009432.177		8009442.433		8009450.468		8009452.688		800		
9462.944	8009473.199		8009483.455		8009493.711		799.9259495.544		799.936		
9503.966	799.9499514.222		8009524.477		8009534.733		800.9540.62		800		
9544.988	8009555.244		8009565.499		8009575.755		8009585.696		800		
9586.011	8009596.266		8009606.522		8009616.777		8009627.033		800		
9630.771	8009637.288		8009647.544		8009657.799		8009668.055		800		
9675.847	8009678.311		8009688.566		8009698.822		800.0859709.077		800.555		
9719.333	801.0659720.923		801.1449729.588		801.5389739.844		801.8249750.099		801.961		
9760.355	801.9839765.999		8029770.611		8029780.866		8029791.122		802		
9801.377	8029811.075		8029811.633		801.999821.888		8029832.368		802		
9842.597	8029852.739		8029852.827		801.9999863.056		801.9619873.285		802		
9883.514	8029893.744		8029900.238		8029903.973		801.8679914.202		801.445		
9919.612	801.1459924.381		800.99934.505		801.6359944.628		8029954.751		802		
9960.24	789.47.9963.94		789.47.9972.59		787.299986.021		787.329989.875		787.51		
9996.31	787.7710003.64		787.45.10008.5		787.45.10021.5		789.7410025.24		789.74		
10027.96	798.7410029.61		801.94310035.74		80210045.86		801.96410055.98		801.89		
10056.39	801.89310065.99		80210075.99		80210085.99		801.986.10096		802		
10106	801.858.10116		801.541.10126		801.53810136.01		801.25910146.01		801.312		
10156.01	801.43110166.01		801.46310176.01		801.33510186.02		801.38510196.02		801.457		
10206.02	801.61110216.02		801.61910226.03		801.64510236.03		801.710246.03		801.733		
10256.03	801.7410266.04		801.22110276.04		793.6110286.04		78810296.04		788		
10304.28	78810306.05		78810316.05		78810326.05		795.83510336.05		803.021		
10346.05	802.8610356.06		80410366.06		80410376.06		804.04810386.06		804.588		
10396.07	805.27510406.07		805.94510416.07		80610426.07		80610436.08		806.527		
10446.08	807.41910456.08		807.9910466.08		80810476.08		808.79710486.09		809.582		
10496.09	81010506.09		810.07210516.09		811.1.10526.1		811.709.10536.1		812.198		
10546.1	813.235.10556.1		813.71910566.11		814.83910576.11		815.37410586.11		815.773		
10596.11	816.81110606.11		817.49510616.12		818.06610626.12		819.21910636.12		819.498		
10646.12	820.65910646.43		820.681100021.5		820.681						

Manning's n Values num= 3

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Sta n Val Sta n Val Sta n Val
 8664.778 .1 9963.94 .065 10021.5 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9963.94 10021.5 171.471577.8137661.24157 .3 .5
 Ineffective Flow num= 4
 Sta L Sta R Elev Permanent
 8664.778 8904.8 800 F
 8904.8 9783.36 805.87 F
 9783.36 9956.74 800 F
 10026.310646.43 802 F
 Blocked Obstructions num= 1
 Sta L Sta R Elev
 10255.7410506.27806.6597

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.	0.100	0.065	0.100
W.S. Elev (ft)	804.72	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)	795.44	Flow Area (sq ft)	594.23	970.92	781.43
E.G. Slope (ft/ft)	0.001430	Area (sq ft)	2699.79	970.92	781.43
Q Total (cfs)	7156.00	Flow (cfs)	717.07	5489.73	949.20
Top Width (ft)	1024.95	Top Width (ft)	733.15	57.56	234.24
Vel Total (ft/s)	3.05	Avg. Vel. (ft/s)	1.21	5.65	1.21
Max Chl Dpth (ft)	17.43	Hydr. Depth (ft)	3.29	16.87	3.34
Conv. Total (cfs)	189228.0	Conv. (cfs)	18961.6	145166.4	25100.0
Length Wtd. (ft)	6.00	Wetted Per. (ft)	188.83	58.05	245.87
Min Ch El (ft)	787.29	Shear (lb/sq ft)	0.28	1.49	0.28
Alpha	2.67	Stream Power (lb/ft s)	100021.50	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	62.19	17.26	4.17
C & E Loss (ft)		Cum SA (acres)	11.51	1.06	1.04

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #10Yr

E.G. Elev (ft)	801.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.	0.100	0.065	0.100
W.S. Elev (ft)	801.49	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)	792.85	Flow Area (sq ft)	81.88	785.00	54.55
E.G. Slope (ft/ft)	0.001211	Area (sq ft)	587.24	785.00	73.32
Q Total (cfs)	3761.00	Flow (cfs)	109.05	3545.14	106.82
Top Width (ft)	529.12	Top Width (ft)	393.05	57.56	78.51
Vel Total (ft/s)	4.08	Avg. Vel. (ft/s)	1.33	4.52	1.96
Max Chl Dpth (ft)	14.20	Hydr. Depth (ft)	2.88	13.64	11.36
Conv. Total (cfs)	108064.7	Conv. (cfs)	3133.2	101862.2	3069.3
Length Wtd. (ft)	6.00	Wetted Per. (ft)	36.33	58.05	7.40
Min Ch El (ft)	787.29	Shear (lb/sq ft)	0.17	1.02	0.56
Alpha	1.16	Stream Power (lb/ft s)	100021.50	0.00	0.00
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	21.13	13.57	1.14
C & E Loss (ft)	0.06	Cum SA (acres)	9.03	0.99	0.57

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	807.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.100	0.065	0.100
W.S. Elev (ft)	807.19	Reach Len. (ft)	6.00	6.00	6.00
Crit W.S. (ft)	797.10	Flow Area (sq ft)	4613.33	1113.23	1459.37
E.G. Slope (ft/ft)	0.000471	Area (sq ft)	4613.33	1113.23	1459.37
Q Total (cfs)	9687.00	Flow (cfs)	4674.80	3958.27	1053.93
Top Width (ft)	1299.73	Top Width (ft)	820.11	57.56	422.06
Vel Total (ft/s)	1.35	Avg. Vel. (ft/s)	1.01	3.56	0.72
Max Chl Dpth (ft)	19.90	Hydr. Depth (ft)	5.63	19.34	3.46
Conv. Total (cfs)	446223.9	Conv. (cfs)	215340.8	182334.8	48548.3

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Length Wtd. (ft)	6.00	Wetted Per. (ft)	828.59	58.05	435.65
Min Ch El (ft)	787.29	Shear (lb/sq ft)	0.16	0.56	0.10
Alpha	3.15	Stream Power (lb/ft s)	100021.50	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	90.89	19.84	8.40
C & E Loss (ft)	0.02	Cum SA (acres)	11.82	1.06	2.79

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: southutoycreek

REACH: 50

RS: 596.1601

INPUT

Description: Fairburn Road (Survey Utoy SUT_0200)

Distance from Upstream XS = 6

Deck/Roadway Width = 60

Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num=	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
269	8550.47	822.73				8555.65	822.52				8563.46	822.2			
	8566.81	822.06				8577.97	822				8586.01	821.86			
	8589.12	821.78				8600.28	821.25				8608.55	820.87			
	8611.44	820.73				8622.6	820.21				8631.1	820.05			
	8633.75	820				8644.91	819.94				8653.65	819.59			
	8656.07	819.47				8667.23	818.97				8676.19	818.57			
	8678.38	818.48				8689.54	818.14				8698.74	818			
	8700.7	818				8711.86	817.97				8721.29	817.73			
	8723.01	817.68				8734.17	817.34				8743.84	816.96			
	8745.33	816.91				8756.48	816.56				8766.38	816.22			
	8767.64	816.18				8778.8	816				8788.93	816			
	8789.96	816				8801.11	815.67				8811.48	815.17			
	8812.27	815.14				8823.43	814.8				8834.02	814.43			
	8834.59	814.42				8845.74	814.25				8856.57	814.01			
	8856.9	814				8868.06	814				8879.12	814			
	8879.22	814				8890.37	814				8901.53	813.66			
	8901.66	813.65				8912.69	813.01				8923.85	812.74			
	8924.21	812.74				8929.6	812.74				8934.46	812.66			
	8944.49	812.44				8954.51	812.14				8964.54	811.72			
	8974.57	811.36				8984.6	811				8994.63	810.73			
	9004.66	810.6				9014.69	810.46				9015.73	810.45			
	9024.87	810.26				9035.07	810.05				9045.27	809.79			
	9055.47	809.35				9060.78	809.16				9065.68	809.01			
	9075.88	808.66				9086.08	808.31				9096.28	808.1			
	9106.48	808				9111.36	807.87				9116.68	807.73			
	9126.88	807.36				9137.08	806.99				9147.29	806.6			
	9157.49	806.2				9161.94	806.1				9167.69	806			
	9172.04	805.95				9177.93	805.9				9188.19	805.46			
	9198.45	805.07				9207.62	804.93				9208.71	804.91			
	9218.98	804.53				9229.24	804.14				9239.5	804			
	9249.77	803.84				9252.07	803.75				9260.03	803.43			
	9270.29	803.27				9280.56	802.66				9290.82	802.02			
	9296.52	802				9301.08	802				9311.35	802			
	9321.61	802				9331.87	802				9340.97	802			
	9342.13	802				9352.4	801.96				9362.66	801.55			
	9372.92	801.15				9383.19	801.15				9385.42	801.15			
	9393.45	801.15				9403.71	801.15				9413.98	801.15			
	9424.24	801.15				9429.87	801.15				9434.5	801.15			
	9444.77	801.15				9455.03	801.15				9465.29	801.15			
	9474.33	801.15				9475.55	801.15				9485.82	801.15			
	9496.08	801.15				9506.34	801.15				9516.61	801.15			
	9518.78	801.15				9526.87	801.15				9537.13	801.15			
	9547.4	801.15				9557.66	801.15				9563.23	801.15			
	9567.92	801.15				9578.19	801.15				9588.45	801.15			
	9598.71	801.15				9607.68	801.15				9608.97	801.15			
	9619.24	801.15				9629.5	801.15				9639.76	801.15			
	9650.03	801.15				9652.13	801.15				9660.29	801.15			
	9670.55	801.15				9680.82	801.15				9691.08	801.15			

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9696.58	801.15	9701.34	801.15	9711.61	801.15			
9721.87	801.15	9732.13	801.15	9741.03	801.15			
9742.39	801.15	9752.66	801.15	9762.92	801.15			
9773.18	801.15	9783.45	801.15	9785.48	801.15			
9793.71	801.15	9794.81	801.15	9803.9	801.15			
9814.09	801.15	9824.28	801.15	9834.46	801.15			
9836.39	801.15	9844.65	801.15	9854.83	801.15			
9865.02	801.15	9875.2	801.15	9909.97	803.59			
9953.51	804.63	9960.24	804.63	785.74	9960.24	804.63	788.04	
9963.4	804.63	793.51	9964.61	804.63	795.13	9966.29	804.63	796.25
9967.73	804.63	796.93	9969.22	804.63	797.51	9980.81	804.63	800.56
9992.74	804.63	801.58	10004.68	804.63	800.56	10016.26	804.63	797.51
10017.75	804.63	796.93	10019.19	804.63	796.25	10020.87	804.63	795.13
10022.08	804.63	793.51	10025.24	804.63	788.04	10025.24	804.63	785.74
10031.83	804.63	10068.91	803.71	10147.7	802			
10157.71	802	10167.72	802	10177.73	802			
10187.73	802	10197.74	802	10207.75	802			
10217.76	802	10227.77	802	10237.78	802			
10247.79	802	10257.8	801.98	10267.81	798			
10277.82	798	10283.08	798	10287.83	798			
10297.84	798	10307.85	798	10317.86	802.28			
10327.87	803.12	10337.88	803.94	10347.89	804			
10357.9	804	10367.91	804.38	10377.92	804.79			
10387.92	805.19	10397.93	805.59	10407.94	805.99			
10417.95	806	10427.96	806.38	10437.97	806.92			
10447.98	807.46	10457.99	807.93	10468	808.36			
10478.01	808.98	10488.02	809.64	10498.03	810.17			
10508.04	810.81	10512.65	811.11	10518.05	811.48			
10528.06	812.05	10536.84	812.81	10538.07	812.92			
10548.07	813.77	10558.07	814.22	10568.07	815.09			
10578.07	815.95	10588.07	816.76	10596.82	817.61			
10598.08	817.74	10608.08	818.41	10618.08	819.34			
10628.08	820.03	10638.08	821.14	10648.08	822			
10658.09	822.83	10668.09	823.85	10678.09	824.56			
10688.09	825.54	10698.09	826.33	10702.9	826.78			
10708.18	827.29	10718.36	828.15	10728.54	829.1			
10738.72	829.98	10746.5	830.59	10748.9	830.79			
10759.08	831.7	10769.26	832.49	10779.44	833.61			
10789.62	834.27	10799.79	835.6	10800.09	835.61			
10809.97	836.02	10820.15	837.2	10830.33	838			
10840.51	838.96	10850.69	839.98	10853.68	840.3			
10860.87	840.88	10867.76	841.46					

Upstream Bridge Cross Section Data

Station Elevation Data num= 238											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8664.778	820.8670.08		8208680.814	820.0498688.036		8208691.547	819.967				
8702.281	819.7218713.015	819.7258715.557		819.748723.748	819.7688734.482	819.412					
8743.078	819.0158745.216	818.9198755.949	818.3898766.683	817.7928770.599	817.002						
8777.417	816.004.8788.15	815.6618798.119	814.968798.884	814.8998809.618	814.315						
8820.351	814.8825.64	8148831.085	814.0978841.819	814.0418852.552	814						
8853.161	8148863.286	814.8874.02	8148880.682	8148884.753	814						
8895.487	8148906.221	8148908.202	8148916.954	8148927.688	814						
8935.723	8148938.422	8148949.155	8148959.889	8148963.244	813.86						
8970.623	813.4078981.356	812.78990.765	812.191.8992.09	812.1129002.824	811.601						
9013.557	811.2089018.286	810.9129024.291	810.5589035.025	810.1049036.474	810.078						
9045.21	810.9055.31	809.834.9065.41	809.376.9075.51	809.12.9083.6	808.962						
9085.609	808.939095.709	808.8419105.809	808.6139115.909	808.2259126.009	807.867						
9136.108	807.4719146.208	807.1099154.904	806.8019156.308	806.7569166.408	806.539						
9176.508	806.3689186.608	806.1959196.707	805.9089206.807	805.5689216.907	805.184						
9223.165	804.9559225.088	804.8899227.066	804.8339237.322	804.5279247.577	804.05						
9257.833	8049268.088	803.5969270.164	803.4669278.344	802.8079288.599	802.153						
9298.855	801.8689309.111	801.947.9315.24	801.9759319.366	8029329.622	802						
9339.877	80293350.133	8029360.316	801.8739360.388	801.879370.644	800.783						
9380.899	800.3519391.155	800.0769401.411	8009405.392	8009411.666	800						
9421.922	8009432.177	8009442.433	8009450.468	8009452.688	800						
9462.944	8009473.199	8009483.455	8009493.711	799.9259495.544	799.936						
9503.966	799.9499514.222	8009524.477	8009534.733	800.9540.62	800						
9544.988	8009555.244	8009565.499	8009575.755	8009585.696	800						
9586.011	8009596.266	8009606.522	8009616.777	8009627.033	800						
9630.771	8009637.288	8009647.544	8009657.799	8009668.055	800						
9675.847	8009678.311	8009688.566	8009698.822	800.0859709.077	800.555						
9719.333	801.0659720.923	801.1449729.588	801.5389739.844	801.8249750.099	801.961						
9760.355	801.9839765.999	8029770.611	8029780.866	8029791.122	802						
9801.377	8029811.075	8029811.633	801.999821.888	8029832.368	802						

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9842.597	8029852.739	8029852.827	801.9999863.056	801.9619873.285	802
9883.514	8029893.744	8029900.238	8029903.973	801.8679914.202	801.445
9919.612	801.1459924.381	800.99934.505	801.6359944.628	8029954.751	802
9960.24	789.47 9963.94	789.47 9972.59	787.299986.021	787.329989.875	787.51
9996.31	787.7710003.64	787.45 10008.5	787.45 10021.5	789.7410025.24	789.74
10027.96	798.7410029.61	801.94310035.74	80210045.86	801.96410055.98	801.89
10056.39	801.89310065.99	80210075.99	80210085.99	801.986 10096	802
10106	801.858 10116	801.541 10126	801.53810136.01	801.25910146.01	801.312
10156.01	801.43110166.01	801.46310176.01	801.33510186.02	801.38510196.02	801.457
10206.02	801.61110216.02	801.61910226.03	801.64510236.03	801.710246.03	801.733
10256.03	801.7410266.04	801.22110276.04	793.6110286.04	78810296.04	788
10304.28	78810306.05	78810316.05	78810326.05	795.83510336.05	803.021
10346.05	802.8610356.06	80410366.06	80410376.06	804.04810386.06	804.588
10396.07	805.27510406.07	805.94510416.07	80610426.07	80610436.08	806.527
10446.08	807.41910456.08	807.9910466.08	80810476.08	808.79710486.09	809.582
10496.09	81010506.09	810.07210516.09	811.1 10526.1	811.709 10536.1	812.198
10546.1	813.235 10556.1	813.71910566.11	814.83910576.11	815.37410586.11	815.773
10596.11	816.81110606.11	817.49510616.12	818.06610626.12	819.21910636.12	819.498
10646.12	820.65910646.43	820.681100021.5	820.681		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8664.778	.1	9963.94	.065	10021.5	.1

Bank Sta: Left Right Coeff Contr. Expan.

9963.94	10021.5	.3	.5
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Ineffective Flow num= 4

Sta L	Sta R	Elev	Permanent
8664.778	8904.8	800	F
8904.8	9783.36	805.87	F
9783.36	9956.74	800	F
10026.31	10646.43	802	F

Blocked Obstructions num= 1

Sta L	Sta R	Elev
10255.74	10506.27	806.6597

Downstream Deck/Roadway Coordinates

num= 269

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
8550.47	822.73		8555.65	822.52		8563.46	822.2	
8566.81	822.06		8577.97	822		8586.01	821.86	
8589.12	821.78		8600.28	821.25		8608.55	820.87	
8611.44	820.73		8622.6	820.21		8631.1	820.05	
8633.75	820		8644.91	819.94		8653.65	819.59	
8656.07	819.47		8667.23	818.97		8676.19	818.57	
8678.38	818.48		8689.54	818.14		8698.74	818	
8700.7	818		8711.86	817.97		8721.29	817.73	
8723.01	817.68		8734.17	817.34		8743.84	816.96	
8745.33	816.91		8756.48	816.56		8766.38	816.22	
8767.64	816.18		8778.8	816		8788.93	816	
8789.96	816		8801.11	815.67		8811.48	815.17	
8812.27	815.14		8823.43	814.8		8834.02	814.43	
8834.59	814.42		8845.74	814.25		8856.57	814.01	
8856.9	814		8868.06	814		8879.12	814	
8879.22	814		8890.37	814		8901.53	813.66	
8901.66	813.65		8912.69	813.01		8923.85	812.74	
8924.21	812.74		8929.6	812.74		8934.46	812.66	
8944.49	812.44		8954.51	812.14		8964.54	811.72	
8974.57	811.36		8984.6	811		8994.63	810.73	
9004.66	810.6		9014.69	810.46		9015.73	810.45	
9024.87	810.26		9035.07	810.05		9045.27	809.79	
9055.47	809.35		9060.78	809.16		9065.68	809.01	
9075.88	808.66		9086.08	808.31		9096.28	808.1	
9106.48	808		9111.36	807.87		9116.68	807.73	
9126.88	807.36		9137.08	806.99		9147.29	806.6	
9157.49	806.2		9161.94	806.1		9167.69	806	
9172.04	805.95		9177.93	805.9		9188.19	805.46	
9198.45	805.07		9207.62	804.93		9208.71	804.91	
9218.98	804.53		9229.24	804.14		9239.5	804	
9249.77	803.84		9252.07	803.75		9260.03	803.43	
9270.29	803.27		9280.56	802.66		9290.82	802.02	
9296.52	802		9301.08	802		9311.35	802	
9321.61	802		9331.87	802		9340.97	802	
9342.13	802		9352.4	801.96		9362.66	801.55	
9372.92	801.15		9383.19	801.15		9385.42	801.15	

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9393.45	801.15	9403.71	801.15	9413.98	801.15			
9424.24	801.15	9429.87	801.15	9434.5	801.15			
9444.77	801.15	9455.03	801.15	9465.29	801.15			
9474.33	801.15	9475.55	801.15	9485.82	801.15			
9496.08	801.15	9506.34	801.15	9516.61	801.15			
9518.78	801.15	9526.87	801.15	9537.13	801.15			
9547.4	801.15	9557.66	801.15	9563.23	801.15			
9567.92	801.15	9578.19	801.15	9588.45	801.15			
9598.71	801.15	9607.68	801.15	9608.97	801.15			
9619.24	801.15	9629.5	801.15	9639.76	801.15			
9650.03	801.15	9652.13	801.15	9660.29	801.15			
9670.55	801.15	9680.82	801.15	9691.08	801.15			
9696.58	801.15	9701.34	801.15	9711.61	801.15			
9721.87	801.15	9732.13	801.15	9741.03	801.15			
9742.39	801.15	9752.66	801.15	9762.92	801.15			
9773.18	801.15	9783.45	801.15	9785.48	801.15			
9793.71	801.15	9794.81	801.15	9803.9	801.15			
9814.09	801.15	9824.28	801.15	9834.46	801.15			
9836.39	801.15	9844.65	801.15	9854.83	801.15			
9865.02	801.15	9875.2	801.15	9909.97	803.59			
9953.51	804.63	9959.66	804.63	785.74	9959.66	804.63	788.04	
9962.82	804.63	793.51	9964.03	804.63	795.13	9965.71	804.63	796.25
9967.15	804.63	796.93	9968.64	804.63	797.51	9980.23	804.63	800.56
9992.16	804.63	801.58	10004.1	804.63	800.56	10015.68	804.63	797.51
10017.17	804.63	796.93	10018.61	804.63	796.25	10020.29	804.63	795.13
10021.5	804.63	793.51	10024.66	804.63	788.04	10024.66	804.63	785.74
10031.83	804.63	10068.91	803.71	802	10147.7	802	802	802
10157.71	802	10167.72	802	802	10177.73	802	802	802
10187.73	802	10197.74	802	802	10207.75	802	802	802
10217.76	802	10227.77	802	802	10237.78	802	802	802
10247.79	802	10257.8	801.98	801.98	10267.81	798	798	798
10277.82	798	10283.08	798	798	10287.83	798	798	798
10297.84	798	10307.85	798	798	10317.86	802.28	802.28	802.28
10327.87	803.12	10337.88	803.94	803.94	10347.89	804	804	804
10357.9	804	10367.91	804.38	804.38	10377.92	804.79	804.79	804.79
10387.92	805.19	10397.93	805.59	805.59	10407.94	805.99	805.99	805.99
10417.95	806	10427.96	806.38	806.38	10437.97	806.92	806.92	806.92
10447.98	807.46	10457.99	807.93	807.93	10468	808.36	808.36	808.36
10478.01	808.98	10488.02	809.64	809.64	10498.03	810.17	810.17	810.17
10508.04	810.81	10512.65	811.11	811.11	10518.05	811.48	811.48	811.48
10528.06	812.05	10536.84	812.81	812.81	10538.07	812.92	812.92	812.92
10548.07	813.77	10558.07	814.22	814.22	10568.07	815.09	815.09	815.09
10578.07	815.95	10588.07	816.76	816.76	10596.82	817.61	817.61	817.61
10598.08	817.74	10608.08	818.41	818.41	10618.08	819.34	819.34	819.34
10628.08	820.03	10638.08	821.14	821.14	10648.08	822	822	822
10658.09	822.83	10668.09	823.85	823.85	10678.09	824.56	824.56	824.56
10688.09	825.54	10698.09	826.33	826.33	10702.9	826.78	826.78	826.78
10708.18	827.29	10718.36	828.15	828.15	10728.54	829.1	829.1	829.1
10738.72	829.98	10746.5	830.59	830.59	10748.9	830.79	830.79	830.79
10759.08	831.7	10769.26	832.49	832.49	10779.44	833.61	833.61	833.61
10789.62	834.27	10799.79	835.6	835.6	10800.09	835.61	835.61	835.61
10809.97	836.02	10820.15	837.2	837.2	10830.33	838	838	838
10840.51	838.96	10850.69	839.98	839.98	10853.68	840.3	840.3	840.3
10860.87	840.88	10867.76	841.46	841.46				

Downstream Bridge Cross Section Data

Station Elevation Data num= 266									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8573.466	807.1078580	218	806.6998590	634	806.4288601	051	806.009	8605.46	805.804
8611.468	805.4948621	884	804.9058632	301	804.3148641	174	804.0568642	718	804
8653.134	8048663.551		8048673.968		803.2838676	888	802.7988684	384	801.568
8694.801	800.1378705	218	8008712.601		8008715.634		8008726.051		800
8736.468	8008746.885		799.9728748	315	799.9348757	301	799.6668767	718	799.356
8778.135	799.0948784	029	798.9618788	551	798.878798	968	798.6628809	385	798.454
8819.743	798.2468819	801	798.2458830	218	798.0378840	635	797.1688851	051	796.104
8855.457	795.68861.468		794.888871.885		7948882.301		7948891.171		794
8892.718	7948903.135		794.9568913.551		797.858923.968		798.3668926.885		798.474
8934.385	798.7668944	801	799.1678955	218	799.5578962	599	799.7618965	635	799.829
8976.051	799.9968986	468	8008996.885		8008998.313		8009007.301		800
9017.718	8009028.135		800.0159034	026	800.0399038	551	800.069048	968	800.061
9059.385	800.041	9069.74	8009069	802	8009080	218	8009090	635	800
9101.052	8009105	454	8009111	468	8009121	885	8009132	302	800
9141.168	8009142	718	8009153	135	8009160	727	8009165	872	800
9166.418	8009177	246	8009187	406	800	9188.62	8009199	994	800
9208.394	8009211	368	8009222	742	8009229	382	800.1529234	116	800.263

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9245.49	800.607	9250.37	800.7319256.864	800.8759268.238	801.0679271.358	801.079		
9279.612	801.0979290.986	801.1349292.347	801.1349292.347	801.138	9302.36	801.1839313.335	801.324	
9313.735	801.3329325.109	801.5569334.323	801.5569334.323	801.7389336.483	801.789347.857	801.997		
9355.311	801.7539359.231	801.6969370.605	801.6969370.605	801.2799376.299	801.0789381.979	801.011		
9393.353	800.7449397.287	800.6679404.727	800.6679404.727	800.3079416.101	8009418.275	800		
9427.475	8009438.849	8009439.263	8009439.263	8009450.223	8009460.251	800		
9461.597	8009472.971	8009481.239	8009481.239	8009484.345	8009495.719	800		
9502.228	8009507.093	8009518.467	8009518.467	800.1429523.216	800.3649529.841	800.703		
9541.215	801.1449544.204	801.0289552.589	801.0289552.589	800.6889563.963	800.2059565.192	800.194		
9575.337	800	9586.18	8009586.711	8009598.085	8009607.168	800		
9609.459	8009620.833	8009628.156	8009628.156	8009632.207	8009643.581	800		
9649.144	8009654.955	8009666.329	8009666.329	8009670.132	8009677.703	800		
9689.077	8009691.121	8009700.451	8009700.451	8009711.826	8009712.109	800		
9723.2	800.0379733.097	800.1459734.574	800.1459734.574	800.1659745.948	800.3259754.085	800.439		
9757.322	800.4849768.696	800.6439775.073	800.6439775.073	800.732	9780.07	800.8029791.444	800.962	
9796.061	801.0239802.818	801.1129814.192	801.1129814.192	801.2219817.049	801.259825.566	801.336		
9836.94	801.59838.037	801.5279848.314	801.5279848.314	801.7759861.663	8029872.097	802		
9877.618	8029882.532	8029883.595	8029883.595	8029893.694	8029901.731	802		
9904.938	8029929.917	801.79951.074	801.79951.074	801	9955.23	798.69	9959.66	789.57
9964.3	789	579972.664	786.79986.021	787.32	9997.92	787.5610003.64	787.45	
10006.54	787.45	10019.9	789.4710024.66	789.4710027.96	798.74	10071.4	798.35	
10083	801.60710093.05	801.065	10103.1	800.32810113.15	800.26	10123.2	799.896	
10125.68	799.81510133.25	799.566	10143.3	799.56810153.34	799.60610163.39	799.897		
10173.44	800.25910183.49	800.89610193.54	800.89610193.54	800.93110203.59	800.56310213.64	800.222		
10223.69	798.95810226.65	798.23610233.74	798.23610233.74	796.53610243.79	794.09910253.84	788		
10263.89	78810273.94	78810283.99	78810283.99	78810294.04	789.34410304.09	796.907		
10314.14	804	50810324.18	807.76610327.62	807.8410334.23	807.88310344.28	808		
10354.33	807.27110364.38	807.09610374.43	807.09610374.43	806.99510384.48	806.80510394.53	806.531		
10404.58	806.43810414.63	806.98710424.68	806.98710424.68	807.53410428.58	807.77910434.73	808.146		
10444.78	809.36510454.83	810.24410464.88	810.24410464.88	811.15510474.93	811.65610484.98	812.19		
10495.02	812.68210505.07	813.13210515.12	813.13210515.12	813.59910525.17	814.00810529.55	814.234		
10535.22	814.5110545.27	815.14810555.32	815.14810555.32	81610565.37	81610575.42	816.425		
10585.47	816.75110595.52	817.30810605.57	817.30810605.57	817.45610615.62	817.58510625.67	817.679		
10630.52	817.75610635.72	817.93410645.77	817.93410645.77	818.29410655.82	819.15910665.86	819.919		
10675.91	820.58210685.96	821.56610696.01	821.56610696.01	823.84910706.06	826.2810716.11	826.561		
10726.16	826.39210731.49	826.15110736.21	826.15110736.21	825.94110746.26	824.79910756.31	823.858		
10763.11	822.944							

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 8573.466 .1 9964.3 .065 10019.9 .1

Bank Sta: Left Right Coeff Contr. Expan.
 9964.3 10019.9 .3 .5

Ineffective Flow num= 4
 Sta L Sta R Elev Permanent
 8573.466 8591.19 800 F
 8591.19 9864.88 805.64 F
 9864.88 9890.11 800 F
 10084.2110763.11 802.2 F

Blocked Obstructions num= 1
 Sta L Sta R Elev
 10197.2610394.06 805.918

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
 Energy
 W.S. Pro Method

W.S. Pro Data

Left Embankment
 El of the top of the embankment = 803.6
 El of the toe of the abutment = 787
 Right Embankment
 El of the top of the embankment = 803.6
 El of the toe of the abutment = 787

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Abtument Type           = 1 Vert. abutments and vert. embankments with or without wingwalls
Slope of abutments     =
Top with of embankment = 42
Centroid station of bridge opening = 9988.45
Wing Wall Type         = Angular wing walls
Width                  = 20
Angle                  = 45
Radius                 =
Guide Banks Type       = No Guide Bank present
Length                 =
Offset                 =
Angle                  =
    
```

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

```

Pressure and Weir flow
Submerged Inlet Cd     =
Submerged Inlet + Outlet Cd = .8
Max Low Cord          =
    
```

Additional Bridge Parameters

```

Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line
    
```

BRIDGE OUTPUT Profile #100Yr

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	805.10	E.G. Elev (ft)	805.11	805.11
W.S. US. (ft)	804.72	W.S. Elev (ft)	804.72	804.72
Q Total (cfs)	7156.00	Crit W.S. (ft)	795.54	795.56
Q Bridge (cfs)	3061.04	Max Chl Dpth (ft)	17.43	18.02
Q Weir (cfs)	4094.96	Vel Total (ft/s)	4.26	5.72
Weir Sta Lft (ft)	9783.36	Flow Area (sq ft)	1681.41	1251.89
Weir Sta Rgt (ft)	10255.74	Froude # Chl	0.25	0.33
Weir Submerg	0.80	Specif Force (cu ft)	9709.68	9723.35
Weir Max Depth (ft)	3.15	Hydr Depth (ft)	3.56	3.77
Min El Weir Flow (ft)	802.01	W.P. Total (ft)	610.30	470.73
Min El Prs (ft)	801.58	Conv. Total (cfs)		
Delta EG (ft)	0.14	Top Width (ft)	1024.95	983.46
Delta WS (ft)	0.11	Frctn Loss (ft)		
BR Open Area (sq ft)	676.44	C & E Loss (ft)		
BR Open Vel (ft/s)	4.53	Shear Total (lb/sq ft)		
Coef of Q		Power Total (lb/ft s)	8664.78	8573.47
Br Sel Method	Press/Weir			

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: For the cross section inside the bridge at the downstream end, the water surface and energy have been projected from the downstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

BRIDGE OUTPUT Profile #10Yr

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	801.79	E.G. Elev (ft)	801.72	801.40
W.S. US. (ft)	801.49	W.S. Elev (ft)	801.22	800.90
Q Total (cfs)	3761.00	Crit W.S. (ft)	792.89	792.82
Q Bridge (cfs)	3761.00	Max Chl Dpth (ft)	13.93	14.20
Q Weir (cfs)		Vel Total (ft/s)	5.57	5.55
Weir Sta Lft (ft)		Flow Area (sq ft)	674.96	677.09
Weir Sta Rgt (ft)		Froude # Chl	0.27	0.27
Weir Submerg				

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Weir Max Depth (ft)		Specif Force (cu ft)	5753.56
Min El Weir Flow (ft)	802.01	Hydr Depth (ft)	80.94
Min El Prs (ft)	801.58	W.P. Total (ft)	126.71
Delta EG (ft)	0.52	Conv. Total (cfs)	50109.3
Delta WS (ft)	0.52	Top Width (ft)	8.34
BR Open Area (sq ft)	676.44	Frctn Loss (ft)	0.32
BR Open Vel (ft/s)	5.57	C & E Loss (ft)	0.00
Coef of Q		Shear Total (lb/sq ft)	1.87
Br Sel Method	Energy only	Power Total (lb/ft s)	8664.78

Warning: The sluice gate calculations did not converge during the pressure flow only calculation.
 Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
 This may indicate the need for additional cross sections.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #500Yr

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	807.28	E.G. Elev (ft)	807.26	807.17
W.S. US. (ft)	807.19	W.S. Elev (ft)	807.21	807.12
Q Total (cfs)	9687.00	Crit W.S. (ft)	797.07	797.08
Q Bridge (cfs)	1797.66	Max Chl Dpth (ft)	19.92	20.42
Q Weir (cfs)		Vel Total (ft/s)	1.62	1.67
Weir Sta Lft (ft)		Flow Area (sq ft)	5972.53	5803.09
Weir Sta Rgt (ft)		Froude # Chl	0.07	0.07
Weir Submerg		Specif Force (cu ft)	23122.97	22653.04
Weir Max Depth (ft)		Hydr Depth (ft)	4.59	4.67
Min El Weir Flow (ft)	802.01	W.P. Total (ft)	1439.99	1382.69
Min El Prs (ft)	801.58	Conv. Total (cfs)	255385.7	253563.0
Delta EG (ft)	0.13	Top Width (ft)	1299.97	1242.81
Delta WS (ft)	0.06	Frctn Loss (ft)	0.09	0.00
BR Open Area (sq ft)	676.44	C & E Loss (ft)	0.00	0.01
BR Open Vel (ft/s)	2.66	Shear Total (lb/sq ft)	0.37	0.38
Coef of Q		Power Total (lb/ft s)	8664.78	8573.47
Br Sel Method	Energy only			

Note: The weir over a bridge is submerged, the energy answer was used.
 Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
 This may indicate the need for additional cross sections.
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: southutoycreek
 REACH: 50 RS: 537.0376

INPUT

Description: Survey SUT_0100

Station	Elevation	Data	num=	266	Sta	Elev	Sta	Elev	Sta	Elev
8573.466	807.1078580	218	806.6998590	634	806.4288601	0.051	806.009	8605.46	805.804	
8611.468	805.4948621	884	804.9058632	301	804.3148641	1.74	804.0568642	718	804	
8653.134	8048663.551		8048673.968		803.2838676	888	802.7988684	384	801.568	
8694.801	800.1378705	218	8008712.601		8008715.634		8008726.051		800	
8736.468	8008746.885		799.9728748	315	799.9348757	301	799.6668767	718	799.356	
8778.135	799.0948784	029	798.9618788	551	798.878798.968		798.6628809	385	798.454	
8819.743	798.2468819	801	798.2458830	218	798.0378840	635	797.1688851	051	796.104	
8855.457	795.68861.468		794.888871.885		7948882.301		7948891.171		794	
8892.718	7948903.135		794.9568913.551		797.858923.968		798.3668926.885		798.474	

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8934.385	798.7668944	801.799.1678955.218	799.5578962.599	799.7618965.635	799.829
8976.051	799.9968986.468	800.8008996.885	800.8008998.313	800.8009007.301	800
9017.718	800.9028.135	800.0159034.026	800.0399038.551	800.069048.968	800.061
9059.385	800.041.9069.74	800.8009069.802	800.8009080.218	800.8009090.635	800
9101.052	800.8009105.454	800.8009111.468	800.8009121.885	800.8009132.302	800
9141.168	800.8009142.718	800.8009153.135	800.8009160.727	800.8009165.872	800
9166.418	800.8009177.246	800.8009187.406	800.8009188.62	800.8009199.994	800
9208.394	800.8009211.368	800.8009222.742	800.8009229.382	800.1529234.116	800.263
9245.49	800.800.607.9250.37	800.800.7319256.864	800.800.8759268.238	801.801.0679271.358	801.079
9279.612	801.801.0979290.986	801.801.1349292.347	801.801.138.9302.36	801.801.1839313.335	801.324
9313.735	801.801.3329325.109	801.801.5569334.323	801.801.7389336.483	801.801.789347.857	801.997
9355.311	801.801.7539359.231	801.801.6969370.605	801.801.2799376.299	801.801.0789381.979	801.011
9393.353	800.800.7449397.287	800.800.6679404.727	800.800.3079416.101	800.8009418.275	800
9427.475	800.8009438.849	800.8009439.263	800.8009450.223	800.8009460.251	800
9461.597	800.8009472.971	800.8009481.239	800.8009484.345	800.8009495.719	800
9502.228	800.8009507.093	800.8009518.467	800.800.1429523.216	800.800.3649529.841	800.703
9541.215	801.801.1449544.204	801.801.0289552.589	800.800.6889563.963	800.800.2059565.192	800.194
9575.337	800.800.9586.18	800.8009586.711	800.8009598.085	800.8009607.168	800
9609.459	800.8009620.833	800.8009628.156	800.8009632.207	800.8009643.581	800
9649.144	800.8009654.955	800.8009666.329	800.8009670.132	800.8009677.703	800
9689.077	800.8009691.121	800.8009700.451	800.8009711.826	800.8009712.109	800
9723.2	800.800.0379733.097	800.800.1459734.574	800.800.1659745.948	800.800.3259754.085	800.439
9757.322	800.800.4849768.696	800.800.6439775.073	800.800.732.9780.07	800.800.8029791.444	800.962
9796.061	801.801.0239802.818	801.801.1129814.192	801.801.2219817.049	801.801.259825.566	801.336
9836.94	801.801.59838.037	801.801.5279848.314	801.801.7759861.663	802.8029872.097	802
9877.618	802.8029882.532	802.8029883.595	802.8029893.694	802.8029901.731	802
9904.938	802.8029929.917	801.801.79951.074	801.801.9955.23	798.798.69.9959.66	789.57
9964.3	789.789.579972.664	786.786.79986.021	787.787.32.9997.92	787.787.5610003.64	787.45
10006.54	787.787.45.10019.9	789.789.4710024.66	789.789.4710027.96	798.798.74.10071.4	798.35
10083	801.801.60710093.05	801.801.065.10103.1	800.800.32810113.15	800.800.26.10123.2	799.896
10125.68	799.799.81510133.25	799.799.566.10143.3	799.799.56810153.34	799.799.60610163.39	799.897
10173.44	800.800.25910183.49	800.800.89610193.54	800.800.93110203.59	800.800.56310213.64	800.222
10223.69	798.798.95810226.65	798.798.23610233.74	796.796.53610243.79	794.794.09910253.84	788
10263.89	788.78810273.94	788.78810283.99	788.78810294.04	789.789.34410304.09	796.907
10314.14	804.804.50810324.18	807.807.76610327.62	807.807.8410334.23	807.807.88310344.28	808
10354.33	807.807.27110364.38	807.807.09610374.43	806.806.99510384.48	806.806.80510394.53	806.531
10404.58	806.806.43810414.63	806.806.98710424.68	807.807.53410428.58	807.807.77910434.73	808.146
10444.78	809.809.36510454.83	810.810.24410464.88	811.811.15510474.93	811.811.65610484.98	812.19
10495.02	812.812.68210505.07	813.813.13210515.12	813.813.59910525.17	814.814.00810529.55	814.234
10535.22	814.814.5110545.27	815.815.14810555.32	816.81610565.37	816.81610575.42	816.425
10585.47	816.816.75110595.52	817.817.30810605.57	817.817.45610615.62	817.817.58510625.67	817.679
10630.52	817.817.75610635.72	817.817.93410645.77	818.818.29410655.82	819.819.15910665.86	819.919
10675.91	820.820.58210685.96	821.821.56610696.01	823.823.84910706.06	826.826.2810716.11	826.561
10726.16	826.826.39210731.49	826.826.15110736.21	825.825.94110746.26	824.824.79910756.31	823.858
10763.11	822.822.944				

Manning's n Values	num=	3
Sta n Val Sta n Val Sta n Val		
8573.466 .1 9964.3 .065 10019.9 .1		

Bank Sta: Left Right Lengths: Left Channel Right	Coeff Contr.	Expan.
9964.3 10019.9 273.42 264.26 226.1	.3	.5

Ineffective Flow num=	4
Sta L Sta R Elev Permanent	
8573.466 8591.19 800 F	
8591.19 9864.88 805.64 F	
9864.88 9890.11 800 F	
10084.2110763.11 802.2 F	

Blocked Obstructions num=	1
Sta L Sta R Elev	
10197.2610394.06 805.918	

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	804.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.36	Wt. n-Val.	0.100	0.065	0.100
W.S. Elev (ft)	804.61	Reach Len. (ft)	273.42	264.26	226.10
Crit W.S. (ft)	795.38	Flow Area (sq ft)	378.50	940.58	921.26
E.G. Slope (ft/ft)	0.001372	Area (sq ft)	6015.84	940.58	921.26
Q Total (cfs)	7156.00	Flow (cfs)	487.41	5207.26	1461.34
Top Width (ft)	1570.18	Top Width (ft)	1337.22	55.60	177.36
Vel Total (ft/s)	3.19	Avg. Vel. (ft/s)	1.29	5.54	1.59
Max Chl Dpth (ft)	17.91	Hydr. Depth (ft)	3.81	16.92	5.19
Conv. Total (cfs)	193223.4	Conv. (cfs)	13160.7	140604.3	39458.4
Length Wtd. (ft)	263.02	Wetted Per. (ft)	105.74	56.25	188.25

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Min Ch El (ft)	786.70	Shear (lb/sq ft)	0.31	1.43	0.42
Alpha	2.25	Stream Power (lb/ft s)	10763.11	0.00	0.00
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	57.80	16.01	3.37
C & E Loss (ft)	0.16	Cum SA (acres)	10.10	0.96	0.68

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #10Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.27	Wt. n-Val.	0.100	0.065	0.100
Vel Head (ft)	0.30	Reach Len. (ft)	273.42	264.26	226.10
W.S. Elev (ft)	800.97	Flow Area (sq ft)	87.85	738.11	194.88
Crit W.S. (ft)	792.78	Area (sq ft)	1462.07	738.11	279.88
E.G. Slope (ft/ft)	0.001326	Flow (cfs)	129.79	3417.91	213.30
Q Total (cfs)	3761.00	Top Width (ft)	986.05	55.60	163.72
Top Width (ft)	1205.37	Avg. Vel. (ft/s)	1.48	4.63	1.09
Vel Total (ft/s)	3.68	Hydr. Depth (ft)	6.67	13.28	3.20
Max Chl Dpth (ft)	14.27	Conv. (cfs)	3564.6	93872.6	5858.2
Conv. Total (cfs)	103295.5	Wetted Per. (ft)	19.47	56.25	67.73
Length Wtd. (ft)	263.54	Shear (lb/sq ft)	0.37	1.09	0.24
Min Ch El (ft)	786.70	Stream Power (lb/ft s)	10763.11	0.00	0.00
Alpha	1.45	Cum Volume (acre-ft)	20.88	12.38	1.08
Frctn Loss (ft)	0.25	Cum SA (acres)	8.87	0.96	0.54
C & E Loss (ft)	0.08				

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.15	Wt. n-Val.	0.100	0.065	0.100
Vel Head (ft)	0.02	Reach Len. (ft)	273.42	264.26	226.10
W.S. Elev (ft)	807.13	Flow Area (sq ft)	9448.32	1080.65	1535.90
Crit W.S. (ft)	797.06	Area (sq ft)	9448.32	1080.65	1535.90
E.G. Slope (ft/ft)	0.000170	Flow (cfs)	6537.99	2308.95	840.06
Q Total (cfs)	9687.00	Top Width (ft)	1390.83	55.60	357.12
Top Width (ft)	1803.55	Avg. Vel. (ft/s)	0.69	2.14	0.55
Vel Total (ft/s)	0.80	Hydr. Depth (ft)	6.79	19.44	4.30
Max Chl Dpth (ft)	20.43	Conv. (cfs)	501778.9	177208.0	64473.0
Conv. Total (cfs)	743459.9	Wetted Per. (ft)	1398.33	56.25	369.53
Length Wtd. (ft)	268.33	Shear (lb/sq ft)	0.07	0.20	0.04
Min Ch El (ft)	786.70	Stream Power (lb/ft s)	10763.11	0.00	0.00
Alpha	2.23	Cum Volume (acre-ft)	82.88	18.35	6.47
Frctn Loss (ft)	0.05	Cum SA (acres)	10.27	0.96	2.10
C & E Loss (ft)	0.00				

Warning: Divided flow computed for this cross-section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: southutoycreek
REACH: 50

RS: 272.774*

INPUT

Description:

Station Elevation Data		num=	355							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
9130.1	801.55	9134.09	801.35	9140.24	801.21	9144.8	801.06	9146.39	801	
9148.99	800.9	9151.24	800.8	9152.54	800.75	9158.69	800.47	9164.84	800.18	
9170.08	800.06	9170.99	800.04	9177.14	800.05	9183.29	800.06	9184.85	799.97	
9189.44	799.7	9191.16	799.46	9195.59	798.84	9201.74	798.12	9207.66	798.05	
9207.89	798.05	9212.25	798.06	9214.04	798.07	9220.19	798.1	9224.91	798.11	
9226.34	798.12	9232.49	798.13	9233.33	798.11	9238.64	797.99	9244.79	797.86	

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9250.94	797.75	9254.42	797.69	9257.09	797.65	9263.24	797.57	9264.08	797.56
9264.96	797.55	9269.39	797.49	9275.5	797.41	9275.54	797.41	9281.69	797.33
9287.84	796.91	9293.99	796.4	9296.59	796.16	9300.14	795.81	9305.01	795.48
9306.29	795.39	9312.44	795.41	9317.67	795.42	9318.58	795.42	9320.5	795.58
9324.74	795.91	9330.88	797.36	9337.03	797.62	9338.76	797.67	9343.18	797.82
9345.07	797.88	9349.33	798.01	9355.48	798.2	9359.84	798.29	9361.63	798.32
9367.78	798.39	9373.93	798.38	9376.92	798.37	9380.08	798.36	9380.93	798.36
9385.12	798.34	9386.23	798.34	9392.38	798.33	9398.53	798.33	9402.01	798.34
9404.68	798.35	9410.83	798.34	9416.98	798.32	9423.1	798.29	9423.13	798.29
9425.18	798.29	9429.28	798.29	9433.34	798.29	9435.43	798.29	9441.58	798.3
9444.18	798.3	9447.73	798.31	9453.88	798.31	9460.03	798.32	9465.23	798.33
9465.27	798.33	9466.18	798.32	9472.33	798.32	9476.81	798.32	9479.85	798.32
9480.17	798.32	9486.57	798.32	9489.75	798.32	9492.56	798.31	9493.28	798.31
9500	798.3	9504.96	798.3	9505.28	798.3	9506.71	798.3	9513.43	798.29
9517.35	798.36	9520.14	798.41	9526.86	798.57	9529.74	798.63	9533.57	798.7
9540.29	798.79	9542.13	798.79	9545.34	798.79	9546.17	798.79	9547	798.79
9553.72	798.81	9554.52	798.81	9560.43	798.84	9566.91	798.91	9567.15	798.91
9573.86	799.02	9579.3	799.11	9580.58	799.13	9585.39	799.21	9587.29	799.24
9591.69	799.12	9594.01	799.1	9600.72	798.89	9602.6	798.84	9604.08	798.79
9607.44	798.75	9614.15	798.59	9616.47	798.55	9620.87	798.35	9625.45	798.24
9627.58	798.18	9628.87	798.17	9634.3	798.15	9641.01	798.12	9641.26	798.12
9647.73	798.1	9653.65	798.07	9654.44	798.07	9659.01	798.05	9661.16	798.04
9665.5	798.02	9666.04	798.02	9667.87	798.02	9674.59	798.02	9678.43	798.02
9681.3	798.01	9688.02	798.08	9690.82	798.19	9694.73	798.36	9701.45	798.57
9703.21	798.52	9705.55	798.43	9708.16	798.34	9714.88	798.1	9715.43	798.1
9715.6	798.1	9721.59	798	9727.99	798	9728.31	798	9735.02	798
9740.38	798	9741.74	798	9745.61	798	9748.45	798	9752.78	798
9755.17	798	9761.88	798	9765.17	798	9768.6	798	9771.85	798
9775.31	798	9777.56	798	9782.03	798	9785.66	798	9788.74	798
9789.95	798	9795.46	798	9802.17	798	9802.34	798	9808.89	798.02
9814.73	798.07	9815.6	798.08	9822.32	798.16	9825.71	798.2	9827.12	798.22
9828.27	798.23	9829.03	798.24	9835.75	798.32	9839.51	798.37	9842.46	798.4
9849.18	798.48	9851.9	798.51	9855.89	798.56	9862.61	798.61	9864.29	798.62
9865.77	798.64	9869.32	798.65	9876.04	798.71	9876.69	798.72	9882.75	798.82
9884.69	798.84	9890.63	798.87	9896.79	798.81	9900.05	798.78	9902.96	798.76
9903.58	798.75	9905.82	798.73	9909.54	798.63	9914.29	798.5	9916.18	798.45
9930.93	797.91	9941.11	797.36	9943.42	797.23	9945.88	796.01	9952.06	793.3
9953.85	792.52	9958.25	790.61	9962.57	788.73	9964.44	787.94	9966.12	787.31
9970	785.87	9983.41	786.33	9983.44	786.33	9984.03	786.35	9995.06	786.66
9996.82	786.68	10004.87	786.78	10009.59	786.73	10010.23	786.69	10022.6	785.93
10023.64	785.87	10028.06	795.42	10035.47	797.62	10051.05	802.38	10063.96	804.79
10064.16	804.86	10066.62	805.67	10072.74	806.81	10076.07	806.68	10080.35	806.53
10082.04	806.45	10087.95	806.16	10092.67	806.14	10095.56	806.13	10097.18	806.09
10103.17	805.95	10105.04	805.91	10110.77	805.78	10112.33	805.78	10118.38	805.78
10125.97	805.81	10127.48	805.83	10133.58	805.95	10141.19	806.13	10142.63	806.19
10148.79	806.45	10156.2	806.47	10156.4	806.47	10157.78	806.43	10164	806.28
10171.61	806.11	10172.92	806.10	10179.21	805.48	10181.46	805.12	10186.82	804.27
10188.07	804.07	10194.43	803.05	10202.03	800.10	10203.22	800.10	10209.64	800
10217.24	800.10	10218.37	800.10	10219.72	800.10	10224.85	800.10	10232.46	800.67
10233.52	801.21	10240.06	804.45	10247.67	808.25	10248.66	808.47	10255.26	809.88
10257.87	809.92	10262.87	809.94	10263.81	809.95	10270.48	810.10	10278.08	809.64
10278.97	809.63	10283.25	809.58	10285.69	809.55	10293.29	809.51	10294.12	809.49
10300.9	809.41	10308.51	809.27	10309.27	809.26	10316.11	809.22	10323.72	809.49
10324.42	809.52	10331.32	809.77	10334.27	809.89	10338.93	810.07	10339.57	810.12
10346.54	810.68	10346.77	810.71	10354.14	811.12	10354.71	811.16	10361.75	811.58
10369.35	811.83	10369.86	811.85	10376.96	812.11	10384.56	812.34	10385.01	812.35
10392.16	812.57	10399.77	812.81	10400.16	812.81	10407.37	813	10410.3	813.1
10410.69	813.12	10414.98	813.26	10415.31	813.27	10422.58	814.31	10430.19	815.5
10430.46	815.53	10437.8	816.22	10445.4	817.14	10445.6	817.16	10453.01	817.35
10460.61	817.65	10460.75	817.66	10468.22	817.73	10473.82	817.78	10475.83	817.79
10475.9	817.79	10483.43	817.84	10487.1	817.88	10491.04	817.97	10498.64	818.15
10506.19	818.58	10506.25	818.58	10513.85	818.96	10521.34	819.29	10521.45	819.29
10529.06	819.78	10536.49	820.91	10536.66	820.92	10537.34	821.03	10544.27	822.14
10551.64	822.28	10551.88	822.26	10559.48	821.68	10563.52	821.29	10566.79	820.98
10567.09	820.96	10574.69	820.28	10581.93	819.72	10582.3	819.69	10587.45	819.15

Manning's n Values num= 3
 Sta n Val Sta n Val
 9130.1 .1 9945.88 .06510028.06 .088

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9945.8810028.06 273.42 264.26 226.1 .3 .5
 Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 9130.1 9763 804.61 F

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1018410587.45 802.21 F
 Blocked Obstructions num= 1
 Sta L Sta R Elev
 1017010587.45 805.92

CROSS SECTION OUTPUT Profile #100Yr

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	804.68		
Vel Head (ft)	0.04		
W.S. Elev (ft)	804.64		
Crit W.S. (ft)	793.89		
E.G. Slope (ft/ft)	0.000241		
Q Total (cfs)	7156.00		
Top Width (ft)	933.08		
Vel Total (ft/s)	1.07		
Max Chl Dpth (ft)	18.77		
Conv. Total (cfs)	461155.9		
Length Wtd. (ft)	267.92		
Min Ch El (ft)	785.87		
Alpha	2.04		
Frctn Loss (ft)	0.08		
C & E Loss (ft)	0.02		
Wt. n-Val.	0.100	0.065	0.088
Reach Len. (ft)	273.42	264.26	226.10
Flow Area (sq ft)	5168.30	1374.14	146.29
Area (sq ft)	5168.30	1374.14	146.29
Flow (cfs)	4067.27	2991.76	96.97
Top Width (ft)	815.78	82.18	35.12
Avg. Vel. (ft/s)	0.79	2.18	0.66
Hydr. Depth (ft)	6.34	16.72	4.17
Conv. (cfs)	262108.3	192798.8	6248.9
Wetted Per. (ft)	819.67	90.37	36.36
Shear (lb/sq ft)	0.09	0.23	0.06
Stream Power (lb/ft s)	10587.45	0.00	0.00
Cum Volume (acre-ft)	22.70	8.99	0.60
Cum SA (acres)	3.34	0.54	0.13

Warning: Multiple water surfaces were found that could balance the energy equation. The program selected the water surface

whose main channel velocity head was the closest to the previously computed cross section.

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #10Yr

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.94		
Vel Head (ft)	0.14		
W.S. Elev (ft)	800.80		
Crit W.S. (ft)	791.38		
E.G. Slope (ft/ft)	0.000733		
Q Total (cfs)	3761.00		
Top Width (ft)	894.51		
Vel Total (ft/s)	2.40		
Max Chl Dpth (ft)	14.93		
Conv. Total (cfs)	138885.5		
Length Wtd. (ft)	265.33		
Min Ch El (ft)	785.87		
Alpha	1.60		
Frctn Loss (ft)	0.13		
C & E Loss (ft)	0.04		
Wt. n-Val.	0.100	0.065	0.088
Reach Len. (ft)	273.42	264.26	226.10
Flow Area (sq ft)	461.20	1057.85	48.18
Area (sq ft)	2036.55	1057.85	48.18
Flow (cfs)	343.43	3376.01	41.56
Top Width (ft)	794.52	82.18	17.80
Avg. Vel. (ft/s)	0.74	3.19	0.86
Hydr. Depth (ft)	2.52	12.87	2.71
Conv. (cfs)	12682.2	124668.5	1534.8
Wetted Per. (ft)	183.20	90.37	18.60
Shear (lb/sq ft)	0.12	0.54	0.12
Stream Power (lb/ft s)	10587.45	0.00	0.00
Cum Volume (acre-ft)	9.90	6.93	0.23
Cum SA (acres)	3.28	0.54	0.07

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500Yr

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.10		
Vel Head (ft)	0.03		
W.S. Elev (ft)	807.07		
Crit W.S. (ft)	795.44		
E.G. Slope (ft/ft)	0.000191		
Q Total (cfs)	9687.00		
Top Width (ft)	1115.21		
Vel Total (ft/s)	1.06		
Max Chl Dpth (ft)	21.20		
Conv. Total (cfs)	701443.3		
Length Wtd. (ft)	268.37		
Min Ch El (ft)	785.87		
Alpha	1.81		
Frctn Loss (ft)	0.07		
C & E Loss (ft)	0.02		
Wt. n-Val.	0.100	0.065	0.088
Reach Len. (ft)	273.42	264.26	226.10
Flow Area (sq ft)	7146.61	1573.43	418.01
Area (sq ft)	7146.61	1573.43	418.01
Flow (cfs)	6200.25	3336.79	149.97
Top Width (ft)	815.78	82.18	217.25
Avg. Vel. (ft/s)	0.87	2.12	0.36
Hydr. Depth (ft)	8.76	19.15	1.92
Conv. (cfs)	448964.9	241619.2	10859.1
Wetted Per. (ft)	822.10	90.37	219.06
Shear (lb/sq ft)	0.10	0.21	0.02
Stream Power (lb/ft s)	10587.45	0.00	0.00
Cum Volume (acre-ft)	30.80	10.30	1.40
Cum SA (acres)	3.34	0.54	0.61

Warning: The cross-section end points had to be extended vertically for the computed water surface.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

SouthUtoyCreek.rep

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: southutoycreek
 REACH: 50 RS: 8.5107

INPUT

Description:

Station Elevation Data		num=		99	
Sta	Elev	Sta	Elev	Sta	Elev
9686.744	7969691.244	7969693.216	7969703.508	7961266	9710.491
9715.772	7962292	7967657	9648549	728.035	7964943
9752.563	7968781	9623147	9674099	764.827	7966834
9789.354	7966501	9628637	9663039	801.618	7965937
9826.146	7964832	9629831	413796.5085	9838.417	9637279
9862.937	7969865.962	7969875.201	7969883.236	7969887.465	796
9899.729	7969900.511	7969911.993	7969917.785	795.847	79924.256
9935.067	93.5808	9936.52793	33399948.784	791.232	19952.334
9969.609	787.731	99973.312	787.161	9976.648	786.803
9994.935	78610005.48	78610016.05	786	10025.8	78610026.62
10032.16	792.091	10037.19796	584710047.768	806.272	2810056.668
10064.74	81210068.79	81210076.01	81210079.07	81210089.35	812
10099.63	81210109.91	81210119.12	81210120.19	81210130.47	812
10140.75	81210151.03	81210161.31	81210162.23	81210171.59	812
10181.87	81210192.15	81210202.44	81210205.34	81210212.72	812
10223	81210233.28	81210243.56	81210248.45	81210253.84	812
10264.12	812	10274.4	81210284.68	81210291.56	81210294.96
10305.248	15.06161	10315.52817	.8961	10325.8	81810334.67
10346.36	81810356.64	81810366.92	818	10377.2	81810377.78
10387.48	81810397.768	15.99241	0408.04815	.53521	10411.78815

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
9686.744	.1	9936.52	.065	10032.16	.075

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	9936.52	10032.16		0	0	0	.1	.3	

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	804.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.100	0.065	0.075
W.S. Elev (ft)	804.49	Reach Len. (ft)			
Crit W.S. (ft)	793.44	Flow Area (sq ft)	2064.25	1590.22	85.16
E.G. Slope (ft/ft)	0.000398	Area (sq ft)	2064.25	1590.22	85.16
Q Total (cfs)	7156.00	Flow (cfs)	2444.17	4618.53	93.30
Top Width (ft)	359.07	Top Width (ft)	249.78	95.64	13.65
Vel Total (ft/s)	1.91	Avg. Vel. (ft/s)	1.18	2.90	1.10
Max Chl Dpth (ft)	18.49	Hydr. Depth (ft)	8.26	16.63	6.24
Conv. Total (cfs)	358800.0	Conv. (cfs)	122549.9	231571.9	4678.2
Length Wtd. (ft)		Wetted Per. (ft)	258.48	98.91	18.44
Min Ch El (ft)	786.00	Shear (lb/sq ft)	0.20	0.40	0.11
Alpha	1.62	Stream Power (lb/ft s)	10411.78	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #10Yr

E.G. Elev (ft)	800.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.100	0.065	0.075
W.S. Elev (ft)	800.70	Reach Len. (ft)			
Crit W.S. (ft)	791.17	Flow Area (sq ft)	1117.60	1227.74	41.24
E.G. Slope (ft/ft)	0.000365	Area (sq ft)	1117.60	1227.74	41.24
Q Total (cfs)	3761.00	Flow (cfs)	850.83	2876.16	34.01
Top Width (ft)	354.94	Top Width (ft)	249.78	95.64	9.52
Vel Total (ft/s)	1.58	Avg. Vel. (ft/s)	0.76	2.34	0.82
Max Chl Dpth (ft)	14.70	Hydr. Depth (ft)	4.47	12.84	4.33
Conv. Total (cfs)	196755.7	Conv. (cfs)	44510.9	150465.5	1779.3
Length Wtd. (ft)		Wetted Per. (ft)	254.69	98.91	12.84
Min Ch El (ft)	786.00	Shear (lb/sq ft)	0.10	0.28	0.07

Alpha	1.75	SouthUtoyCreek.rep		
Frctn Loss (ft)		Stream Power (lb/ft s)	10411.78	0.00
C & E Loss (ft)		Cum Volume (acre-ft)		0.00
		Cum SA (acres)		

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.01	Wt. n-Val.	0.100	0.065	0.075
Vel Head (ft)	0.11	Reach Len. (ft)			
W.S. Elev (ft)	806.90	Flow Area (sq ft)	2666.21	1820.72	121.37
Crit W.S. (ft)	794.75	Area (sq ft)	2666.21	1820.72	121.37
E.G. Slope (ft/ft)	0.000400	Flow (cfs)	3732.80	5805.61	148.59
Q Total (cfs)	9687.00	Top Width (ft)	249.78	95.64	16.71
Top Width (ft)	362.13	Avg. Vel. (ft/s)	1.40	3.19	1.22
Vel Total (ft/s)	2.10	Hydr. Depth (ft)	10.67	19.04	7.26
Max Chl Dpth (ft)	20.90	Conv. (cfs)	186572.9	290176.0	7426.9
Conv. Total (cfs)	484175.8	Wetted Per. (ft)	260.89	98.91	22.36
Length Wtd. (ft)		Shear (lb/sq ft)	0.26	0.46	0.14
Min Ch El (ft)	786.00	Stream Power (lb/ft s)	10411.78	0.00	0.00
Alpha	1.56	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

SUMMARY OF MANNING'S N VALUES

River:southutoycreek

Reach	River Sta.	n1	n2	n3
50	2981.919	.1	.065	.1
50	2679.912	.075	.06	.1
50	2645.586	Culvert		
50	2560.417	.075	.06	.1
50	2392.796	.075	.06	.08
50	2000	.085	.065	.085
50	1653.432	.09	.065	.1
50	1283.438	.09	.065	.1
50	1008.862	.095	.065	.1
50	614.851	.1	.065	.1
50	596.1601	Bridge		
50	537.0376	.1	.065	.1
50	272.774*	.1	.065	.088
50	8.5107	.1	.065	.075

SUMMARY OF REACH LENGTHS

River: southutoycreek

Reach	River Sta.	Left	Channel	Right
50	2981.919	274.7351	302.006	402.9232
50	2679.912	130.6893	119.4957	98.23132
50	2645.586	Culvert		
50	2560.417	169.3019	167.621	203.519
50	2392.796	390.0865	392.7958	322.4135
50	2000	333.4372	346.5684	358.5162
50	1653.432	379.0372	369.9936	362.339
50	1283.438	280.2758	274.5756	284.1626
50	1008.862	246.5609	394.0111	542.1083
50	614.851	171.4715	77.81376	61.24157
50	596.1601	Bridge		
50	537.0376	273.42	264.26	226.1
50	272.774*	273.42	264.26	226.1
50	8.5107	0	0	0

SouthUtoyCreek.rep

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
 River: southutoycreek

Reach	River Sta.	Contr.	Expan.
50	2981.919	.3	.5
50	2679.912	.3	.5
50	2645.586 Culvert		
50	2560.417	.3	.5
50	2392.796	.1	.3
50	2000	.1	.3
50	1653.432	.1	.3
50	1283.438	.1	.3
50	1008.862	.3	.5
50	614.851	.3	.5
50	596.1601 Bridge		
50	537.0376	.3	.5
50	272.774*	.3	.5
50	8.5107	.1	.3

**Appendix F:
HEC-RAS Output - Natural/ Unrestricted
Conditions, Existing Conditions, Proposed
Conditions
North Utoy Creek**

NorthUtoyCreek.rep

HEC-RAS Version 4.1.0 Jan 2010
U.S. Army Corps of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X   X  XXXXXX   XXXX       XXXX       XX       XXXX
X   X  X       X   X       X   X       X   X       X
X   X  X       X           X   X       X   X       X
XXXXXXXX XXXX   X           XXX XXXX   XXXXXX   XXXX
X   X  X       X           X   X       X   X       X
X   X  X       X   X       X   X       X   X       X
X   X  XXXXXX   XXXX       X   X       X   X       XXXXX
```

PROJECT DATA

Project Title: North Utoy Creek
Project File : NorthUtoyCreek.prj
Run Date and Time: 3/17/2014 3:46:31 PM

Project in English units

Project Description:

Flood Insurance Restudy for Fulton County, GA
Flooding Source: North Utoy
Creek
Model Date: January 2010 - Edited March 2014
Mapping Partner:
PBS&J
Modeler: Rebecca Riggs, PE, CFM - Edited Benjamin Pickering II, PE
II
Downstream Boundary Conditions are set at known water surface elevation
obtained from Utoy Creek Detailed Model.

Report edited to only show section of data at Fairburn Road

PLAN DATA

Plan Title: Conspan O1165
Plan File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study Data\Proposed Analysis
Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\North Utoy Creek\HYDRAULICS\Simulations\NorthUtoyCreek.p06

Geometry Title: Conspan O1165

Geometry File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study
Data\Proposed Analysis Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\North Utoy
Creek\HYDRAULICS\Simulations\NorthUtoyCreek.g05

Flow Title : Flow 01

Flow File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study
Data\Proposed Analysis Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\North Utoy
Creek\HYDRAULICS\Simulations\NorthUtoyCreek.f01

Plan Summary Information:

Number of:	Cross Sections =	16	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	2	Lateral Structures =	0

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculation tolerance	=	0.01
Maximum number of iterations	=	20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computation Options

Critical depth computed only where necessary	
Conveyance Calculation Method:	At breaks in n values only
Friction Slope Method:	Average Conveyance

NorthUtoyCreek.rep

Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Flow 01
 Flow File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study Data\Proposed Analysis
 Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\North Utoy Creek\HYDRAULICS\Simulations\NorthUtoyCreek.f01

Flow Data (cfs)

River	Reach	RS	100Yr	005Yr	010Yr
025Yr	050Yr	500Yr	FW-M4		
northutoycreek	108	5014.488	4309	1741	2267
3044	3662	5754	4309	1741	2267
northutoycreek	108	4941.385	4309	1741	2267
3044	3662	5754	4309	1741	2267
northutoycreek	108	4584.487	4309	1741	2267
3044	3662	5754	4309	1741	2267
northutoycreek	108	4271.358	4309	1741	2267
3044	3662	5754	4309	1741	2267
northutoycreek	108	3989.023	4309	1741	2267
3044	3662	5754	4309	1741	2267
northutoycreek	108	3500	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	3000	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	2500	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	1990.777	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	1485.967	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	1285.964	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	1037.962	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	806.1852	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	495.8178	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	439.239	4417	1789	2316
3098	3746	5934	4417	1789	2316
northutoycreek	108	340.0176	6979	2782	3635
4903	5903	9438	6979		

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
northutoycreek	108	100Yr		Known WS = 804.49
northutoycreek	108	005Yr		Known WS = 799.47
northutoycreek	108	010Yr		Known WS = 800.7
northutoycreek	108	025Yr		Known WS = 802.17
northutoycreek	108	050Yr		Known WS = 803.31
northutoycreek	108	500Yr		Known WS = 806.9
northutoycreek	108	FW-M4		Known WS = 805.49

GEOMETRY DATA

Geometry Title: Conspan 01165
 Geometry File : v:\14603 Fairburn Road\Hydraulic Study\FEMA\Proposed Model Flood Study Data\Proposed
 Analysis Caldwell Branch, Utoy, N. Utoy, S. Utoy Creeks\North Utoy
 Creek\HYDRAULICS\Simulations\NorthUtoyCreek.g05

CROSS SECTION

NorthUtoyCreek.rep

RIVER: northutoycreek
REACH: 108

RS: 5014.488

INPUT

Description: Survey Utoy NUT 0600

Station Elevation Data num= 107

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9574.732820	72489581.143819	94329591.148819	07629601.152818	24189611.157	818				
9621.162817	51119631.166816	81339641.171816	17019651.176815	9018	9661.18815	0365			
9671.185814	6053	9681.19	814.399691	194814	03499701.199	8149711.204	814		
9721.209	8149731.213		8149741.218		8149751.223813	84449761.227813	7848		
9771.232813	79659781.237	813.7639791	241813.74649801	246813	61849811.251813	5235			
9821.255813	45489822	929813.3765	9831.26	812.9899841	265	812.4859851	269	812	
9861.274	8129871.279		8129881.283		8129891.288	8129901.293811	9963		
9911.298811	94099921.302811	83499938	745	812.21	9951.29	812.489963	918	812	31
9971.98	808.589991	261	798.58	9995.19	798.310004	42	798.4310012	94	798.53
10012.96	798.7610021	35803	418210031	35808	496110041	36809	309410051	36809	8003
10061.37809	999810071	37	81010081	38809	953110091	38809	943410101	39810	2246
10111.39	810.505	10121.4810	7858	10131.4811	067110141	41811	3495	10149	7811
10151.41811	635910161	41811	943310171	42	81210181	42	81210191	43	812
10201.43	81210211	44	81210221	44	81210231	45	81210241	45	812
10251.46	81210261	46	81210271	47	81210281	47	81210291	48	812
10301.48	81210311	48	81210321	49	81210331	49812	0546	10341	5812
10351.5	813.5110361	51813	489710371	51812	898410381	52812	730510391	52	812
10401.53812	382510411	53812	318910421	54812	231310431	54812	658810441	55813	2271
10447.92813	722110451	64814	024910461	88814	190810472	13814	439810482	38814	5084
10489.78814	168110492	62814	023210502	87814	558510513	12815	793410523	36	816
10533.61816	146610535	65816	266310543	86816	8193	10554	1817	408210564	35817
10574.6818	271410576	29818	3229						

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9574.732	.085	9971.98	.05510031	35	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	9971.9810031	35	75.1689273	1023367	47525	.3	.5

Ineffective Flow	num=	Sta L	Sta R	Elev	Permanent
9574.732	2	9965.69		812	F
10041.4510576		29		812	F

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	812.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.77	Wt. n-Val.	0.085	0.055	0.110
W.S. Elev (ft)	811.80	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	806.93	Flow Area (sq ft)	11.09	596.90	29.21
E.G. Slope (ft/ft)	0.003564	Area (sq ft)	11.19	596.90	186.25
Q Total (cfs)	4309.00	Flow (cfs)	15.83	4245.47	47.70
Top Width (ft)	191.66	Top Width (ft)	6.96	59.37	125.34
Vel Total (ft/s)	6.76	Avg. Vel. (ft/s)	1.43	7.11	1.63
Max Chl Dpth (ft)	13.50	Hydr. Depth (ft)	1.76	10.05	2.89
Conv. Total (cfs)	72182.3	Conv. (cfs)	265.2	71118.1	799.1
Length Wtd. (ft)	1.00	Wetted Per. (ft)	6.93	64.45	10.13
Min Ch El (ft)	798.30	Shear (lb/sq ft)	0.36	2.06	0.64
Alpha	1.09	Stream Power (lb/ft s)	10576.29	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	109.64	113.16	96.33
C & E Loss (ft)		Cum SA (acres)	31.80	9.94	25.75

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #010Yr

E.G. Elev (ft)	810.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.	0.085	0.055	0.110
W.S. Elev (ft)	810.08	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	804.39	Flow Area (sq ft)	2.44	495.03	11.88
E.G. Slope (ft/ft)	0.001881	Area (sq ft)	2.44	495.03	22.46
Q Total (cfs)	2267.00	Flow (cfs)	1.43	2257.84	7.73
Top Width (ft)	127.59	Top Width (ft)	3.25	59.37	64.97
Vel Total (ft/s)	4.45	Avg. Vel. (ft/s)	0.59	4.56	0.65

NorthUtoyCreek.rep				
Max Chl Dpth (ft)	11.78	Hydr. Depth (ft)	0.75	8.34 1.18
Conv. Total (cfs)	52274.5	Conv. (cfs)	33.0	52063.2 178.3
Length Wtd. (ft)	1.00	Wetted Per. (ft)	3.58	64.45 10.13
Min Ch El (ft)	798.30	Shear (lb/sq ft)	0.08	0.90 0.14
Alpha	1.05	Stream Power (lb/ft s)	10576.29	0.00 0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	40.81	89.89 43.32
C & E Loss (ft)		Cum SA (acres)	20.73	9.88 20.76

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.54	Wt. n-Val.	0.085	0.055	0.110
Vel Head (ft)	0.97	Reach Len. (ft)	1.00	1.00	1.00
W.S. Elev (ft)	812.57	Flow Area (sq ft)	76.04	642.56	392.64
Crit W.S. (ft)	808.35	Area (sq ft)	76.04	642.56	392.64
E.G. Slope (ft/ft)	0.004338	Flow (cfs)	60.25	5296.03	397.72
Q Total (cfs)	5754.00	Top Width (ft)	132.34	59.37	347.36
Top Width (ft)	539.07	Avg. Vel. (ft/s)	0.79	8.24	1.01
Vel Total (ft/s)	5.18	Hydr. Depth (ft)	0.57	10.82	1.13
Max Chl Dpth (ft)	14.27	Conv. (cfs)	914.9	80413.0	6038.8
Conv. Total (cfs)	87366.7	Wetted Per. (ft)	133.19	64.45	347.45
Length Wtd. (ft)	1.00	Shear (lb/sq ft)	0.15	2.70	0.31
Min Ch El (ft)	798.30	Stream Power (lb/ft s)	10576.29	0.00	0.00
Alpha	2.33	Cum Volume (acre-ft)	171.30	130.95	144.66
Frctn Loss (ft)		Cum SA (acres)	36.22	9.94	28.09
C & E Loss (ft)					

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE

RIVER: northutoycreek
 REACH: 108 RS: 4995.442

INPUT

Description: Benjamin E Hayes Dr (Survey Utoy NUT_0600)
 Distance from Upstream XS = 1
 Deck/Roadway Width = 34
 Weir Coefficient = 2.6
 Upstream Deck/Roadway Coordinates

num=	150	Sta Hi Cord Lo Cord				Sta Hi Cord Lo Cord			
9143.11	839.72	0	9150.2	839.4	0	9160.06	839.02	0	
9162.27	838.95	0	9174.33	838.56	0	9177.93	838.38	0	
9186.4	837.86	0	9195.8	837.39	0	9198.47	837.27	0	
9210.53	836.83	0	9213.67	836.76	0	9222.6	836.58	0	
9231.55	836.22	0	9234.66	836	0	9246.73	835.54	0	
9249.42	835.38	0	9258.79	834.93	0	9267.29	834.61	0	
9270.86	834.54	0	9282.92	834.33	0	9285.16	834.25	0	
9294.99	833.76	0	9303.03	833.3	0	9307.06	833.1	0	
9314.98	832.83	0	9318.79	832.71	0	9322.57	832.55	0	
9329.91	832.18	0	9341.03	831.6	0	9345.47	831.2	0	
9352.14	830.85	0	9363.26	830.49	0	9368.37	830.34	0	
9374.37	830.04	0	9385.49	829.37	0	9391.27	828.92	0	
9396.61	828.7	0	9407.72	828.29	0	9414.17	828.02	0	
9418.84	827.76	0	9425.29	827.37	0	9429.68	827.12	0	
9440.14	826.49	0	9442.8	826.38	0	9450.6	826	0	
9461.06	825.07	0	9471.53	824.45	0	9476.85	824.32	0	
9481.99	824.11	0	9492.45	822.76	0	9502.91	822.27	0	
9510.89	822.31	0	9513.37	822.28	0	9523.83	821.76	0	
9534.11	820.93	0	9534.29	820.92	0	9544.4	820.33	0	
9554.51	819.72	0	9555.79	819.65	0	9564.62	819.07	0	
9574.73	818.73	0	9584.83	818.47	0	9594.94	817.99	0	
9605.05	817.26	0	9615.16	817.03	0	9623.98	816.96	0	
9624.09	816.96	0	9624.45	816.95	0	9625.26	816.93	0	
9635.27	816.68	0	9645.28	816.01	0	9655.29	815.95	0	
9665.3	815.65	0	9675.31	815.21	0	9685.32	814.8	0	
9695.33	814.39	0	9705.34	814.04	0	9715.35	814	0	
9725.36	813.93	0	9735.37	813.87	0	9745.38	813.66	0	

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9755.38	813.42	0	9759.47	813.33	0	9765.39	813.2	0
9775.4	813.17	0	9785.4	813.14	0	9795.41	813.07	0
9805.41	812.91	0	9846.41	812.89	0	9889.96	812.53	0
9929.41	812.45	0	9967.82	813.15	0	9970.69	813.15	809.6
10036.45	813.16	809.6	110089.69	812.45	0	10137.38	812.51	0
10175.62	812		010180.57	812		010185.63	812	0
10195.63	811.86		010205.64	811.98		010215.64	811.99	0
10225.65	812		010235.66	812		010245.66	812	0
10255.67	812		010265.67	812		010275.68	812	0
10285.68	812		010295.69	812		010305.69	812	0
10315.7	812		010325.71	812		010335.71	812	0
10345.72	812		010355.72	812		010365.73	812	0
10375.73	812		010385.74	812		010395.75	812	0
10405.75	812		010415.76	812.18		010423.64	812.49	0
10425.78	812.55		010435.88	812.64		010445.97	813.07	0
10456.07	813.85		010466.17	814		010476.26	814.01	0
10482.57	814		010486.36	814.01		010496.46	814.25	0
10506.55	814.49		010516.65	815.21		010526.75	816	0
10536.84	816.05		010546.94	816.36		010555.03	816.67	0
10557.04	816.75		010567.13	817.3		010577.23	817.88	0
10587.33	818.09		010597.42	818.59		010607.52	819.14	0
10617.62	819.8		010627.48	820.49		010627.71	820.51	0
10637.81	821.2		010647.91	821.96		010653.12	822.39	0

Upstream Bridge Cross Section Data

Station Elevation Data		num=		107	
Sta	Elev	Sta	Elev	Sta	Elev
9574.732820	72489581	143819	94329591	148819	07629601
9621.162817	51119631	166816	81339641	171816	17019651
9671.185814	60539681	19	814399691	194814	03499701
9721.209	8149731	213	8149741	218	8149751
9771.232813	79659781	237	8137639791	241813	74649801
9821.255813	45489822	929813	37659831	26	8129899841
9861.274	8129871	279	8129881	283	8129891
9911.298811	94099921	302811	83499938	745	812.21
9971.98	808.589991	261	798.58	9995.19	798.310004
10012.96	798.7610021	35803	418210031	35808	496110041
10061.37809	999810071	37	81010081	38809	953110091
10111.39	810.505	10121	4810.7858	10131	4811.0671
10151.41811	635910161	41811	943310171	42	81210181
10201.43	81210211	44	81210221	44	81210231
10251.46	81210261	46	81210271	47	81210281
10301.48	81210311	48	81210321	49	81210331
10351.5	813.5110361	51813	489710371	51812	898410381
10401.53812	382510411	53812	318910421	54812	231310431
10447.92813	722110451	64814	024910461	88814	190810472
10489.78814	168110492	62814	023210502	87814	558510513
10533.61816	146610535	65816	266310543	86816	8193
10574.6818	271410576	29818	3229		

Manning's n Values

Sta	n Val	Sta	n Val	Sta	n Val
9574.732	.085	9971.98	.05510031	35	.11

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
9971.9810031			.3		.5

Ineffective Flow		num=		2	
Sta L	Sta R	Elev	Permanent		
9574.732	9965.69	812	F		
10041.4510576	29	812	F		

Downstream Deck/Roadway Coordinates

num=		150			
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9143.11	839.72	0	9150.2	839.4	0
9162.27	838.95	0	9174.33	838.56	0
9186.4	837.86	0	9195.8	837.39	0
9210.53	836.83	0	9213.67	836.76	0
9231.55	836.22	0	9234.66	836	0
9249.42	835.38	0	9258.79	834.93	0
9270.86	834.54	0	9282.92	834.33	0
9294.99	833.76	0	9303.03	833.3	0
9314.98	832.83	0	9318.79	832.71	0
9329.91	832.18	0	9341.03	831.6	0
9352.14	830.85	0	9363.26	830.49	0

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9374.37	830.04	0	9385.49	829.37	0	9391.27	828.92	0
9396.61	828.7	0	9407.72	828.29	0	9414.17	828.02	0
9418.84	827.76	0	9425.29	827.37	0	9429.68	827.12	0
9440.14	826.49	0	9442.8	826.38	0	9450.6	826	0
9461.06	825.07	0	9471.53	824.45	0	9476.85	824.32	0
9481.99	824.11	0	9492.45	822.76	0	9502.91	822.27	0
9510.89	822.31	0	9513.37	822.28	0	9523.83	821.76	0
9534.11	820.93	0	9534.29	820.92	0	9544.4	820.33	0
9554.51	819.72	0	9555.79	819.65	0	9564.62	819.07	0
9574.73	818.73	0	9584.83	818.47	0	9594.94	817.99	0
9605.05	817.26	0	9615.16	817.03	0	9623.98	816.96	0
9624.09	816.96	0	9624.45	816.95	0	9625.26	816.93	0
9635.27	816.68	0	9645.28	816.01	0	9655.29	815.95	0
9665.3	815.65	0	9675.31	815.21	0	9685.32	814.8	0
9695.33	814.39	0	9705.34	814.04	0	9715.35	814	0
9725.36	813.93	0	9735.37	813.87	0	9745.38	813.66	0
9755.38	813.42	0	9759.47	813.33	0	9765.39	813.2	0
9775.4	813.17	0	9785.4	813.14	0	9795.41	813.07	0
9805.41	812.91	0	9846.41	812.89	0	9889.96	812.53	0
9929.41	812.45	0	9967.82	813.15	0	9970.69	813.15	809.6
10036.45	813.16	809.6	10089.69	812.45	0	10137.38	812.51	0
10175.62	812	0	10180.57	812	0	10185.63	812	0
10195.63	811.86	0	10205.64	811.98	0	10215.64	811.99	0
10225.65	812	0	10235.66	812	0	10245.66	812	0
10255.67	812	0	10265.67	812	0	10275.68	812	0
10285.68	812	0	10295.69	812	0	10305.69	812	0
10315.7	812	0	10325.71	812	0	10335.71	812	0
10345.72	812	0	10355.72	812	0	10365.73	812	0
10375.73	812	0	10385.74	812	0	10395.75	812	0
10405.75	812	0	10415.76	812.18	0	10423.64	812.49	0
10425.78	812.55	0	10435.88	812.64	0	10445.97	813.07	0
10456.07	813.85	0	10466.17	814	0	10476.26	814.01	0
10482.57	814	0	10486.36	814.01	0	10496.46	814.25	0
10506.55	814.49	0	10516.65	815.21	0	10526.75	816	0
10536.84	816.05	0	10546.94	816.36	0	10555.03	816.67	0
10557.04	816.75	0	10567.13	817.3	0	10577.23	817.88	0
10587.33	818.09	0	10597.42	818.59	0	10607.52	819.14	0
10617.62	819.8	0	10627.48	820.49	0	10627.71	820.51	0
10637.81	821.2	0	10647.91	821.96	0	10653.12	822.39	0

Downstream Bridge Cross Section Data

Station	Elevation	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev					
9200.48828	21319205	011827	11289215	379824	53129225	746821	88159226	852821	5919					
9236.113819	25429246	481817	49319256	848816	14229264	758815	67369267	215815	5487					
9277.582815	1212	9287	95814	46129298	317	8149302	663	8149308	684814	0249				
9319.051813	88929329	419813	70189339	786813	41049340	569813	38519350	153813	0739					
9360.52812	69649370	888812	34279378	475812	04629381	255811	95489391	622811	8417					
9401.99811	69649412	357811	81939416	381811	85519422	724	811	6799433	091811	0118				
9443.459810	55699453	826810	24189454	286810	23399464	193810	1213	9474	56809	6435				
9484.928808	74129492	192808	39149495	295808	27599505	662808	1563	9516	03808	1058				
9526.397	8089530	098	8089536	764	8089547	131	8089557	499	808					
9567.866	8089568	004	8089578	233	808	9588	6	8089598	968	808				
9605.909	8089609	335	8089619	702	808	9630	07	8089640	437	808				
9643.815	8089650	804	8089661	171	8089671	539	8089681	721	808					
9681.906	8089692	273808	0176	9702	64808	09829713	008808	16759719	626808	2507				
9723.375808	33989733	742808	5755	9744	11	808	7649754	477809	03489757	532809	1018			
9764.844809	26579775	211809	89879785	579810	18519795	438811	10989795	946811	1574					
9806.313	812	9816	68	8129827	048	8129833	344	8129837	217	812				
9837.408	8129847	408	8129857	409	8129867	409	812	9877	41811	3123				
9887.41810	07069904	929	809	19	9935	58	809	319966	646	809	59984	426	807	37
9990.73	798	099995	506	798	110000	42	798	4810021	66	799	6810029	09	807	59
10042.69	809	2210072	65	809	210079	41	809	2410087	42	810	10097	42810	0723	
10107.42810	345410117	42810	654210127	42810	962910137	42811	271710147	42811	5804					
10157.42811	889210167	42	81210177	42	81210187	42	81210197	42811	4365					
10207.42810	981810217	42811	107210226	67811	231810227	42811	241510237	42811	3709					
10247.43811	500310257	43811	629710267	43811	759110277	43811	933610287	43	812					
10297.43	81210307	43	81210317	43	81210327	43	81210337	43	812					
10347.44	81210357	44811	900110367	44	81210377	44	81210387	44	812					
10397.44	81210407	44	812	00610417	44812	323410427	44812	584410437	44812	7127				
10447812	771910447	45812	777710457	49812	887810467	54813	134610477	59	813	505				
10487.63813	837510497	68814	449510507	73815	779810517	77817	705310527	82818	6482					
10536.58819	402710537	87819	496810547	91819	502910557	96819	798110568	01819	8986					
10578.05	820	10588	1	820	07510598	15820	200310608	19820	340510613	98820	4211			

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Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 9200.48 .0859984.426 .05510029.09 .11

Bank Sta: Left Right Coeff Contr. Expan.
 9984.42610029.09 .3 .5

Ineffective Flow num= 3
 Sta L Sta R Elev Permanent
 9200.48 9820 820 F
 9841.41 9902.49 810.5 F
 10104.6510613.98 810.5 F

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Piers = 2

Pier Data
 Pier Station Upstream= 9992.57 Downstream= 9992.57
 Upstream num= 2
 Width Elev Width Elev
 2 0 2 811
 Downstream num= 2
 Width Elev Width Elev
 2 0 2 811

Pier Data
 Pier Station Upstream=10014.57 Downstream=10014.57
 Upstream num= 2
 Width Elev Width Elev
 2 0 2 811
 Downstream num= 2
 Width Elev Width Elev
 2 0 2 811

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 Momentum Cd = 2
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #100Yr

E.G. US. (ft)	812.57	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	811.80	E.G. Elev (ft)	812.57	812.42
Q Total (cfs)	4309.00	W.S. Elev (ft)	811.80	811.80
Q Bridge (cfs)	4103.30	Crit W.S. (ft)	807.47	807.33
Q Weir (cfs)	205.70	Max Chl Dpth (ft)	13.50	13.71
Weir Sta Lft (ft)	9884.81	Vel Total (ft/s)	7.85	7.56
Weir Sta Rgt (ft)	10428.31	Flow Area (sq ft)	549.24	569.65
Weir Submerg	0.00	Froude # Chl	0.49	0.53
Weir Max Depth (ft)	0.57	Specif Force (cu ft)	4252.17	4289.64
Min El Weir Flow (ft)	812.01	Hydr Depth (ft)		
Min El Prs (ft)	809.61	W.P. Total (ft)	171.77	177.51
Delta EG (ft)	1.16	Conv. Total (cfs)		
Delta WS (ft)	1.67	Top Width (ft)		

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BR Open Area (sq ft)	409.17	Frctn Loss (ft)		
BR Open Vel (ft/s)	10.03	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)	9574.73	9200.48

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir flow. The momentum answer has been disregarded.

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: For the cross section inside the bridge at the downstream end, the energy is based on critical depth over the weir. The water surface has been projected.

BRIDGE OUTPUT Profile #010Yr

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	810.40	E.G. Elev (ft)	810.40	809.19
W.S. US. (ft)	810.08	W.S. Elev (ft)	809.61	808.64
Q Total (cfs)	2267.00	Crit W.S. (ft)	804.83	804.53
Q Bridge (cfs)	2267.00	Max Chl Dpth (ft)	11.31	10.55
Q Weir (cfs)		Vel Total (ft/s)	5.27	6.47
Weir Sta Lft (ft)		Flow Area (sq ft)	430.12	350.25
Weir Sta Rgt (ft)		Froude # Chl	0.28	0.36
Weir Submerg		Specif Force (cu ft)	2332.25	2018.01
Weir Max Depth (ft)		Hydr Depth (ft)		5.97
Min El Weir Flow (ft)	812.01	W.P. Total (ft)	171.77	107.21
Min El Prs (ft)	809.61	Conv. Total (cfs)	22242.5	22488.6
Delta EG (ft)	1.21	Top Width (ft)		58.70
Delta WS (ft)	1.44	Frctn Loss (ft)		
BR Open Area (sq ft)	409.17	C & E Loss (ft)		
BR Open Vel (ft/s)	5.54	Shear Total (lb/sq ft)	1.62	2.07
Coef of Q		Power Total (lb/ft s)	9574.73	9200.48
Br Sel Method	Press Only			

Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #500Yr

		Element	Inside BR US	Inside BR DS
E.G. US. (ft)	813.54	E.G. Elev (ft)	813.54	813.35
W.S. US. (ft)	812.57	W.S. Elev (ft)	812.57	812.57
Q Total (cfs)	5754.00	Crit W.S. (ft)	808.94	809.40
Q Bridge (cfs)	4056.13	Max Chl Dpth (ft)	14.27	14.48
Q Weir (cfs)	1697.87	Vel Total (ft/s)	5.51	5.25
Weir Sta Lft (ft)	9809.60	Flow Area (sq ft)	1043.45	1095.96
Weir Sta Rgt (ft)	10445.57	Froude # Chl	0.60	0.63
Weir Submerg	0.00	Specif Force (cu ft)	5510.59	5535.07
Weir Max Depth (ft)	1.54	Hydr Depth (ft)	3.01	2.77
Min El Weir Flow (ft)	812.01	W.P. Total (ft)	518.23	573.73
Min El Prs (ft)	809.61	Conv. Total (cfs)		
Delta EG (ft)	0.90	Top Width (ft)	346.43	396.20
Delta WS (ft)	1.41	Frctn Loss (ft)		
BR Open Area (sq ft)	409.17	C & E Loss (ft)		
BR Open Vel (ft/s)	9.91	Shear Total (lb/sq ft)		
Coef of Q		Power Total (lb/ft s)	9574.73	9200.48
Br Sel Method	Press/Weir			

Note: Momentum answer is not valid if the water surface is above the low chord or if there is weir

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flow. The momentum

answer has been disregarded.

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was

used for pressure flow.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from

the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: For the cross section inside the bridge at the downstream end, the energy is based on critical depth over the weir. The water surface has been projected.

CROSS SECTION

RIVER: northutoycreek

REACH: 108

RS: 4941.385

INPUT

Description: Survey Utoy NUT_0500

Station Elevation Data		num= 155	
Sta	Elev	Sta	Elev
9200.48828	21319205.011827	11289215.379824	53129225.746821
88159226.852821	5919		
9236.113819	25429246.481817	49319256.848816	14229264.758815
67369267.215815	5487		
9277.582815	1212 9287.95814	46129298.317	8149302.663
8149308.684814	0249		
9319.051813	88929329.419813	70189339.786813	41049340.569813
38519350.153813	0739		
9360.52812	69649370.888812	34279378.475812	04629381.255811
95489391.622811	8417		
9401.99811	69649412.357811	81939416.381811	85519422.724
811.6799433	091811	0118	
9443.459810	55699453.826810	24189454.286810	23399464.193810
1213 9474.56809	6435		
9484.928808	74129492.192808	39149495.295808	27599505.662808
1563 9516.03808	1058		
9526.397	8089530.098	8089536.764	8089547.131
8089557.499	808		
9567.866	8089568.004	8089578.233	808 9588.6
8089598.968	808		
9605.909	8089609.335	8089619.702	808 9630.07
8089640.437	808		
9643.815	8089650.804	8089661.171	8089671.539
8089681.721	808		
9681.906	8089692.273808	0176 9702.64808	09829713.008808
16759719.626808	2507		
9723.375808	33989733.742808	5755 9744.11	808.7649754.477809
03489757.532809	1018		
9764.844809	26579775.211809	89879785.579810	18519795.438811
10989795.946811	1574		
9806.313	812 9816.68	8129827.048	8129833.344
8129837.217	812		
9837.408	8129847.408	8129857.409	8129867.409
812 9877.41811	3123		
9887.41810	07069904.929	809.19 9935.58	809.319966.646
809.59984	426	807.37	
9990.73	798.099995.506	798.110000.42	798.4810021.66
799.6810029	09	807.59	
10042.69	809.2210072.65	809.210079.41	809.2410087.42
81010097.42810	0723		
10107.42810	345410117.42810	654210127.42810	962910137.42811
271710147.42811	5804		
10157.42811	889210167.42	81210177.42	81210187.42
81210197.42811	4365		
10207.42810	981810217.42811	107210226.67811	231810227.42811
241510237.42811	3709		
10247.43811	500310257.43811	629710267.43811	759110277.43811
933610287.43	812		
10297.43	81210307.43	81210317.43	81210327.43
81210337.43	812		
10347.44	81210357.44811	900110367.44	81210377.44
81210387.44	812		
10397.44	81210407.44	812.00610417.44812	323410427.44812
584410437.44812	7127		
10447812.771910447.45812	777710457.49812	887810467.54813	134610477.59
813.505			
10487.63813	837510497.68814	449510507.73815	779810517.77817
705310527.82818	6482		
10536.58819	402710537.87819	496810547.91819	502910557.96819
798110568.01819	8986		
10578.05	820 10588.1	820.07510598.15820	200310608.19820
340510613.98820	4211		

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
9200.48	.0859984	426	.05510029
			.09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
9984.42610029	.09		309.0297356	.8978331	.2556	.3	.5
Ineffective Flow		num= 3					
Sta L	Sta R	Elev	Permanent				
9200.48	9820	820	F				
9841.41	9902.49	810.5	F				
10104.6510613	98	810.5	F				

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	811.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.28	Wt. n-Val,	0.085	0.055	0.110

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W.S. Elev (ft)	810.13	Reach Len. (ft)	309.03	356.90	331.26
Crit W.S. (ft)	806.69	Flow Area (sq ft)	81.67	445.21	62.17
E.G. Slope (ft/ft)	0.006902	Area (sq ft)	656.22	445.21	62.17
Q Total (cfs)	4309.00	Flow (cfs)	118.22	4126.65	64.13
Top Width (ft)	532.53	Top Width (ft)	417.47	44.66	70.39
Vel Total (ft/s)	7.32	Avg. Vel. (ft/s)	1.45	9.27	1.03
Max Chl Dpth (ft)	12.04	Hydr. Depth (ft)	1.00	9.97	0.88
Conv. Total (cfs)	51867.9	Conv. (cfs)	1423.0	49673.0	772.0
Length Wtd. (ft)	347.07	Wetted Per. (ft)	82.07	53.05	70.53
Min Ch El (ft)	798.09	Shear (lb/sq ft)	0.43	3.62	0.38
Alpha	1.54	Stream Power (lb/ft s)	10613.98	0.00	0.00
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	109.33	112.47	96.29
C & E Loss (ft)	0.61	Cum SA (acres)	31.62	9.92	25.72

Warning: Divided flow computed for this cross-section.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #010Yr

E.G. Elev (ft)	809.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.	0.085	0.055	0.110
W.S. Elev (ft)	808.64	Reach Len. (ft)	309.03	356.90	331.26
Crit W.S. (ft)	804.07	Flow Area (sq ft)	6.75	378.81	4.62
E.G. Slope (ft/ft)	0.003544	Area (sq ft)	148.14	378.81	4.62
Q Total (cfs)	2267.00	Flow (cfs)	5.17	2259.42	2.41
Top Width (ft)	314.48	Top Width (ft)	261.04	44.66	8.78
Vel Total (ft/s)	5.81	Avg. Vel. (ft/s)	0.77	5.96	0.52
Max Chl Dpth (ft)	10.55	Hydr. Depth (ft)	0.64	8.48	0.53
Conv. Total (cfs)	38078.2	Conv. (cfs)	86.9	37950.8	40.5
Length Wtd. (ft)	348.19	Wetted Per. (ft)	10.69	53.05	8.84
Min Ch El (ft)	798.09	Shear (lb/sq ft)	0.14	1.58	0.12
Alpha	1.05	Stream Power (lb/ft s)	10613.98	0.00	0.00
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	40.74	89.27	43.31
C & E Loss (ft)	0.26	Cum SA (acres)	20.60	9.83	20.74

Warning: Divided flow computed for this cross-section.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	812.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.48	Wt. n-Val.	0.085	0.055	0.110
W.S. Elev (ft)	811.16	Reach Len. (ft)	309.03	356.90	331.26
Crit W.S. (ft)	808.32	Flow Area (sq ft)	193.02	491.25	154.37
E.G. Slope (ft/ft)	0.007552	Area (sq ft)	1119.31	491.25	154.37
Q Total (cfs)	5754.00	Flow (cfs)	437.26	5085.87	230.87
Top Width (ft)	638.09	Top Width (ft)	470.96	44.66	122.47
Vel Total (ft/s)	6.86	Avg. Vel. (ft/s)	2.27	10.35	1.50
Max Chl Dpth (ft)	13.07	Hydr. Depth (ft)	1.82	11.00	1.26
Conv. Total (cfs)	66213.7	Conv. (cfs)	5031.8	58525.2	2656.7
Length Wtd. (ft)	345.48	Wetted Per. (ft)	106.00	53.05	122.62
Min Ch El (ft)	798.09	Shear (lb/sq ft)	0.86	4.37	0.59
Alpha	2.02	Stream Power (lb/ft s)	10613.98	0.00	0.00
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	170.79	130.25	144.40
C & E Loss (ft)	0.70	Cum SA (acres)	35.95	9.92	27.63

Warning: Divided flow computed for this cross-section.

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or

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greater than 1.4.

This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the

need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: northutoycreek
REACH: 108

RS: 4584.487

INPUT

Description: C

Station Elevation Data		num= 189									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8988.586841	3.6618990	361840.94838996	.653839	09319000.398837	.97179010	.436	834.753				
9020.473831	5.5349030	511828.44969040	.548	825.5219050	585822.80919060	.623820	2945				
9070.66818	1.8749080	698816.44439090	.735815	10689100.772813	5104	9110.81812	5982				
9112.6812	4.8219120	847811.98479130	.885811	74519140.922811	44169150	.959811	1371				
9160.997810	8.1869171	034810.50019181	.072810	18159191.109	8109201	.146	810				
9211.184	8109221	.221	8109228	.546809	92069231	.259809	89229241	.296809	.6054		
9251.333809	3.1879261	371809.08019271	.408808	83319281	446808	58689291	483808	.3658			
9301.52808	1.6619311	558808.02879321	.595	808.0139331	633808	2328	9341	.67808	.5452		
9344.493808	6.3159351	707808.84089361	.745809	12489371	782809	4071	9381	82809	.7332		
9391.857	8109401	.894	8109411	.932	8109421	.969	8109432	.007	810		
9442.044809	8.9479452	081809.50529460	.439809	18989462	119809	12989472	156808	.7792			
9482.194	808.4999492	.231808	25889502	.268808	07069512	.306	8089522	.343	808		
9532.381	8089542	.418	8089552	.455	8089562	.493	808	9572	.53	808	
9576.385	8089582	.568	8089592	.605	8089602	.642	808	9612	.68	808	
9622.717	8089632	.755	8089642	.792	8089652	.829808	92949662	.867	810	.087	
9672.904	8129682	.942	8129692	.332	8129692	.979	8129703	.016	812		
9713.054	8129723	.091810	68399733	.129807	83119743	.166	805	0199753	.203802	.2155	
9763.241800	.02179773	.278	8009783	.316	8009793	.353	800	9803	.39	800	
9808.278	8009813	.428800	01499823	.465800	07689833	.503	800	326	9843	.54801	.5486
9853.577	802.2289863	.615802	90829873	.652803	6592	9883	69804	54459893	.727805	.4339	
9903.765	805.4869913	.802804	81579923	.839804	14889924	.225	804	1219933	.877803	.5078	
9943.914803	3.2159953	952803.42789963	.989803	45729974	026802	20319984	.064	799	.915		
9994.101	79810005	.94	797.3210010	.32	797.3810010	.72	797	3810015	.64	797	.72
10024.21	79810034	.25	79810040	.17799	622410044	.29800	883910054	.33804	.9031		
10064.36808	.7333	10074.4	811.48810084	.44814	013110094	.48816	783810104	.51819	.3388		
10114.55819	7.26910124	.59818	716410134	.62818	612110144	.66818	6867	10154	.7818	.4633	
10156.12818	4.48410164	.74818	355210174	.77818	323310184	.81818	292410194	.85818	.2657		
10204.89818	1.84410214	.92	818.12410224	.96818	1113	10235818	199610245	.04818	.4065		
10255.07818	5.79810265	.11818	764510272	.06819	040710275	.15819	159710285	.19819	.7068		
10295.22	82010305	.26	820	10315.3	82010325	.34	82010335	.37	820		
10345.41	82010355	.45	82010365	.48820	724410375	.52821	655710385	.56822	.0516		
10388.01822	.1843	10395.6	822.59710405	.63823	133710415	.67823	658510425	.71824	.2939		
10435.75825	1.19110445	.78825	821810455	.82	826.59610465	.86	827.245	10475	.9	828	
10485.93	82810495	.97828	509510503	.96828	992810506	.01829	116410516	.05829	.6665		
10526.08830	2.64310536	.12831	081710546	.16831	15004	10556.2	831	88510566	.23	832	
10576.27832	1.04210586	.31832	796210596	.35833	533910606	.38834	701710616	.42835	.9903		
10619.9836	4.06910626	.46837	119610636	.49	83810646	.53	83810656	.57838	.0594		
10666.61838	8.25110676	.64839	704310686	.68	84010689	.64840	.0996				

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
8988.586	.099923	839	.0510054
			.33
			.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	9923.83910054	.33	295.3084313	1298287	.8358	.1	.3
Ineffective Flow			num= 2				
Sta L	Sta R	Elev	Permanent				
9000	9500	825	F				
95009686	.636	812	F				

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	810.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.090	0.050	0.110
W.S. Elev (ft)	810.50	Reach Len. (ft)	295.31	313.13	287.84
Crit W.S. (ft)	802.89	Flow Area (sq ft)	1570.28	1268.11	42.60
E.G. Slope (ft/ft)	0.000249	Area (sq ft)	2365.03	1268.11	42.60

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Q Total (cfs)	4309.00	Flow (cfs)	1607.36	2685.15	16.50
Top Width (ft)	841.01	Top Width (ft)	694.06	130.49	16.47
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)	1.02	2.12	0.39
Max Chl Dpth (ft)	13.18	Hydr. Depth (ft)	7.85	9.72	2.59
Conv. Total (cfs)	272961.9	Conv. (cfs)	101821.3	170095.6	1045.0
Length Wtd. (ft)	307.52	Wetted Per. (ft)	201.75	132.25	17.41
Min Ch El (ft)	797.32	Shear (lb/sq ft)	0.12	0.15	0.04
Alpha	1.42	Stream Power (lb/ft s)	10689.64	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	98.62	105.45	95.90
C & E Loss (ft)	0.01	Cum SA (acres)	27.68	9.20	25.39

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #010Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.79	Wt. n-Val.	0.090	0.050	0.110
Vel Head (ft)	0.02	Reach Len. (ft)	295.31	313.13	287.84
W.S. Elev (ft)	808.77	Flow Area (sq ft)	1229.91	1042.71	19.60
Crit W.S. (ft)	801.61	Area (sq ft)	1386.82	1042.71	19.60
E.G. Slope (ft/ft)	0.000139	Flow (cfs)	815.71	1446.67	4.62
Q Total (cfs)	2267.00	Top Width (ft)	448.13	130.49	10.17
Top Width (ft)	588.79	Avg. Vel. (ft/s)	0.66	1.39	0.24
Vel Total (ft/s)	0.99	Hydr. Depth (ft)	6.34	7.99	1.93
Max Chl Dpth (ft)	11.45	Conv. (cfs)	69216.2	122755.2	391.8
Conv. Total (cfs)	192363.2	Wetted Per. (ft)	195.43	132.25	10.88
Length Wtd. (ft)	308.62	Shear (lb/sq ft)	0.05	0.07	0.02
Min Ch El (ft)	797.32	Stream Power (lb/ft s)	10689.64	0.00	0.00
Alpha	1.42	Cum Volume (acre-ft)	35.30	83.44	43.22
Frctn Loss (ft)	0.06	Cum SA (acres)	18.09	9.11	20.67
C & E Loss (ft)	0.00				

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	811.64	Wt. n-Val.	0.090	0.050	0.110
Vel Head (ft)	0.07	Reach Len. (ft)	295.31	313.13	287.84
W.S. Elev (ft)	811.57	Flow Area (sq ft)	1787.80	1407.60	62.29
Crit W.S. (ft)	803.55	Area (sq ft)	3131.71	1407.60	62.29
E.G. Slope (ft/ft)	0.000309	Flow (cfs)	2167.59	3556.35	30.06
Q Total (cfs)	5754.00	Top Width (ft)	741.38	130.49	20.39
Top Width (ft)	892.26	Avg. Vel. (ft/s)	1.21	2.53	0.48
Vel Total (ft/s)	1.77	Hydr. Depth (ft)	8.62	10.79	3.05
Max Chl Dpth (ft)	14.25	Conv. (cfs)	123368.4	202409.6	1711.1
Conv. Total (cfs)	327489.1	Wetted Per. (ft)	209.23	132.25	21.48
Length Wtd. (ft)	307.00	Shear (lb/sq ft)	0.16	0.21	0.06
Min Ch El (ft)	797.32	Stream Power (lb/ft s)	10689.64	0.00	0.00
Alpha	1.44	Cum Volume (acre-ft)	155.71	122.47	143.58
Frctn Loss (ft)	0.12	Cum SA (acres)	31.65	9.20	27.08
C & E Loss (ft)	0.01				

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: northutoycreek

REACH: 108 RS: 4271.358

INPUT

Description:

Station	Elevation	Data	num=	256						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
8753.44840	1.7578757	315	8408767.449		8408777.584		8408786.654		840	
8787.718	8408797.852		8408807.986		840 8818.12		8408828.255		840	
8838.389	8408848.304		8408848.523		8408858.657		8408868.791		840	

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8878.926	840 8889.06	8408899.194	8408909.328	8408909.954	840
8919.462	8408929.597	8408939.731	8408949.865	8408959.999	840
8970.134	8408971.603	8408980.268	8408990.402	8409000.536	840
9010.67	8409020.805838	85279030.939837	21759033.253836	85689041.073	835.642
9051.207833	99959061.341830	80249071.476826	1946 9081.61821	52919091.744817	1162
9094.903815	96729101.878813	57429112.012811	36259122.147	8109132.281809	9191
9142.415809	80569152.549809	70519156.553809	67499162.683809	63259172.818809	5729
9182.952809	50959193.086809	4461 9203.22809	38279213.355809	31949218.203809	2891
9223.489 809	2569233.623809	19269243.757809	12929253.891809	06599264.026809	0025
9274.16808	93919279.852808	90359284.294808	87579294.428808	81239304.562 808	749
9314.697808	68569324.831808	62229334.965808	55889341.502808	51799345.099808	4954
9355.233808	43219365.368808	36879375.502808	30539385.636808	2419 9395.77808	1785
9403.152808	13239405.904808	11519416.039808	05189426.173808	00319436.307	808
9446.441	8089456.576	8089464.802	808 9466.71	8089476.844	808
9486.978	8089497.112	8089507.247	8089517.381	8089526.451	808
9527.515	8089537.333	8089537.645	8089547.652	8089557.659808	0021
9567.665808	19229577.672808	40069585.549808	56469587.679 808	6099597.685808	8173
9607.692809	02579617.699809	23549627.706809	56099637.712809	92689647.719810	5458
9657.726	8129667.732	8129677.739	8129687.746	8129697.753	812
9707.759	8129717.766	8129727.773810	60949737.779 808	7059747.786	808
9757.793	8089767.799	8089777.806	8089787.813807	9352 9797.82807	2466
9807.826806	59679817.833806	0165 9827.84	8069837.846	8069847.853805	9607
9857.86805	76559858.732805	78539867.867805	99029877.873	806 9887.88	806
9897.887	8069907.893	806 9917.9	8069927.907804	58959937.913803	1666
9947.92 801	2789957.927799	02289967.934798	2425 9977.94	798 9985.27 797.11	
9986.15	796.55 9990.54	796.65 9990.94	796.65 9995.86	796.9610005.99	797.43
10017.97	79810027.97803	379910028.63	806.2310037.98810	558110047.99812	8393
10057.99813	7572 10068814	721610078.01815	623810088.01816	365610098.02817	2238
10108.03817	922610118.03817	947410128.04817	985510131.92816	851910138.05815	0371
10148.05811	003610158.06806	812710168.07	80610178.07	80610188.08	806
10198.09	80610208.09	806 10218.1	80610228.11806	119710238.11807	1477
10248.12808	500410258.13810	4065 10261810	880910268.48812	609210276.67814	4474
10278.97814	960410289.45817	184810299.94819	276410309.83820	257110310.43820	2817
10320.92820	898210331.41821	5101 10341.9 822.232	10343822.299210352	38822.7663	
10362.87823	345610373.36823	966610376.16824	134110383.85824	578710394.34825	2144
10404.82826	336410409.33826	991910415.31827	8279 10425.8828	708810436.29829	8185
10442.49830	414510446.78830	756510457.26831	657810467.75832	551910475.66833	1386
10478.24833	325510488.73834	063110499.22 835	26510508.83836	1361 10509.7836	2193
10520.19837	058910530.68838	006610541.17838	902510541.99838	964610551.66839	6101
10562.15	84010572.63	84010575.16	84010583.12	84010593.61	840
10604.1839	978610608.32	84010614.59	84010625.07	84010635.56840	2207
10641.49841	188610646.05841	686710656.54841	510310667.03841	462810674.65841	6336
10677.51841	6041 10688841	442210698.49841	419210707.82841	552110708.98841	5666
10719.47841	753610729.96841	992510740.44	84210740.98842	004910750.93842	2034
10761.42842	736510771.91843	269510774.15843	3733 10782.4843	749610792.88843	7656
10803.37843	833210807.31843	883510813.86843	911510824.35843	946610834.84843	9385
10840.48	84410845.32	84410855.81844	1698 10866.3 845	72210873.64	846
10876.79	84610887.28	84610897.77	84610906.81	84610908.25	846
10911.12	846				

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
8753.44 .075	9917.9 .0510028	.63 .09

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9917.910028	.63	307.9576282	.3344	242.213	.1	.3
Ineffective Flow	num=	2				
Sta L	Sta R	Elev	Permanent			
9000	9500	825	F			
9500	9698.24	812	F			

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	810.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.075	0.050	0.090
W.S. Elev (ft)	810.34	Reach Len. (ft)	307.96	282.33	242.21
Crit W.S. (ft)	802.88	Flow Area (sq ft)	659.81	1160.18	403.46
E.G. Slope (ft/ft)	0.000437	Area (sq ft)	1511.80	1160.18	403.46
Q Total (cfs)	4309.00	Flow (cfs)	629.32	3361.87	317.81
Top Width (ft)	941.20	Top Width (ft)	713.45	110.73	117.01
Vel Total (ft/s)	1.94	Avg. Vel. (ft/s)	0.95	2.90	0.79
Max Chl Dpth (ft)	13.79	Hydr. Depth (ft)	3.50	10.48	3.45
Conv. Total (cfs)	206018.2	Conv. (cfs)	30088.3	160734.8	15195.1
Length Wtd. (ft)	282.92	Wetted Per. (ft)	188.95	115.26	118.98
Min Ch El (ft)	796.55	Shear (lb/sq ft)	0.10	0.27	0.09

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Alpha	1.79	Stream Power (lb/ft s)	10911.12	0.00	0.00
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	85.48	96.72	94.42
C & E Loss (ft)	0.01	Cum SA (acres)	22.91	8.33	24.95

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #010Yr

E.G. Elev (ft)	808.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.075	0.050	0.090
W.S. Elev (ft)	808.67	Reach Len. (ft)	307.96	282.33	242.21
Crit W.S. (ft)	801.15	Flow Area (sq ft)	353.07	975.92	222.31
E.G. Slope (ft/ft)	0.000271	Area (sq ft)	490.74	975.92	222.31
Q Total (cfs)	2267.00	Flow (cfs)	180.62	1983.78	102.60
Top Width (ft)	665.54	Top Width (ft)	454.11	110.73	100.71
Vel Total (ft/s)	1.46	Avg. Vel. (ft/s)	0.51	2.03	0.46
Max Chl Dpth (ft)	12.12	Hydr. Depth (ft)	1.96	8.81	2.21
Conv. Total (cfs)	137683.6	Conv. (cfs)	10969.9	120482.6	6231.1
Length Wtd. (ft)	281.79	Wetted Per. (ft)	179.78	115.26	101.81
Min Ch El (ft)	796.55	Shear (lb/sq ft)	0.03	0.14	0.04
Alpha	1.71	Stream Power (lb/ft s)	10911.12	0.00	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	28.93	76.19	42.42
C & E Loss (ft)	0.01	Cum SA (acres)	15.03	8.25	20.31

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	811.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.075	0.050	0.090
W.S. Elev (ft)	811.38	Reach Len. (ft)	307.96	282.33	242.21
Crit W.S. (ft)	803.87	Flow Area (sq ft)	860.23	1275.77	531.87
E.G. Slope (ft/ft)	0.000503	Area (sq ft)	2269.57	1275.77	531.87
Q Total (cfs)	5754.00	Flow (cfs)	1024.24	4221.73	508.03
Top Width (ft)	977.01	Top Width (ft)	737.25	110.73	129.03
Vel Total (ft/s)	2.16	Avg. Vel. (ft/s)	1.19	3.31	0.96
Max Chl Dpth (ft)	14.83	Hydr. Depth (ft)	4.40	11.52	4.12
Conv. Total (cfs)	256642.9	Conv. (cfs)	45683.6	188300.0	22659.3
Length Wtd. (ft)	283.63	Wetted Per. (ft)	196.02	115.26	131.45
Min Ch El (ft)	796.55	Shear (lb/sq ft)	0.14	0.35	0.13
Alpha	1.80	Stream Power (lb/ft s)	10911.12	0.00	0.00
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	137.40	112.82	141.61
C & E Loss (ft)	0.01	Cum SA (acres)	26.64	8.33	26.59

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: northutoycreek

REACH: 108

RS: 3989.023

INPUT

Description: Blocked obstruction assumes parallel channel is full during storm event.

Station Elevation Data num= 176

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

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9273.723814.49699274.122 814.5069282.976814.69619293.159814.91469303.343815.1285
 9313.527815.0568 9323.71815.16659327.025 815.1779333.894815.19449344.077 815.28
 9354.261814.75799364.445814.13589374.628813.83619379.927813.75539384.812813.6795
 9394.995813.55059405.179813.44889415.363813.36519425.546813.26729432.829813.2214
 9435.73813.20269445.913813.14189456.097813.0888 9466.28 813.0259476.464812.9558
 9485.731812.90759486.648812.90279496.831812.84969507.015812.79659517.198812.8546
 9527.382812.92789537.566812.84939538.634812.83369547.749812.70029557.933812.9791
 9568.116813.4501 9578.3813.62629588.484813.27719591.536813.22679598.667813.0943
 9608.851 813.1389619.034812.83959629.218811.98789639.402809.46299644.438809.0488
 9649.585808.60849659.769 8089669.952 8089680.136807.9636 9690.32807.6731
 9697.341807.30569700.503807.14039710.687806.5791 9720.87806.17299731.054 806
 9741.237806.07379750.243806.26369751.421806.18849761.605803.90569771.788 800.988
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 9863.441797.29999873.624797.87749883.808798.95619893.991800.04519904.175801.1322
 9908.95801.63839914.359802.21169924.542803.94559934.726806.34259944.909 807.425
 9955.093808.67739961.852809.25149965.276809.3563 9969.69 807.74 9975.46803.4419
 9978.463801.61179985.644797.23529995.827 79610006.01 79610014.75 796
 10016.19 79610026.38 79610036.56801.748610046.75807.956110056.93812.3235
 10067.11813.548610067.66813.5771 10077.3 81410087.48 81410097.66813.9427
 10107.85813.062310118.03812.394410120.56 812.27510128.21811.9133 10138.4811.1103
 10148.58808.363510158.76806.262410168.95 80610173.46 80610179.13 806
 10189.32 806 10199.5 80610209.68806.338710219.87807.279810226.36807.6406
 10230.05807.851210240.23 808.52510250.42809.2694 10260.6809.951310270.78810.5881
 10279.27811.117510280.97811.223810291.15811.624810301.34811.961410311.52812.7142
 10321.7813.777310331.89 814.93910332.17814.966810342.07815.914810352.25817.2186
 10362.44818.479310372.62819.8425 10382.8821.532110385.07821.925210392.99823.2796
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 10490.88828.882510494.82828.959110505.01828.923810515.19828.901810525.37828.8565
 10535.56828.751810543.78828.426610545.74828.368210555.92828.649810566.11829.0366
 10576.29829.147510586.48 829.49410596.66829.568110596.68829.568410606.84829.7146
 10617.03829.733710627.21829.772110637.39829.606310647.58829.344110649.58829.2923
 10657.76829.074810667.94828.803210678.13828.530410688.31828.2566 10698.5 828
 10702.48827.824610708.68 827.52210718.86 826.8210729.05826.231310739.23826.0124
 10747.76826.0009

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 9273.723 .08 9969.69 .05510046.75 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9969.6910046.75 470.5776489.0232486.6256 .1 .3

Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 9273.723 9578 829.51 F

Blocked Obstructions num= 1
 Sta L Sta R Elev
 9273.723 9961.85 808

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	810.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.080	0.055	0.090
W.S. Elev (ft)	810.07	Reach Len. (ft)	470.58	489.02	486.63
Crit W.S. (ft)	802.65	Flow Area (sq ft)	654.11	858.63	336.98
E.G. Slope (ft/ft)	0.000954	Area (sq ft)	654.11	858.63	336.98
Q Total (cfs)	4309.00	Flow (cfs)	588.26	3386.26	334.48
Top Width (ft)	534.86	Top Width (ft)	332.72	77.06	125.08
Vel Total (ft/s)	2.33	Avg. Vel. (ft/s)	0.90	3.94	0.99
Max Chl Dpth (ft)	14.07	Hydr. Depth (ft)	1.97	11.14	2.69
Conv. Total (cfs)	139526.1	Conv. (cfs)	19047.9	109647.6	10830.7
Length Wtd. (ft)	485.66	Wetted Per. (ft)	333.20	83.55	126.10
Min Ch El (ft)	796.00	Shear (lb/sq ft)	0.12	0.61	0.16
Alpha	2.29	Stream Power (lb/ft s)	10747.76	0.00	0.00
Frctn Loss (ft)	0.79	Cum Volume (acre-ft)	77.82	90.18	92.36
C & E Loss (ft)	0.04	Cum SA (acres)	19.21	7.72	24.27

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

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CROSS SECTION OUTPUT Profile #010Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.61	Wt. n-Val.	0.080	0.055	0.090
Vel Head (ft)	0.12	Reach Len. (ft)	470.58	489.02	486.63
W.S. Elev (ft)	808.49	Flow Area (sq ft)	146.71	737.44	166.00
Crit W.S. (ft)	800.53	Area (sq ft)	146.71	737.44	166.00
E.G. Slope (ft/ft)	0.000623	Flow (cfs)	41.83	2124.03	101.14
Q Total (cfs)	2267.00	Top Width (ft)	304.14	77.06	92.90
Top Width (ft)	474.10	Avg. Vel. (ft/s)	0.29	2.88	0.61
Vel Total (ft/s)	2.16	Hydr. Depth (ft)	0.48	9.57	1.79
Max Chl Dpth (ft)	12.49	Conv. (cfs)	1675.9	85086.7	4051.4
Conv. Total (cfs)	90814.0	Wetted Per. (ft)	304.32	83.55	93.33
Length Wtd. (ft)	487.09	Shear (lb/sq ft)	0.02	0.34	0.07
Min Ch El (ft)	796.00	Stream Power (lb/ft s)	10747.76	0.00	0.00
Alpha	1.67	Cum Volume (acre-ft)	26.68	70.63	41.34
Frctn Loss (ft)	0.58	Cum SA (acres)	12.35	7.64	19.77
C & E Loss (ft)	0.03				

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	811.31	Wt. n-Val.	0.080	0.055	0.090
Vel Head (ft)	0.20	Reach Len. (ft)	470.58	489.02	486.63
W.S. Elev (ft)	811.11	Flow Area (sq ft)	1003.40	939.02	479.45
Crit W.S. (ft)	803.90	Area (sq ft)	1003.40	939.02	479.45
E.G. Slope (ft/ft)	0.000986	Flow (cfs)	1210.15	3997.67	546.18
Q Total (cfs)	5754.00	Top Width (ft)	336.93	77.06	148.08
Top Width (ft)	562.07	Avg. Vel. (ft/s)	1.21	4.26	1.14
Vel Total (ft/s)	2.38	Hydr. Depth (ft)	2.98	12.19	3.24
Max Chl Dpth (ft)	15.11	Conv. (cfs)	38531.3	127285.8	17390.3
Conv. Total (cfs)	183207.3	Wetted Per. (ft)	337.54	83.55	149.48
Length Wtd. (ft)	484.85	Shear (lb/sq ft)	0.18	0.69	0.20
Min Ch El (ft)	796.00	Stream Power (lb/ft s)	10747.76	0.00	0.00
Alpha	2.31	Cum Volume (acre-ft)	125.83	105.65	138.80
Frctn Loss (ft)	0.76	Cum SA (acres)	22.84	7.72	25.82
C & E Loss (ft)	0.04				

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: northutoycreek

REACH: 108 RS: 3500

INPUT

Description:

Station Elevation Data num= 181

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9250882	0.5669253	024882	1.6499263	181882	7.5059267	099883	0.06069273	339883	5.194
9283	4.96883	99819293	6.53	884	0.78	9303	8.1884	16489313	9.68884
9324	1.46883	99949334	2.82883	7.2659344	4.39883	2.6439354	5.97882	5.2489364	7.54881
9374	9.11880	75089381	1.93880	2.1069385	0.69	879	9.99395	2.26	879
9415	5.4877	3.6119425	6.98	876	1.59435	8.55875	1.2169438	2.41874	9.9669446
9456	1.69874	2.7889466	3.27874	4.4199476	4.84874	7.4369486	6.41874	3.9319495	2.88
9496	7.99873	5.8389506	9.56	872	6.629517	1.13871	6.245	9.527	2.7870
9547	5.85869	7.3679552	3.35870	0.4149557	7.42870	6.4989567	8.99871	7.7279578	0.57872
9588	2.14	873	3.979598	3.71872	6.3659608	5.29871	1.3129609	3.82870	8.9459618
9628	8.43863	1.484	9639858	3.4929649	1.58	855	5.739659	3.15854	8.059
9669	4.72854	7.3829679	6.29854	6.1149689	7.87854	2.0419699	9.44851	9.9249710	1.01849
9720	2.59846	3.1379723	4.77845	3.6629730	4.16843	3.5239740	5.73840	2.998	9750

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9760.888835	.87269771	.045834	.35379780	.524833	.20659781	.202833	.12569791	.359831	.9368								
9801.517829	.96559811	.674	.828	.5149821	.831826	.26389831	.989824	.15889837	.571822	.8485							
9842.146821	.65749852	.303816	.8666	.9862	.46813	.52069872	.618812	.40539882	.775810	.3254							
9892.932808	.13649894	.619	.807	.7899903	.089	.8069913	.247	.8069923	.404	.806							
9933.561	.8069943	.719805	.73439951	.666805	.94999953	.876	.8069964	.033	.806								
9974.19802	.8848	.9990	.99	.797	.77	.9991	.66	.797	.54	.9993	.62	.797	.18	.9998	.15	.796	.45
10000.26	.795	.35	10001.6	.794	.9	10006	.795	.1	10006.4	.795	.1110011	.33	.795	.33			
10021.49	.795	.6910035	.13795	.729210045	.29799	.460510051	.45	.80410055	.45807	.4378							
10065.61	.80810065	.76	.80810075	.76	.80810085	.92	.80810096	.08807	.1056								
10106.23805	.347310116	.39804	.157510122	.81	.80410126	.55	.80410136	.71804	.0559								
10146.86804	.377910157	.02804	.889210167	.18805	.458510177	.34805	.912310179	.85	.805	.997							
10187.49806	.313610197	.65806	.797210207	.81807	.268810217	.96807	.760710228	.12	.808								
10236.9	.80810238	.28	.80810248	.44	.80810258	.59807	.567710268	.75805	.8604								
10278.91804	.089110289	.07	.80410293	.95	.80410299	.22	.80410309	.38	.804								
10319.54	.80410329	.69	.80410339	.85	.80410350	.01	.804	.10351	.804								
10360.17	.80410370	.32	.80410380	.48804	.179510390	.64804	.4444	10400	.8804	.7092							
10408.04804	.898210410	.95804	.974110421	.11805	.238910431	.27805	.503810441	.42805	.7383								
10451.58805	.978110461	.74	.80610465	.09806	.0229	10471	.9806	.078710482	.05806	.7837							
10492.21807	.536310502	.37808	.646410512	.53810	.551310522	.14812	.543110522	.68812	.6555								
10532.84	814	.522	10543815	.787310553	.15	816	.45210563	.31817	.334610573	.47817	.9046						
10579.19817	.995810583	.63817	.993110593	.78817	.601610603	.94817	.2064	10614	.1816	.7367							
10624.26816	.499110634	.41816	.727710636	.23816	.750610644	.57816	.847210654	.73	816	.875							
10664.88817	.048410675	.04817	.3759	10685	.2817	.744910693	.28818	.099810695	.36818	.1779							
10705.51	818	.72310715	.67819	.190810725	.83819	.635310735	.99820	.293710746	.14821	.8206							
10750822	.3702																

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
9250 .095	9974.19	.510051.45 .11

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
9974.1910051.45		490.8088		500474.5651	.1	.3

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	809.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.095	0.500	0.110
W.S. Elev (ft)	809.38	Reach Len. (ft)	490.81	500.00	474.57
Crit W.S. (ft)		Flow Area (sq ft)	285.85	921.01	1667.63
E.G. Slope (ft/ft)	0.003283	Area (sq ft)	285.85	921.01	1667.63
Q Total (cfs)	4417.00	Flow (cfs)	562.48	795.18	3059.34
Top Width (ft)	619.12	Top Width (ft)	87.03	77.26	454.83
Vel Total (ft/s)	1.54	Avg. Vel. (ft/s)	1.97	0.86	1.83
Max Chl Dpth (ft)	14.48	Hydr. Depth (ft)	3.28	11.92	3.67
Conv. Total (cfs)	77090.4	Conv. (cfs)	9817.1	13878.4	53394.9
Length Wtd. (ft)	480.78	Wetted Per. (ft)	87.86	80.67	456.99
Min Ch El (ft)	794.90	Shear (lb/sq ft)	0.67	2.34	0.75
Alpha	1.25	Stream Power (lb/ft s)	10750.00	0.00	0.00
Frctn Loss (ft)	1.25	Cum Volume (acre-ft)	72.74	80.19	81.17
C & E Loss (ft)	0.00	Cum SA (acres)	16.94	6.86	21.03

Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #010Yr

E.G. Elev (ft)	808.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.095	0.500	0.110
W.S. Elev (ft)	807.98	Reach Len. (ft)	490.81	500.00	474.57
Crit W.S. (ft)		Flow Area (sq ft)	168.87	813.14	1039.30
E.G. Slope (ft/ft)	0.002974	Area (sq ft)	168.87	813.14	1039.30
Q Total (cfs)	2316.00	Flow (cfs)	234.68	614.94	1466.38
Top Width (ft)	560.48	Top Width (ft)	80.52	77.26	402.70
Vel Total (ft/s)	1.15	Avg. Vel. (ft/s)	1.39	0.76	1.41
Max Chl Dpth (ft)	13.08	Hydr. Depth (ft)	2.10	10.52	2.58
Conv. Total (cfs)	42469.9	Conv. (cfs)	4303.4	11276.5	26890.0
Length Wtd. (ft)	482.80	Wetted Per. (ft)	81.20	80.67	404.75
Min Ch El (ft)	794.90	Shear (lb/sq ft)	0.39	1.87	0.48
Alpha	1.22	Stream Power (lb/ft s)	10750.00	0.00	0.00
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	24.97	61.93	34.61
C & E Loss (ft)	0.00	Cum SA (acres)	10.27	6.77	17.00

NorthUtoyCreek.rep

Warning: Divided flow computed for this cross-section.
 Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section.
 This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500Yr

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.51		
Vel Head (ft)	0.06		
W.S. Elev (ft)	810.46		
Crit W.S. (ft)			
E.G. Slope (ft/ft)	0.002764		
Q Total (cfs)	5934.00		
Top Width (ft)	629.89		
Vel Total (ft/s)	1.67		
Max Chl Dpth (ft)	15.56		
Conv. Total (cfs)	112864.8		
Length Wtd. (ft)	479.89		
Min Ch El (ft)	794.90		
Alpha	1.27		
Frctn Loss (ft)	0.89		
C & E Loss (ft)	0.00		
Element			
Wt. n-Val.	0.095	0.500	0.110
Reach Len. (ft)	490.81	500.00	474.57
Flow Area (sq ft)	382.20	1004.15	2160.20
Area (sq ft)	382.20	1004.15	2160.20
Flow (cfs)	806.42	842.73	4284.85
Top Width (ft)	92.05	77.26	460.57
Avg. Vel. (ft/s)	2.11	0.84	1.98
Hydr. Depth (ft)	4.15	13.00	4.69
Conv. (cfs)	15338.2	16028.8	81497.9
Wetted Per. (ft)	93.00	80.67	462.83
Shear (lb/sq ft)	0.71	2.15	0.81
Stream Power (lb/ft s)	10750.00	0.00	0.00
Cum Volume (acre-ft)	118.35	94.74	124.06
Cum SA (acres)	20.52	6.86	22.42

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
 This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: northutoycreek
 REACH: 108

RS: 3000

INPUT

Description: B

Station Elevation Data num= 182

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9250932	34899256	245931	8552	9258	94931	70259266	512931	27259276	778
9287	045	930	0679297	312929	36279303	095928	87699307	579928	51239317
9328	112927	46899338	379	925	449	9347	25924	74269348	646924
9369	179923	15019379	446922	56049389	713921	80659391	405921	6411	9399
9410	246919	94429420	513919	4629	9430	78918	95519435	561918	75139441
9451	313917	9955	9461	58917	47929471	847916	94459479	716	916
9492	38	915	9339502	647915	79559512	914915	55869523	181915	25719523
9533	447	914	759543	714914	11199553	981913	18659564	248912	05889568
9574	514910	38049584	781909	77349595	048909	18869605	315	908	3639612
9615	581907	43389625	848906	91899636	115906	45279646	382906	26339656	337905
9656	649905	99479666	915903	42519677	182896	11959687	449	888	759697
9700	492880	75959707	982876	64039718	249871	33019728	516866	29689738	783862
9744	647859	85919749	049858	13149759	316	854	0049769	583849	7279
9788	803841	88859790	116841	36569800	383838	0567	9810	65835	09689820
9831	183828	18469832	958827	5425	9841	45824	45779851	717820	73029861
9872	25813	38829877	113811	71219882	517809	82269892	784806	72839903	051805
9913	317805	24679921	268804	90759923	584804	80339933	851804	34279944	118
9954	385803	33119964	651802	72469965	424802	67679974	918801	82879985	185
9995	452	79410005	72	79410009	58	79410015	99	79410026	25795
10036	52799	893810046	79801	114410053	73801	711310057	05	80210067	32
10077	59802	221610087	85803	284710097	89803	990710098	12	80410108	39
10118	65	80410128	92	80410139	19	80410142	04	80410149	45
10159	72	80410169	99	80410180	25	804	10186	2	80410190
10200	79	80410211	05	80410221	32	80410230	36	80410231	59
10241	85	80410252	12	80410262	39	80410272	65	80410274	51804
10282	92804	035510293	19804	341510303	45804	633310313	72804	805110318	67804
10323	99804	968410334	25805	131710344	52805	168410354	79805	153810362	82805
10365	05805	202510375	32	805	4310385	59805	657510395	86	805
10406	98	80610416	39	80610426	66	80610436	92	80610447	19
10451	13	80610457	46	80610467	72	80610477	99	80610488	26
10495	29806	269510498	52806	407110508	79806	890810519	06807	479210529	32808
10539	44808	712910539	59808	722510549	86809	467710560	12810	100310570	39810
10580	66811	3103	10583	6811	508310590	92812	014310601	19813	225110611
10621	72817	273310627	75819	157910631	99820	546810642	26826	071810652	52
10662	79827	989710671	91826	801310673	06826	652810683	32	82410693	59
10703	86	82410714	12	82410716	06	82410724	39	82410734	66
10744	92	824	10750	824					

NorthUtoyCreek.rep

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 9250 .089974.918 .510046.79 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9974.91810046.79 499.9186 500472.4327 .1 .3

CROSS SECTION OUTPUT Profile #100Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.18	Wt. n-Val.	0.080	0.500	0.080
Vel Head (ft)	0.05	Reach Len. (ft)	499.92	500.00	472.43
W.S. Elev (ft)	808.13	Flow Area (sq ft)	317.82	861.89	1650.57
Crit W.S. (ft)		Area (sq ft)	317.82	861.89	1650.57
E.G. Slope (ft/ft)	0.002096	Flow (cfs)	640.30	594.12	3182.59
Q Total (cfs)	4417.00	Top Width (ft)	86.78	71.87	483.19
Top Width (ft)	641.84	Avg. Vel. (ft/s)	2.01	0.69	1.93
Vel Total (ft/s)	1.56	Hydr. Depth (ft)	3.66	11.99	3.42
Max Chl Dpth (ft)	14.13	Conv. (cfs)	13986.2	12977.4	69518.1
Conv. Total (cfs)	96481.7	Wetted Per. (ft)	87.15	75.58	483.39
Length Wtd. (ft)	481.95	Shear (lb/sq ft)	0.48	1.49	0.45
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	10750.00	0.00	0.00
Alpha	1.37	Cum Volume (acre-ft)	69.34	69.96	63.09
Frctn Loss (ft)	0.99	Cum SA (acres)	15.96	6.00	15.92
C & E Loss (ft)	0.00				

CROSS SECTION OUTPUT Profile #010Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.67	Wt. n-Val.	0.080	0.500	0.080
Vel Head (ft)	0.03	Reach Len. (ft)	499.92	500.00	472.43
W.S. Elev (ft)	806.64	Flow Area (sq ft)	192.32	754.88	950.12
Crit W.S. (ft)		Area (sq ft)	192.32	754.88	950.12
E.G. Slope (ft/ft)	0.002591	Flow (cfs)	322.55	529.67	1463.77
Q Total (cfs)	2316.00	Top Width (ft)	81.25	71.87	456.67
Top Width (ft)	609.80	Avg. Vel. (ft/s)	1.68	0.70	1.54
Vel Total (ft/s)	1.22	Hydr. Depth (ft)	2.37	10.50	2.08
Max Chl Dpth (ft)	12.64	Conv. (cfs)	6336.2	10404.8	28754.0
Conv. Total (cfs)	45495.0	Wetted Per. (ft)	81.41	75.58	456.83
Length Wtd. (ft)	485.14	Shear (lb/sq ft)	0.38	1.62	0.34
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	10750.00	0.00	0.00
Alpha	1.35	Cum Volume (acre-ft)	22.94	52.93	23.77
Frctn Loss (ft)	1.28	Cum SA (acres)	9.36	5.91	12.32
C & E Loss (ft)	0.00				

Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.62	Wt. n-Val.	0.080	0.500	0.080
Vel Head (ft)	0.05	Reach Len. (ft)	499.92	500.00	472.43
W.S. Elev (ft)	809.57	Flow Area (sq ft)	445.98	965.19	2360.94
Crit W.S. (ft)		Area (sq ft)	445.98	965.19	2360.94
E.G. Slope (ft/ft)	0.001342	Flow (cfs)	868.28	574.07	4491.65
Q Total (cfs)	5934.00	Top Width (ft)	91.55	71.87	504.67
Top Width (ft)	668.09	Avg. Vel. (ft/s)	1.95	0.59	1.90
Vel Total (ft/s)	1.57	Hydr. Depth (ft)	4.87	13.43	4.68
Max Chl Dpth (ft)	15.57	Conv. (cfs)	23704.2	15672.0	122622.5
Conv. Total (cfs)	161998.8	Wetted Per. (ft)	92.13	75.58	504.91
Length Wtd. (ft)	480.77	Shear (lb/sq ft)	0.41	1.07	0.39
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	10750.00	0.00	0.00
Alpha	1.35	Cum Volume (acre-ft)	113.68	83.44	99.43
Frctn Loss (ft)	0.58	Cum SA (acres)	19.49	6.00	17.16
C & E Loss (ft)	0.00				

CROSS SECTION

RIVER: northutoycreek
 REACH: 108 RS: 2500

NorthUtoyCreek.rep

INPUT

Description:

Station Elevation Data									
num= 193									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9250891	71559256	947891	34889267	425890	73949273	453890	30789277	903889	9458
9288	381889	09989298	858888	17129306	951886	95929309	336886	57329319	814884
9330	292882	9874	9340	45881	41159340	769881	36059351	247879	61749361
9372	203875	38699373	948875	0248	9382	68873	17149393	158871	02179403
9407	447868	04929414	114866	64449424	591864	51579435	069862	00339440	946860
9445	547859	53019456	025857	19999466	502855	00359474	444853	2451	9476
9487	458850	20069497	936847	71019507	943845	30829508	413845	21139518	891843
9529	369	842	5379539	847841	17679541	441	840	8869550	325839
9571	28835	4137	9574	94834	78669581	758833	62689592	236831	60819602
9608	438828	32329613	191827	37819623	669825	30659634	147	823	2019641
9644	624821	06459655	102818	8189	9665	58816	74389675	435814	66119676
9686	535811	94349697	013809	83599707	491808	21319708	934808	07479717	969807
9728	446	806	5929738	924806	03039742	432805	90459749	402805	7171
9770	357804	79799775	931804	49439780	835804	23149791	313803	20679801	791802
9809	43	802	1079812	268802	01059822	746	8029833	224	8029842
9843	702	8029854	179	8029864	657	8029875	135	8029876	427801
9885	613	801	609	9896	09	801	0139906	568800	36739909
9927	524798	26319938	001797	19899943	424796	63949948	479796	16089958	957795
9969	435	794	0989976	922	794	0369979	912	794	9990
9997	2	792	7110001	61	793	0410002	01	793	0410006
10021	82	794	10032	3798	123810042	78	80410043	92	80410053
10063	73	80410074	21	80410077	42	80410084	69	80410095	17
10105	65	80410110	92	80410116	12	804	10126	6	80410137
10144	42	80410147	56	80410158	03803	967510168	51	803	95110177
10178	99803	898410189	47803	840610199	95	803	8310210	42803	485410211
10220	9803	095310231	38802	682610241	86802	244310244	91802	175210252	33
10262	81	80210273	29	80210278	41	80210283	77	80210294	24802
10304	72802	602810311	91802	7731	10315	2802	840710325	68803	094110336
10345	41803	623910346	63803	657510357	11803	944610367	59804	848210378	07
10378	9806	261110388	54808	117510399	02810	2685	10409	5811	6629
10419	98814	164810430	46	816	97410440	93819	8524	10445	9821
10461	89	82610472	37	826	10479	4	82610482	84	82610493
10503	8	826	10512	9	82610514	28	82610524	76	82610535
10545	71	827	104	10546	4	827	27410556	19	830
10579	9834	195410587	62834	4566	10598	1834	846110608	58835	258810613
10619	06835	671410629	53835	974510640	01	83610646	89	83610650	49
10660	97836	595110671	44837	105510680	39837	531510681	92837	5927	10692
10702	88	83810713	35	83810713	89	83810723	83	83810734	31
10744	79838	010810747	39838	0382	10750838	0705			

Manning's n Values					
num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
9250	.119876	427	.510042	78	.075

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	9876	427	10042	78	541	.5267509	2226
					393	.185	.3

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	807.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.110	0.500	0.075
W.S. Elev (ft)	807.15	Reach Len. (ft)	541.53	509.22	393.19
Crit W.S. (ft)		Flow Area (sq ft)	555.91	1693.24	1241.02
E.G. Slope (ft/ft)	0.001994	Area (sq ft)	555.91	1693.24	1241.02
Q Total (cfs)	4417.00	Flow (cfs)	775.92	1043.42	2597.66
Top Width (ft)	664.85	Top Width (ft)	157.77	166.35	340.72
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)	1.40	0.62	2.09
Max Chl Dpth (ft)	14.44	Hydr. Depth (ft)	3.52	10.18	3.64
Conv. Total (cfs)	98917.6	Conv. (cfs)	17376.5	23367.2	58173.9
Length Wtd. (ft)	450.10	Wetted Per. (ft)	157.94	169.21	341.00
Min Ch El (ft)	792.71	Shear (lb/sq ft)	0.44	1.25	0.45
Alpha	1.88	Stream Power (lb/ft s)	10750.00	0.00	0.00
Frctn Loss (ft)	0.84	Cum Volume (acre-ft)	64.33	55.30	47.41
C & E Loss (ft)	0.00	Cum SA (acres)	14.56	4.63	11.46

CROSS SECTION OUTPUT Profile #010Yr

E.G. Elev (ft)	805.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.110	0.500	0.075
W.S. Elev (ft)	805.36	Reach Len. (ft)	541.53	509.22	393.19

NorthUtoyCreek.rep

Crit W.S. (ft)		Flow Area (sq ft)	305.77	1396.16	641.67
E.G. Slope (ft/ft)	0.002700	Area (sq ft)	305.77	1396.16	641.67
Q Total (cfs)	2316.00	Flow (cfs)	404.95	880.35	1030.70
Top Width (ft)	613.33	Top Width (ft)	117.86	166.35	329.12
Vel Total (ft/s)	0.99	Avg. Vel. (ft/s)	1.32	0.63	1.61
Max Chl Dpth (ft)	12.65	Hydr. Depth (ft)	2.59	8.39	1.95
Conv. Total (cfs)	44570.6	Conv. (cfs)	7793.1	16942.1	19835.4
Length Wtd. (ft)	457.56	Wetted Per. (ft)	117.98	169.21	329.25
Min Ch El (ft)	792.71	Shear (lb/sq ft)	0.44	1.39	0.33
Alpha	1.64	Stream Power (lb/ft s)	10750.00	0.00	0.00
Frctn Loss (ft)	1.97	Cum Volume (acre-ft)	20.08	40.59	15.14
C & E Loss (ft)	0.00	Cum SA (acres)	8.22	4.55	8.06

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m), between the current and previous cross section. This may indicate the

need for additional cross sections.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	809.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.110	0.500	0.075
W.S. Elev (ft)	808.99	Reach Len. (ft)	541.53	509.22	393.19
Crit W.S. (ft)		Flow Area (sq ft)	862.54	1999.01	1875.94
E.G. Slope (ft/ft)	0.001106	Area (sq ft)	862.54	1999.01	1875.94
Q Total (cfs)	5934.00	Flow (cfs)	1125.90	1025.01	3783.09
Top Width (ft)	690.26	Top Width (ft)	173.92	166.35	349.99
Vel Total (ft/s)	1.25	Avg. Vel. (ft/s)	1.31	0.51	2.02
Max Chl Dpth (ft)	16.28	Hydr. Depth (ft)	4.96	12.02	5.36
Conv. Total (cfs)	178396.3	Conv. (cfs)	33848.4	30815.3	113732.6
Length Wtd. (ft)	450.89	Wetted Per. (ft)	174.20	169.21	350.44
Min Ch El (ft)	792.71	Shear (lb/sq ft)	0.34	0.82	0.37
Alpha	1.89	Stream Power (lb/ft s)	10750.00	0.00	0.00
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)	106.17	66.42	76.46
C & E Loss (ft)	0.00	Cum SA (acres)	17.97	4.63	12.53

CROSS SECTION

RIVER: northutoycreek

REACH: 108

RS: 1990.777

INPUT

Description: Survey Utoy NUT_0300

Station Elevation Data

num= 149

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9435.963	8529436.573	8529437.667	8529446.76	8529456.946	852				
9467.133851	49429477.319850	45739487.506	849.2459490	163848.87559497	692847.8163				
9507.879846	20999518.065844	76259528.252843	24089538.438841	62919542.659840	9938				
9548.625840	10329558.811837	71839568.998834	90129579.184832	16439589.371829	1585				
9595.154827	49419599.557826	21519609.744823	65169619.931821	17769630.117818	7966				
9640.304816	4809.9647	65814.7533	9650.49814	08929660.677812	23479670.863810	2217			
9681.05807	96339691.236805	94129700.146805	24069701.423805	13459711.609	804.09				
9721.796	8049731.982	8049742.169	8049752.355	8049752.642	804				
9762.542	8049772.728	8049782.915	8049793.101	8049803.288	804				
9805.138	8049813.475	8049823.661	8049833.848	8049844.034	804				
9890.885	800.659920	773.801	479960.069	802.729974	356	791.879975	503	791.74	
9978.855	792.029986	622.792	899990.229	791.719992	528	791.59996	949	791.9	
10012.52	792.110031	26.802	1610057.82	801.81	10092.8	801.1210103	75801	5821	
10110.38801	511310117.35801	453210125.13801	382910130.96801	314210139.88801	2159				
10144.56801	169110154.62801	068410158.17801	020810169.37800	882110171.78	800.847				
10184.12800	675210185.38800	657510198.87800	454710198.99800	453110212.59800	2734				
10213.61800	2586.10226	2800.116210228	36.800	116.10239	8800.267210243	11	800.36		
10253.41800	692910257.86800	824210267.02801	0825.10272	6801.244410280	62	801.477			
10287.35	801.67210294	23801.8667	10302.1802	066210307.83802	228610316	85802	5088		
10321.44802	641610331.59803	023310335.04803	149910346.34803	575310348.65803	6622				
10361.09804	172210362.26804	223410375.84805	002610375.86805	004310376.99805	0791				
10387.07	805.71610398	06806.7001	10399.2	806.81110409	05808.143510420	04810	3547		
10423.3811	613410431.03814	477110442.03821	297710447.39822	954210453.02	824.209				
10464.01824	544910471.48824	8387.10475824	992810485.99826	074110495.58827	4131				
10496.98827	603610507.97829	056910518.96830	424210519.67830	521610529.96832	0334				

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10540.95832.432510543.77832.531510551.94832.819410562.93833.208210567.86833.3805
 10573.92833.589510584.91833.971310591.96834.1241 10595.9834.2191 10606.9834.7058
 10616.05835.119210617.89835.198710628.88835.676310639.87 836.0510640.15836.0613
 10650.86836.511210661.85836.938210664.24837.032710672.84837.373310683.84837.8085
 10688.33837.896310694.83 83810705.82 83810709.57838.0802

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 9435.963 .089960.069 .510031.26 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9960.06910031.26 393.0073504.8104460.3262 .1 .3
 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 10326.1310709.57 809.71 F

CROSS SECTION OUTPUT Profile #100Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.35	Wt. n-Val.	0.080	0.500	0.110
Vel Head (ft)	0.04	Reach Len. (ft)	393.01	504.81	460.33
W.S. Elev (ft)	806.31	Flow Area (sq ft)	840.27	845.22	1497.62
Crit W.S. (ft)	798.80	Area (sq ft)	840.27	845.22	1634.70
E.G. Slope (ft/ft)	0.001760	Flow (cfs)	1392.29	517.52	2507.20
Q Total (cfs)	4417.00	Top Width (ft)	270.69	71.19	362.45
Top Width (ft)	704.33	Avg. Vel. (ft/s)	1.66	0.61	1.67
Vel Total (ft/s)	1.39	Hydr. Depth (ft)	3.10	11.87	5.08
Max Chl Dpth (ft)	14.81	Conv. (cfs)	33188.7	12336.3	59765.4
Conv. Total (cfs)	105290.4	Wetted Per. (ft)	270.97	77.66	294.94
Length Wtd. (ft)	470.42	Shear (lb/sq ft)	0.34	1.20	0.56
Min Ch El (ft)	791.50	Stream Power (lb/ft s)	10709.57	0.00	0.00
Alpha	1.30	Cum Volume (acre-ft)	55.65	40.46	34.43
Frctn Loss (ft)	0.65	Cum SA (acres)	11.90	3.24	8.28
C & E Loss (ft)	0.02				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #010Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.41	Wt. n-Val.	0.080	0.500	0.110
Vel Head (ft)	0.05	Reach Len. (ft)	393.01	504.81	460.33
W.S. Elev (ft)	803.36	Flow Area (sq ft)	169.69	635.10	627.31
Crit W.S. (ft)	796.58	Area (sq ft)	169.69	635.10	631.23
E.G. Slope (ft/ft)	0.007961	Flow (cfs)	381.96	683.58	1250.46
Q Total (cfs)	2316.00	Top Width (ft)	107.07	71.19	309.33
Top Width (ft)	487.59	Avg. Vel. (ft/s)	2.25	1.08	1.99
Vel Total (ft/s)	1.62	Hydr. Depth (ft)	1.58	8.92	2.13
Max Chl Dpth (ft)	11.86	Conv. (cfs)	4281.0	7661.4	14014.9
Conv. Total (cfs)	25957.3	Wetted Per. (ft)	107.20	77.66	294.94
Length Wtd. (ft)	483.18	Shear (lb/sq ft)	0.79	4.06	1.06
Min Ch El (ft)	791.50	Stream Power (lb/ft s)	10709.57	0.00	0.00
Alpha	1.27	Cum Volume (acre-ft)	17.13	28.71	9.39
Frctn Loss (ft)	1.41	Cum SA (acres)	6.82	3.16	5.18
C & E Loss (ft)	0.02				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the

need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.60	Wt. n-Val.	0.080	0.500	0.110
Vel Head (ft)	0.03	Reach Len. (ft)	393.01	504.81	460.33
W.S. Elev (ft)	808.57	Flow Area (sq ft)	1464.66	1006.08	2163.88
Crit W.S. (ft)	801.71	Area (sq ft)	1464.66	1006.08	2475.93
E.G. Slope (ft/ft)	0.000811	Flow (cfs)	2321.79	469.61	3142.60
Q Total (cfs)	5934.00	Top Width (ft)	281.76	71.19	379.91
Top Width (ft)	732.86				

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Vel Total (ft/s)	1.28	Avg. Vel. (ft/s)	1.59	0.47	1.45
Max Chl Dpth (ft)	17.07	Hydr. Depth (ft)	5.20	14.13	7.34
Conv. Total (cfs)	208399.5	Conv. (cfs)	81540.2	16492.5	110366.8
Length Wtd. (ft)	463.90	Wetted Per. (ft)	282.26	77.66	294.94
Min Ch El (ft)	791.50	Shear (lb/sq ft)	0.26	0.66	0.37
Alpha	1.29	Stream Power (lb/ft s)	10709.57	0.00	0.00
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	91.71	48.86	56.81
C & E Loss (ft)	0.02	Cum SA (acres)	15.13	3.24	9.23

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: northutoycreek
 REACH: 108 RS: 1485.967

INPUT

Description: A

Station Elevation Data		num= 232	
Sta	Elev	Sta	Elev
9128.102828	52049131.756	827.7449134	199826.9943
9155.925	819.383	9168.01817	12459169.817816
9192.18814	1.0819204	265813.06459205	436812.9727
9228.435811	6877	9240.52811	33749241.055811
9264.69810	75479276	674810.47289276	775810.4703
9300.945809	86459312	293809.5823	9313.03809
9337.2809	35759347	912809.33879349	284809.35619361
9373.454	808.685	9383.53807	94129385.539807
9409.709806	12329419	149	8069421.794
9445.964805	81569454	768805.66319458	049805.60799470
9482.219804	39319490	387804.04199494	304
9518.474803	81579526	006803.46899530	559803.24679542
9554.728	8029561	624	8029566.813
9590.983	8029597	243	8029603.068
9627.238	8029632	862	8029639.323
9663.493802	08299668	481802.14899675	578
9699.748	802	9704.1	8029711.833802
9736.003805	97579739	719	8069748.088
9772.257	8069775	337	8069784.342
9808.512	8069810	956	8069820.597
9844.767806	37259846	575806.50489856	852807.42429864
9881.022	8089882	194	8089893.107
9917.277807	29629917	813807.25659929	362806.40019935
9953.431	8069953	532	8069965.617805
9989.05	7929989	786	792
10001.5	790.8910004	36	790.3110006
10024.67792	448810026	04793	035910038
10060.29805	9995	10062	3805
10095.91802	829210098	55802	796510110
10131.53802	213310134	81802	141610146
10167.14800	048610171	06	80010183
10202.76800	879110207	32801	0785
10238.38	80210243	57	80210255
10274802	939310279	82803	274610291
10309.62804	957510316	08805	531810327
10345.24809	886310352	33810	999810363
10380.86814	907510388	59816	031710398
10416.48819	365810424	84820	192310434
10452.09821	3394	10461	1821
10487.71823	099710497	35823	558810505
10523.33826	495510533	61828	424710541
10558.95836	022810569	86836	479610576
10594.57837	598110606	12838	015810612
10630.29839	927510642	37841	7845
10666.54847	223610678	63853	172410683
10702.8	86210714	88	86210719
10739.05	86210748	54	862

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9128.102	.119971	241	.05510038	13	.11

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Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9971.24110038.13 196.5503200.0032196.1781 .1 .3
 Ineffective Flow num= 1
 Sta L Sta R Elev Permanent
 9128.102 9890.8 809.42 F

CROSS SECTION OUTPUT Profile #100Yr

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	805.68		
Vel Head (ft)	0.26		
W.S. Elev (ft)	805.42		
Crit W.S. (ft)	798.16		
E.G. Slope (ft/ft)	0.001112		
Q Total (cfs)	4417.00		
Top Width (ft)	611.88		
Vel Total (ft/s)	2.67		
Max Chl Dpth (ft)	15.26		
Conv. Total (cfs)	132459.8		
Length Wtd. (ft)	199.35		
Min Ch El (ft)	790.16		
Alpha	2.33		
Frctn Loss (ft)	0.20		
C & E Loss (ft)	0.01		
Wt. n-Val.	0.110	0.055	0.110
Reach Len. (ft)	196.55	200.00	196.18
Flow Area (sq ft)	12.87	804.75	838.72
Area (sq ft)	724.27	804.75	838.72
Flow (cfs)	6.49	3604.04	806.48
Top Width (ft)	275.24	66.89	269.74
Avg. Vel. (ft/s)	0.50	4.48	0.96
Hydr. Depth (ft)	1.33	12.03	3.11
Conv. (cfs)	194.6	108080.1	24185.1
Wetted Per. (ft)	10.87	72.61	270.70
Shear (lb/sq ft)	0.08	0.77	0.22
Stream Power (lb/ft s)	10748.54	0.00	0.00
Cum Volume (acre-ft)	48.59	30.90	21.36
Cum SA (acres)	9.43	2.44	4.94

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #010Yr

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.98		
Vel Head (ft)	0.25		
W.S. Elev (ft)	801.72		
Crit W.S. (ft)	795.98		
E.G. Slope (ft/ft)	0.001506		
Q Total (cfs)	2316.00		
Top Width (ft)	144.90		
Vel Total (ft/s)	3.64		
Max Chl Dpth (ft)	11.56		
Conv. Total (cfs)	59685.0		
Length Wtd. (ft)	199.92		
Min Ch El (ft)	790.16		
Alpha	1.23		
Frctn Loss (ft)	0.27		
C & E Loss (ft)	0.02		
Wt. n-Val.	0.110	0.055	0.110
Reach Len. (ft)	196.55	200.00	196.18
Flow Area (sq ft)	0.10	557.42	78.47
Area (sq ft)	0.10	557.42	78.47
Flow (cfs)	0.02	2274.16	41.82
Top Width (ft)	0.55	66.89	77.46
Avg. Vel. (ft/s)	0.15	4.08	0.53
Hydr. Depth (ft)	0.18	8.33	1.01
Conv. (cfs)	0.4	58606.8	1077.8
Wetted Per. (ft)	0.66	72.61	77.68
Shear (lb/sq ft)	0.01	0.72	0.09
Stream Power (lb/ft s)	10748.54	0.00	0.00
Cum Volume (acre-ft)	16.36	21.80	5.64
Cum SA (acres)	6.33	2.36	3.13

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500Yr

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.23		
Vel Head (ft)	0.19		
W.S. Elev (ft)	808.03		
Crit W.S. (ft)	799.47		
E.G. Slope (ft/ft)	0.000743		
Q Total (cfs)	5934.00		
Top Width (ft)	951.19		
Vel Total (ft/s)	2.21		
Max Chl Dpth (ft)	17.87		
Conv. Total (cfs)	217671.7		
Length Wtd. (ft)	198.97		
Min Ch El (ft)	790.16		
Alpha	2.54		
Frctn Loss (ft)	0.14		
C & E Loss (ft)	0.00		
Wt. n-Val.	0.110	0.055	0.110
Reach Len. (ft)	196.55	200.00	196.18
Flow Area (sq ft)	124.29	979.56	1585.33
Area (sq ft)	1930.23	979.56	1585.33
Flow (cfs)	60.55	4088.64	1784.81
Top Width (ft)	588.97	66.89	295.33
Avg. Vel. (ft/s)	0.49	4.17	1.13
Hydr. Depth (ft)	1.55	14.64	5.37
Conv. (cfs)	2221.2	149980.0	65470.4
Wetted Per. (ft)	81.68	72.61	296.58
Shear (lb/sq ft)	0.07	0.63	0.25
Stream Power (lb/ft s)	10748.54	0.00	0.00
Cum Volume (acre-ft)	76.39	37.35	35.36
Cum SA (acres)	11.21	2.44	5.66

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

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RIVER: northutoycreek
 REACH: 108 RS: 1285.964

INPUT

Description:

Station Elevation Data		num= 209	
Sta	Elev	Sta	Elev
9047.984823	.02149053	.993821	.87659057
9078.185818	.52479090	.281816	.69419093
9114.473813	.10389126	.569811	.81839128
9150.761810	.49539162	.856	.8109164
9187.048		.8109199	.144810
9223.336	.809	.6579235	.402808
9259.624		.8069270	.951
9295.912		.806	.9306
9332.199805	.92089342	.049	.805
9368.487		.8049377	.598803
9404.775	.802	.5289413	.146802
9441.063800	.83889448	.695800	.14199453
9477.351799	.47719484	.244799	.36119489
9513.638798	.85569519	.793	.798
9549.926798	.17669555	.342	.798
9586.214		.798	.9590
9622.502	.798	.4079626	.439
9658.789799	.77129661	.988799	.91249670
9695.077	.801	.9149697	.537802
9731.365805	.74369733	.086	.8069743
9767.653	.807	.419768	.634807
9803.941	.809	.9979804	.183
9839.732		.8109840	.228809
9875.281808	.02379876	.516	.8089888
9910.83		.8089912	.804
9946.378		.8089949	.092
9989.85	.791	.41	.9991
10004.21	.790	.2710005	.42
10014.93	.790	.5310028	.32
10057.96801	.638210070	.05804	.2639
10094.24800	.518510106	.34	.80010106
10130.53		.800	.10141
10166.82	.800	.510177	.45800
10203.11	.801	.93110212	.99
10239.39809	.408210248	.54811	.421310251
10275.68815	.529210284	.09816	.732810287
10311.97821	.543410319	.64822	.862210324
10348.26826	.945810355	.19827	.919610360
10384.55832	.189810390	.74833	.237610396
10420.83833	.840510426	.29833	.529610432
10457.12829	.607710461	.84829	.051310469
10493.41822	.598110497	.38	.822

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
9047.984	.119973	.284	.05510053

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	9973.284	10053.02		283.166248	.0013	198.678	.1		.3

Ineffective Flow		num= 1	
Sta L	Sta R	Elev	Permanent
9047.984	9824.69	811.46	F

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.110	0.055	0.110
W.S. Elev (ft)	805.25	Reach Len. (ft)	283.17	248.00	198.68
Crit W.S. (ft)	797.83	Flow Area (sq ft)	21.66	919.67	662.45
E.G. Slope (ft/ft)	0.000915	Area (sq ft)	1854.75	919.67	662.45
Q Total (cfs)	4417.00	Flow (cfs)	15.19	3726.65	675.16
Top Width (ft)	634.57	Top Width (ft)	387.84	79.74	166.99
Vel Total (ft/s)	2.75	Avg. Vel. (ft/s)	0.70	4.05	1.02
Max Chl Dpth (ft)	15.76	Hydr. Depth (ft)	2.73	11.53	3.97
Conv. Total (cfs)	145991.9	Conv. (cfs)	502.1	123174.1	22315.7
Length Wtd. (ft)	244.08	Wetted Per. (ft)	9.64	83.32	168.22

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Min Ch El (ft)	789.49	Shear (lb/sq ft)	0.13	0.63	0.23
Alpha	1.85	Stream Power (lb/ft s)	10512.32	0.00	0.00
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	42.77	26.94	17.98
C & E Loss (ft)	0.05	Cum SA (acres)	7.94	2.11	3.96

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #010Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.69	Wt. n-Val.	0.110	0.055	0.110
Vel Head (ft)	0.20	Reach Len. (ft)	283.17	248.00	198.68
W.S. Elev (ft)	801.49	Flow Area (sq ft)	2.09	619.87	118.17
Crit W.S. (ft)	795.69	Area (sq ft)	613.32	619.87	118.17
E.G. Slope (ft/ft)	0.001247	Flow (cfs)	0.78	2253.67	61.55
Q Total (cfs)	2316.00	Top Width (ft)	252.64	79.74	103.79
Top Width (ft)	436.17	Avg. Vel. (ft/s)	0.38	3.64	0.52
Vel Total (ft/s)	3.13	Hydr. Depth (ft)	0.85	7.77	1.14
Max Chl Dpth (ft)	12.00	Conv. (cfs)	22.2	63821.5	1743.0
Conv. Total (cfs)	65586.7	Wetted Per. (ft)	2.99	83.32	104.18
Length Wtd. (ft)	248.36	Shear (lb/sq ft)	0.05	0.58	0.09
Min Ch El (ft)	789.49	Stream Power (lb/ft s)	10512.32	0.00	0.00
Alpha	1.31	Cum Volume (acre-ft)	14.98	19.10	5.20
Frctn Loss (ft)	0.14	Cum SA (acres)	5.76	2.02	2.72
C & E Loss (ft)	0.04				

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.08	Wt. n-Val.	0.110	0.055	0.110
Vel Head (ft)	0.20	Reach Len. (ft)	283.17	248.00	198.68
W.S. Elev (ft)	807.88	Flow Area (sq ft)	47.85	1129.92	1118.94
Crit W.S. (ft)	799.12	Area (sq ft)	3139.11	1129.92	1118.94
E.G. Slope (ft/ft)	0.000689	Flow (cfs)	37.69	4558.31	1338.00
Q Total (cfs)	5934.00	Top Width (ft)	546.42	79.74	179.27
Top Width (ft)	805.42	Avg. Vel. (ft/s)	0.79	4.03	1.20
Vel Total (ft/s)	2.58	Hydr. Depth (ft)	3.99	14.17	6.24
Max Chl Dpth (ft)	18.39	Conv. (cfs)	1435.4	173596.9	50956.0
Conv. Total (cfs)	225988.2	Wetted Per. (ft)	14.46	83.32	180.77
Length Wtd. (ft)	241.14	Shear (lb/sq ft)	0.14	0.58	0.27
Min Ch El (ft)	789.49	Stream Power (lb/ft s)	10512.32	0.00	0.00
Alpha	1.92	Cum Volume (acre-ft)	64.96	32.51	29.27
Frctn Loss (ft)	0.07	Cum SA (acres)	8.65	2.11	4.60
C & E Loss (ft)	0.05				

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: northutoycreek

REACH: 108

RS: 1037.962

INPUT

Description:

Station Elevation Data num= 223

Sta	Elev								
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NorthUtoyCreek.rep

9193.334861	99699197.366	8629204.833	8629213.111	862	9217.78	862			
9228.857	8629230.726	8629243.672	8629244.602	8629256.619	862				
9260.347	8629269.565861	66959276.092861	11169282.511860	49939291.837859	7155				
9295.458859	45239307.582858	56739308.404858	5078	9321.35	857.919323	328857.8074			
9334.297857	00159339.073856	72569347.243856	23999354.818	856	9360.19	856			
9370.563855	89339373.136855	88869386.082855	19719386.308855	18599399.029854	6474				
9402.054	854.5879411	975854.38539417	799854.32719424	921854.38499433	544854.8871				
9437.868855	22959449.289	8569450.814	856	9463.76	8569465.034	856			
9476.707855	7387	9480.78855	39879489.653854	48239496.525853	69629502.599	853.025			
9512.27851	80139515.546851	40129528.015849	62399528.492849	56369541.439847	8739				
9543.76847	59439554.385846	63489559.505846	01449567.331845	05559575.251843	9584				
9580.278843	24719590.996841	28369593.224840	8896	9606.17838	89219606.741838	8055			
9619.117836	67779622.486836	03999632.063834	26489638.231834	06269645.009	834				
9653.977833	33699657.956833	28469669.722833	31469670.902833	30239683.849830	8346				
9685.467830	51359696.795828	06129701.212827	11879709.741825	00039716.957823	4458				
9722.688821	51589732.702818	29279735.634817	30949748.448813	0284	9748.58812	9839			
9761.527808	64959764.193807	75869774.473804	30169779.938	802.4719787	419	800.199			
9795.683798	53469800.366	798.029811.428	7989813.312	7989826.259	798				
9827.174	7989839.205	7989842.919	7989852.151	7989858.664	798				
9865.098	7989874.409	7989878.044	7989890.154	798	9890.99798	0377			
9903.937	799.0479905	899799.23379916	883799.88449921	645	8009929.829	800			
9937.39799	64069942.776798	28819953.135795	28889955.722794	54219968.669790	1584				
9968.88790	07249981.615	7909984.625	790	9995.2	789.54	9999.9	789.57		
10001.16	789.410004.29	789.0510007.08	788.9510008.19	789.2110016.12	790				
10020.45	79010031.86791	9398	10033.4	792.96410046	35799.616110047	61	800		
10059.29800	297710063.35800	823810072.24801	8366	10079.1803	014110085.19	804			
10094.84	80410098.13803	872610110.59803	517410111.08803	456610124.02801	8429				
10126.33801	559510136.97801	102110142.08	800.83410149	92800.437210157	82800.0437				
10162.86800	048710173.57	80010175.81	80010188.76	80010189.31	800				
10201.7	80010205.06	80010214.65	800	10220.8	800	10227.6	800		
10236.55	80010240.54	80010252.29	80010253.49	80010266.43	800				
10268.04800	098310279.38801	019410283.78801	385910292.33801	919210299.53802	6719				
10305.27803	159410315.27803	761910318.22	803.99810331	02804	976110331.17804	9984			
10344.11806	933910346.76807	396310357.06809	248410362.51810	227510370.01811	4266				
10378.26812	728910382.95813	4864	10394815.5567	10395.9815	904910408.84818	6467			
10409.75818	843610421.79821	588110425.49	822.44410434	74824.250310441	24824	9766			
10447.68825	480310456.98826	583610460.63827	118910472.73828	201710473.58828	2448				
10486.52	828.7210488	47828.791910499	47829.197510504	22829.372610512	42	829.675			
10519.96829	894310525.36	83010535.71	829.63610538	31829.664510551	25829	9607			
10551.45829	9593	10564.2829	9321	10567.2829	819710577	15830	149910582	94828	7519
10590.09824	928710598.69822	477710603.04	82210614.43	82210615.99	822				
10628.93826	716710630.18827	327910641.88847	647610645	92854.532110654	83854	7829			
10661.67854	627510667.77853	916410677.41854	989810680	72855	597710693	16856	4872		
10693.66856	438910706.61857	1937	10708	9857	278210719	56854	796610724	65853	3041
10732.5851	377810740.39850	012910743	05849	6082					

Manning's n Values	num=	3			
Sta n Val	Sta n Val	Sta n Val			
9193.334	.11	9937.39	.05510047	.61	.11

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
9937.3910047	.61	263.3315231	.7772219	1.555	.1	.3	

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.110	0.055	0.110
W.S. Elev (ft)	805.26	Reach Len. (ft)	263.33	231.78	219.16
Crit W.S. (ft)		Flow Area (sq ft)	1051.78	1425.95	1111.45
E.G. Slope (ft/ft)	0.000227	Area (sq ft)	1051.78	1425.95	1111.45
Q Total (cfs)	4417.00	Flow (cfs)	730.18	3127.91	558.91
Top Width (ft)	561.33	Top Width (ft)	165.78	110.22	285.33
Vel Total (ft/s)	1.23	Avg. Vel. (ft/s)	0.69	2.19	0.50
Max Chl Dpth (ft)	16.31	Hydr. Depth (ft)	6.34	12.94	3.90
Conv. Total (cfs)	293296.8	Conv. (cfs)	48485.0	207699.1	37112.7
Length Wtd. (ft)	236.86	Wetted Per. (ft)	166.84	113.91	285.99
Min Ch El (ft)	788.95	Shear (lb/sq ft)	0.09	0.18	0.06
Alpha	2.32	Stream Power (lb/ft s)	10743.05	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	33.33	20.26	13.94
C & E Loss (ft)	0.01	Cum SA (acres)	6.14	1.57	2.93

CROSS SECTION OUTPUT Profile #010Yr

E.G. Elev (ft)	801.51	Element	Left OB	Channel	Right OB
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NorthUtoyCreek.rep

Vel Head (ft)	0.06	Wt. n-Val.	0.110	0.055	0.110
W.S. Elev (ft)	801.45	Reach Len. (ft)	263.33	231.78	219.16
Crit W.S. (ft)		Flow Area (sq ft)	441.50	1005.68	210.82
E.G. Slope (ft/ft)	0.000311	Area (sq ft)	441.50	1005.68	210.82
Q Total (cfs)	2316.00	Flow (cfs)	211.84	2047.62	56.54
Top Width (ft)	441.48	Top Width (ft)	154.09	110.22	177.17
Vel Total (ft/s)	1.40	Avg. Vel. (ft/s)	0.48	2.04	0.27
Max Chl Dpth (ft)	12.50	Hydr. Depth (ft)	2.87	9.12	1.19
Conv. Total (cfs)	131275.4	Conv. (cfs)	12007.4	116063.1	3204.9
Length Wtd. (ft)	235.45	Wetted Per. (ft)	154.55	113.91	177.34
Min Ch El (ft)	788.95	Shear (lb/sq ft)	0.06	0.17	0.02
Alpha	1.89	Stream Power (lb/ft s)	10743.05	0.00	0.00
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	11.55	14.47	4.45
C & E Loss (ft)	0.01	Cum SA (acres)	4.44	1.48	2.08

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.97	Wt. n-Val.	0.110	0.055	0.110
Vel Head (ft)	0.05	Reach Len. (ft)	263.33	231.78	219.16
W.S. Elev (ft)	807.92	Flow Area (sq ft)	1502.32	1718.54	1891.94
Crit W.S. (ft)		Area (sq ft)	1502.32	1718.54	1891.94
E.G. Slope (ft/ft)	0.000170	Flow (cfs)	1108.46	3695.59	1129.95
Q Total (cfs)	5934.00	Top Width (ft)	173.67	110.22	302.05
Top Width (ft)	585.94	Avg. Vel. (ft/s)	0.74	2.15	0.60
Vel Total (ft/s)	1.16	Hydr. Depth (ft)	8.65	15.59	6.26
Max Chl Dpth (ft)	18.97	Conv. (cfs)	85027.9	283481.6	86675.9
Conv. Total (cfs)	455185.4	Wetted Per. (ft)	175.17	113.91	302.92
Length Wtd. (ft)	236.92	Shear (lb/sq ft)	0.09	0.16	0.07
Min Ch El (ft)	788.95	Stream Power (lb/ft s)	10743.05	0.00	0.00
Alpha	2.26	Cum Volume (acre-ft)	49.87	24.40	22.40
Frctn Loss (ft)	0.03	Cum SA (acres)	6.30	1.57	3.50
C & E Loss (ft)	0.01				

CROSS SECTION

RIVER: northutoycreek
 REACH: 108 RS: 806.1852

INPUT

Description:

Station	Elevation	Data	num=	199	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9062.493858	41569062.496	858.4159069	351857.54099072	528857.13379082	559856.0276							
9092.591	854.899102	622853.50429112	653851.75879122	685850.18959132	716848.6355							
9142.748847	01459152.779845	4726.9162.81	844.1469172	842842.86659182	873841.4382							
9192.905840	01849195.831839	69199202.936838	88689212.967837	56949222.999	835.923							
9233.03834	46769243.062832	75329253.093831	02419263.124829	36319273.156827	8085							
9283.187	826.2299293	219824.6699	9303.25822	76649313.281820	25189322.311	818.064						
9323.313817	81829333.344815	37979343.376	812.8159353	407810.55429363	439808.7641							
9373.47807	27389383.501805	88099393.533804	51999403.564	803.3269413	596802.2798							
9423.627801	78189433.658801	4313.9443	69801.10379444	042801.09519444	467801.0832							
9455.797800	85259464.567800	74449467.127800	70729478.457800	52179485.838	800.32							
9489.788800	23479501.118	799.794	9507.11799	53979512.448799	31959523.778	798.834						
9528.381798	63959535.108798	35329546.438798	05919549.652	7989557.768	798							
9569.098798	80049570.924	7989580.428	7989591.758	7989592.195	798							
9603.088	7989613.467	7989614.419	7989625.749	7989634.738	798							
9637.079	7989648.409	798.9656.01	7989659.739	7989671.069	798							
9677.281	7989682.399	7989693.729	7989698.552	7989705.059	798							
9716.389	7989719.824	7989727.719	798.9739.05	7989741.095	798							
9750.38	798.9761.71	7989762.367	798.9773.04	7989783.638	798							
9784.37	798.9795.7	798.9804.91	798.9807.03	798.9818.36	798							
9826.181	798.9829.69798	0572.9841	02798.74129847	452799.3358	9852.35799	6827						
9863.681	8009868.724	8009875.011	8009886.341	8009889.995	800							
9897.671	8009909.001	8009911.267	799.9789920	331799.64639931	661798.7482							
9932.538798	72349942.991797	7444.9953	81795.08449954	321794.96349965	651791.9681							
9975.081790	09049976.981	790.9983.75	789.87.9985.87	789.53.9990.84	788.77							
9995.76	788.7.9997.08	788.5710000.35	788.3510003.28	788.2810004.32	788.58							
10006.71	789.7210010.97	79010017.62791	0325.10022.3793	436210033.63797	9737							
10038.9799	327610044.96	80010056.29	80010060.17	80010067.62799	9566							
10078.95799	390710081.44799	286110090.28	798.87910101	61798.410610102	71	798.379						

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10112.94	79810123.98	79810124.27	798 10135.6	79810145.25	798
10146.93	79810158.26	79810166.52	79810169.59	79810180.92	798
10187.8	79810192.25	79810203.58	79810209.07	79810214.91798	0514
10226.24798	708510230.34799	087110237.57799	6904 10248.9	80010251.61	800
10260.23	80010271.56	80010272.88	80010282.89	80010294.15	800
10294.22	80010305.55	80010315.42	80010316.88800	071810328.21802	2011
10336.7802	740410339.54802	881410350.87803	001110357.97803	1658 10362.2803	2467
10373.53803	715510379.24	804.39810384.86805	168910396.19807	314910400.51808	0116
10407.52809	252510418.85810	963610421.78811	440710430.18813	891710441.52817	3132
10443.05817	771710452.85820	626710464.18823	800210464.32823	839910475.51826	6102
10485.6829	596210486.84829	993310498.17833	342310506.87835	9907 10509.5836	7297
10520.83839	694910528.14	841.55910532.16842	321110543.15844	6184	

Manning's n Values	num=	3
Sta n Val	Sta n Val	Sta n Val
9062.493	.119920.331	.05510044.96 .11

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
9920.33110044.96		397.3029310.3674291.4702			.3		.5
Ineffective Flow	num=	1					
Sta L	Sta R	Elev	Permanent				
9062.493	9585	828	F				

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.110	0.055	0.110
W.S. Elev (ft)	805.25	Reach Len. (ft)	397.30	310.37	291.47
Crit W.S. (ft)	795.71	Flow Area (sq ft)	2278.57	1425.97	1864.96
E.G. Slope (ft/ft)	0.000134	Area (sq ft)	3264.99	1425.97	1864.96
Q Total (cfs)	4417.00	Flow (cfs)	1279.84	2230.19	906.96
Top Width (ft)	997.08	Top Width (ft)	532.15	124.63	340.31
Vel Total (ft/s)	0.79	Avg. Vel. (ft/s)	0.56	1.56	0.49
Max Chl Dpth (ft)	16.97	Hydr. Depth (ft)	6.79	11.44	5.48
Conv. Total (cfs)	381035.2	Conv. (cfs)	110406.3	192389.0	78239.8
Length Wtd. (ft)	325.48	Wetted Per. (ft)	335.40	127.78	340.75
Min Ch El (ft)	788.28	Shear (lb/sq ft)	0.06	0.09	0.05
Alpha	2.19	Stream Power (lb/ft s)	10543.15	0.00	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	20.28	12.67	6.45
C & E Loss (ft)	0.04	Cum SA (acres)	4.03	0.94	1.35

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #010Yr

E.G. Elev (ft)	801.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.110	0.055	0.110
W.S. Elev (ft)	801.40	Reach Len. (ft)	397.30	310.37	291.47
Crit W.S. (ft)	793.72	Flow Area (sq ft)	989.74	946.97	668.04
E.G. Slope (ft/ft)	0.000261	Area (sq ft)	1286.03	946.97	668.04
Q Total (cfs)	2316.00	Flow (cfs)	462.79	1570.36	282.84
Top Width (ft)	889.41	Top Width (ft)	485.78	124.63	279.00
Vel Total (ft/s)	0.89	Avg. Vel. (ft/s)	0.47	1.66	0.42
Max Chl Dpth (ft)	13.12	Hydr. Depth (ft)	2.95	7.60	2.39
Conv. Total (cfs)	143425.3	Conv. (cfs)	28659.9	97249.5	17515.9
Length Wtd. (ft)	317.77	Wetted Per. (ft)	335.40	127.78	279.23
Min Ch El (ft)	788.28	Shear (lb/sq ft)	0.05	0.12	0.04
Alpha	2.44	Stream Power (lb/ft s)	10543.15	0.00	0.00
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	6.33	9.28	2.24
C & E Loss (ft)	0.02	Cum SA (acres)	2.51	0.86	0.94

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	807.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.110	0.055	0.110
W.S. Elev (ft)	807.91	Reach Len. (ft)	397.30	310.37	291.47
Crit W.S. (ft)	796.85	Flow Area (sq ft)	3171.58	1757.87	2790.11
E.G. Slope (ft/ft)	0.000094	Area (sq ft)	4707.83	1757.87	2790.11
Q Total (cfs)	5934.00	Flow (cfs)	1854.33	2639.22	1440.46

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Top Width (ft)	1030.68	Top Width (ft)	551.13	124.63	354.91
Vel Total (ft/s)	0.77	Avg. Vel. (ft/s)	0.58	1.50	0.52
Max Chl Dpth (ft)	19.63	Hydr. Depth (ft)	9.46	14.10	7.86
Conv. Total (cfs)	613072.8	Conv. (cfs)	191580.3	272671.4	148821.1
Length Wtd. (ft)	330.19	Wetted Per. (ft)	335.40	127.78	355.60
Min Ch El (ft)	788.28	Shear (lb/sq ft)	0.06	0.08	0.05
Alpha	1.99	Stream Power (lb/ft s)	10543.15	0.00	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	31.10	15.15	10.62
C & E Loss (ft)	0.04	Cum SA (acres)	4.11	0.94	1.85

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: northutoycreek
 REACH: 108 RS: 495.8178

INPUT

Description: Blockede area relates to Souty Utoy influence

Station	Elevation	Data	num=	230						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
8458.226818	484448463.754818	21538466.082818	0.876	8474.35817	80968484.946816	4.351				
8495.542	816.0658496	323816.00598506	1.39815	16888516.735814	50848526.565814	0.544				
8527.331814	0.2988537	927814.18488548	5.23814	0.5048556	806814.01528559	1.19	814			
8569.715	8148580.311	8148587.047		8148590.907	8148601.503	814				
8612.099	8148617.289	8148622.695		8148633.291	8148643.888	814				
8647.53	8148654.484	814 8665.08		8148675.676813	57178677.771813	4.552				
8686.272812	91018696.868812	30648702.629812	1.1048707	242812.05348717	353812.0546					
8727.463811	98578737.574811	83548747.684811	8.7678757	795812.0859	8758.39812	0.982				
8767.905812	0.4378778	0.16811.18628788	1.26810	86948798.237810	87238808.347810	3.927				
8818.457809	5.3838826	2.27808.96518828	5.68808	77938838.678808	15058848.789808	0.399				
8858.899807	9.145 8869.01807	8847 8879.12807	7.5258889	2.31807	51888894.065	807.336				
8899.341807	1.4188909	4.52 806.7558919	5.62806	3.6358929	6.72805	7.8398939	7.83805	0.638		
8949.893804	2.7458960	0.04803.32648961	9.02803	1.1828970	11.4802	2.3868980	2.25801	6.255		
8990.335801	2.5779000	4.46801.03249001	1.19801	0.3579010	6.22801	0.5999020	804801	4.355		
9023.575801	3.7639030	0.985 801.1539041	1.66800	9.1739051	3.47800	6.1229061	5.29800	2.536		
9071.71800	0.4049076	801 8009081.891		8009092.073	8009102.254	800				
9112.435	8009122.617	8009130.027		8009132.798	8009142.979799	9017				
9153.16799	6.2399163	3.342 799.6899173	5.23799	5.1789183	2.54 798	7.229183	7.04798	6.843		
9193.886	798.5589204	0.67799	3.6589214	2.48799	5.755 9224	4.3799	6.9679234	6.11	800	
9236.48	8009244.792799	8.1699254	9.74799	7.0879265	1.55	8009275.336	800			
9285.517	8009289.706	8009295.699799	9.507 9305.88		8009316.061	800				
9326.243	8009336.424	8009342.933		8009346.605799	9.4289356	7.87	800			
9366.968	8009377.149	800 9387.33		8009396.159	8009397.512799	9.987				
9407.693800	4.3199417	8.74800	9.1749428	0.56801	3.5789438	2.37801	7.5899448	4.18	801.998	
9449.385	802 9458.6801	8.7739468	7.81	8029478.962	8029489.143	802				
9499.325	8029502.612	8029509.506801	8.9279519	6.87	8029529.869	802				
9540.05	8029550.231	8029555.838		8029560.413801	9.8449570	5.94	802			
9580.775	8029590.956	8029601.138		8029609.065	8029611.319801	9.201				
9621.5801	4.6679631	6.82801	7.5719641	8.63	8029652.044	8029662.226799	2.469			
9662.291799	2.0469672	4.07792	1.5079682	5.88787	7.713 9692.77	7.869702	9.51	7.86		
9713.132795	7.6499715	5.17797	4.3839723	3.13801	8.5019730	9.47801	9.2589733	4.52	802	
9743.464	801.9789753	4.75801	9.6219763	4.87	8029773.499	802 9783	5.1801	9.989		
9791.164	8029793.522	8029803.534		8029813.545	8029823.557	802				
9833.568	802 9843.58	8029853.592		8029863.603	8029873.615	802				
9883.626	8029893.638	802 9903.65		8029913.661	8029923.673	802				
9933.684	8029943.696	8029953.708		8029963.719801	8009 9966.4	798.84				
9966.731791	6.859 9967.5	7.889983.742		7.88 9999.46	7.87	7.10005	8.8	7.87	7	
10013.78	7.88 10032.5	7.8810032.79801	6.232	10033.8803	1.949 10043	8.803	9.966			
10053.81	80410054.82	80410063.82		80410073.82804	2.87810083	83 804	9.29			
10093.84805	3.25910103	8.4805	7.96710113	8.5	80610123.86	80610133	8.7806	5.966		
10143.87807	4.18110153	8.8807	9.81510163	8.9	80810173	8.9808	8.278	10183	9 809	5.78
10193.91	81010203	9.1810	0.73410213	9.2	811.08710223	9.3	811.64710233	9.4812	1.576	
10243.94813	0.74410253	9.5813	5.42410263	9.6814	3.35610273	9.6814	7.60910283	9.7815	4.063	
10293.98816	1.37610303	9.8816	6.51810313	9.9	817.03810322	5.2817	5.286	10324817	6.033	
10334.01	818.06810344	0.1818	2.94710354	0.2818	9.47410364	0.3819	6.93110374	0.3	820	3.61
10384.04821	3.75710394	0.5822	5.81110404	0.5	823.59310414	0.6824	3.509 10416	1.824	5.378	

Manning's n Values num= 3

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Sta	n Val	Sta	n Val	Sta	n Val
8458.226	.11	9966.4	.05510032.79	.11	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	9966.410032.79		46.4286356.5787764.34172			.3	.5
Ineffective Flow	num=		2				
Sta L	Sta R	Elev	Permanent				
8458.226	9967.5	802	F				
10032.5	10416.1	802	F				
Blocked Obstructions	num=		1				
Sta L	Sta R	Elev					
8458.226	9737.89	818.4					

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.110	0.055	0.110
W.S. Elev (ft)	804.97	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	793.15	Flow Area (sq ft)	685.12	1126.41	47.75
E.G. Slope (ft/ft)	0.000575	Area (sq ft)	685.12	1126.41	47.75
Q Total (cfs)	4417.00	Flow (cfs)	455.78	3946.80	14.42
Top Width (ft)	347.01	Top Width (ft)	228.51	66.39	52.11
Vel Total (ft/s)	2.38	Avg. Vel. (ft/s)	0.67	3.50	0.30
Max Chl Dpth (ft)	17.27	Hydr. Depth (ft)	3.00	16.97	0.92
Conv. Total (cfs)	184186.9	Conv. (cfs)	19005.7	164579.8	601.4
Length Wtd. (ft)	1.00	Wetted Per. (ft)	232.81	89.56	53.03
Min Ch El (ft)	787.70	Shear (lb/sq ft)	0.11	0.45	0.03
Alpha	1.95	Stream Power (lb/ft s)	10416.10	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	2.26	3.58	0.05
C & E Loss (ft)		Cum SA (acres)	0.56	0.26	0.04

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #010Yr

E.G. Elev (ft)	801.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.055	
W.S. Elev (ft)	801.21	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	791.32	Flow Area (sq ft)		863.84	
E.G. Slope (ft/ft)	0.000313	Area (sq ft)	2.53	876.39	
Q Total (cfs)	2316.00	Flow (cfs)		2316.00	
Top Width (ft)	68.52	Top Width (ft)	2.14	66.38	
Vel Total (ft/s)	2.68	Avg. Vel. (ft/s)		2.68	
Max Chl Dpth (ft)	13.51	Hydr. Depth (ft)		13.29	
Conv. Total (cfs)	130930.1	Conv. (cfs)		130930.1	
Length Wtd. (ft)	1.00	Wetted Per. (ft)		65.01	
Min Ch El (ft)	787.70	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)	10416.10	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.45	2.78	0.00
C & E Loss (ft)		Cum SA (acres)	0.28	0.18	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	807.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.110	0.055	0.110
W.S. Elev (ft)	807.68	Reach Len. (ft)	1.00	1.00	1.00
Crit W.S. (ft)	794.30	Flow Area (sq ft)	1303.55	1306.08	288.28
E.G. Slope (ft/ft)	0.000473	Area (sq ft)	1303.55	1306.08	288.28
Q Total (cfs)	5934.00	Flow (cfs)	1198.36	4580.86	154.78
Top Width (ft)	410.60	Top Width (ft)	228.51	66.39	115.70
Vel Total (ft/s)	2.05	Avg. Vel. (ft/s)	0.92	3.51	0.54
Max Chl Dpth (ft)	19.98	Hydr. Depth (ft)	5.70	19.67	2.49
Conv. Total (cfs)	272835.8	Conv. (cfs)	55098.5	210620.8	7116.5
Length Wtd. (ft)	1.00	Wetted Per. (ft)	235.51	89.56	116.69
Min Ch El (ft)	787.70	Shear (lb/sq ft)	0.16	0.43	0.07
Alpha	2.31	Stream Power (lb/ft s)	10416.10	0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	3.68	4.24	0.32
C & E Loss (ft)	0.01	Cum SA (acres)	0.56	0.26	0.27

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9697.73	802	0	9708.01	802	0	9718.29	802	0
9728.56	802	0	9734.09	802	0	9738.72	802	0
9748.73	802	0	9758.75	802	0	9768.76	802	0
9778.78	802	0	9788.79	802	0	9798.81	802	0
9808.82	802	0	9818.84	802	0	9828.85	802	0
9838.87	802	0	9848.88	802	0	9858.9	802	0
9868.91	802	0	9910.83	803.17	0	9959.15	803.62	0
9965.5	803.62	0	9965.5	803.62	0	9967.5	803.62	786.93
9967.5	803.62	786.77	9970.66	803.62	792.24	9971.87	803.62	793.86
9973.55	803.62	794.98	9974.99	803.62	795.66	9976.48	803.62	796.24
9988.07	803.62	799.29	10000	803.62	800.3110011.94	803.62	799.29	
10023.52	803.62	796.2410025.01	803.62	795.6610026.45	803.62	794.98		
10028.13	803.62	793.8610029.34	803.62	792.24	10032.5	803.62	786.77	
10032.5	803.62	786.93	10033.5	803.62	010033.51	803.8	0	
10080.82	805.09	010169.15	807.91	010178.16	808.27	0		
10179.15	808.31	010189.16	808.95	010199.16	809.62	0		
10209.17	810.19	010219.18	810.84	010229.18	811.51	0		
10239.19	812.08	0	10249.2	812.94	0	10259.2	813.8	0
10269.21	814.31	010279.21	815.18	010289.22	816.01	0		
10299.23	816.85	010309.02	817.84	010309.23	817.86	0		
10319.27	818.49	010329.31	819.45	010339.34	820.15	0		
10349.38	821.19	010359.42	822.01	010363.29	822.31	0		
10369.45	822.82	010379.49	823.85	010389.52	824.57	0		
10399.56	825.55	0	10409.6	826.36	010419.63	827.34	0	
10429.67	828.18	010439.71	829.1	010449.74	829.97	0		
10459.78	830.71	010469.82	831.6	010479.85	832.13	0		
10480.86	832.24	010489.18	833.2	0				

Upstream Bridge Cross Section Data

Station	Elevation	Data	num=	230									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev				
8458.226818	48448463	754818	21538466	082818	0876	8474	35817	80968484	946816	4351			
8495.542	816	0658496	323816	00598506	139815	16888516	735814	50848526	565814	0544			
8527.331814	02988537	927814	18488548	523814	05048556	806814	01528559	119	814				
8569.715	8148580	311	8148587	047	8148590	907	8148601	503	814				
8612.099	8148617	289	8148622	695	8148633	291	8148643	888	814				
8647.53	8148654	484	814	8665	08	8148675	676813	57178677	771813	4552			
8686.272812	91018696	868812	30648702	629812	11048707	242812	05348717	353812	0546				
8727.463811	98578737	574811	83548747	684811	87678757	795812	0859	8758	39812	0982			
8767.905812	04378778	016811	18628788	126810	86948798	237810	87238808	347810	3927				
8818.457809	53838826	227808	96518828	568808	77938838	678808	15058848	789808	0399				
8858.899807	9145	8869	01807	8847	8879	12807	75258889	231807	51888894	065	807	336	
8899.341807	14188909	452	806	7558919	562806	36358929	672805	78398939	783805	0638			
8949.893804	27458960	004803	32648961	902803	11828970	114802	23868980	225801	6255				
8990.335801	25779000	446801	03249001	119801	03579010	622801	05999020	804801	4355				
9023.575801	37639030	985	801	1539041	166800	91739051	347800	61229061	529800	2536			
9071.71800	04049076	801	8009081	891	8009092	073	8009102	254	800				
9112.435	8009122	617	8009130	027	8009132	798	8009142	979799	9017				
9153.16799	62399163	342	799	6899173	523799	51789183	254	798	7229183	704798	6843		
9193.886	798	5589204	067799	36589214	248799	5755	9224	43799	69679234	611	800		
9236.48	8009244	792799	81699254	974799	70879265	155	8009275	336	800				
9285.517	8009289	706	8009295	699799	9507	9305	88	8009316	061	800			
9326.243	8009336	424	8009342	933	8009346	605799	94289356	787	800				
9366.968	8009377	149	800	9387	33	8009396	159	8009397	512799	9987			
9407.693800	43199417	874800	91749428	056801	35789438	237801	75899448	418	801	998			
9449.385	802	9458	6801	87739468	781	8029478	962	8029489	143	802			
9499.325	8029502	612	8029509	506801	89279519	687	8029529	869	802				
9540.05	8029550	231	8029555	838	8029560	413801	98449570	594	802				
9580.775	8029590	956	8029601	138	8029609	065	8029611	319801	9201				
9621.5801	46679631	682801	75719641	863	8029652	044	8029662	226799	2469				
9662.291799	20469672	407792	15079682	588787	7713	9692	77	7869702	951	786			
9713.132795	76499715	517797	43839723	313801	85019730	947801	92589733	452	802				
9743.464	801	9789753	475801	96219763	487	8029773	499	802	9783	51801	9989		
9791.164	8029793	522	8029803	534	8029813	545	8029823	557	802				
9833.568	802	9843	58	8029853	592	8029863	603	8029873	615	802			
9883.626	8029893	638	802	9903	65	8029913	661	8029923	673	802			
9933.684	8029943	696	8029953	708	8029963	719801	8009	9966	4	798	84		
9966.731791	6859	9967	5	7889983	742	788	9999	46	787	710005	88	787	7
10013.78	788	10032	5	78810032	79801	6232	10033	8803	1949	10043	8803	9966	
10053.81	80410054	82	80410063	82	80410073	82804	287810083	83	804	929			
10093.84805	325910103	84805	796710113	85	80610123	86	80610133	87806	5966				
10143.87807	418110153	88807	981510163	89	80810173	89808	8278	10183	9	809	578		
10193.91	81010203	91810	073410213	92	811	08710223	93	811	64710233	94812	1576		
10243.94813	074410253	95813	542410263	96814	335610273	96814	760910283	97815	4063				
10293.98816	137610303	98816	651810313	99	817	03810322	52817	5286	10324817	6033			

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10334.01 818.06810344.01818.294710354.02818.947410364.03819.693110374.03 820.361
 10384.04821.375710394.05822.581110404.05 823.59310414.06824.3509 10416.1824.5378

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val
 8458.226 .11 9966.4 .05510032.79 .11

Bank Sta: Left Right Coeff Contr. Expan.
 9966.410032.79 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 8458.226 9967.5 802 F
 10032.5 10416.1 802 F

Blocked Obstructions num= 1
 Sta L Sta R Elev
 8458.226 9737.89 818.4

Downstream Deck/Roadway Coordinates

num= 238											
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
8393.98	818.24	0	8401.97	818.07	0	8409.53	818	0			
8413.77	817.99	0	8425.57	817.74	0	8428.37	817.64	0			
8437.36	817.36	0	8447.22	816.97	0	8449.16	816.91	0			
8460.96	816.54	0	8466.06	816.37	0	8472.76	816.16	0			
8484.56	816	0	8484.91	816	0	8496.36	816	0			
8503.75	815.73	0	8508.15	815.59	0	8519.95	815.22	0			
8522.6	815.14	0	8531.75	814.98	0	8541.44	814.88	0			
8543.55	814.85	0	8555.35	814.65	0	8560.28	814.54	0			
8567.14	814.28	0	8578.94	814	0	8579.13	814	0			
8590.74	814	0	8597.97	814	0	8600.28	814.01	0			
8602.2	814	0	8612.25	813.58	0	8622.29	813.19	0			
8632.33	812.92	0	8642.37	812.77	0	8652.41	812.53	0			
8662.46	812.22	0	8672.5	811.8	0	8682.54	811.45	0			
8692.58	811.12	0	8696.26	811.03	0	8702.62	810.88	0			
8712.67	810.78	0	8722.71	810.65	0	8732.75	810.55	0			
8742.79	810.32	0	8749.46	810.15	0	8752.9	810.02	0			
8763.15	809.73	0	8771.75	809.47	0	8773.4	809.42	0			
8783.64	809.06	0	8793.89	808.81	0	8804.14	808.48	0			
8814.38	808.03	0	8817.6	808	0	8824.63	807.96	0			
8834.88	807.65	0	8845.12	807.3	0	8855.37	806.89	0			
8863.44	806.53	0	8865.62	806.43	0	8875.86	806	0			
8886.11	805.9	0	8896.36	805.31	0	8906.6	804.83	0			
8909.28	804.76	0	8916.85	804.58	0	8927.1	804.4	0			
8937.34	804.05	0	8945.04	803.98	0	8947.6	803.96	0			
8954.6	803.69	0	8957.87	803.57	0	8968.15	803.12	0			
8978.43	803.1	0	8988.7	802.8	0	8998.05	802.19	0			
8998.98	802.13	0	9009.25	802	0	9019.53	802	0			
9029.81	802	0	9040.08	802	0	9041.51	802	0			
9050.36	802	0	9060.63	802	0	9070.91	802	0			
9081.18	802	0	9084.96	802	0	9091.46	802	0			
9101.74	802	0	9112.01	802	0	9122.29	802	0			
9128.41	802	0	9132.56	802	0	9142.84	802	0			
9153.11	802	0	9163.39	802	0	9171.86	802	0			
9173.67	802	0	9183.94	802	0	9194.22	802	0			
9204.49	802	0	9214.77	802	0	9215.32	802	0			
9225.05	802	0	9235.32	802	0	9245.6	802	0			
9255.87	802	0	9258.77	802	0	9266.15	802	0			
9276.42	802	0	9286.7	802	0	9296.98	802	0			
9302.22	802	0	9307.25	802	0	9317.53	802	0			
9327.8	802	0	9338.08	802	0	9345.67	802	0			
9348.36	802	0	9358.63	802	0	9368.91	802	0			
9379.18	802	0	9389.13	802	0	9389.46	802	0			
9399.73	802	0	9410.01	802	0	9420.29	802	0			
9430.56	802	0	9432.58	802	0	9440.84	802	0			
9451.11	802	0	9461.39	802	0	9471.67	802	0			
9476.03	802	0	9481.94	802	0	9492.22	802	0			
9502.49	802	0	9512.77	802	0	9519.48	802	0			
9523.04	802	0	9533.32	802	0	9543.6	802	0			
9553.87	802	0	9562.93	802	0	9564.15	802	0			
9574.42	802	0	9584.7	802	0	9594.98	802	0			
9605.25	802	0	9606.39	802	0	9615.53	802	0			
9625.8	802	0	9636.08	802	0	9646.35	802	0			
9649.84	802	0	9656.63	802	0	9666.91	802	0			
9677.18	802	0	9687.46	802	0	9693.29	802	0			
9697.73	802	0	9708.01	802	0	9718.29	802	0			

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9728.56	802	0	9734.09	802	0	9738.72	802	0
9748.73	802	0	9758.75	802	0	9768.76	802	0
9778.78	802	0	9788.79	802	0	9798.81	802	0
9808.82	802	0	9818.84	802	0	9828.85	802	0
9838.87	802	0	9848.88	802	0	9858.9	802	0
9868.91	802	0	9910.83	803.17	0	9959.15	803.62	0
9962.5	803.62	786.93	9962.5	803.62	786.77	9965.66	803.62	792.24
9966.87	803.62	793.86	9968.55	803.62	794.98	9969.99	803.62	795.66
9971.48	803.62	796.24	9983.07	803.62	799.29	9995	803.62	800.31
10006.94	803.62	799.29	10018.52	803.62	796.24	10020.01	803.62	795.66
10021.45	803.62	794.98	10023.13	803.62	793.86	10024.34	803.62	792.24
10027.5	803.62	786.77	10027.5	803.8	786.93	10080.82	805.09	0
10169.15	807.91		010178.16	808.27		010179.15	808.31	0
10189.16	808.95		010199.16	809.62		010209.17	810.19	0
10219.18	810.84		010229.18	811.51		010239.19	812.08	0
10249.2	812.94		0 10259.2	813.8		010269.21	814.31	0
10279.21	815.18		010289.22	816.01		010299.23	816.85	0
10309.02	817.84		010309.23	817.86		010319.27	818.49	0
10329.31	819.45		010339.34	820.15		010349.38	821.19	0
10359.42	822.01		010363.29	822.31		010369.45	822.82	0
10379.49	823.85		010389.52	824.57		010399.56	825.55	0
10409.6	826.36		010419.63	827.34		010429.67	828.18	0
10439.71	829.1		010449.74	829.97		010459.78	830.71	0
10469.82	831.6		010479.85	832.13		010480.86	832.24	0
10489.18	833.2		0					0

Downstream Bridge Cross Section Data

Station Elevation Data		num= 213							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8792.093	804.5668800	505803.5539	8811.52	802.261	8814.32801	92658822	534800	9746	
8833.549800	06958838	173	8008844.564	8008855.578	8008862.027	800			
8866.593	8008877.608	800	8885.88	8008888.622	8008899.637	800			
8909.734	8008910.652	8008921.666	8008932.681	8008933.587	800				
8943.696	800 8954.71	8008957.441	8008965.725	800 8976.74	800				
8981.294	8008987.754	8008998.769800	03479005.147800	05839009.783800	0885				
9020.798800	29349029.001800	45839031.813800	53329042.827800	83959052.854801	1345				
9053.842801	16459064.857801	49949075.871801	83439076.708801	85199086.886	802				
9097.901	8029100.561	8029108.915801	8663 9119.93801	30929124.415	800.99				
9130.945800	56079141.959800	06289148.268	8009152.974	8009163.989	800				
9172.122	8009175.003	8009186.018	8009195.975	8009197.033	800				
9208.047	8009219.062	8009219.828	8009230.077	8009241.091	800				
9243.682	800.1079252	106800.7035	9263.12801	28019267.535801	41839274.135801	6001			
9285.15801	93059291.389801	38169296.164800	72659307.179800	00649315.242	800				
9318.194	8009329.208	8009339.096	8009340.223	8009351.238	800				
9362.252	8009362.949	8009373.267	8009384.282	8009386.803	800				
9395.296	8009406.311	8009410.656	8009417.326	800 9428.34	800				
9434.509	8009439.355	800 9450.37800	07789458.363800	17989461.384800	2205				
9472.399	800.3699482	216800.50149483	414800.51759494	428 800.6669505	443800.8145				
9506.07800	82299516.457	800.9639527	472801.11159529	923 801.1429538	487801.2474				
9549.501	801.3489553	777801.38829560	516801.45169571	531801.5748	9577.63801	7228			
9582.545	801.842	9593.56	8029601.484	8029604.575	8029615.589	802			
9625.337	8029626.604	8029637.619	8029648.633801	6949 9649.19801	6628				
9659.648801	03979670.663	800.3269673	044799.86099681	677797.96139692	692794.1627				
9696.897792	19579703	707788.69179714	721786.27289720	751 7869725.736	786				
9736.75	7869744.604787	35719747.765788	2799 9758.78792	61219768.458796	4584				
9769.794796	96849780	809799.77299791	824800.89889792	311800.94629802	838801.6473				
9804.287801	68259813	018801.60019823	072801.04989833	126800.30039843	179800.2299				
9852.947799	86849853	233799.85769863	287799.5217	9873.34799	52759883	394799	5768		
9893.448799	86469903	501 800.229913	555800.8456	9921.13 800.729933	662 800.473				
9943.716800	10949955	903 799.42	9961.59 795.97	9962.5 7889986	869 787.54				
9993.557	787.24	10000.2 787.2110001	14 787.56	10027.5 787.8310032	37 804.88				
10045.36	807.0710080	55 807.1310094	52807.198310104	57807.068110107	37807.0131				
10114.59	806.838	10124.6806	5365 10134.6806	434810144.61806	977810154	61807	5026		
10164.62808	146910174	62809.358310184	63810.044310194	63810.817210204	64811	3221			
10214.64812	111110224	64812.489410229	41812.680210234	65812.889410244	65813	5904			
10254.66814	160410264	66814.961310274	67815.722410284	67816.365510294	68817	3759			
10304.68818	401410314	69819.314910324	69819.4101	10334.7820	4691 10344	7821	1774		
10354.71822	101610364	71822.655510374	72823.435910384	72824.545710394	73825	1289			
10404.73825	921410414	73826.629410424	74 827.25910434	74827.863310444	75828	4753			
10454.75828	633610464	76828.733210474	76829.063410484	77829.399510494	77829	1124			
10504.78829	260210514	78829.261210524	79828.790410534	79828.7022	10544	8828	2382		
10554.8826	954910554	97 826.94910562	31826	7379					

Manning's n Values num= 3
 Sta n Val Sta n Val Sta n Val

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8792.093 .11 9961.59 .05510032.37 .11

Bank Sta: Left Right Coeff Contr. Expan.
 9961.5910032.37 .3 .5

Ineffective Flow num= 2
 Sta L Sta R Elev Permanent
 8792.093 9928.84 800.31 F
 10061.1610562.31 800.31 F

Blocked Obstructions num= 1
 Sta L Sta R Elev
 8792.093 9790.75 815.77

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow = .95
 Elevation at which weir flow begins =
 Energy head used in spillway design =
 Spillway height used in design =
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy
 W.S. Pro Method

W.S. Pro Data

Left Embankment
 El of the top of the embankment = 803.6
 El of the toe of the abutment = 786.93
 Right Embankment
 El of the top of the embankment = 803.6
 El of the toe of the abutment = 786.93
 Abutment Type = 1 Vert. abutments and vert. embankments with or without wingwalls
 Slope of abutments =
 Top with of embankment = 42
 Centroid station of bridge opening = 9997.5
 Wing Wall Type = Angular wing walls
 Width = 20
 Angle = 45
 Radius =
 Guide Banks Type = No Guide Bank present
 Length =
 Offset =
 Angle =

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow
 Submerged Inlet Cd =
 Submerged Inlet + Outlet Cd = .8
 Max Low Cord =

Additional Bridge Parameters

Add Friction component to Momentum
 Do not add Weight component to Momentum
 Class B flow critical depth computations use critical depth
 inside the bridge at the upstream end
 Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #100Yr

	E.G. US. (ft)	805.14	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	804.97		E.G. Elev (ft)	805.14	805.14
Q Total (cfs)	4417.00		W.S. Elev (ft)	804.97	804.92
Q Bridge (cfs)	1857.34		Crit W.S. (ft)	793.31	792.99
Q Weir (cfs)	2559.66		Max Chl Dpth (ft)	17.27	17.71
Weir Sta Lft (ft)	9737.89		Vel Total (ft/s)	3.27	3.78
Weir Sta Rgt (ft)	10082.47		Flow Area (sq ft)	1352.02	1167.88
Weir Submerg	0.92		Froude # Chl	0.18	0.20
Weir Max Depth (ft)	3.14		Specif Force (cu ft)	8551.30	8622.78
Min El Weir Flow (ft)	802.01		Hydr Depth (ft)	3.99	4.83
Min El Prs (ft)	800.31		W.P. Total (ft)	477.52	381.85
Delta EG (ft)	0.09		Conv. Total (cfs)		

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Delta WS (ft)	0.05	Top Width (ft)	338.59	241.84
BR Open Area (sq ft)	602.34	Frctn Loss (ft)		
BR Open Vel (ft/s)	3.08	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)	8458.23	8792.09

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: For the cross section inside the bridge at the downstream end, the water surface and energy have been projected from the downstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

BRIDGE OUTPUT Profile #010Yr

E.G. US. (ft)		Element	Inside BR US	Inside BR DS
W.S. US. (ft)	801.32	E.G. Elev (ft)	801.32	801.06
Q Total (cfs)	2316.00	W.S. Elev (ft)	800.31	800.31
Q Bridge (cfs)	2316.00	Crit W.S. (ft)	791.41	791.11
Q Weir (cfs)		Max Chl Dpth (ft)	12.61	13.10
Weir Sta Lft (ft)		Vel Total (ft/s)	3.85	3.73
Weir Sta Rgt (ft)		Flow Area (sq ft)	602.34	620.19
Weir Submerg		Froude # Chl	0.19	0.18
Weir Max Depth (ft)		Specif Force (cu ft)	4628.81	4845.64
Min El Weir Flow (ft)	802.01	Hydr Depth (ft)		
Min El Prs (ft)	800.31	W.P. Total (ft)	135.76	136.15
Delta EG (ft)	0.26	Conv. Total (cfs)	43938.5	46042.3
Delta WS (ft)	0.25	Top Width (ft)		
BR Open Area (sq ft)	602.34	Frctn Loss (ft)		
BR Open Vel (ft/s)	3.85	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)	0.77	0.72
Br Sel Method	Press Only	Power Total (lb/ft s)	8458.23	8792.09

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

BRIDGE OUTPUT Profile #500Yr

E.G. US. (ft)		Element	Inside BR US	Inside BR DS
W.S. US. (ft)	807.83	E.G. Elev (ft)	807.82	807.64
Q Total (cfs)	5934.00	W.S. Elev (ft)	807.68	807.40
Q Bridge (cfs)	2244.48	Crit W.S. (ft)	794.45	794.17
Q Weir (cfs)		Max Chl Dpth (ft)	19.98	20.19
Weir Sta Lft (ft)		Vel Total (ft/s)	2.56	3.35
Weir Sta Rgt (ft)		Flow Area (sq ft)	2322.50	1773.73
Weir Submerg		Froude # Chl	0.12	0.15
Weir Max Depth (ft)		Specif Force (cu ft)	13382.36	12228.31
Min El Weir Flow (ft)	802.01	Hydr Depth (ft)	5.66	4.90
Min El Prs (ft)	800.31	W.P. Total (ft)	552.38	504.65
Delta EG (ft)	0.24	Conv. Total (cfs)	116107.5	94833.7
Delta WS (ft)	0.24	Top Width (ft)	410.67	361.96
BR Open Area (sq ft)	602.34	Frctn Loss (ft)	0.16	0.01
BR Open Vel (ft/s)	3.73	C & E Loss (ft)	0.03	0.04
Coef of Q		Shear Total (lb/sq ft)	0.69	0.86
Br Sel Method	Energy only	Power Total (lb/ft s)	8458.23	8792.09

Note: The weir over a bridge is submerged, the energy answer was used.

Note: The downstream water surface is above the minimum elevation required for orifice flow. The

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orifice flow equation was

used for pressure flow.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.

This may indicate the need for additional cross sections.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: northutoycreek

REACH: 108

RS: 439.239

INPUT

Description: Survey Utoy NUT_0100

Blocked area relates to Souty Utoy influence

Station Elevation Data

num= 213

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev							
8792.093	804.5668800	505803.5539	8811.52	802.261	8814.32801	92658822	534800.9746									
8833.549800	0.6958838	173	8008844.564		8008855.578		8008862.027	800								
8866.593		8008877.608	800	8885.88		8008888.622		8008899.637	800							
8909.734		8008910.652		8008921.666		8008932.681		8008933.587	800							
8943.696		800	8954.71		8008957.441		8008965.725		800							
8981.294		8008987.754		8008998.769800	0.3479005	147800	0.5839009	783800	0.0885							
9020.798800	2.9349029	001800	4.5839031	813800	5.3329042	827800	8.3959052	854801	1.1345							
9053.842801	1.6459064	857801	4.9949075	871801	8.3439076	708801	8.5199086	886	802							
9097.901		8029100.561		8029108.915801	8.663	9119.93801	3.0929124	415	800.99							
9130.945800	5.6079141	959800	0.6289148	268		8009152.974		8009163.989	800							
9172.122		8009175.003		8009186.018		8009195.975		8009197.033	800							
9208.047		8009219.062		8009219.828		8009230.077		8009241.091	800							
9243.682	800	1079252	1.06800	7035	9263.12801	2.8019267	5.35801	4.1839274	1.35801	6.001						
	9285.15801	9.3059291	3.89801	3.8169296	1.64800	7.2659307	1.79800	0.0649315	2.42	800						
9318.194		8009329.208		8009339.096		8009340.223		8009351.238	800							
9362.252		8009362.949		8009373.267		8009384.282		8009386.803	800							
9395.296		8009406.311		8009410.656		8009417.326		800	9428.34	800						
9434.509		8009439.355		800	9450.37800	0.7789458	3.63800	1.7989461	3.84800	2.205						
9472.399	800	3.699482	2.16800	5.0149483	4.14800	5.1759494	4.28	800	6.669505	4.43800	8.145					
	9506.07800	8.2299516	4.57	800	9.639527	4.72801	1.1159529	9.23	801	1.429538	4.87801	2.474				
9549.501	801	3.489553	7.77801	3.8829560	5.16801	4.5169571	5.31801	5.748	9577	6.3801	7.228					
9582.545	801	842	9593.56		8029601.484		8029604.575		8029615.589	802						
9625.337		8029626.604		8029637.619		8029648.633801	6.949	9649	1.9801	6.628						
9659.648801	0.3979670	6.63	800	3.269673	0.44799	8.6099681	6.77797	9.6139692	6.92794	1.627						
9696.897792	1.9579703	7.07788	6.9179714	7.21786	2.7289720	7.51		7.869725	7.36	7.86						
	9736.75		7.869744	6.04787	3.5719747	7.65788	2.799	9758	7.8792	6.1219768	4.58796	4.584				
9769.794796	9.6849780	8.09799	7.7299791	8.24800	8.9889792	3.11800	9.4629802	8.38801	6.473							
9804.287801	6.8259813	0.18801	6.0019823	0.72801	0.4989833	1.26800	3.0039843	1.79800	2.299							
9852.947799	8.6849853	2.33799	8.5769863	2.87799	5.217	9873	3.4799	5.2759883	3.94799	5.768						
9893.448799	8.6469903	5.01	800	2.29913	5.55800	8.456	9.921	1.3	800	7.29933	6.62	800	4.73			
9943.716800	1.0949955	9.03	7.99	4.2	9.961	5.9	7.95	9.97	9.962	5	7.889986	8.69	7.87	5.4		
9993.557	7.87	24	10000	2	7.87	2.110001	1.4	7.87	5.6	10027	5	7.87	8.310032	3.7	804	8.8
10045.36	807	0.710080	5.5	807	1.310094	5.2807	1.98310104	5.7807	0.68110107	3.7807	0.131					
10114.59	806	8.38	10124	6.806	5.365	10134	6.806	4.34810144	6.1806	9.77810154	6.1807	5.026				
10164.62808	1.46910174	6.2809	3.58310184	6.3810	0.44310194	6.3810	8.17210204	6.4811	3.221							
10214.64812	1.11110224	6.4812	4.89410229	4.1812	6.80210234	6.5812	8.89410244	6.5813	5.904							
10254.66814	1.60410264	6.6814	9.61310274	6.7815	7.22410284	6.7816	3.65510294	6.8817	3.759							
10304.68818	4.01410314	6.9819	3.14910324	6.9819	4.101	10334	7.820	4.691	10344	7.821	1.774					
10354.71822	1.01610364	7.1822	6.55510374	7.2823	4.35910384	7.2824	5.45710394	7.3825	1.289							
10404.73825	9.21410414	7.3826	6.29410424	7.4	8.27	2.5910434	7.4827	8.63310444	7.5828	4.753						
10454.75828	6.33610464	7.6828	7.33210474	7.6829	0.63410484	7.7829	3.99510494	7.7829	1.124							
10504.78829	2.60210514	7.8829	2.61210524	7.9828	7.90410534	7.9828	7.022	10544	8.828	2.382						
10554.8826	9.54910554	9.7	8.26	9.4910562	3.1826	7.379										

Manning's n Values

num= 3

Sta	n	Val	Sta	n	Val	Sta	n	Val
8792.093	.11	9961.59	.05510032	.37	.11			

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
 9961.5910032,37 81.35 49.61 46.24 .3 .5

Sta L	Sta R	Elev	Permanent
8792.093	9928.84	800.31	F
10061.1610562	31	800.31	F

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Blocked Obstructions num= 1
 Sta L Sta R Elev
 8792.093 9790.75 815.77

CROSS SECTION OUTPUT Profile #100Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	805.06	Wt. n-Val.	0.110	0.055	0.000
Vel Head (ft)	0.14	Reach Len. (ft)	81.35	49.61	46.24
W.S. Elev (ft)	804.92	Flow Area (sq ft)	794.20	1176.55	0.00
Crit W.S. (ft)	792.85	Area (sq ft)	794.20	1176.55	0.00
E.G. Slope (ft/ft)	0.000466	Flow (cfs)	632.24	3784.76	0.00
Q Total (cfs)	4417.00	Top Width (ft)	170.84	70.78	0.22
Top Width (ft)	241.84	Avg. Vel. (ft/s)	0.80	3.22	0.02
Vel Total (ft/s)	2.24	Hydr. Depth (ft)	4.65	16.62	0.02
Max Chl Dpth (ft)	17.71	Conv. (cfs)	29287.2	175321.3	0.0
Conv. Total (cfs)	204608.5	Wetted Per. (ft)	176.08	90.83	0.22
Length Wtd. (ft)	53.15	Shear (lb/sq ft)	0.13	0.38	
Min Ch El (ft)	787.21	Stream Power (lb/ft s)	10562.31	0.00	0.00
Alpha	1.78	Cum Volume (acre-ft)	1.61	2.63	0.04
Frctn Loss (ft)	0.03	Cum SA (acres)	0.30	0.17	0.01
C & E Loss (ft)	0.01				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #010Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.06	Wt. n-Val.	0.110	0.055	
Vel Head (ft)	0.10	Reach Len. (ft)	81.35	49.61	46.24
W.S. Elev (ft)	800.96	Flow Area (sq ft)	132.21	898.57	
Crit W.S. (ft)	791.04	Area (sq ft)	132.21	898.57	
E.G. Slope (ft/ft)	0.000391	Flow (cfs)	34.22	2281.78	
Q Total (cfs)	2316.00	Top Width (ft)	139.05	69.66	
Top Width (ft)	208.71	Avg. Vel. (ft/s)	0.26	2.54	
Vel Total (ft/s)	2.25	Hydr. Depth (ft)	0.95	12.90	
Max Chl Dpth (ft)	13.75	Conv. (cfs)	1729.9	115355.0	
Conv. Total (cfs)	117084.8	Wetted Per. (ft)	140.29	86.75	
Length Wtd. (ft)	50.21	Shear (lb/sq ft)	0.02	0.25	
Min Ch El (ft)	787.21	Stream Power (lb/ft s)	10562.31	0.00	0.00
Alpha	1.26	Cum Volume (acre-ft)	0.44	1.97	0.00
Frctn Loss (ft)	0.02	Cum SA (acres)	0.27	0.17	0.00
C & E Loss (ft)	0.00				

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.59	Wt. n-Val.	0.110	0.055	0.110
Vel Head (ft)	0.15	Reach Len. (ft)	81.35	49.61	46.24
W.S. Elev (ft)	807.44	Flow Area (sq ft)	1225.09	1355.08	69.18
Crit W.S. (ft)	793.98	Area (sq ft)	1225.09	1355.08	69.18
E.G. Slope (ft/ft)	0.000442	Flow (cfs)	1256.04	4664.44	13.51
Q Total (cfs)	5934.00	Top Width (ft)	170.84	70.78	121.04
Top Width (ft)	362.66	Avg. Vel. (ft/s)	1.03	3.44	0.20
Vel Total (ft/s)	2.24	Hydr. Depth (ft)	7.17	19.14	0.57
Max Chl Dpth (ft)	20.23	Conv. (cfs)	59743.8	221864.8	642.8
Conv. Total (cfs)	282251.4	Wetted Per. (ft)	178.60	90.83	121.26
Length Wtd. (ft)	54.64	Shear (lb/sq ft)	0.19	0.41	0.02
Min Ch El (ft)	787.21	Stream Power (lb/ft s)	10562.31	0.00	0.00
Alpha	1.90	Cum Volume (acre-ft)	2.36	3.06	0.13
Frctn Loss (ft)	0.03	Cum SA (acres)	0.30	0.17	0.12
C & E Loss (ft)	0.02				

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: northutoycreek

NorthUtoyCreek.rep

REACH: 108

RS: 389.628*

INPUT

Description:

Station Elevation Data

num= 388

Sta	Elev								
8917	804.28	8918.67	804.17	8924.24	803.79	8924.47	803.78	8934.25	803.13
8936.74	802.96	8936.85	802.96	8944.04	802.49	8945.88	802.4	8949.46	802.23
8953.82	802.02	8957.92	801.97	8962.08	801.96	8963.6	801.96	8973.08	801.97
8973.38	801.96	8974.69	801.96	8979.1	801.94	8983.16	801.93	8987.31	801.91
8992.94	801.86	8999.92	801.8	9000.28	801.79	9002.72	801.74	9012.5	801.53
9012.53	801.52	9021.47	801.21	9022.28	801.18	9025.15	801.08	9027.5	800.92
9032.06	800.61	9037.76	800.22	9041.84	799.97	9042.65	799.92	9050.38	799.44
9051.62	799.39	9054.7	799.26	9061.4	799.05	9062.99	799	9063.83	799
9071.18	799	9075.61	799	9080.96	799	9081.91	799	9085.01	799
9088.22	799	9090.74	799	9100.53	799.02	9100.83	799.02	9106.19	799.03
9109.11	799.04	9110.3	799.04	9113.45	799.08	9120.09	799.15	9126.06	799.21
9127.37	799.23	9129.87	799.27	9136.32	799.37	9138.68	799.4	9139.65	799.42
9148.55	799.57	9149.43	799.58	9151.29	799.61	9159.21	799.75	9165.87	799.87
9168.99	799.96	9169.73	799.98	9176.52	800.13	9178.77	800.17	9188.55	800.27
9189.13	800.28	9190.73	800.28	9190.91	800.28	9198.33	800.2	9201.75	800.09
9208.11	799.9	9212.09	799.73	9214.36	799.65	9217.89	799.51	9217.93	799.51
9226.98	799.25	9227.67	799.23	9233.27	799.17	9237.45	799.15	9239.59	799.14
9245.14	799.11	9247.23	799.09	9252.21	799.05	9254.46	799.04	9257.01	799.02
9264.82	798.97	9266.79	798.96	9272.34	798.94	9275.64	798.92	9276.58	798.92
9277.44	798.91	9286.36	798.9	9290.05	798.89	9296.14	798.88	9296.82	798.87
9299.55	798.87	9302.66	798.85	9305.92	798.84	9315.28	798.82	9315.7	798.82
9318	798.87	9325.48	799.14	9326.75	799.18	9327.89	799.21	9335.26	799.4
9339.18	799.46	9340.51	799.48	9345.04	799.59	9353.12	799.8	9353.96	799.83
9354.82	799.85	9360.36	799.66	9364.6	799.39	9365.73	799.36	9374.38	799.16
9378.35	799.21	9381.17	799.25	9381.54	799.25	9384.16	799.28	9390.96	799.37
9393.94	799.41	9402.72	799.53	9403.58	799.54	9403.72	799.54	9408.37	799.6
9413.5	799.66	9416.19	799.69	9423.28	799.77	9423.9	799.78	9428.8	799.84
9433.06	799.89	9435.58	799.92	9441.42	799.98	9442.85	799.99	9445.08	799.99
9452.62	800	9454.03	800	9462.41	800	9462.78	800	9466.26	800
9466.65	800	9472.19	800	9479.26	800	9481.97	800	9487.45	800
9489.99	800	9491.75	800	9491.88	800	9501.53	800.04	9504.49	800.06
9508.63	800.09	9511.31	800.11	9517.11	800.15	9517.19	800.15	9521.09	800.19
9529.72	800.26	9529.81	800.26	9530.87	800.28	9540.65	800.49	9542.33	800.52
9544.4	800.57	9550.43	800.72	9550.99	800.73	9554.95	800.82	9560.21	800.95
9567.56	801.13	9569.99	801.18	9571.6	801.22	9572.17	801.23	9579.77	801.4
9580.18	801.41	9589.55	801.5	9592.79	801.53	9593.35	801.54	9598.81	801.58
9599.33	801.59	9605.4	801.64	9609.12	801.67	9614.53	801.75	9618.02	801.8
9618.89	801.81	9626.02	801.86	9628.68	801.88	9630.63	801.88	9635.71	801.88
9638.46	801.88	9643.25	801.87	9648.24	801.88	9653.22	801.89	9655.86	801.9
9656.89	801.9	9658.02	801.9	9667.8	801.93	9668.48	801.92	9677.58	801.77
9678.07	801.76	9680.43	801.68	9681.09	801.65	9687.36	801.36	9693.71	801.05
9697.14	800.88	9699.25	800.61	9706.32	799.63	9706.92	799.55	9707.63	799.4
9716.7	797.47	9718.93	796.84	9720.44	796.41	9726.48	794.55	9731.55	793.83
9734.84	793.34	9736.26	793.09	9741.62	792.66	9744.16	792.52	9746.04	792.29
9755.82	791.12	9756.78	791.1	9762.04	791.02	9762.8	791.01	9765.6	791.14
9769.39	791.54	9775.38	792.22	9782.01	792.99	9783.98	793.21	9785.16	793.34
9789.25	793.48	9794.62	793.63	9794.95	793.66	9804.73	793.61	9805.16	793.61
9807.23	793.55	9814.51	793.82	9815.79	793.84	9816.45	793.84	9819.85	793.82
9823.54	793.89	9832.46	793.83	9832.47	793.84	9841.4	794.31	9843.66	794.51
9845.08	794.7	9850.33	795.16	9857.69	795.69	9859	795.79	9859.26	795.81
9868.18	796.55	9870.3	796.76	9870.86	796.81	9877.11	797.41	9882.92	797.98
9886.04	798.17	9894.96	798.82	9895.53	798.86	9898.07	798.99	9903.89	799.11
9908.15	799.26	9912.82	799.42	9919.54	799.36	9920.76	799.35	9923.71	799.31
9930.67	799.24	9931.81	799.21	9932.51	799.2	9939.6	799.05	9943.99	798.91
9950.42	798.36	9955.47	796.35	9956.4	792.24	9965.31	790.9	9975.16	789.4
9981.25	788.46	9985	787.83	9988.07	787.72	9994.84	787.6	9999.86	787.6
10004.88	787.61	10009.89	787.61	10010.51	787.92	10027.8	791.93	10031	801.17
10041.76	805.75	10043.15	806.05	10052.54	807.23	10054.87	807.31	10063.31	807.55
10074.07	807.56	10076.09	807.57	10084.84	807.59	10089.16	807.61	10095.62	807.55
10098.57	807.53	10101.19	807.51	10106.39	807.44	10107.95	807.42	10117.15	807.27
10117.32	807.27	10126.67	807.22	10127.93	807.25	10136.04	807.49	10138.7	807.56
10145.4	807.75	10149.47	807.89	10154.77	808.07	10160.24	808.43	10164.13	808.68
10171.01	808.93	10173.5	809.02	10181.78	809.36	10182.86	809.41	10187.1	809.53
10192.23	809.67	10192.55	809.68	10201.59	810.23	10203.32	810.29	10210.95	810.58
10214.09	810.71	10215.41	810.74	10220.31	810.93	10224.87	811.17	10229.67	811.42
10235.63	811.69	10239.04	811.84	10246.4	812.27	10248.4	812.38	10257.17	812.84
10257.77	812.86	10267.13	813.18	10267.95	813.23	10276.5	813.81	10278.71	813.97
10285.86	814.69	10289.48	815.03	10295.23	815.51	10300.26	815.72	10304.59	815.93
10311.03	816.58	10313.95	816.88	10319.35	817.32	10321.79	817.52	10323.31	817.63

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10332.57	818.4110332.68	818.4210342.04	818.8810343.34	818.9510351.41	819.36
10354.11	819.5410360.77	820.0110364.88	820.1910370.14	820.4510375.65	820.78
10379.5	821.0110386.42	821.3910388.86	821.52 10397.2	821.9510398.22	822
10407.58	822.4610407.96	822.4810416.95	822.9410418.73	822.9910426.31	823.2
10429.5	823.2710435.68	823.3410440.27	823.4510445.04	823.5710451.04	823.74
10451.58	823.7710454.41	823.9410461.81	824.1410463.77	824.2110472.59	824.72
10473.14	824.79 10482.5	825.9110483.35	825.9910491.86	826.5510494.12	826.74
10501.22	826.73 10504.9	826.6510510.59	826.410515.67	825.9410519.95	825.5
10520.11	825.4910526.43	825.1710526.98	825.13		

Manning's n Values num= 3

Sta	n	Val	Sta	n	Val	Sta	n	Val
8917		.09	9955.47		.055	10031		.09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

9955.47	10031	81.35	49.61	46.24	.3	.5
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Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
8917	9828	800.31	F
10161	10526.98	800.31	F

Blocked Obstructions num= 1

Sta L	Sta R	Elev
8917	9902.7	825.9

CROSS SECTION OUTPUT Profile #100Yr

E.G. Elev (ft)	805.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.	0.090	0.055	0.090
W.S. Elev (ft)	804.84	Reach Len. (ft)	81.35	49.61	46.24
Crit W.S. (ft)	794.10	Flow Area (sq ft)	309.29	1155.53	15.84
E.G. Slope (ft/ft)	0.000530	Area (sq ft)	309.29	1155.53	15.84
Q Total (cfs)	4417.00	Flow (cfs)	354.97	4053.49	8.54
Top Width (ft)	136.93	Top Width (ft)	52.77	75.53	8.63
Vel Total (ft/s)	2.98	Avg. Vel. (ft/s)	1.15	3.51	0.54
Max Chl Dpth (ft)	17.24	Hydr. Depth (ft)	5.86	15.30	1.84
Conv. Total (cfs)	191862.8	Conv. (cfs)	15419.1	176073.0	370.8
Length Wtd. (ft)	52.71	Wetted Per. (ft)	58.95	86.27	9.37
Min Ch El (ft)	787.60	Shear (lb/sq ft)	0.17	0.44	0.06
Alpha	1.28	Stream Power (lb/ft s)	10526.98	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.58	1.31	0.03
C & E Loss (ft)	0.07	Cum SA (acres)	0.09	0.09	0.01

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #010Yr

E.G. Elev (ft)	801.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.090	0.055	
W.S. Elev (ft)	800.93	Reach Len. (ft)	81.35	49.61	46.24
Crit W.S. (ft)	792.38	Flow Area (sq ft)	102.85	860.06	
E.G. Slope (ft/ft)	0.000440	Area (sq ft)	102.85	860.06	
Q Total (cfs)	2316.00	Flow (cfs)	54.04	2261.96	
Top Width (ft)	128.22	Top Width (ft)	52.77	75.45	
Vel Total (ft/s)	2.41	Avg. Vel. (ft/s)	0.53	2.63	
Max Chl Dpth (ft)	13.33	Hydr. Depth (ft)	1.95	11.40	
Conv. Total (cfs)	110420.6	Conv. (cfs)	2576.6	107844.0	
Length Wtd. (ft)	50.87	Wetted Per. (ft)	55.03	86.02	
Min Ch El (ft)	787.60	Shear (lb/sq ft)	0.05	0.27	
Alpha	1.17	Stream Power (lb/ft s)	10526.98	0.00	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.22	0.96	0.00
C & E Loss (ft)	0.04	Cum SA (acres)	0.09	0.09	0.00

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION OUTPUT Profile #500Yr

E.G. Elev (ft)	807.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.090	0.055	0.090
W.S. Elev (ft)	807.32	Reach Len. (ft)	81.35	49.61	46.24
Crit W.S. (ft)	795.18	Flow Area (sq ft)	440.30	1343.04	51.18
E.G. Slope (ft/ft)	0.000543	Area (sq ft)	440.30	1343.04	51.18

NorthUtoyCreek.rep

Q Total (cfs)	5934.00	Flow (cfs)	629.99	5273.84	30.16
Top Width (ft)	169.62	Top Width (ft)	52.77	75.53	41.32
Vel Total (ft/s)	3.23	Avg. Vel. (ft/s)	1.43	3.93	0.59
Max Chl Dpth (ft)	19.72	Hydr. Depth (ft)	8.34	17.78	1.24
Conv. Total (cfs)	254544.0	Conv. (cfs)	27024.1	226226.1	1293.9
Length Wtd. (ft)	53.47	Wetted Per. (ft)	61.43	86.27	42.37
Min Ch El (ft)	787.60	Shear (lb/sq ft)	0.24	0.53	0.04
Alpha	1.33	Stream Power (lb/ft s)	10526.98	0.00	0.00
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.81	1.52	0.06
C & E Loss (ft)	0.09	Cum SA (acres)	0.09	0.09	0.03

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: northutoycreek
 REACH: 108 RS: 340.0176

INPUT

Description: Blockede area relates to Souty Utoy influence

Station Elevation Data num= 181

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9041.917	8049043.375	8049048.235	8049059.257	8049067.148	804				
9070.28803	98859081.303803	92619090.921803	93019092.325803	92519103.348803	8239				
9114.37	803.6019114	693803	58739125.393803	04859136.416802	15139138	466801	8473		
9147.438800	44689158.461798	88159162.239798	51829169.484	7989180.506	798				
9186.012	7989191.529	7989202.552	7989209.784	7989213.574	798				
9224.597	7989233.557	798 9235.62	7989246.642	798 9259.38	798.01				
9268.688798	2917 9279.71798	56189281.103798	55879290.733798	51679301.755798	4686				
9304.875	798.4559312	778798	39989323.801798	27959328.648798	21079334	823	798.103		
9345.846797	93529352.421797	87059356.869797	82359367.891797	78559376.194797	7315				
9378.914797	70649389.937797	64229399.966 797	5779400.959797	57069411.982797	4989				
9423.005797	72919423.739797	75349434.027798	0833 9445.05798	41689447.512798	4909				
9456.073798	74489467.095799	08139471.285799	20689478.118799	3807 9489	14799	6815			
9495.057799	84979500.163799	96819511.186	800 9518.83	8009522.208	800				
9533.231	8009542.603	8009544.254	8009555.276	8009566.299	800				
9566.376	8009577.322800	01029588.344	800.359590.148800	41789599.367800	7642				
9610.39801	17859613.921801	29619621.412801	56059632.435801	68639637.694 801	721				
9643.457801	7528 9654.48801	77349661.467801	76029665.503801	75159676.525801	7491				
9685.239801	78669687.548801	79899698.571801	85769709.012801	84859709.593801	8418				
9720.616801	52759731.639801	15669732.785 801	1169742.661800	68839753.684800	2292				
9756.558800	05639764.707799	03359775.729796	0212 9780.33 794	8369786.752793	1279				
9797.775790	39589804.103788	81149808.797787	5806 9819	82786.00459827	876				
9830.842	7869841.865786	61929851.649788	74669852.888789	1343 9863	91791	4505			
9874.933794	00159875.421794	10549885.956796	39789896.978797	83829899.194	798				
9908.001	7989919.024	7989921.601	7989928.678	7989929.288	798				
9939.321	7989949.354796	73719959.387793	96059969.421791	14249979.454788	2884				
9989.487	788 9999.52	78810009.55	78810019.59	78810029.62797	4536				
10039.65804	674910049.69807	366710051.86807	515710059.72	80810069.75	808				
10079.78	80810089.82	80810099.85	80810109.88	80810119.92	808				
10129.95	80810139.98	80810150.02	80810160.05	80810170.08	808				
10175.04808	010410180.12808	020110190.15808	404210200.18808	767110210.22809	1059				
10220.25809	422510230.28809	743410240.31	81010250.35	81010260.38810	3195				
10270.41	811.30410280	45812.068810290.48	813.03110298	23813.761510300	51813	9832			
10310.55814	735610320.58815	145810330.61815	331110340.65815	577510350.68815	9697				
10360.71816	330510370.75816	700910380.78817	076810390.81817	477710400.84817	8823				
10410.88	81810420.91 818	19410421.41818	236610430.94819	101310440.98820	1939				
10451.01822	759110461.04824	717110471.08824	783310481.11824	347310491.14823	5862				
10491.65823	5277								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9041.917	.079949	354	.05510029	62	.07

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

9949.354	10029.62	0	0	0	.1	.3
----------	----------	---	---	---	----	----

Blocked Obstructions num= 1

Sta L	Sta R	Elev
9033.83	9902.2	825.9

CROSS SECTION OUTPUT Profile #100Yr

NorthUtoyCreek.rep

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	804.90	Wt. n-Val.	0.070	0.055	0.070
Vel Head (ft)	0.41	Reach Len. (ft)			
W.S. Elev (ft)	804.49	Flow Area (sq ft)	312.36	1138.12	34.38
Crit W.S. (ft)	796.39	Area (sq ft)	312.36	1138.12	34.38
E.G. Slope (ft/ft)	0.001267	Flow (cfs)	763.26	6163.44	52.30
Q Total (cfs)	6979.00	Top Width (ft)	47.15	80.27	9.77
Top Width (ft)	137.19	Avg. Vel. (ft/s)	2.44	5.42	1.52
Vel Total (ft/s)	4.70	Hydr. Depth (ft)	6.62	14.18	3.52
Max Chl Dpth (ft)	16.49	Conv. (cfs)	21439.6	173127.6	1469.0
Conv. Total (cfs)	196036.2	Wetted Per. (ft)	53.72	85.19	12.04
Length Wtd. (ft)		Shear (lb/sq ft)	0.46	1.06	0.23
Min Ch El (ft)	788.00	Stream Power (lb/ft s)	10491.65	0.00	0.00
Alpha	1.20	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #010Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.95	Wt. n-Val.	0.070	0.055	0.070
Vel Head (ft)	0.25	Reach Len. (ft)			
W.S. Elev (ft)	800.70	Flow Area (sq ft)	133.65	833.92	7.32
Crit W.S. (ft)	793.73	Area (sq ft)	133.65	833.92	7.32
E.G. Slope (ft/ft)	0.001117	Flow (cfs)	182.80	3445.96	6.24
Q Total (cfs)	3635.00	Top Width (ft)	47.15	80.27	4.51
Top Width (ft)	131.93	Avg. Vel. (ft/s)	1.37	4.13	0.85
Vel Total (ft/s)	3.73	Hydr. Depth (ft)	2.83	10.39	1.62
Max Chl Dpth (ft)	12.70	Conv. (cfs)	5469.1	103098.8	186.7
Conv. Total (cfs)	108754.7	Wetted Per. (ft)	49.93	85.19	5.56
Length Wtd. (ft)		Shear (lb/sq ft)	0.19	0.68	0.09
Min Ch El (ft)	788.00	Stream Power (lb/ft s)	10491.65	0.00	0.00
Alpha	1.17	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #500Yr

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.41	Wt. n-Val.	0.070	0.055	0.070
Vel Head (ft)	0.51	Reach Len. (ft)			
W.S. Elev (ft)	806.90	Flow Area (sq ft)	426.00	1331.57	67.77
Crit W.S. (ft)	797.96	Area (sq ft)	426.00	1331.57	67.77
E.G. Slope (ft/ft)	0.001288	Flow (cfs)	1253.37	8071.71	112.92
Q Total (cfs)	9438.00	Top Width (ft)	47.15	80.27	18.33
Top Width (ft)	145.75	Avg. Vel. (ft/s)	2.94	6.06	1.67
Vel Total (ft/s)	5.17	Hydr. Depth (ft)	9.03	16.59	3.70
Max Chl Dpth (ft)	18.90	Conv. (cfs)	34922.4	224900.2	3146.2
Conv. Total (cfs)	262968.8	Wetted Per. (ft)	56.13	85.19	20.95
Length Wtd. (ft)		Shear (lb/sq ft)	0.61	1.26	0.26
Min Ch El (ft)	788.00	Stream Power (lb/ft s)	10491.65	0.00	0.00
Alpha	1.22	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

SUMMARY OF MANNING'S N VALUES

River:northutoycreek

Reach	River Sta.	n1	n2	n3
108	5014.488	.085	.055	.11
108	4995.442	Bridge		
108	4941.385	.085	.055	.11
108	4584.487	.09	.05	.11
108	4271.358	.075	.05	.09
108	3989.023	.08	.055	.09
108	3500	.095	.5	.11
108	3000	.08	.5	.08
108	2500	.11	.5	.075
108	1990.777	.08	.5	.11

NorthUtoyCreek.rep

108	1485.967	.11	.055	.11
108	1285.964	.11	.055	.11
108	1037.962	.11	.055	.11
108	806.1852	.11	.055	.11
108	495.8178	.11	.055	.11
108	481.3187	Bridge		
108	439.239	.11	.055	.11
108	389.628*	.09	.055	.09
108	340.0176	.07	.055	.07

SUMMARY OF REACH LENGTHS

River: northutoycreek

Reach	River Sta.	Left	Channel	Right
108	5014.488	75.16892	73.10233	67.47525
108	4995.442	Bridge		
108	4941.385	309.0297	356.8978	331.2556
108	4584.487	295.3084	313.1298	287.8358
108	4271.358	307.9576	282.3344	242.213
108	3989.023	470.5776	489.0232	486.6256
108	3500	490.8088	500	474.5651
108	3000	499.9186	500	472.4327
108	2500	541.5267	509.2226	393.185
108	1990.777	393.0073	504.8104	460.3262
108	1485.967	196.5503	200.0032	196.1781
108	1285.964	283.166	248.0013	198.678
108	1037.962	263.3315	231.7772	219.1555
108	806.1852	397.3029	310.3674	291.4702
108	495.8178	46.42863	56.57877	64.34172
108	481.3187	Bridge		
108	439.239	81.35	49.61	46.24
108	389.628*	81.35	49.61	46.24
108	340.0176	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: northutoycreek

Reach	River Sta.	Contr.	Expan.
108	5014.488	.3	.5
108	4995.442	Bridge	
108	4941.385	.3	.5
108	4584.487	.1	.3
108	4271.358	.1	.3
108	3989.023	.1	.3
108	3500	.1	.3
108	3000	.1	.3
108	2500	.1	.3
108	1990.777	.1	.3
108	1485.967	.1	.3
108	1285.964	.1	.3
108	1037.962	.1	.3
108	806.1852	.3	.5
108	495.8178	.3	.5
108	481.3187	Bridge	
108	439.239	.3	.5
108	389.628*	.3	.5
108	340.0176	.1	.3

REPORT OF

BRIDGE FOUNDATION EXPLORATION
STP-0000-00(191)
FAIRBURN ROAD SIDEWALK AND ON-STREET BICYCLE LANES
NORTH UTOY CREEK-EAST AND WEST BRIDGES
FULTON COUNTY, GEORGIA

FOR

MR. JEFF DYER
QK4 ARCHITECTURE ENGINEERING CONSTRUCTION
2957 CLAIRMONT ROAD, SUITE 500
ATLANTA, GEORGIA 30329

PROJECT NO. 2002.2186.01(NORTH)

DRAFT





We're here for you

UNITED CONSULTING

March 1, 2004

Mr. Jeff Dyer
QK4 Architecture Engineering Construction
2957 Clairmont Road, Suite 500
Atlanta, Georgia 30329

PROJECT: Report of Bridge Foundation Exploration
STP-0000-00 (191)
Fairburn Road Sidewalk and On-Street Bicycle Lanes
North Utoy Creek-East and West Bridges
Fulton County, Georgia
Project No. **2002.2186.01(North)**

Dear Mr. Dyer:

United Consulting is pleased to submit this Report of Bridge Foundation Exploration for the above-referenced project. We appreciate the opportunity to assist you with this project and look forward to working with you on future projects.

If you have any questions regarding this report, or if we can be of further assistance, please feel free to contact us.

Sincerely,

UNITED CONSULTING

Aaron C. Epstein, P.E.
Senior Geotechnical Engineer

Santanu Sinharoy, P.E.
Vice President - Geotechnical

ACE/SS/zc

h:\geoenvir\reports\2002\2002.2186.01North

DRAFT

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MAXIMUM PILE DESIGN LOADS 3
ELEVATIONS (FT.)..... 3
NOTES..... 3
LIMITATIONS 4

APPENDIX A

General Notes/Description of Drilling Operations

Figure 1 - Site Location Map

Figure 2 - Boring Location Plan & Subsurface Profile-North Utoy East Bridge

Figure 3 - Boring Location Plan & Subsurface Profile-North Utoy West Bridge

Log of Borings - (B-3 and B-4)

APPENDIX B

Field Exploration Procedures

pH and Specific Conductivity Test Results for North Utoy Creek



BRIDGE FOUNDATION EXPLORATION

PROJECT: STP-0000-00 (191), Fulton County
North Utoy Creek-East and West Bridges

P. I. NUMBER:

UC PROJECT NO.: 2002.2186.01(North)

LOCATION: The proposed Sidewalk and On-Street Bicycle bridges are to be located along both sides (East and West) of the existing bridge on Fairburn Road, and will span the north branch of Utoy Creek approximately 1,900 feet north of the intersection of Fairburn Road and Cascade Road in Fulton County, GA. The bridges will be about 10 feet wide, 70 feet long (East), 58 feet long (West), and will accommodate bicycle and pedestrian movement along Fairburn Road.

GENERAL INFORMATION

GEOLOGIC FORMATION Porphyritic Granite Formation of Georgia Piedmont Physiographic Region.

SUBSURFACE FEATURES Fill, generally described as firm silt with trace sand and organics, was encountered in each boring to a depth of about 9 feet (elevation 794). An approximately 4 to 5-foot layer of alluvium consisting of loose to firm sand with some silt was encountered below the fill. Residual soil consisting primarily of loose silty sand and stiff sandy silt was encountered beneath the alluvium on the south bent of the east bridge. Stiff to hard silty clay and sandy silt residual soils were encountered below the alluvium on the north bent of the west bridge. Partially weathered rock (PWR) was encountered beneath the residual soils below about 30 to 35 feet (approx. elevation 770 to 774) to the boring termination depths. Auger refusal occurred at depths of about 40 to 42 feet (approx. elevation 761 to 763 feet). Groundwater was encountered at depths of about 14 to 15 feet (approx. elevation 788 to 789 feet).



Battered Piles The recommended pile capacities are for vertical piles. Typically, lateral capacities for vertical piles are low and are generally insufficient to provide adequate resistance to lateral loads. Battered piles are recommended to provide resistance to lateral forces. We recommend a reduction of 25 % be used for calculation of battered pile capacity. The battered piles may be installed using a maximum inclination of 4 (vertical) to 1 (horizontal).

Erosion We recommend the use of 24 inches of Type I riprap and filter fabric.

Special Problems Variable Pile lengths can be expected.

LIMITATIONS

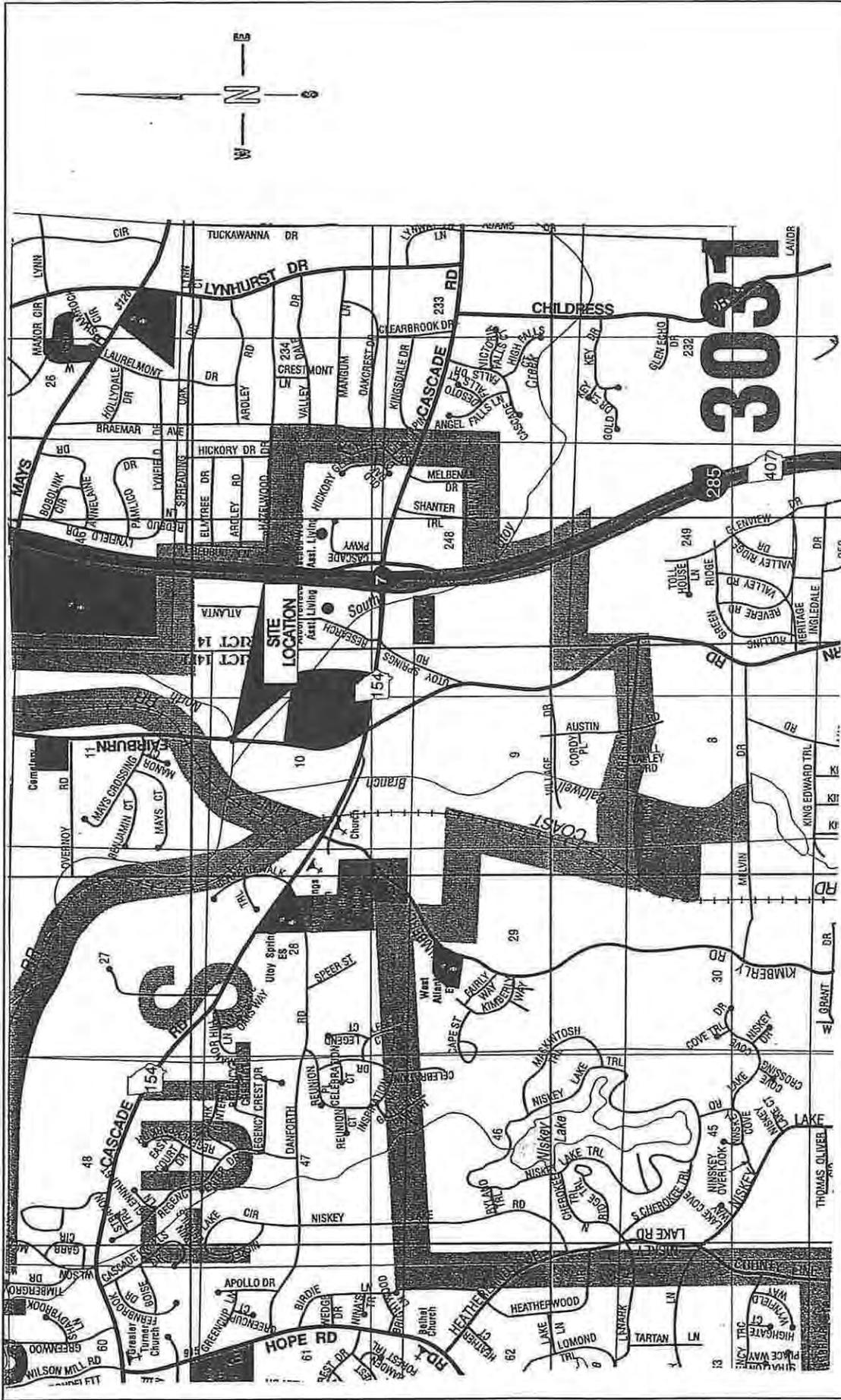
This report is for the exclusive use of QK4 Architecture Engineering Construction, Georgia Department of Transportation and its agents, and the designers of the project described herein, and may only be applied to this specific project. Our conclusions and recommendations have been prepared using generally accepted standards of Geotechnical Engineering practice in the State of Georgia. No other warranty is expressed or implied. Our firm is not responsible for conclusions, opinions or recommendations of others.

Our conclusions and recommendations are based upon design information furnished us, data obtained from the previously described exploration and testing program and our past experience. They do not reflect variations in subsurface conditions that may exist intermediate of our borings and in unexplored areas of the site. Should such variations become apparent during construction, it will be necessary to re-evaluate our conclusions and recommendations based upon "on-site" observations of the conditions.

If the design or location of the project is changed, the recommendations contained herein, must be considered invalid unless our firm reviews the changes and our recommendations are either verified or modified in writing. When design is complete, we should be given the opportunity to review the foundation plan, grading plan, and applicable portions of the specifications to see if they are consistent with the intent of our recommendations.

UNITED CONSULTING





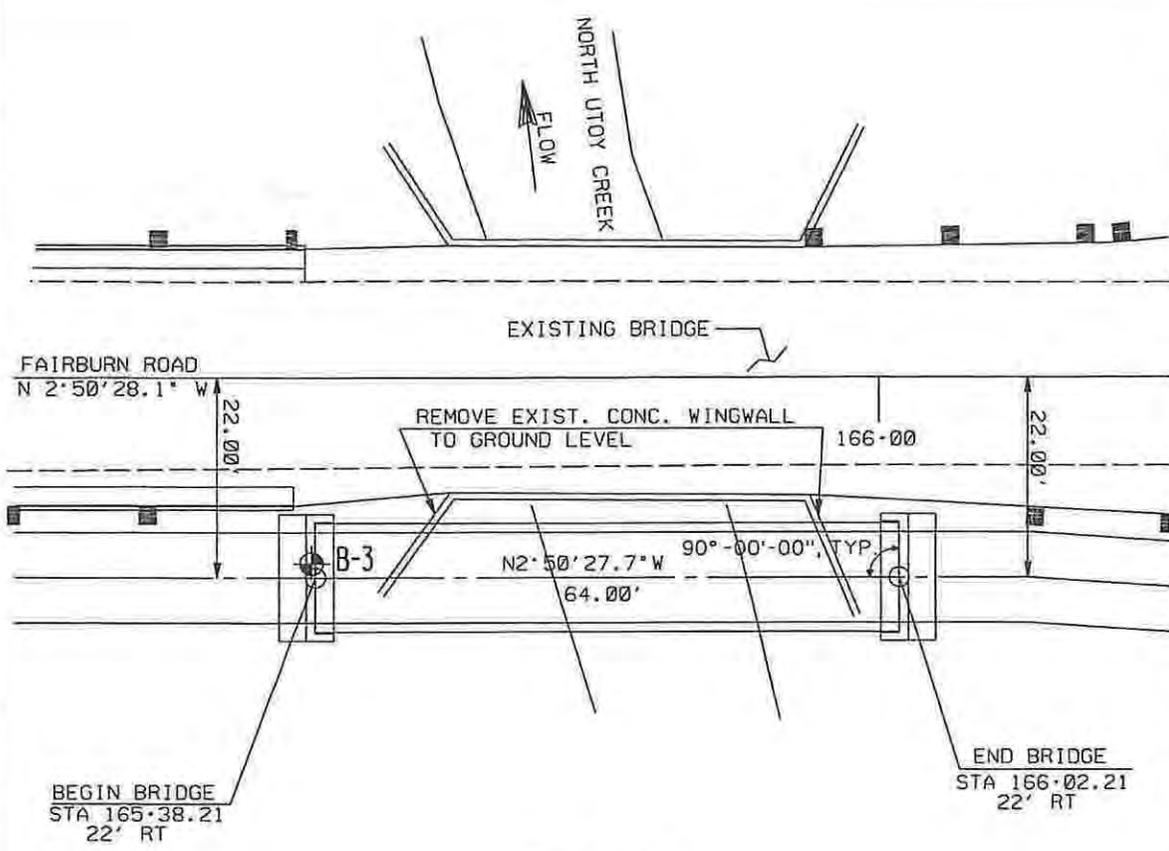
SCALE: APPROX. 1"=2000'	DATE: 02/24/2004	PROJECT NO: 2002.2186.01	TITLE: SITE LOCATION MAP
PREPARED: LR	CHECKED:	REVISIONS:	FAIRBURN ROAD SIDEWALK AND ON-STREET BICYCLE LANES— NORTH UTOY, FULTON COUNTY, GA
CLIENT:	UNITED CONSULTING 625 Holcomb Bridge Road, Norcross, GA 30071 Tel. 770-209-0029 FAX 770-582-5900 www.unitedconsulting.com		

FIG. 1

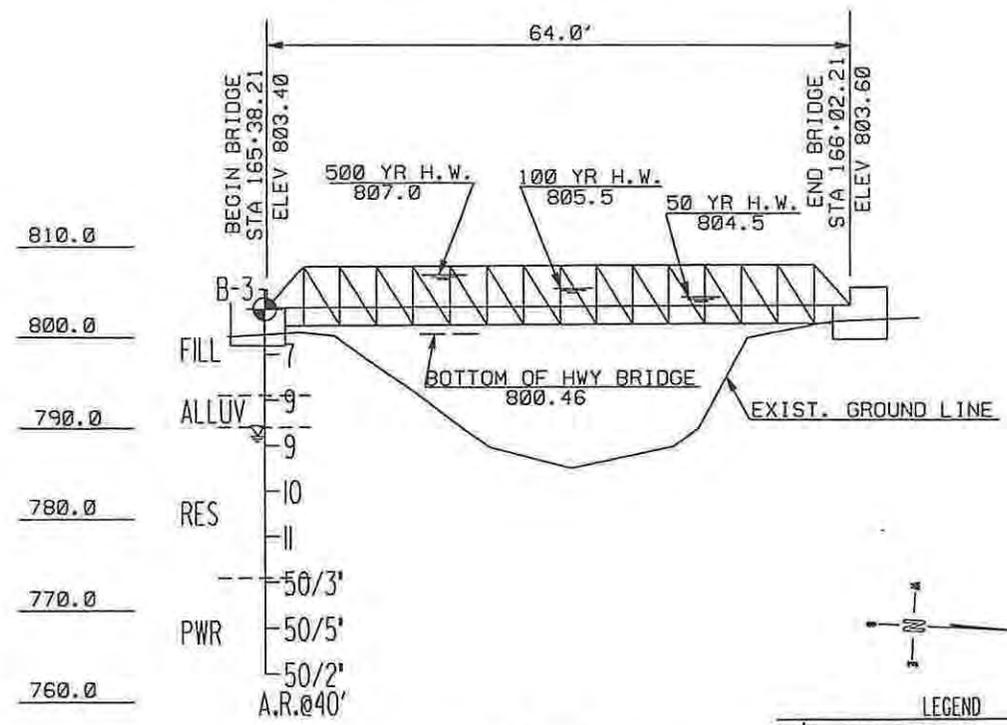




TITLE: BORING LOCATION/SUBSURFACE PROFILE PLAN
 NORTH UTOY - EAST BRIDGE
 FAIRBURN ROAD - SIDEWALK & ON STREET BICYCLE LANES
UNITED CONSULTING
 770 - 209-0029 FAX 582-2900
 E-MAIL ADDRESS UNITED@UNITEDCONSULTING.COM
 WWW.UNITEDCONSULTING.COM



PLAN



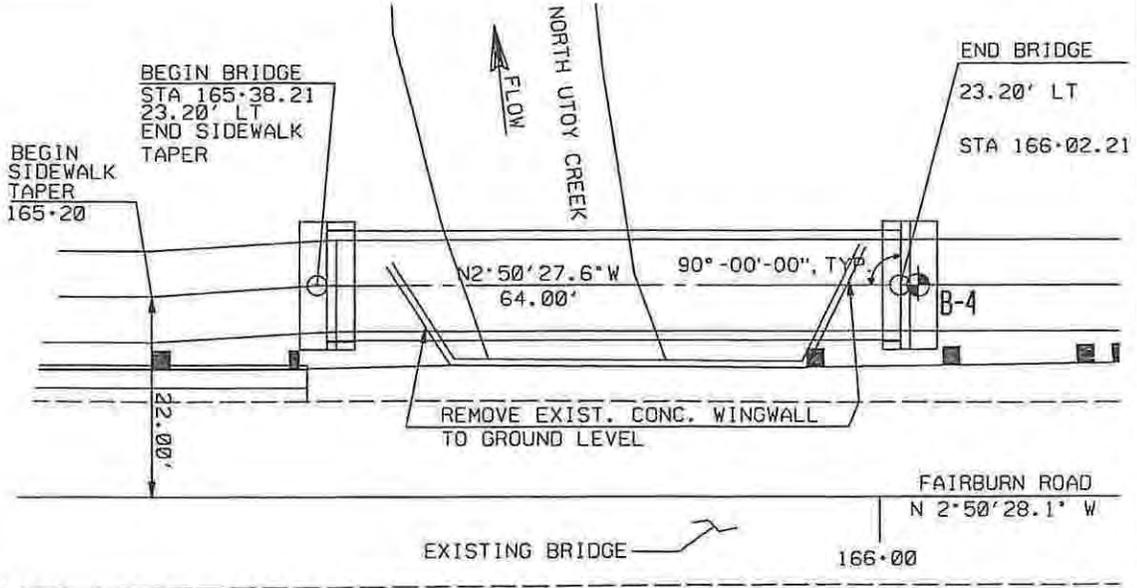
PROFILE

LEGEND

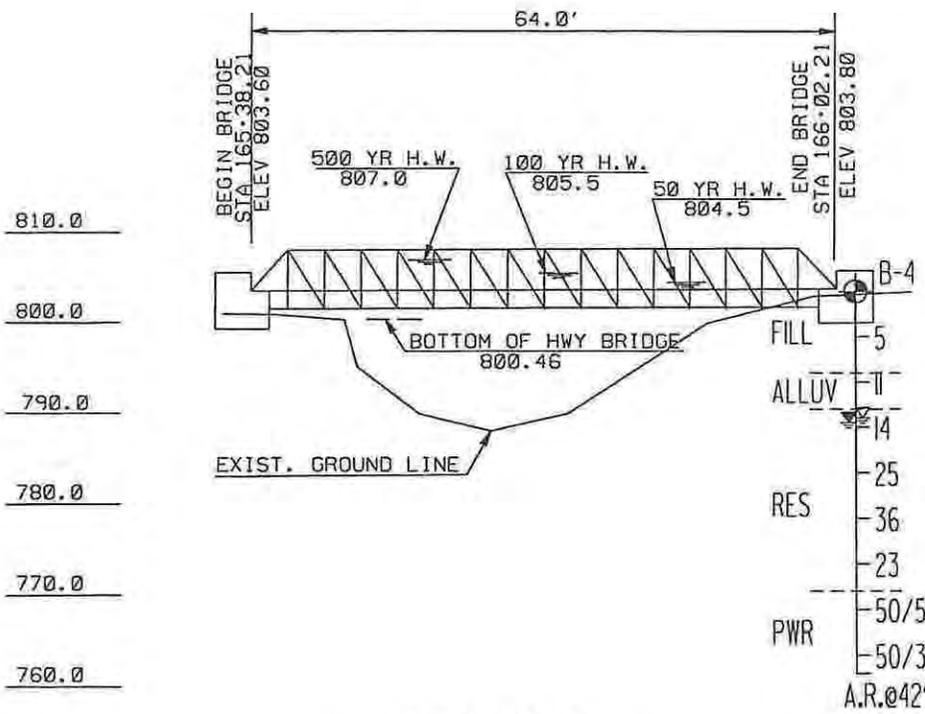
	BORING LOCATION
	GROUNDWATER AT TIME OF BORING
	A.R. AUGER REFUSAL
	FILL FILL SOIL
	ALLUV ALLUVIAL SOIL
	RES RESIDUAL SOIL
	PWR PARTIALLY WEATHERED ROCK

SCALE: 1" = 20'	DATE: 2-25-04	PROJECT NO: 2002.2186.01
PREPARED: VPV	CHECKED:	REVISIONS:
CLIENT: QK4		

FIG. 3



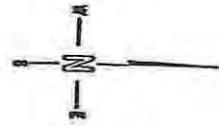
PLAN



PROFILE

LEGEND

	BORING LOCATION
	GROUNDWATER AT TIME OF BORING
	STABILIZED GROUNDWATER
A.R.	AUGER REFUSAL
FILL	FILL SOIL
ALLUV	ALLUVIAL SOIL
RES	RESIDUAL SOIL
PWR	PARTIALLY WEATHERED ROCK



TITLE: BORING LOCATION/SUBSURFACE PROFILE PLAN NORTH UTOY - WEST BRIDGE FAIRBURN ROAD - SIDEWALK & ON STREET BICYCLE LANES	
SCALE: 1" = 20' PREPARED: VPV CLIENT: OK4	PROJECT NO: 2002.2186.01 DATE: 2-25-04 CHECKED: REVISIONS:
UNITED CONSULTING 770 - 209-0029 FAX 582-2900 E-MAIL ADDRESS UNITED@UNITEDCONSULTING.COM WWW.UNITEDCONSULTING.COM Copyright © United Consulting Group, Ltd.	



UNITED CONSULTING
 625 HOLCOMB BRIDGE ROAD
 NORCROSS, GEORGIA 30071
 (770)209-0029, FAX (770)582-2800

BORING LOG

CONTRACTED WITH: OK4 BORING NO.: B-4
 PROJECT NAME: FAIRBURN ROAD SIDEWALK DATE: 02/16/04
 JOB NO.: 2002.2186-01 DRILLER: DAVID STATON RIG: CME-55 TRUCK LOGGED BY: R.D.

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES				NOTES
			NO.	TYPE	BLOWS/6"	RECOV.	
803.51	8" - TOPSOIL	0					
800	SILT-SOME SAND, TRACE ORGANICS; FIRM; RED-BROWN (FILL)	5	1	█	3-2-3	2	GROUNDWATER ENCOUNTERED AT 14' AT TIME OF BORING GROUNDWATER ENCOUNTERED AT 14.5', 96 HOURS AFTER BORING
795		10	2	█	4-5-6	12	
790	CLAY-SILTY; STIFF; GRAY-BROWN (POSSIBLE RESIDUAL)	15	3	█	5-5-9	12	
785	SILT-SANDY, SOME MICA; VERY STIFF; BROWN (RESIDUAL)	20	4	█	5-10-15	12	
780	-TRACE ROCK PARTICLES; HARD	25	5	█	20-15-21	14	
775	-MICACEOUS; VERY STIFF	30	6	█	3-6-17	14	
770	PARTIALLY WEATHERED ROCK SAMPLED AS SAND-SILTY; VERY DENSE; TAN-GRAY	35	7	█	12-22-50/5	12	
765		40	8	█	12-42-50/3	8	



UNITED CONSULTING
 625 HOLCOMB BRIDGE ROAD
 NORCROSS, GEORGIA 30071
 (770)209-0029, FAX (770)582-2800

BORING LOG

CONTRACTED WITH: QK4 BORING NO.: B-4
 PROJECT NAME: FAIRBURN ROAD SIDEWALK DATE: 02/16/04
 JOB NO.: 2002.2186-01 DRILLER: DAVID STATON RIG: CME-55 TRUCK LOGGED BY: R.D.

ELEV.	DESCRIPTION	DEPTH in FEET	SAMPLES				NOTES
			NO.	TYPE	BLOWS/6"	RECOV.	
760	AUGER REFUSAL AT 42' BORING TERMINATED AT 42'	45					
755			50				
750			55				
745			60				
740			65				
735			70				
730		75					
725		80					
720		85					

FIELD EXPLORATION PROCEDURES

SPT BORINGS

Two (2) SPT borings (designated as borings B-3 and B-4) were drilled along the proposed Fairburn Road Sidewalk and On-Street Bicycle Lanes North Utoy Creek bridges. Boring B-3 was drilled on the south bent of the east bridge. Boring B-4 was drilled on the north bent of the west bridge. The depths of borings were extended to depths of 40 and 42 feet below the existing grades. The approximate locations of the borings are shown on the attached Boring Location Plan (Figure 1) attached to this report.

Boring locations were established in the field by the project engineer along the proposed site using the provided site plan, TBM PE #15 (elevation 803.10), survey equipment, existing bridge and other site features. The drilling and sampling were performed in general accordance with ASTM Standard D-1586. Soil samples obtained were examined by a Geotechnical Engineer and classified according to the visual manual procedures (ASTM D-2488-90). A narrative of field operations is also included in Appendix A.

DRAFT



ACCURA ANALYTICAL LABORATORY, INC. (AAL)
6017 Financial Drive, Norcross, Georgia, 30071, Phone (770) 449-8800
FL Certification #E87429 LA Certification #04079 NC Certification #483
SC Certification #98015 USACE-MRD Approved
Case Narrative

AAL Work Order # 5700

Client Project: OK4 / 2002.2186.11

Accura Analytical Laboratory Inc. certifies that the results meet all requirements of the NELAC Standards.

The data package includes a 1 page case narrative and 1 report page.

The following items were noted concerning this work order:

Receiving Notations:

1. The samples were received at 18°C. EPA protocol requires that samples be preserved at 4±2°C. Also, note that the samples were received without ice and one day after collection.

Brian G Burns

Brian Burns

Receiving

February 17, 2004

Date

These Case Narrative Notations have been generated, reviewed, and edited by:

Mike Trinidad

Mike Trinidad

Project Manager

February 24, 2004

Date



Certificate of Analytical Results 5700

United Consulting, Norcross, GA
OK4

Sample Id: OK4-North Utoy	Matrix: WATER	% Moisture:
Lab Sample Id: 5700-001	Date Collected: Feb-16-04 17:00	Date Received: Feb-17-04 15:40
Sample Depth:		

Analytical Method: Specific Conductance by EPA 120.1	Prep Method:
Date Analyzed: Feb-17-04 16:30	Tech: JLB01
Analyst: JLB01	
Seq Number: 20707	

Parameter	Cas Number	Result	Rep Limit	MDL	Units	Flag	Dil
Specific conductance	SPEC_CONI	120	1.0	1.0	umhos/cm		1

Analytical Method: pH by SW9040B	Prep Method:
Date Analyzed: Feb-17-04 16:30	Tech: JLB01
Analyst: JLB01	
Seq Number: 20708	

Parameter	Cas Number	Result	Rep Limit	MDL	Units	Flag	Dil
pH		6.3	N/A	1.0	pH		1

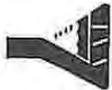
Sample Id: OK4-South Utoy	Matrix: WATER	% Moisture:
Lab Sample Id: 5700-002	Date Collected: Feb-16-04 17:30	Date Received: Feb-17-04 15:40
Sample Depth:		

Analytical Method: Specific Conductance by EPA 120.1	Prep Method:
Date Analyzed: Feb-23-04 14:00	Tech: JLB01
Analyst: JLB01	
Seq Number: 20794	

Parameter	Cas Number	Result	Rep Limit	MDL	Units	Flag	Dil
Specific conductance	SPEC_CONI	110	1.0	1.0	umhos/cm		1

Analytical Method: pH by SW9040B	Prep Method:
Date Analyzed: Feb-23-04 14:00	Tech: JLB01
Analyst: JLB01	
Seq Number: 20793	

Parameter	Cas Number	Result	Rep Limit	MDL	Units	Flag	Dil
pH		6.6	N/A	1.0	pH		1



ACCURA ANALYTICAL LABORATORY, INC.

Environmental Analytical Services

38272

6017 Financial Drive, Norcross, GA 30071
Phone # (770) 449-8800 Fax # (770) 449-5477

CHAIN OF CUSTODY

Company Name: United Consulting Billing address: 625 Holcomb Bridge Rd, Norcross, GA 30074

Address: 625 Holcomb Bridge Rd, Norcross GA Client P.O. # 47180

Report Sent to: (Client Contact): Roberto Diaz

Contact Phone # (770) 582-2815 Fax # (770) 582-2800

Project Name: OK4

Project Number: 2002.2186.11

For Laboratory Use Only AAL LIMS SYS. ID: 2173
Custody Seal(s) Y TAPE Page 1 OF 1
QC Level: 1 2 3 4 CLP Init Temp: 18.6 / 18.6
Sample Condition: NOISE AAL Work Order # 5700

Line No.	Samplers: (signature)				Samplers: (printed)				No. of Containers	Remarks	AAL Sampled:
	Sample ID #	Sample Date / Time	Comp	Grab	Matrix	Preserved	Sample Location:				
1	OK24-North Utoy	2/16/04 5:30P	✓	W	W			1	✓		5700
2	OK24-South Utoy	2/16/04 5:30P	✓	W	W			1	✓		5700
3											
4											
5											
6											
7											
8											
9											
10											

1) Relinquished By: Roberto Diaz Date / Time: 2/17/04 3:40 2) Received By: [Signature] Date / Time: 02/17/04 15:40
 3) Relinquished By: _____ Date / Time: _____ 4) Received By: _____ Date / Time: _____

Delivered by: (Circle One)
 FedEX UPS Hard Other
 Turnaround Time Requested: STD

Matrix Guide: (W=Water) (DW = Drinking Water) (GW = Groundwater) (SW = Surface Water) (L = Liquid) (O = Oil) (S = Soil) (SD = Solid) (SL = Sludge) (A = Air Sample) (C = Canister)

COST PROPOSAL FORMS

- 1. Cost Proposal Form – Phase One**
- 2. Cost Proposal Form – Phase Two**
- 3. Cost Proposal Form – Phases One and Two**

COST PROPOSAL FORM – PHASE ONE

Submitted to: Fulton County Government

Submitted to: _____

For: **#14RFP95820K-JD, DESIGN/BUILD SERVICES FOR FAIRBURN ROAD
FROM VILLAGE DRIVE TO NORTH UTOY CREEK ROAD, BRIDGE,
AND SIDEWALK IMPROVEMENTS PROJECT**

Submitted on _____, 20____

In response to the Request for Proposal (RFP), the undersigned, hereby proposes to furnish all design and construction services, labor, technical and professional services, materials, supplies, equipment, Design-Builder Fees, Architectural and Engineering Fees, and General Conditions Fees for the satisfactory completion of Phase One of the Project for a cost not to exceed:

_____ ,
which amount is hereinafter called the Owner's Available Funds.

We propose to furnish all design, architecture, engineering and construction services called for by the Proposal Documents for the following lump sum fees:

1.	Design-Builder's Fee	\$ _____
2.	Architectural and Engineering Services Fee	\$ _____
3.	General Conditions (Construction) Fee	\$ _____
4.	Contingency	\$ _____ 50,000.00
5.	Total Cost for Phase One	\$ _____

\$ _____
(Dollar Amount in Numbers of lines 1-4)

\$ _____
(Dollar Amount in Words of lines 1-4)

For Changes in the Work beyond those contemplated by the Proposal Documents, we propose a Design-Builder's Fee of ____ percent (%) of the actual costs reimbursable to the Design-Builder, as defined by the Proposal Documents, and an Architectural and Engineering Services Fee of ____ percent (%) of the actual costs reimbursable to the Design-Builder, as defined by the Proposal Documents.

The undersigned agrees that this Cost Proposal constitutes a firm offer to the Fulton County Government ("County"), which cannot be withdrawn for sixty (60) calendar days from and after the due date or until a Contract for the Work is executed by the undersigned and the County, whichever is earlier. If necessary the period of time specified may be extended by written agreement between the County and the Proposer or Proposers concerned.

The undersigned declares that the only person or persons interested in the Proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the Contract to be entered into that this Proposal is made without connection with any other person, company or parties making a Proposal, and that it is in all respects fair and in good faith without collusion or fraud.

The undersigned further declares that it has examined and is fully familiar with all of the provisions of the Technical Documents and any addenda; that it has carefully checked all of the words and figures shown in its Cost Proposal; that it has carefully reviewed the accuracy of all statements in this proposal and attachments; and that it has by careful examination of the Proposal Documents and any addenda and by examination of the actual site conditions, satisfied itself as to the nature and location of all work, the general and local conditions to be encountered in the performance of any work, the requirements of the undersigned hereby agrees that the County, its departments and agencies and their representatives shall not be responsible for any errors or omissions on the part of the undersigned in preparing this Proposal.

If awarded a Contract, the undersigned agrees that, in the case of a failure on his part to execute the Contract Agreement and Bonds within ten (10) days after receipt of conformed contract documents for execution, the Proposal Bond accompanying the proposal and the monies payable thereon shall be paid into the funds of the Owner as liquidated damages for such failure.

Enclosed is a Proposal Bond in the approved form, in the sum of (\$ _____)
_____ Dollars

according to the conditions of "Instruction to Proposers" and provisions thereof.

The Proposer proposes and agrees, if this Proposal is accepted, to contract with the Board of Commissioners of Fulton County, Atlanta, Georgia, in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary, and to complete the design and construction of the work in full and complete accordance with the shown, noted, and reasonably intended requirements of the Specification and Contract Documents to the full and entire satisfaction of the Board of Commissioners of Fulton County, Atlanta, Georgia, with a definite understanding that no money will be allowed for extra work except as set forth in the attached General Conditions and Contract Documents for the following prices.

The Proposer agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Contracting

Officer and to fully complete all work under this Contract within **five hundred and forty-seven (547) calendar days** from issuance of the Notice to Proceed.

The undersigned acknowledges receipt of the following addenda (list by the number and date appearing on each addendum) and thereby affirms that its Bid considers and incorporates any modifications to the originally issued Bidding Documents included therein.

ADDENDUM # _____ DATED _____

PROPOSER: _____

Signed by: _____

[Name Typed or Print Name]

[Name Signed]

Title: _____

Business Address: _____

Business Phone: _____

Proposer's Contractor License No: _____

[State/County]

License Expiration Date: _____

Note: If the Bidder is a corporation, the Bid shall be signed by an officer of the corporation; if a partnership, it shall be signed by a partner. If signed by others, authority for signature shall be attached.

The full name and addresses of persons or parties interested in the foregoing Bid, as principals, are as follows:

<i>Name</i>	<i>Address</i>

COST PROPOSAL FORM – PHASE TWO

Submitted to: Fulton County Government

Submitted to: _____

For: **#14RFP95820K-JD, DESIGN/BUILD SERVICES FOR FAIRBURN ROAD FROM VILLAGE DRIVE TO NORTH UTOY CREEK ROAD, BRIDGE, AND SIDEWALK IMPROVEMENTS PROJECT**

Submitted on _____, 20__

In response to the Request for Proposal (RFP), the undersigned, hereby proposes to furnish all design and construction services, labor, technical and professional services, materials, supplies, equipment, Design-Builder Fees, Architectural and Engineering Fees, and General Conditions Fees for the satisfactory completion of Phase One of the Project for a cost not to exceed:

_____ ,
which amount is hereinafter called the Owner's Available Funds.

We propose to furnish all design, architecture, engineering and construction services called for by the Proposal Documents for the following lump sum fees:

1.	Design-Builder's Fee	\$ _____
2.	Architectural and Engineering Services Fee	\$ _____
3.	General Conditions (Construction) Fee	\$ _____
4.	Contingency	\$ _____ 50,000.00
5.	Total Cost for Phase Two	\$ _____

\$ _____

(Dollar Amount in Numbers of lines 1-4)

\$ _____

(Dollar Amount in Words of lines 1-4)

For Changes in the Work beyond those contemplated by the Proposal Documents, we propose a Design-Builder's Fee of ____ percent (%) of the actual costs reimbursable to the Design-Builder, as defined by the Proposal Documents, and an Architectural and Engineering Services Fee of ____ percent (%) of the actual costs reimbursable to the Design-Builder, as defined by the Proposal Documents.

The undersigned agrees that this Cost Proposal constitutes a firm offer to the Fulton County Government ("County"), which cannot be withdrawn for sixty (60) calendar days from and after the due date or until a Contract for the Work is executed by the undersigned and the County, whichever is earlier. If necessary the period of time specified may be extended by written agreement between the County and the Proposer or Proposers concerned.

The undersigned declares that the only person or persons interested in the Proposal as principal or principals is or are named herein and that no other person than herein mentioned has any interest in this Proposal or in the Contract to be entered into that this Proposal is made without connection with any other person, company or parties making a Proposal, and that it is in all respects fair and in good faith without collusion or fraud.

The undersigned further declares that it has examined and is fully familiar with all of the provisions of the Technical Documents and any addenda; that it has carefully checked all of the words and figures shown in its Cost Proposal; that it has carefully reviewed the accuracy of all statements in this proposal and attachments; and that it has by careful examination of the Proposal Documents and any addenda and by examination of the actual site conditions, satisfied itself as to the nature and location of all work, the general and local conditions to be encountered in the performance of any work, the requirements of the undersigned hereby agrees that the County, its departments and agencies and their representatives shall not be responsible for any errors or omissions on the part of the undersigned in preparing this Proposal.

If awarded a Contract, the undersigned agrees that, in the case of a failure on his part to execute the Contract Agreement and Bonds within ten (10) days after receipt of conformed contract documents for execution, the Proposal Bond accompanying the proposal and the monies payable thereon shall be paid into the funds of the Owner as liquidated damages for such failure.

Enclosed is a Proposal Bond in the approved form, in the sum of (\$ _____)
_____ Dollars

according to the conditions of "Instruction to Proposers" and provisions thereof.

The Proposer proposes and agrees, if this Proposal is accepted, to contract with the Board of Commissioners of Fulton County, Atlanta, Georgia, in the form of contract specified, to furnish all necessary materials, equipment, machinery, tools, apparatus, means of transportation and labor necessary, and to complete the design and construction of the work in full and complete accordance with the shown, noted, and reasonably intended requirements of the Specification and Contract Documents to the full and entire satisfaction of the Board of Commissioners of Fulton County, Atlanta, Georgia, with a definite understanding that no money will be allowed for extra work except as set forth in the attached General Conditions and Contract Documents for the following prices.

The Proposer agrees hereby to commence work under this Contract, with adequate personnel and equipment, on a date to be specified in a written order of the Contracting Officer and to fully complete all work under this Contract within **five hundred and forty-seven (547) calendar days** from the issuance of the Notice to Proceed.

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ADDENDUM # _____ DATED _____

PROPOSER: _____

Signed by: _____

[Name Typed or Print Name]

[Name Signed]

Title: _____

Business Address: _____

Business Phone: _____

Proposer's Contractor License No: _____

[State/County]

License Expiration Date: _____

Note: If the Bidder is a corporation, the Bid shall be signed by an officer of the corporation; if a partnership, it shall be signed by a partner. If signed by others, authority for signature shall be attached.

The full name and addresses of persons or parties interested in the foregoing Bid, as principals, are as follows:

<i>Name</i>	<i>Address</i>

COST PROPOSAL FORM – PHASES ONE AND TWO

Submitted to: Fulton County Government

Submitted to: _____

**For: #14RFP95820K-JD, DESIGN/BUILD SERVICES FOR FAIRBURN ROAD
FROM VILLAGE DRIVE TO NORTH UTOY CREEK ROAD, BRIDGE,
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We propose to furnish all design, architecture, engineering and construction services called for by the Proposal Documents for the following lump sum fees:

1.	Design-Builder's Fee	\$ _____
2.	Architectural and Engineering Services Fee	\$ _____
3.	General Conditions (Construction) Fee	\$ _____
4.	Contingency	\$ _____ 100,000.00
5.	Total Cost for Phases One and Two	\$ _____

\$ _____

(Dollar Amount in Numbers of lines 1-4)

\$ _____

(Dollar Amount in Words of lines 1-4)

For Changes in the Work beyond those contemplated by the Proposal Documents, we propose a Design-Builder's Fee of ____ percent (%) of the actual costs reimbursable to the Design-Builder, as defined by the Proposal Documents, and an Architectural and Engineering Services Fee of ____ percent (%) of the actual costs reimbursable to the Design-Builder, as defined by the Proposal Documents.

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ADDENDUM #	_____	DATED	_____
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ADDENDUM #	_____	DATED	_____
ADDENDUM #	_____	DATED	_____

PROPOSER: _____

Signed by: _____
[Name Typed or Print Name]

[Name Signed]

Title: _____

Business Address: _____

Business Phone: _____

Proposer's Contractor License No: _____
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License Expiration Date: _____

Note: If the Bidder is a corporation, the Bid shall be signed by an officer of the corporation; if a partnership, it shall be signed by a partner. If signed by others, authority for signature shall be attached.

The full name and addresses of persons or parties interested in the foregoing Bid, as principals, are as follows:



<i>Name</i>	<i>Address</i>

SAFETY PLAN

CONTRACTOR SAFETY AND HEALTH MANAGEMENT PROCESS

2.0 REFERENCES

- 1.1 Occupational Safety and Health Regulations (OSHA) 29CFR1910 and 29CFR1926
- 1.2 Environmental Protection Agency Regulations (EPA) 40CFR
- 1.3 Fulton County Safety and Health and Requirements
- 1.4 Georgia Department of Transportation Regulations and Requirements
- 1.5 US Department of Transportation Requirements
- 1.6 Manual of Uniform Traffic Control Devices for Streets and Highways (ANSI D6.1)
- 1.7 Georgia Department of Natural Resources Environmental Protection Division Regulations

Safety rules and regulations will be followed using federal, state or local regulations in force. Should a Contractor's rule be in use which is more effective, the most stringent rule or regulation will be enforced by the Contractor, Sub-Contractors and Fulton County designated Safety Representative(s).

3.0 RESPONSIBILITY

The Contractor receiving the bid has the ultimate responsibility for the safety and health of all Sub-Contractors, all employees on the project, and the general public and complying with all governmental regulations and requirements (OSHA, EPA, DOT, state, local).

The Contractor is responsible for:

1. Implementing a safety, health and loss prevention process and program that meets or exceeds all the requirements in the Contract Documents and the safety, health and loss prevention guidelines referenced in the Contract Documents;
2. Reporting all accidents, incidents and near misses as required in the safety guidelines;
3. Coordinating the investigation of major accidents and incidents with the Project Manager;
4. Designating an employee on the site to be responsible for the Contractor's safety program; and
5. Implementing corrective action plans to address safety, health and loss prevention findings identified on the work site.

Nothing contained herein shall relieve the Contractor or any Sub-Contractor of such responsibility or liability.

4.0 PROCEDURE

- 4.1 The Contractor and each Sub-Contractor must implement a written safety and health prevention process and program following the guidelines contained in this document and in any other relevant portion of the Contract Documents. This program must be accepted by Fulton County or its Representatives prior to Notice to Proceed.
- 4.2 The Contractor and each Sub-Contractor must implement a drug and alcohol policy following the guidelines contained in this document and in the bid specific actions. This program must be accepted by Fulton County or its Representatives prior to Notice to Proceed.
- 4.3 The Contractor must designate a person responsible for site safety. Each Sub-Contractor must designate a person responsible for site safety.
- 4.4 Not Used.
- 4.5 Contractor is responsible for providing all necessary safety supplies and personal protective equipment required to protect its employees, Sub-Contractors, and the 'general public.
- 4.6 Contractor shall make available certified First-aid services, First-aid supplies, and provisions for medical care for all employees at the construction site prior to beginning work on site.
- 4.7 Contractor shall maintain a competent person at the construction site at all times with an OSHA 10-hour certification, Said person shall have the knowledge to recognize hazards or potential hazards and has the authority to correct such hazards.
- 4.8 The status of project safety shall be included in the Contractor's agenda, which is required in Progress Meetings.

5.0 DRUG AND ALCOHOL POLICY

The Contractor and each Sub-Contractor must implement a drug and alcohol policy in order to maintain a safe and efficient work environment. This policy must include the following elements.

1. Written policy that prohibits the use, transportation, sale and possession of these materials
2. Disciplinary action plan for violations
3. Any treatment or reinstatement reemployment options
4. Drug and alcohol testing schedule that includes pre-employment, periodic for safety sensitive or critical jobs, and for cause

Note: AGC, ABC and/or Fulton County programs may be used as guidance documents.

6.0 OTHER CONTROLLED ITEMS

The Contractor and each Sub-Contractor is required to include in the Project Safety Program a prohibition against the use, possession, concealment, transportation, promotion or sale of the following controlled items

1. Firearms, weapons, and ammunition.
2. Switchblades
3. Unauthorized explosives including fireworks
4. Stolen property or contraband
5. Controlled chemicals or chemicals recognized as being able to be used for improper purposes

7.0 EMERGENCY PROCEDURES/GUIDELINES

7.1 The Contractor is required to establish site specific emergency procedures in the Project Safety Program to manage emergencies that may occur at any time in the following categories:

1. Fire
2. Employee injury
3. Pedestrian injury due to work activity of any kind
4. Property damage and damage to various utilities (i.e., electrical, gas, sewerage,, water, telephone or public roadways)
5. Public demonstrations
6. Bomb threats
7. Flood, Wind, Lightening, Hail
8. Terrorists Threats
9. Work place violence

7.2 These Emergency Procedures will be made part of the Contractor's Project Safety Program submittal and shall include but not be limited to the following elements:

1. A list of emergency phone numbers posted at the job site, along with information to be transmitted in such emergencies.
2. An incident command structure defining duties and responsibilities
3. A system to train supervisors and employees on this emergency plan
4. Procedures on how to handle emergencies including access to the site by emergency responders, accounting for workers, and securing the area.
5. Procedures for media releases. These releases must be coordinated through the Fulton County Information and Public Affairs Office in coordination with the County's designated Representative.
6. A plan that addresses serious incidents that includes notification to Fulton County, Fulton County's designated Representative immediately after the incident.
7. A review and updating frequency that includes forwarding a copy to Fulton County and the County's designated Representative.

8.0 ACCIDENT AND INCIDENT INVESTIGATION AND REPORTING

- 8.1 The Contractor is responsible for reporting all accidents and incidents on the project site to the County's designated Representative within (1) business day. Accidents or incidents resulting in a fatality, property loss in excess of \$5,000, or involvement with the general public must be reported immediately to Fulton County's designated Representative and the investigation of the accident or incident coordinated with Fulton County Safety staff.
- 8.2 The Contractor will maintain a log of all injuries that occur on the job site. This log will be current and available for review.
- 8.3 For any incidents such as fires, explosions, fatalities, etc., the Contractor must notify Fulton County's designated Representative immediately and must coordinate any releases to the news media through the County's designated Representative and the County's Information and Public Affairs Office.
- 8.4 If a work-related injury should occur on this project, Contractor shall perform a thorough investigation of the incident and document the information.
- 8.5 A written accident investigation report containing the following information a minimum must be forwarded to the Fulton County's designated Representative within 24 hours of incident.
 1. Company Name
 2. Location
 3. Date and Time of incident
 4. Description of incident
 5. Names of all parties involved and all witnesses
 6. Corrective action(s) taken to prevent recurrence
 7. If the incident involves injury or illness, the following information must be provided:
 - a) A medical description of the injury or illness
 - b) OSHA recordability status i.e. first aid, medical treatment, lost time, days of restricted work.
 - c) If the public is involved, information about treatment and treatment location.
 8. Any pictures, site drawings, etc. if they assist in describing the incident.

If the investigation cannot be completed in 24 hours, a preliminary report marked as such shall be forwarded and the report completed and forwarded as soon as possible.

9.0 JOB SAFETY ANALYSIS

- 9.1 The Contractor and each Sub-Contractor must implement a procedure to conduct a written job safety analysis or job hazard analysis for all project work tasks prior to beginning each task. Reference Appendix A.
- 9.2 The job safety analysis should follow National Safety Council, AGC, or

other recognized guidelines and address all safety and health hazards for the work, identify personal protective and other safety equipment required, identify potential hazards to the general public if applicable, and identify any safety equipment, training, or controls that must be implemented prior to starting the work.

- 9.3 The Contractor must maintain a file for all job safety analysis forms, which is Accessible for review.

10.0 SAFETY AND HEALTH COMPLIANCE AUDITING

10.1 Self-Auditing Requirements

10.1.1 The Contractor and each Sub-Contractor must implement a procedure to assure that written safety and health audits or inspections are conducted at least biweekly (every 2 weeks). Safety checklists used by Fulton County's designated Representative may be used. The Contractor may use this checklist or an equivalent approved by Fulton County's designated Representative.

10.1.2 Each written safety audit must be filed on the site and a copy forwarded to Fulton County designated Representative.

10.2 NOT USED

10.3 INSPECTIONS BY REGULATORY AGENCIES

10.3.1 The Contractor must notify the Fulton County designated Representative whenever an 051-IA compliance officer, health inspector, or EPA or Georgia Environmental Protection Division Representative arrives at the project site to conduct an inspection.

10.3.2 The Contractor is required to forward a copy of all regulatory citations, notice of violations, or similar for this project to Fulton County's designated Representative.

10.3.3 These records will be reviewed with Fulton County designated Representative and included in the Construction Project files.

10.4 SAFETY INSPECTION AND AUDIT FOLLOW UP

10.4.1 Every safety audit or regulatory inspection conducted per the requirements above may be reviewed by the Fulton County designated Representative. This review may identify serious and repeat safety items, look at trends, identify risks and potential losses, and site safety and loss prevention activities.

10.4.2 After this review the findings may identify areas needing improvement.

-
- 10.4.3 A copy of the audit and any areas identified, as needing improvement will be forwarded to the Contractor's senior management.
 - 10.4.4 For findings that indicate major loss potential or serious concerns about site safety, the areas identified as needing improvement and the overall performance may be reviewed by Fulton County's designated Representative A written action plan to address the Contractor's performance issues may be developed.
 - 10.4.5 Fulton County or designated Representative may meet the Contractor's senior management to discuss the findings, contract requirements, and their plans to address the findings.
 - 10.4.6 The number and frequency of safety audits and site visits may be increased until improvements are noted.

11.0 SAFETY MEETINGS

- 11.1 The Contractor will conduct weekly safety meetings with all Contractor and Sub-Contractor employees on the site.
- 11.2 The Contractor will keep safety-meeting records that include meeting topic(s), outline of items discussed, and attendance and sign in sheet. At this meeting any accidents or audit findings and corrective actions from the previous week will be discussed.
- 11.3 The Contractor will maintain a job site file that contains copies of the safety meeting records.

12.0 TRAINING, INSPECTION AND CERTIFICATION

- 12.1 Employee Training
 - 12.1.1 The Contractor must be able to show when requested the required safety training for all Contractor and Subcontractor employees and competent persons working on the site including any required craft training,
 - 12.1.2 The Contractor must be able to show when requested that all employees operating mobile equipment or cranes have met or exceeded training and licensing requirements.
 - 12.1.3 The Contractor must be able to show when requested that all scaffolds are erected under the direction of a competent scaffold builder, that all users are properly trained, and that the scaffold is inspected daily.
 - 12.1.4 The Contractor shall ensure that each employee is properly trained in the recognition and avoidance of unsafe conditions and the regulations applicable to his or her work environment to control or eliminate any hazards or other exposure to illness or injury.

12.1.5 If Contractor or Sub-Contractor employs anyone who cannot effectively communicate using the English language, a translator must be maintained on site who can relay instructions, questions, or concerns in a manner that the non-English and English-speaking employees will understand. The identification of this translator shall be provided to Fulton County's designated Representative.

12.1.6 Contractor shall orient all supervision and employees concerning safety requirements before working on the project

12.2 Equipment Certification and Inspection

12.2.1 The Contractor must be able to document that all cranes and mobile equipment used on the job site have current inspections and certifications.

12.2.2 The Contractor must assure that required daily and weekly equipment inspections are performed and documented in writing per governmental regulations and the requirements of this policy.

12.2.3 The Contractor must maintain a job site file for these required inspections and certifications.

12.2.4 Equipment identified as having safety problems or not meeting standards or codes shall be tagged as defective and shall not be used until those identified items have been corrected.

12.2.5 Contractor shall maintain, and have available for viewing, safety inspection reports for ladder, electrical cords, scaffolds, and trenches/excavations.

13.0 SAFETY AND HEALTH PROGRAM ELEMENTS

Note: Based on the project work activities and scope of work, some program elements may be not applicable to the project work and therefore do not have to be implemented. Elements marked with an asterisk are applicable to all Projects.

13.1 Return to Work Policy*

The Contractor and each Sub-Contractor will be required to establish a transitional work program for employees injured at work, which provides modified duty within the employee's physical limitations.

13.2 Fire Prevention Program*

The Contractor and each Sub-Contractor will be required to submit a temporary fire protection plan to be in effect for the duration of the contract. This plan must be submitted as part of the Contractor's Safety Program submittal, It must include provisions for fire protection systems and equipment, as identified in OSHA Safety and Health for Construction 1926, Sub-Part F, Fire Protection and Prevention.

13.3 Hazard Communication (HAZCOM)*

The Contractor and each Sub-Contractor shall have a written HAZCOM Program. The program shall meet OSHA 1926 Requirements and provide for training so that all employees will be able to:

- Understand the program and identify hazardous chemicals with which they work.
- Understand product-warning labels.
- Have MSDSs for all potentially hazardous materials brought onto, used on, or stored at the job site.
- Know the physical location of the Material Safety Data Sheets (MSDS).

13.4 Personal Protective Equipment (PPE)*

All Contractor and Sub-Contractor employees and other site visitors will be required to wear the PPE necessary to accomplish the work in a safe manner, PPE required will vary from job to job and must be based on a written hazard assessment. A list of PPE that is required is identified below:

- Hard Hats shall be worn at all times on all projects
- Hearing Protection for operations that create noise in excess of 65 dBA is required.
- Contractor shall provide eye or face protection equipment when machines or operations present potential eye or face injury from physical, chemical, or radiation agents.
- Work boots or work shoes made of leather shall be required. No open toed shoes or canvas shoes are allowed
- Shirts with sleeves at least 4 inches long are required. Tank tops and mesh shirt are not allowed.
- Full Body Safety Harnesses with shock absorbing lanyards for fall protection are required.
- Full body and chemical splash protection is required when handling hazardous chemicals.
- Respirators are required when employees maybe exposed to dust and/or chemicals in excess of the OSHA permissible exposure limits.
- Long pants are required.

13.5 Confined Space Entry

If the project work involves permit required confined spaces, a permit required confined space entry program that meets 051-iA requirements must be established. This program must include but is not limited to the following elements.

- Confined Space Identification
- Environmental Testing
- Rescue
- Communication with employees in the confined space
- Employee Training
- Permit System for entry

13.6 Excavations

If the Contractor or Sub-Contractor must make a cut, cavity, trench or depression in an earth surface formed by earth removal, the work must comply with the OSHA Regulations on trenching and excavations. A competent person must be assigned for each excavation. Requirements include but are not limited to:

- Employee Training
- Daily inspections
- Soil testing
- Protective or support systems.

13.7 Electrical Tools, Equipment, and Systems*

- The Contractor and each Sub-Contractor must implement Assured Grounding Program or use Ground Fault Circuit Interrupter (GFCI) devices on all electrical tools and extension cords.
- All electrical work must be performed in accordance with the National Electrical Code (NEC) and OSHA,
- All electrical tools and extension cords must be in good repair and the Contractor must establish a written inspection program for all electrical tools. The frequency of inspection shall be at least monthly.

13.8 Lockout/Tagout Procedure

The Contractor and each Sub-Contractor will be required to implement a written Lockout/Tag procedure that meets OSHA requirements if their work requires energy isolation, Program elements include but are not limited to the following:

- Energy isolation lists for each piece of equipment
- Employee training
- Individually keyed locks and danger tags
- Written Procedure that assigns responsibilities

13.9 Fall Protection*

Contractor shall provide an approved fall protection system for all employees working at an elevation of 6 feet or higher on this project, including scaffolding work and steel erection. Employees will be responsible for utilizing the fall protection 100% of the time. Sub-Contractor will be responsible for ascertaining their employees' compliance with this requirement. The plan must address the following items:

- Only full body harnesses with shock absorbing lanyards and double locking hooks shall be use.
- Falls should be limited to less than. 6 feet such than employee can neither fall more than 6 feet nor contact any lower level.
- Fall protection systems must be planned into the job and must be designed to handle loads and forces expected. The project goal is 100% fall protection.
- Employee training and enforcement of these requirements are

mandatory to assure an effective program.

13.10 Scaffolding

All scaffolds and work platforms shall be constructed to meet the requirements of OSHA 1926.451 and ANSI A10.8. Some program elements include but are not limited to:

- User training for all employees who may use scaffolds;
- Scaffolding is to be designed and erected by competent person(s) following manufacturer's guidelines. Employees must use fall protection when erecting scaffolding;
- Daily inspection by competent person. Must implement daily tag system to document inspection;
- Must have engineering approval for scaffolds above 100 feet in height;
- Must be able to document competent person credentials; and
- Scaffolds must have proper egress (ladder/stairs) and should have guardrails, complete deck, toe boards and netting if anything can fall on people below. If guardrails or decking is not complete, fall protection must be used.

13.11 Cranes and Other Lifting Devices

- Trained and experienced operators shall operate Cranes in accordance with the applicable OSHA and ANSI/ASME.
- The Contractor is responsible for ensuring that the crane is properly sized for the job and that all required inspections and maintenance required by OSHA 1926.551 and ANSI/ASME standards have been conducted.
- All cranes should have anti-two block devices installed and operational. Cranes lifting employees in personnel baskets must have an anti-two block device to stop the crane if this condition occurs (positive acting).
- Tag lines are required to secure materials while being moved or handled by cranes.
- All cranes working in the vicinity of overhead power lines shall be grounded and be equipped with proximity guards.
- A lift plan must be submitted for all lifts that exceed 20,000 pounds or 75% of the crane's lift capacity. This plan must be reviewed and approved by the Contractor.
- Slings, hooks, and other lifting devices must be inspected on regular basis and stored properly.

13.12 Use of Personnel Baskets

- Personnel baskets should only be used as the last practical means after documenting that all other means are unacceptable.
- The personnel basket must be manufactured, tested, and used in accordance with OSHA 1926.550. The crane lifting the basket must also meet OSHA requirements.

13.13 Personal Lifts with Articulating Booms (Jig) and Scissors Lifts

- Operators must be trained in the safe operation of the lift including daily inspection procedures prior to use.
- Operators of JLG lifts must wear a full body harness with shock absorbing lanyard and be tied off while the lift is operation. Operators in a scissors lift must use fall protection anytime the guardrail system removed or altered.

13.14 Ladders*

- Ladders are acceptable means of access when used in compliance with OSHA 1926.1053.
- Ladders must be in good repair, have safety feet and be inspected.
- Extension ladders must be either held by an employee on the ground or tied off at the top.
- Homemade ladders not meeting OSHA requirements should not be used.
- Non-conducting ladders are required for electrical work.
- Fall protection is encouraged for employees working on ladders especially if they will be leaning and turning in their work activities.

13.15 Tools and Equipment

All tools and equipment used on the project must be in a safe operating condition, with all guards in place, and must meet or exceed all governmental regulations (OSHA, EPA, DOT, etc.). Tools and equipment must be maintained, inspected, tested, and used in accordance with OSHA regulations.

13.16 Compressed Gas Cylinders*

- Compressed gas cylinders must be used, stored, and transported in accordance with OSHA requirements, DOT requirements, and Compressed Gas Association standards.
- Fuel and oxygen cylinders must be stored separately or separated in accordance with the appropriate code.
- Compressed gas cylinders are not allowed inside confined spaces.

13.17 Welding, Burning, and Cutting*

- The Contractor's program must meet or exceed OSHA and NFPA requirements.
- All flammables must be removed from work area and a fire watch

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- posted in area until 30 minutes after the job is completed.
 - At a minimum a 10 LB ABC rated fire extinguisher must be available in the immediate work area.
 - Regulators must be in good working order and must have anti-flash back and check valves.
 - Welding shields and burning goggles must be used.

13.18 Sanitation and Housekeeping*

- The project site shall have an adequate number of portable toilets and hand washing facilities.
- The project site must establish a housekeeping plan that includes daily site clean-up and trash and debris removal.

13.19 Hearing Conservation*

The Contractor and each Sub-Contractor who has employees exposed to noise levels exceeding 85 dBA must establish a hearing conservation program that meets or exceeds OSHA requirements. Minimum program elements include audiometric testing, noise monitoring, use of hearing protectors, and employee training.

13.20 Respiratory Protection

The Contractor and each Sub-Contractor who has employees who wear respiratory protection must implement a respiratory protection program that meets or exceeds OSHA requirements. Minimum program elements include risk based respirator selection, medical surveillance, employee training, respirator fit testing, and written operating procedures.

14.0 SPECIALIZED SAFETY PROGRAM ELEMENTS

If required by the project scope of work and specific work site or activities, specialized programs listed below shall be included in the Contractor's Safety Program submittal. The Contractor is required to implement the required programs and assure that they meet or exceed all contractual, regulatory and Fulton County's requirements applicable. Details for specific program elements may be included in the contract documents,

- 14.1 Asbestos Removal
- 14.2 Lead Based Paint Removal
- 14.3 Exposure Assessment and Employee Monitoring (Industrial Hygiene)
- 14.4 Hazardous Waste Operations and Training
- 14.5 Overhead Power Lines
- 14.6 Locating underground utilities
- 14.7 Dust Control
- 14.8 Guarding for floor holes and roof openings
- 14.9 Heavy Equipment, Truck and Earth Moving Equipment requirements
- 14.10 Environmental Requirements

15.0 ROAD AND TRANSPORTATION SAFETY REQUIREMENTS

The Contractor shall implement the following into its safety program whether required by the contract or any other authority having jurisdiction if required to perform the work and maintain vehicular and pedestrian traffic safety:

- 15.1 Barricades and Cones
- 15.2 Traffic and Warning Signs
- 15.3 Traffic control devices
- 15.4 Equipment and materials storage
- 15.5 Reflective Clothing and other personal protective equipment
- 15.6 Excavation and road hole protection
- 15.7 Erosion protection
- 15.8 Trained flaggers

16.0 ADDITIONAL REQUIREMENTS TO PROTECT THE GENERAL PUBLIC

Based on the Contractor's scope of work and specific work activities or location the Contractor may be required to implement the following into its safety program to protect the general public:

- 16.1 Fencing and other measures for site security
- 16.2 Warning, direction and no trespassing signs
- 16.3 Alternate public walk ways
- 16.4 Protection of the public from overhead and other construction hazards
- 16.5 Site Traffic Control
- 16.6 Barricading off hazardous areas and open pits and holes

SAFETY POLICY STATEMENT

It is the policy of Fulton County to establish a comprehensive accident and loss prevention process for all Capital Projects implemented by Fulton County or its agents.

The goals of this comprehensive accident and loss prevention process are as follows:

- To prevent personal injury, property damage, and injury to the public.
- To implement safety and loss prevention processes as critical elements in the complete design and build process.
- To establish a proactive safety and health process that complies with all laws, regulations, consensus standards, and good management practices.
- To have the Contractors partner with Fulton County in the implementation of a Safety and Loss Prevention Process Program to minimize loss potential and to minimize risk.

Fulton County requires safety, health and loss prevention requirements and expectations to be included in project design, in the invitation to bid, in bid award and project meetings, and in the post job evaluations. The Contractor is required to develop and submit a project safety and health program for acceptance by Fulton County prior to Notice to Proceed. The Contractor is required to implement these requirements, and develop a management system to ensure compliance following the safety and health process outlined in this document and the bid documents.

The Contractor and other entities placed under contract with Fulton County will be obligated to implement, adhere to and enforce this Policy. The safety and health of the Contractor's employees, Sub-Contractors, and the public are the sole responsibility of the Contractor, The County may use and direct designated Representatives to implement and enforce this policy. **Failure of the Contractor to comply with this policy or any Safety related obligations may be grounds for contract termination.**

Fulton County's designated Representative will periodically inspect all Fulton County construction projects to identify safety hazards and make recommendations to resolve the issues, Contractor will be responsible for abating the identified issues in a timely manner, and submitting written description of corrective action within forth-eight (48) hours to Fulton County designated Representatives. Failure to bring timely resolution to the issues may result in work stoppage at Contractor's expense.

Prior to commencing work under this contract, Contractor's Project Manager and Project Superintendent shall attend a Pre-Construction Meeting and Safety Pre-Planning meeting to address safety issues/requirements.

Job Safety Analysis Worksheet Example and Information
Job Safety Analysis - Job Pre-Planning Worksheet

Job Name and #:		Completed By:
Date:	Phase/Operation:	
Task	Hazard	Control

CONTRACT DRAWINGS

PHASE ONE

PHASE TWO