

**Appendix F**

**Millstone River and Little Bear Brook HEC-RAS Models**

**HEC-RAS Steady Flow Model of Millstone River**

MillstoneRiverWW.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      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: Millstone River Analysis  
Project File : MillstoneRiverWW.prj  
Run Date and Time: 4/17/2015 7:05:20 PM

Project in English units

\*\*\*\*\*

PLAN DATA

Plan Title: SWM - FEMA 2- 500 Year - Exist - Rating  
Plan File : c:\Users\Joe\Documents\West Windsor Little Bear Brook and Regional SWM Plan\HEC-RAS\Millstone River\MillstoneRiverWW.p11

Geometry Title: SWM - Revised NJDOT Geometry - No Moment  
Geometry File : c:\Users\Joe\Documents\West Windsor Little Bear Brook and Regional SWM Plan\HEC-RAS\Millstone River\MillstoneRiverWW.g05

Flow Title : FEMA Middlesex 2 to 500-Year - Rating  
Flow File : c:\Users\Joe\Documents\West Windsor Little Bear Brook and Regional SWM Plan\HEC-RAS\Millstone River\MillstoneRiverWW.f03

Plan Description:

SWM Revised NJDOT Geometry File with Corrected Expansion/Contraction Coefficients and IFAs at Bridge.  
Eliminated Momentum Computation Due to Lack of Piers.  
Reassigned Top of Bank Stations at Station 221060.  
Revised Starting WSEL Rating Curve to NJDEP/FEMA Discharges, WSELS, and 0 Flow at Channel Invert  
February 23, 2015

Plan Summary Information:

Number of:	Cross Sections =	15	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	1	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

\*\*\*\*\*

FLOW DATA

Flow Title: FEMA Middlesex 2 to 500-Year - Rating
Flow File : c:\Users\Joe\Documents\West Windsor Little Bear Brook and Regional SWM Plan\HEC-RAS\Millstone
River\MillstoneRiverWW.f03

Flow Data (cfs)

Table with 8 columns: River, Reach, RS, EST 2-YEAR, 10-YEAR, 50-YEAR, 100-YEAR. Row 1: EST NJFHA, 500-YEAR \*. Row 2: Millstone River Route One, 11288, 12950, 221060, 1253, 4885, 7570, 9030.

Boundary Conditions

Table with 5 columns: River, Reach, Profile, Upstream, Downstream. Row 1: Millstone River Route One, EST 2-YEAR, Rating Curve #1.

Rating Curve #1

Table with 2 columns: Flow (cfs), Elev (ft). Rows: 0, 1253, 4885, 7570, 9030, 12950.

\*\*\*\*\*

GEOMETRY DATA

Geometry Title: SWM - Revised NJDOT Geometry - No Moment
Geometry File : c:\Users\Joe\Documents\West Windsor Little Bear Brook and Regional SWM Plan\HEC-RAS\Millstone
River\MillstoneRiverWW.g05

CROSS SECTION

RIVER: Millstone River
REACH: Route One RS: 221060

INPUT

Description: Station 221060
Adjusted Top of Bank Stations

Table with 10 columns: Station, Elevation, Station, Elevation, Station, Elevation, Station, Elevation, Station, Elevation. Rows: 0, 1025.

MillstoneRiverWW.rep

1695	53.91	1700	52.91	1714	47.91	1728	46.91	1733	46.91
1752	52.91	2140	53.41	2595	53.91	3305	66.41	3750	68.91

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 1695 .04 1752 .1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	1695	1752		1300	1660		.1	.3

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 219400

INPUT

Description: Station 219400

Station Elevation Data		num=		13					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
*****									
0	71.91	235	66.41	495	53.91	623	53.41	640	46.91
650	52.91	662	52.91	673	45.91	683	45.91	697	53.41
1040	53.91	1780	61.91	2925	71.91				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .09 623 .04 697 .09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	623	697		920	900		.1	.3

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 218500

INPUT

Description: Station 218500

Station Elevation Data		num=		12					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
*****									
0	73.91	502	53.41	521	52.91	530	45.91	550	45.91
570	45.91	580	45.91	605	45.91	913	53.91	1655	61.91
2118	66.41	3420	73.91						

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .09 502 .04 913 .09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	502	913		900	1060		.1	.3

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 217440

INPUT

Description: Station 217440

Station Elevation Data		num=		11					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

MillstoneRiverWw.rep

```
*****
0 73.91 330 53.91 710 51.91 896 53.41 907 52.91
917 45.91 947 45.91 957 52.91 965 53.91 1453 61.91
1755 73.91
```

```
Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
*****
0 .09 896 .04 965 .09
```

```
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
896 965 1080 1200 1270 .1 .3
```

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 216240

INPUT

Description: Station 216240

```
Station Elevation Data num= 14
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 73.91 195 66.41 368 53.91 729 53.41 755 52.91
770 44.91 790 43.91 840 43.91 857 44.91 872 52.91
890 53.91 1350 61.91 1728 65.91 2040 73.91
```

```
Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
*****
0 .09 729 .04 890 .09
```

```
Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
729 890 130 130 130 .1 .3
```

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 216110

INPUT

Description: Station 216110

```
Station Elevation Data num= 83
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 83.66 165.91 82.02 177.47 82.02 243.02 82.02 366.8 78.74
463.2 75.46 545.1 72.18 603.99 68.89 662.74 65.62 710.93 62.33
737.18 59.06 763.06 55.77 780.94 52.49 789.29 52.46 796.9 52.5
801.22 50.5 807.72 50.4 815.46 50.1 821.26 50 826.37 49.7
835.92 49.6 842.47 49.5 847.95 49.5 855.72 49.4 865.77 49.2
874.66 49.2 880.62 49 887.33 49.2 893.38 49.3 898.55 49.2
904.17 49.4 913.14 49.7 920.39 49.7 926.95 49.9 934.56 50.2
938.91 50.4 943.01 50.6 947.48 50.8 976.65 50.8 980.46 51
984.12 51.1 987.92 51.4 990.86 52.2 996.86 52.49 1033.21 52.49
1039.64 52.49 1050.36 52.2 1054.21 51 1056.52 50.4 1062.03 50.4
1067.12 50.4 1072.76 50.4 1079.45 49.4 1085.87 48.1 1090.89 47.8
1095.67 47.3 1102.89 47 1108.17 45.8 1113.02 45.4 1119.18 45.1
1124.28 44.8 1134.06 44.7 1140.9 44.6 1145.97 44.6 1154.64 44.6
1159.85 44.5 1166.03 44.3 1171.14 44.2 1175.97 44.2 1182.54 44.7
1188.29 45.4 1193.56 46.9 1198.59 49 1204.28 50 1208.33 52.2
1347.67 55.77 1449.67 59.05 1871.78 64.4 1895.25 64.6 1937.95 65.62
1972.37 65.62 1986.65 62.33 1987.82 62.07
```

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

MillstoneRiverWW.rep

\*\*\*\*\*  
 0 .08 796.9 .04 1208.33 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 796.9 1208.33 500 500 500 .1 .3

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 215610

INPUT

Description: Station 215610

Station Elevation Data num= 83

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	83.17	116.62	82.02	210.72	78.74	328.55	75.46	431.07	72.18
455.14	72.18	467.94	72.18	531.88	68.9	580.11	65.62	624.19	62.34
663.49	59.06	714.72	55.77	821.3	52.49	823.03	51.94	829.11	52.2
836.94	51.7	843.97	51.2	848.54	50.4	852.58	49.6	856.96	49.1
862.58	48	868.58	47.1	874.01	46.5	880.21	46	885.42	45.5
890.78	45.3	895.99	45	901.25	44.7	906.3	44.4	911.81	44.2
917.55	43.9	923.08	43.5	929.39	43.8	934.5	44.4	943.16	44.5
948.39	44.3	954.01	43.2	959.27	43	965.32	43.6	970.44	44.1
977.48	44.7	983.1	45.3	988.21	46.1	993.62	46.8	1002.04	47.4
1007.26	47.6	1012.58	47.9	1017.67	48.2	1023.82	48.4	1030.2	48.4
1039.85	48.5	1046.42	48.5	1051.71	48.5	1061.18	48.5	1066.87	48.4
1073.23	48.2	1079.07	48.1	1084.19	48	1090.86	47.8	1096.11	47.5
1101.96	47.3	1107.66	47	1113.5	46.7	1119.34	46.3	1124.7	45.7
1129.78	45.3	1135.05	45.1	1140.68	44.7	1150.66	44.9	1157.41	45.4
1162.58	46	1167.88	46.9	1172.89	48.1	1178.04	49.3	1183.31	50.2
1187.86	52.2	1296.1	55.77	1529.05	59.06	1704.85	62.33	1798.18	64.14
1835.96	64.25	1846.27	65.62	1916.17	68.89				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	829.11	.04	1187.86	.07

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 829.11 1187.86 255 255 255 .1 .3

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 215355

INPUT

Description: Station 215355

Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	78.74	116.62	75.46	210.72	72.18	325.22	68.9	427.74	65.62
514.16	62.33	551.67	59.06	635.69	55.77	798.26	52.49	811.46	52.2
817.14	52.2	820.74	49.9	825.69	49	832.58	48.3	838.14	48.1
843.4	47.7	849.53	47.5	858.27	47.3	863.83	47.2	869.47	47.1
874.85	46.8	880.51	46.5	885.88	46.3	891.8	46	897.02	46
903.95	45.8	909.33	45.5	914.38	45.4	919.98	45.3	926.51	45.4
934.89	45.4	942.15	45.6	948.22	45.9	953.49	46.2	959.86	46.4
966.46	46.8	971.76	47.4	977.15	47.9	982.72	48.3	988.62	48.6
995.02	48.9	1001.74	49.2	1007.06	49.4	1016.46	49.4	1024.55	49.3
1030.38	49.2	1038.99	48.9	1047.29	48.8	1052.49	48.7	1058.93	48.5
1064.14	48.4	1069.5	48	1076.17	47.9	1081.46	47.7	1087.06	47.4
1092.12	47.2	1097.38	46.9	1105.63	46.5	1111.09	46	1116.58	45.7
1123.67	45.5	1131.27	45.4	1140.88	45	1149.12	45.3	1154.24	45.6

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1159.58 46 1165.01 46.6 1197.06 50.4 1199.85 52.2 1210.99 55.77  
 1535.35 59.06 1658.45 62.33 1806.45 65.62 1837.28 68.9

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .08 811.46 .04 1199.85 .07

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 811.46 1199.85 150 150 150 .1 .3

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 215205

INPUT

Description: Statioin 215205

Station Elevation Data num= 83  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 77.3 149.62 75.46 498.1 72.18 618.21 68.9 721.77 65.62  
 862.41 62.33 910.13 62.33 917.96 62.33 957.32 59.05 1040.89 55.77  
 1225.19 52.49 1227.65 51.94 1231.84 52.2 1236.66 50.5 1242.29 50.1  
 1247.62 49 1253.14 48.3 1258.49 48 1263.63 47.7 1271.06 47.5  
 1276.72 47.4 1281.99 47.4 1289.96 47.3 1298.46 47.2 1304.9 47.1  
 1310.55 47 1316.61 46.9 1321.59 47 1326.88 47.2 1336.69 47.3  
 1346.38 47.3 1352.96 47.2 1362.16 47.2 1369.64 47.2 1377.61 47  
 1382.76 46.9 1388.06 46.8 1396.96 46.7 1402.31 46.5 1409.12 46.4  
 1416.08 46.3 1421.19 46.2 1428.95 46 1437.43 45.9 1443.6 45.7  
 1450.34 45.5 1457.74 45.3 1466.97 45.2 1473.87 45.1 1479.41 45.2  
 1485.69 45.1 1491.85 45.2 1498.84 45.1 1504.88 45 1509.94 45  
 1518.79 44.9 1523.91 44.9 1533.21 44.7 1539.58 44.4 1545.45 43.7  
 1550.63 44.2 1556.86 44.2 1562.9 44.5 1568.33 44.5 1575.07 44.8  
 1581.7 44.7 1587.62 45 1596.96 45.3 1603.9 45.7 1609.32 45.9  
 1614.98 46.6 1620.3 47.3 1625.48 48.2 1630.73 49 1636.33 49.8  
 1642.63 50.5 1647.19 52.2 1701.47 55.77 1946.69 59.06 1991.41 62.33  
 2173.56 64.11 2205.63 65.61 2219.94 68.9

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .08 1231.84 .04 1647.19 .07

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 1231.84 1647.19 93 93 93 .5 .8

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 215112

INPUT

Description: Statioin 215112 - Upstream Face of Route One Bridge

Station Elevation Data num= 52  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 31.94 72.18 164.82 68.9 232.05 65.61 248.14 63.26 287.7 63.43  
 415.22 62.34 418.04 61.43 466.46 61.1 575 59.8 792.12 59.7  
 842.09 59.84 892.59 60.24 943.15 60.55 993.71 60.57 1043.66 61.05  
 1108.48 60.93 1146.34 52.2 1147.59 49.2 1152.69 49 1157.67 48.7  
 1162.9 48.5 1168.69 48.3 1174.27 47.9 1179.4 47.3 1184.55 46.8  
 1189.44 46.4 1197.17 46.2 1202.34 45.9 1208.71 45.5 1214.36 45.5  
 1219.53 46.2 1227.2 47 1233.45 47.1 1239.43 47.6 1244.39 48.8  
 1249.48 47.5 1255.47 47.4 1261.54 48.4 1266.47 50.5 1269.2 52.2



MillstoneRiverWW.rep

1322.92 59.06 1338.34 55.77 1369.03 55.16 1444.79 55.77 1553.23 59.06  
 1584.45 61.51 1627.09 62.32 1726.3 64.49 1774.12 64.2 1823.95 63.57  
 1835.6 65.62 1850.5 68.9

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 31.94 .08 1146.34 .04 1269.2 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 1146.34 1269.2 134 134 134 .1 .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 31.94 1146.75 60 F  
 1253.25 1850.5 64.36 F

BRIDGE

RIVER: Millstone River  
 REACH: Route One RS: 215045

INPUT

Description:  
 Distance from Upstream XS = 2  
 Deck/Roadway Width = 130  
 Weir Coefficient = 2.5  
 Upstream Deck/Roadway Coordinates  
 num= 38

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
265	68.3				449.7	65.5				449.8	62.8			
479	62.3				510	61				514	61			
564	60.3				573.7	62.9				573.8	62.9			
614	62.7				664	62.48				714	62.49			
764	62.7				814	63.09				864	63.6			
914	64.11				964	64.62				1014	65.13			
1064	65.64				1114	66.11				1147.75	66.31			0
1147.75	66.31	58.3			1164	66.4	58.3			1200	66.45	58.3		
1214	66.47	58.3			1252.25	66.4	58.3			1252.25	66.34			0
1264	66.3				1314	65.93				1364	64.36			
1414	64.81				1464	64.51				1514	64.48			
1564	64.72				1614	64.74				1664	66.02			
1714	67.16				1764	68.42								

Upstream Bridge Cross Section Data

Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
31.94	72.18	164.82	68.9	232.05	65.61	248.14	63.26	287.7	63.43
415.22	62.34	418.04	61.43	466.46	61.1	575	59.8	792.12	59.7
842.09	59.84	892.59	60.24	943.15	60.55	993.71	60.57	1043.66	61.05
1108.48	60.93	1146.34	52.2	1147.59	49.2	1152.69	49	1157.67	48.7
1162.9	48.5	1168.69	48.3	1174.27	47.9	1179.4	47.3	1184.55	46.8
1189.44	46.4	1197.17	46.2	1202.34	45.9	1208.71	45.5	1214.36	45.5
1219.53	46.2	1227.2	47	1233.45	47.1	1239.43	47.6	1244.39	48.8
1249.48	47.5	1255.47	47.4	1261.54	48.4	1266.47	50.5	1269.2	52.2
1322.92	59.06	1338.34	55.77	1369.03	55.16	1444.79	55.77	1553.23	59.06
1584.45	61.51	1627.09	62.32	1726.3	64.49	1774.12	64.2	1823.95	63.57
1835.6	65.62	1850.5	68.9						

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 31.94 .08 1146.34 .04 1269.2 .08

Bank Sta: Left Right Coeff Contr. Expan.

MillstoneRiverWW.rep

1146.34 1269.2 .1 .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 31.94 1146.75 60 F  
 1253.25 1850.5 64.36 F

Downstream Deck/Roadway Coordinates

num= 38  
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 \*\*\*\*\*  
 265 68.3 449.7 65.5 449.8 62.8  
 479 62.3 510 61 514 61  
 564 60.3 573.7 62.9 573.8 62.9  
 614 62.7 664 62.48 714 62.49  
 764 62.7 814 63.09 864 63.6  
 914 64.11 964 64.62 1014 65.13  
 1064 65.64 1114 66.11 1147.75 66.31 0  
 1147.75 66.31 58.3 1164 66.4 58.3 1200 66.45 58.3  
 1214 66.47 58.3 1252.25 66.4 58.3 1252.25 66.34 0  
 1264 66.3 1314 65.93 1364 64.36  
 1414 64.81 1464 64.51 1514 64.48  
 1564 64.72 1614 64.74 1664 66.02  
 1714 67.16 1764 68.42

Downstream Bridge Cross Section Data

Station Elevation Data num= 40  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 247.04 65.62 419.33 62.33 465.55 60.54 512.3 59.85 590.42 59.06  
 596.88 59.06 672.36 59.06 758.28 53.57 803.9 52.2 853.96 53.31  
 908.35 52.1 957.69 52.06 1007.05 52.35 1058.77 52.57 1103.2 52.27  
 1110.66 52.49 1129.01 52.49 1140.32 52.2 1143.96 51.7 1147.07 51.2  
 1151.37 50.5 1156.86 49.3 1165.1 47.4 1170.24 45.3 1178.66 44.7  
 1185.15 44.1 1190.35 43.9 1196.86 43.1 1202.11 43 1211.27 43.3  
 1216.31 43.6 1222 44.4 1226.76 44.3 1231.61 45.5 1238.51 45.7  
 1244.31 46.4 1250.34 47.3 1260.06 52.2 1504.49 59.06 1649.26 62.34

Manning's n Values

num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 247.04 .08 1143.96 .04 1260.06 .06

Bank Sta: Left Right Coeff Contr. Expan.

1143.96 1260.06 .5 .8  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 247.04 1146.75 58 F  
 1253.25 1649.26 63.7 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 Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy  
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow  
 Submerged Inlet Cd =  
 Submerged Inlet + Outlet Cd = .77

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

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 214978

INPUT

Description: Station 214978 - Downstream Face of Route One Bridge

Station Elevation Data num= 40

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
247.04	65.62	419.33	62.33	465.55	60.54	512.3	59.85	590.42	59.06
596.88	59.06	672.36	59.06	758.28	53.57	803.9	52.2	853.96	53.31
908.35	52.1	957.69	52.06	1007.05	52.35	1058.77	52.57	1103.2	52.27
1110.66	52.49	1129.01	52.49	1140.32	52.2	1143.96	51.7	1147.07	51.2
1151.37	50.5	1156.86	49.3	1165.1	47.4	1170.24	45.3	1178.66	44.7
1185.15	44.1	1190.35	43.9	1196.86	43.1	1202.11	43	1211.27	43.3
1216.31	43.6	1222	44.4	1226.76	44.3	1231.61	45.5	1238.51	45.7
1244.31	46.4	1250.34	47.3	1260.06	52.2	1504.49	59.06	1649.26	62.34

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
247.04	.08	1143.96	.04	1260.06	.06

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

1143.96	1260.06	93	93	93	.5	.8
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Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
247.04	1146.75	58	F
1253.25	1649.26	63.7	F

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 214885

INPUT

Description: Station 214885

Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	65.62	53.93	62.33	106.06	59.06	125.17	57.77	148.04	57.19
164.14	55.77	188.58	52.49	204.71	52.2	211.68	51.8	219.51	51.2
225.91	51.1	232.98	50.9	241.81	50.7	248	50.5	253.99	50.5
259.29	50.4	267.54	50.4	273.83	50.4	281.87	50.5	288.23	50.4
294.75	50.5	301.98	50.4	307.87	50.4	313.58	50.4	321	50.5
329.48	50.5	335.37	50.5	370.09	49.7	378.52	49.3	383.47	49.2
388.95	49.1	398.99	49	403.88	48.9	410.64	49	416.95	49.1
422.67	49.2	431.87	49.2	439.68	49.2	446.98	49.2	453.4	49.3
462.44	49.6	468.04	50.2	474.19	49.9	479.27	50.2	485.09	50.4
489.42	50.3	495.16	50.4	499.19	50.4	502.9	50.4	506.59	50.5
512.53	50.5	515.56	50.5	519.73	50.7	523.43	50.8	527.69	52.2
614.49	52.2	620.41	51.5	625.48	51.5	629.87	51.4	634.5	51.2
639	51.1	644.73	51.1	648.92	51.1	654.67	51	660.82	50.9
736.26	50.9	740.88	50.8	782.72	50.8	788.99	50.99	794.44	50.8
800.27	50.7	804.62	50.6	808.91	50.5	813.82	50.3	818.66	50.2

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823.54	50.2	829.2	49.7	834.09	46.4	839.7	43.2	847.57	43.2
853.5	43.3	859.24	42.9	868.34	42.8	873.8	43.1	881.36	42.8
887.02	45.7	892.38	46.7	898.35	48.9	903.36	50.4	909.21	50.5
913.37	52.2	1091.37	55.77	1199.73	59.06	1241.86	61.59		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	204.71	.04	913.37	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	204.71	913.37		160	140		.1	.3

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 214745

INPUT

Description: Station 214745

Station Elevation Data num= 159

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	65.62	184	62.34	276	59.06	415	56.73	438.7	55.76
460.25	55.77	478.15	52.49	500.06	52.2	505.35	51.2	507.97	51.2
510.53	51.2	513.75	51	517.54	51	522.12	50.9	527.44	50.3
532.29	50.1	537.61	49.6	542.73	49.8	550.5	49.7	555.7	49.8
561.82	50	567.27	50.2	573.16	50.4	579.51	50.8	583.96	51
588.7	51.2	592.31	52.2	602.31	52.4	645.42	52.4	672.99	52.2
676.1	51.2	679.34	50.8	683.38	50.7	687.23	50.6	692.01	50.5
696.57	50.5	701.09	50.5	705.27	50.4	713.07	49.6	719.54	49.3
724.66	49.2	731.33	49.2	736.45	49.2	742.38	49.2	747.45	49.1
753.29	49	759.43	49.1	769.18	49	774.44	48.9	780.35	49
789.63	48.9	794.94	49	805.79	49	813.42	49.1	819.05	49
824.23	49.2	832.77	49.2	838.04	49.3	847.18	49.5	852.86	49.6
858.71	49.6	865.12	49.5	869.18	49.5	874.21	49.5	879.36	49.5
883.58	49.5	888.95	49.5	894.02	49.7	899.21	49.9	904.42	49.9
908.97	50.3	914.17	50.4	918.4	50.5	922.9	50.6	927.29	50.7
930.74	50.8	939.94	50.8	943.01	50.8	949.28	50.8	955.22	50.8
962.03	50.8	967.75	50.8	972.33	50.8	978.12	50.7	984.32	50.7
990.67	50.7	996.45	50.6	1002.25	50.5	1008.04	50.5	1013.45	50.5
1018.9	50.5	1024.05	50.5	1029.22	50.6	1035.24	50.6	1042.69	50.5
1049.16	50.5	1053.36	50.4	1056.64	50.4	1060.77	50.4	1063.03	50.3
1065.57	50.1	1068.88	50.1	1072.23	49.5	1075.5	49	1078.94	48.2
1081.71	47.7	1085	47	1087.68	46.2	1090.62	44.9	1093.67	44.8
1096.67	44.7	1099.9	44.6	1102.57	44.5	1105.69	44.5	1107.95	44.3
1111.25	44.2	1114.95	44.2	1118.45	44.2	1121.63	44.2	1125.2	41.1
1128.07	44	1130.68	43.9	1133.87	43.9	1137.6	43.8	1141.72	45
1145.28	46.2	1149.56	46.5	1152.58	46.7	1155.95	47.1	1158.63	47.4
1161.92	47.6	1164.82	47.9	1167.32	48.1	1169.1	48.3	1170.9	48.8
1172.22	49.4	1173.91	49.8	1175.52	50.2	1177.81	50.5	1180.74	50.6
1182.9	50.7	1185.52	50.8	1187.41	50.9	1189.87	50.9	1192.5	50.9
1195.12	51	1198.87	51.1	1201.91	51.2	1205.58	51.1	1209.2	51
1212.6	51	1215.95	51	1219.25	51.2	1222.78	51.4	1225.91	51.5
1230.12	52.2	1320.94	52.69	1398.31	55.77	1502.21	59.06		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	500.06	.04	1230.12	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	500.06	1230.12		360	260		.1	.3

CROSS SECTION

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RIVER: Millstone River  
 REACH: Route One RS: 214485

INPUT

Description: Station 214485

Station Elevation Data num= 113									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	62.41	56	62.33	137.67	59.06	245.85	55.77	428.35	55.77
439.5	56.32	460.82	56.27	481.16	55.77	489.92	52.49	528.24	52.2
557.81	50.9	569.01	50.6	582.86	50.6	593.2	50.5	600.93	50.4
611.78	50.4	620.1	50.3	630.91	50.4	638.58	50.4	646.24	50.4
651.62	50.4	657.07	50.3	662.79	50.4	670.61	50.4	677.27	50.3
682.06	50.4	685.3	50.6	687.08	50.7	690.08	50.9	711.46	50.5
713.76	50.4	718.58	50.4	723.55	50.4	727.7	50.4	735.56	50.1
740.38	50.1	745.02	50	754.04	49.9	763.4	49.8	769.27	49.7
776.8	49.8	781.33	49.7	786.54	49.8	792.87	49.7	799.41	49.6
807.08	49.5	815.03	49.5	827.71	49.6	835.03	49.6	840.91	49.7
847.23	49.7	853.09	49.7	857.88	49.8	863.56	50.1	871.44	50.2
878.65	50.2	883.9	50.2	888.58	50.2	896.66	50.2	906.4	50.2
911.81	50.3	920.78	49.9	926.89	49.8	931.82	49.4	937.44	49
942.88	47.9	948.33	46.9	953.27	46.3	959.02	45.8	964.23	45.6
969.27	45.5	977.95	45.7	983.05	45.6	988.48	45.1	993.48	45.52
999.27	45.7	1004.8	46.3	1010.01	46.8	1014.79	46.8	1019.72	46.5
1024.6	46	1029.26	45.4	1034.45	45.3	1040.48	45.6	1045.5	46.2
1050.32	46.8	1055.06	47.2	1059.83	48.2	1064.93	50.3	1070.74	50.2
1079.99	50.3	1084.78	50.3	1089.55	50.3	1094.62	50.4	1103.22	50.5
1108.95	50.5	1115.75	50.5	1126.88	50.7	1134.67	50.7	1141.49	50.8
1150.17	50.8	1158.34	50.9	1165.69	51	1172.39	51	1182.92	51.1
1191.43	51.1	1198.59	52.2	1251.69	52.49	1325.43	55.77	1357.75	56.09
1383.15	55.83	1640.69	59.06	1703.03	62.34				

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.08	528.24	.04	1198.59	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	528.24	1198.59		695	570	.1	.3

CROSS SECTION

RIVER: Millstone River  
 REACH: Route One RS: 213915

INPUT

Description: Station 213915

Station Elevation Data num= 118									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	59.05	365	57.87	441.54	55.77	501.66	52.49	521.37	52.06
549.69	52.2	558.41	49.9	563.97	49.7	574.83	49.7	579.97	49
586.54	49.7	597.68	49.7	603.78	50	612.2	49.9	621.78	50
627.22	50	633.97	49.9	643.2	49.7	652.38	49.9	659.21	49.9
664.97	49.7	673.09	49.8	682.04	49.7	690.5	49.9	695.56	49.9
700.82	49.7	705.94	49.9	716.37	50.2	726.33	50	735.07	50
743.68	50.2	751.22	50.4	756.49	50.2	762.14	50.3	769.89	50.3
777.01	50	782.51	50.1	788.81	50	799.76	49.9	805.83	49.7
811.47	49.1	816.43	48.4	821.57	47.8	826.96	46.9	831.82	46.3
836.99	46.2	842.28	45	850.11	44	855.21	44.1	860.39	44.8
865.51	45.1	870.44	45.4	875.58	46.1	880.45	47	885.79	48.3
891.07	49.1	897.1	49.3	903.13	49.7	907.96	50.2	913.57	50.3
919.34	50.4	925.59	50.5	930.53	50.4	941.35	50.4	948.85	50.5
953.99	50.3	960.52	50.3	966.17	50.1	971.55	50.2	976.34	50.1
984.97	50.1	993.43	49.8	999.9	49.7	1004.7	49.5	1010.76	49.1

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1015.87	48.9	1021.03	48.6	1032.33	48.3	1040.35	48.2	1049.7	48.1
1056.21	47.9	1061.96	48	1067.9	48.2	1077.23	48.1	1087.26	48.2
1093.78	48.3	1099.42	48.4	1104.79	48.5	1113.8	48.6	1122.75	49
1128.33	49.2	1137.18	49.4	1145.16	49.3	1152.19	49.3	1157.43	49.2
1162.63	49	1168.71	48.9	1175.77	48.8	1180.63	48.6	1187.69	48.4
1196.81	48.1	1203.22	47.7	1210.21	47.9	1215.22	48.1	1220.14	48.6
1225.02	49.3	1231.62	52.2	1246.98	54.3	1267.64	54.86	1295.34	55.77
1366.74	59.06	1663.74	62.3	1820.74	63.5	1838.9	63.75	1850.88	65.62
1860.55	68.9	1872.8	72.18	1893.25	75.5				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	549.69	.04	1231.62	.06

Bank Sta:	Left	Right	Lengths:	Left	Channel	Right	Coeff	Contr.	Expan.
	549.69	1231.62		0	0	0		.1	.3

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SUMMARY OF MANNING'S N VALUES

River: Millstone River

* Reach	* River Sta.	* n1	* n2	* n3
*Route One	* 221060	* .1*	* .04*	* .1*
*Route One	* 219400	* .09*	* .04*	* .09*
*Route One	* 218500	* .09*	* .04*	* .09*
*Route One	* 217440	* .09*	* .04*	* .09*
*Route One	* 216240	* .09*	* .04*	* .09*
*Route One	* 216110	* .08*	* .04*	* .06*
*Route One	* 215610	* .08*	* .04*	* .07*
*Route One	* 215355	* .08*	* .04*	* .07*
*Route One	* 215205	* .08*	* .04*	* .07*
*Route One	* 215112	* .08*	* .04*	* .08*
*Route One	* 215045	*Bridge	*	*
*Route One	* 214978	* .08*	* .04*	* .06*
*Route One	* 214885	* .08*	* .04*	* .06*
*Route One	* 214745	* .08*	* .04*	* .06*
*Route One	* 214485	* .08*	* .04*	* .06*
*Route One	* 213915	* .08*	* .04*	* .06*

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SUMMARY OF REACH LENGTHS

River: Millstone River

* Reach	* River Sta.	* Left	* Channel	* Right
*Route One	* 221060	* 1300*	* 1660*	* 1300*
*Route One	* 219400	* 920*	* 900*	* 700*
*Route One	* 218500	* 900*	* 1060*	* 1110*
*Route One	* 217440	* 1080*	* 1200*	* 1270*
*Route One	* 216240	* 130*	* 130*	* 130*
*Route One	* 216110	* 500*	* 500*	* 500*
*Route One	* 215610	* 255*	* 255*	* 255*
*Route One	* 215355	* 150*	* 150*	* 150*
*Route One	* 215205	* 93*	* 93*	* 93*
*Route One	* 215112	* 134*	* 134*	* 134*
*Route One	* 215045	*Bridge	*	*
*Route One	* 214978	* 93*	* 93*	* 93*
*Route One	* 214885	* 160*	* 140*	* 120*
*Route One	* 214745	* 360*	* 260*	* 230*
*Route One	* 214485	* 695*	* 570*	* 495*

\*Route One \* 213915 \* 0\* 0\* 0\*  
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SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS  
River: Millstone River

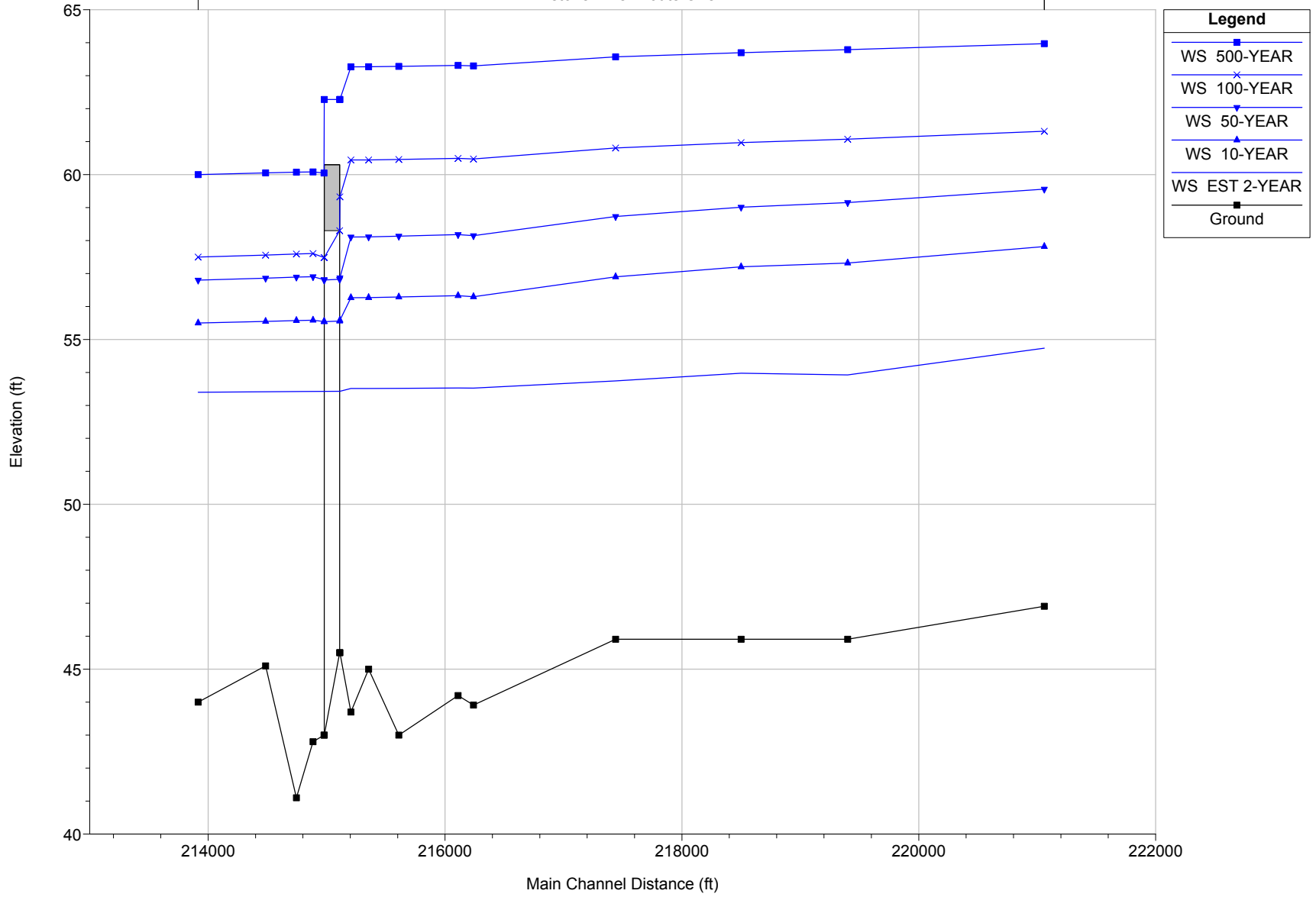
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* Reach	* River Sta.	* Contr.	* Expan.
*Route One	* 221060	* .1*	* .3*
*Route One	* 219400	* .1*	* .3*
*Route One	* 218500	* .1*	* .3*
*Route One	* 217440	* .1*	* .3*
*Route One	* 216240	* .1*	* .3*
*Route One	* 216110	* .1*	* .3*
*Route One	* 215610	* .1*	* .3*
*Route One	* 215355	* .1*	* .3*
*Route One	* 215205	* .5*	* .8*
*Route One	* 215112	* .1*	* .3*
*Route One	* 215045	*Bridge	* *
*Route One	* 214978	* .5*	* .8*
*Route One	* 214885	* .1*	* .3*
*Route One	* 214745	* .1*	* .3*
*Route One	* 214485	* .1*	* .3*
*Route One	* 213915	* .1*	* .3*

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Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

Millstone River Route One





HEC-RAS Plan: SWMEXFEMA2-500RA River: Millstone River Reach: Route One

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Route One	213915	EST 2-YEAR	1253.00	44.00	53.40	48.39	53.40	0.000019	0.42	3006.60	755.42	0.04
Route One	213915	10-YEAR	4885.00	44.00	55.50	50.13	55.52	0.000074	1.10	4669.50	840.63	0.08
Route One	213915	50-YEAR	7570.00	44.00	56.80	50.63	56.83	0.000094	1.40	5808.50	913.69	0.09
Route One	213915	100-YEAR	9030.00	44.00	57.50	50.80	57.54	0.000099	1.53	6462.34	954.40	0.09
Route One	213915	500-YEAR	12950.00	44.00	60.00	51.32	60.04	0.000081	1.64	9540.38	1452.91	0.09
Route One	214485	EST 2-YEAR	1253.00	45.10	53.41		53.42	0.000029	0.48	2670.19	784.97	0.04
Route One	214485	10-YEAR	4885.00	45.10	55.55		55.57	0.000094	1.18	4401.90	838.63	0.09
Route One	214485	50-YEAR	7570.00	45.10	56.86		56.89	0.000114	1.48	5858.92	1254.92	0.10
Route One	214485	100-YEAR	9030.00	45.10	57.56		57.60	0.000115	1.59	6768.59	1334.05	0.10
Route One	214485	500-YEAR	12950.00	45.10	60.05		60.09	0.000082	1.61	10408.08	1546.61	0.09
Route One	214745	EST 2-YEAR	1253.00	41.10	53.42		53.42	0.000028	0.47	2778.69	866.21	0.04
Route One	214745	10-YEAR	4885.00	41.10	55.57		55.59	0.000087	1.11	4713.38	932.00	0.08
Route One	214745	50-YEAR	7570.00	41.10	56.89		56.92	0.000102	1.38	6009.03	1028.20	0.09
Route One	214745	100-YEAR	9030.00	41.10	57.59		57.63	0.000105	1.49	6754.22	1092.33	0.09
Route One	214745	500-YEAR	12950.00	41.10	60.07		60.11	0.000080	1.56	9711.96	1254.63	0.09
Route One	214885	EST 2-YEAR	1253.00	42.80	53.42		53.43	0.000039	0.52	2448.68	792.79	0.05
Route One	214885	10-YEAR	4885.00	42.80	55.58		55.61	0.000110	1.21	4293.60	916.51	0.09
Route One	214885	50-YEAR	7570.00	42.80	56.90		56.94	0.000125	1.49	5544.21	977.35	0.10
Route One	214885	100-YEAR	9030.00	42.80	57.60		57.64	0.000126	1.60	6244.46	1020.13	0.10
Route One	214885	500-YEAR	12950.00	42.80	60.08		60.12	0.000094	1.67	8919.02	1126.96	0.09
Route One	214978	EST 2-YEAR	1253.00	43.00	53.42	46.36	53.46	0.000104	1.49	841.45	540.51	0.09
Route One	214978	10-YEAR	4885.00	43.00	55.54	49.32	55.87	0.000717	4.58	1067.19	651.79	0.25
Route One	214978	50-YEAR	7570.00	43.00	56.81	50.87	57.43	0.001157	6.30	1202.29	716.84	0.33
Route One	214978	100-YEAR	9030.00	43.00	57.48	51.59	58.26	0.001358	7.09	1273.86	751.31	0.36
Route One	214978	500-YEAR	12950.00	43.00	60.05	53.24	60.34	0.000598	5.32	4936.05	1049.28	0.25
Route One	215045		Bridge									
Route One	215112	EST 2-YEAR	1253.00	45.50	53.43	48.80	53.49	0.000237	1.90	658.25	137.82	0.13
Route One	215112	10-YEAR	4885.00	45.50	55.58	51.28	56.05	0.001332	5.51	887.16	237.07	0.34
Route One	215112	50-YEAR	7570.00	45.50	56.87	52.64	57.72	0.001980	7.39	1024.40	327.42	0.42
Route One	215112	100-YEAR	9030.00	45.50	59.33	53.31	60.09	0.001320	7.02	1286.12	441.17	0.36
Route One	215112	500-YEAR	12950.00	45.50	62.28	54.97	62.96	0.001014	7.09	3195.86	1209.46	0.32
Route One	215205	EST 2-YEAR	1253.00	43.70	53.51		53.52	0.000010	0.43	2978.34	499.39	0.03
Route One	215205	10-YEAR	4885.00	43.70	56.27		56.29	0.000048	1.17	4628.04	710.22	0.07
Route One	215205	50-YEAR	7570.00	43.70	58.11		58.14	0.000061	1.49	6104.64	894.30	0.08

HEC-RAS Plan: SWMEXFEMA2-500RA River: Millstone River Reach: Route One (Continued)

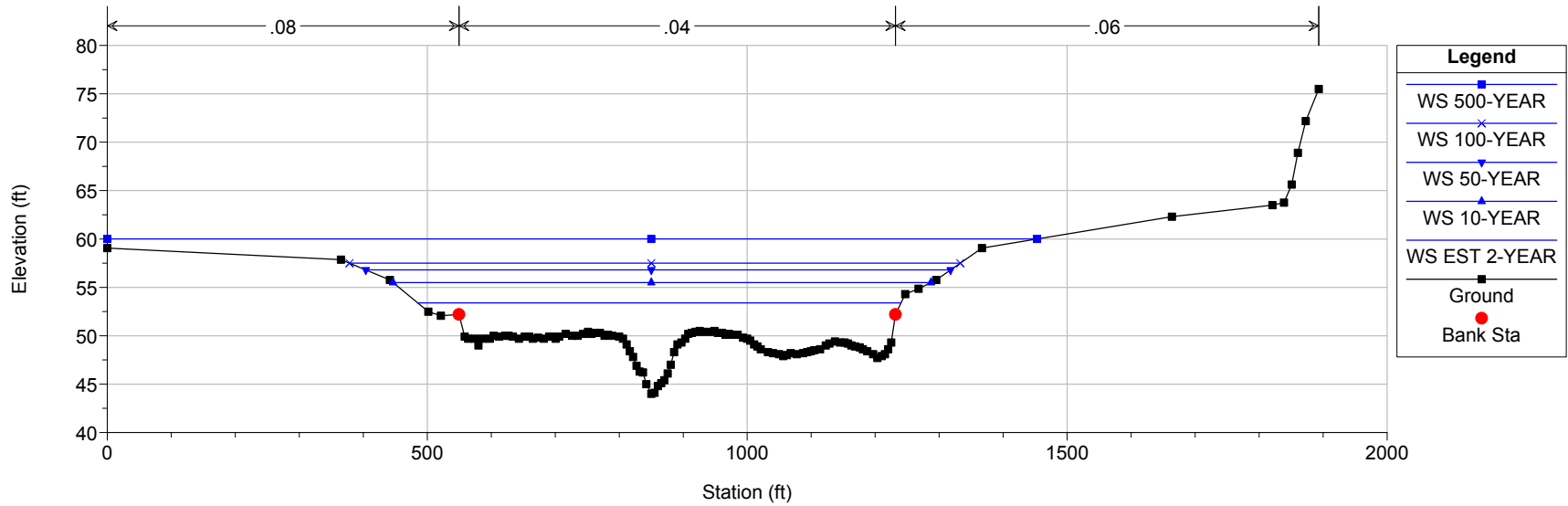
Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Route One	215205	100-YEAR	9030.00	43.70	60.44		60.47	0.000043	1.40	8395.42	1025.00	0.07
Route One	215205	500-YEAR	12950.00	43.70	63.27		63.30	0.000043	1.60	11496.57	1264.90	0.07
Route One	215355	EST 2-YEAR	1253.00	45.00	53.51		53.52	0.000018	0.53	2420.46	456.40	0.04
Route One	215355	10-YEAR	4885.00	45.00	56.27		56.30	0.000076	1.38	3887.51	637.30	0.08
Route One	215355	50-YEAR	7570.00	45.00	58.11		58.15	0.000092	1.72	5270.85	865.78	0.09
Route One	215355	100-YEAR	9030.00	45.00	60.45		60.48	0.000060	1.59	7558.80	1051.71	0.08
Route One	215355	500-YEAR	12950.00	45.00	63.27		63.31	0.000056	1.75	10735.69	1211.28	0.08
Route One	215610	EST 2-YEAR	1253.00	43.00	53.52		53.52	0.000015	0.51	2483.53	439.89	0.03
Route One	215610	10-YEAR	4885.00	43.00	56.29		56.32	0.000069	1.39	3946.48	626.12	0.08
Route One	215610	50-YEAR	7570.00	43.00	58.13		58.18	0.000087	1.75	5248.09	785.42	0.09
Route One	215610	100-YEAR	9030.00	43.00	60.46		60.50	0.000060	1.65	7288.98	957.52	0.08
Route One	215610	500-YEAR	12950.00	43.00	63.28		63.33	0.000058	1.83	10253.80	1142.40	0.08
Route One	216110	EST 2-YEAR	1253.00	44.20	53.53		53.53	0.000048	0.69	1868.91	484.87	0.06
Route One	216110	10-YEAR	4885.00	44.20	56.33		56.37	0.000131	1.58	3400.71	606.38	0.10
Route One	216110	50-YEAR	7570.00	44.20	58.18		58.23	0.000138	1.89	4590.94	678.56	0.11
Route One	216110	100-YEAR	9030.00	44.20	60.49		60.53	0.000087	1.74	6311.94	837.67	0.09
Route One	216110	500-YEAR	12950.00	44.20	63.31		63.36	0.000077	1.90	9027.25	1094.80	0.09
Route One	216240	EST 2-YEAR	1253.00	43.91	53.52		53.55	0.000108	1.29	973.78	236.04	0.09
Route One	216240	10-YEAR	4885.00	43.91	56.30		56.42	0.000372	3.00	2569.01	692.24	0.18
Route One	216240	50-YEAR	7570.00	43.91	58.15		58.29	0.000375	3.42	3971.24	824.17	0.18
Route One	216240	100-YEAR	9030.00	43.91	60.47		60.57	0.000214	2.95	6081.48	990.13	0.14
Route One	216240	500-YEAR	12950.00	43.91	63.30		63.39	0.000177	3.06	9198.75	1242.97	0.14
Route One	217440	EST 2-YEAR	1253.00	45.91	53.74		53.86	0.000875	3.03	850.97	601.77	0.24
Route One	217440	10-YEAR	4885.00	45.91	56.90		57.01	0.000733	3.84	3200.19	866.76	0.24
Route One	217440	50-YEAR	7570.00	45.91	58.73		58.83	0.000589	3.95	4915.69	1008.55	0.22
Route One	217440	100-YEAR	9030.00	45.91	60.81		60.87	0.000315	3.29	7175.55	1169.38	0.17
Route One	217440	500-YEAR	12950.00	45.91	63.57		63.62	0.000227	3.21	10655.43	1324.17	0.15
Route One	218500	EST 2-YEAR	1253.00	45.91	53.98		53.98	0.000040	0.65	1917.67	430.89	0.05
Route One	218500	10-YEAR	4885.00	45.91	57.20		57.23	0.000099	1.46	3917.52	809.06	0.09
Route One	218500	50-YEAR	7570.00	45.91	59.01		59.05	0.000111	1.77	5571.75	1021.01	0.10
Route One	218500	100-YEAR	9030.00	45.91	60.97		61.01	0.000077	1.67	7800.95	1251.06	0.09
Route One	218500	500-YEAR	12950.00	45.91	63.70		63.74	0.000068	1.81	11663.37	1588.79	0.08
Route One	219400	EST 2-YEAR	1253.00	45.91	53.92		54.16	0.001943	3.98	429.96	546.55	0.34
Route One	219400	10-YEAR	4885.00	45.91	57.32		57.47	0.001025	4.31	2936.85	931.01	0.28

HEC-RAS Plan: SWMEXFEMA2-500RA River: Millstone River Reach: Route One (Continued)

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Route One	219400	50-YEAR	7570.00	45.91	59.15		59.27	0.000746	4.25	4836.27	1138.94	0.24
Route One	219400	100-YEAR	9030.00	45.91	61.07		61.14	0.000392	3.49	7233.59	1356.62	0.18
Route One	219400	500-YEAR	12950.00	45.91	63.79		63.84	0.000265	3.31	11373.34	1705.57	0.16
Route One	221060	EST 2-YEAR	1253.00	46.91	54.74		54.75	0.000150	1.35	3651.03	2150.23	0.10
Route One	221060	10-YEAR	4885.00	46.91	57.82		57.82	0.000106	1.54	10709.37	2432.07	0.09
Route One	221060	50-YEAR	7570.00	46.91	59.56		59.57	0.000092	1.63	15081.51	2591.32	0.09
Route One	221060	100-YEAR	9030.00	46.91	61.31		61.32	0.000059	1.45	19772.98	2751.98	0.07
Route One	221060	500-YEAR	12950.00	46.91	63.97		63.97	0.000047	1.47	27402.88	2994.91	0.07

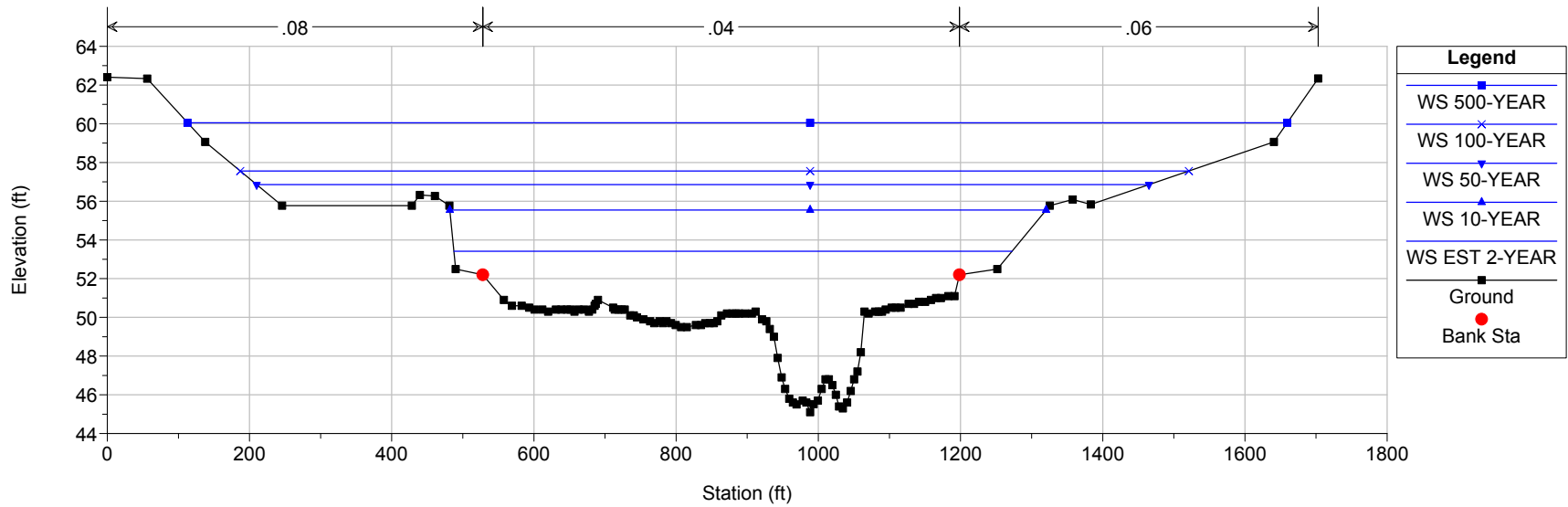
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 213915 Station 213915



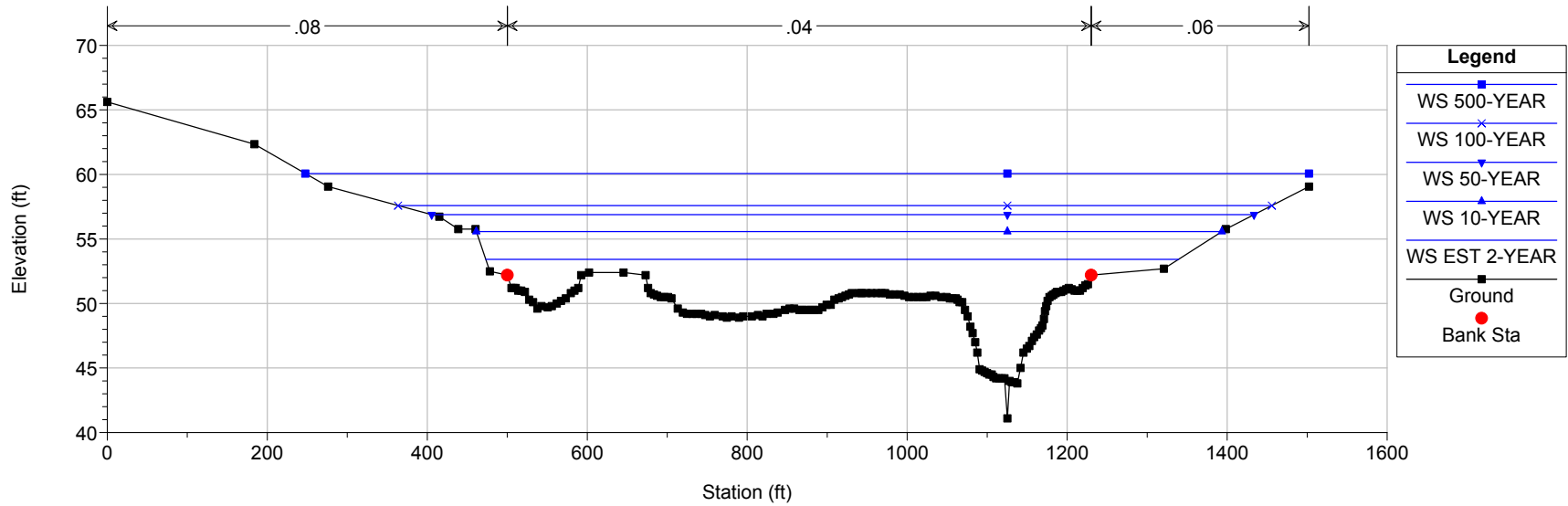
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 214485 Station 214485



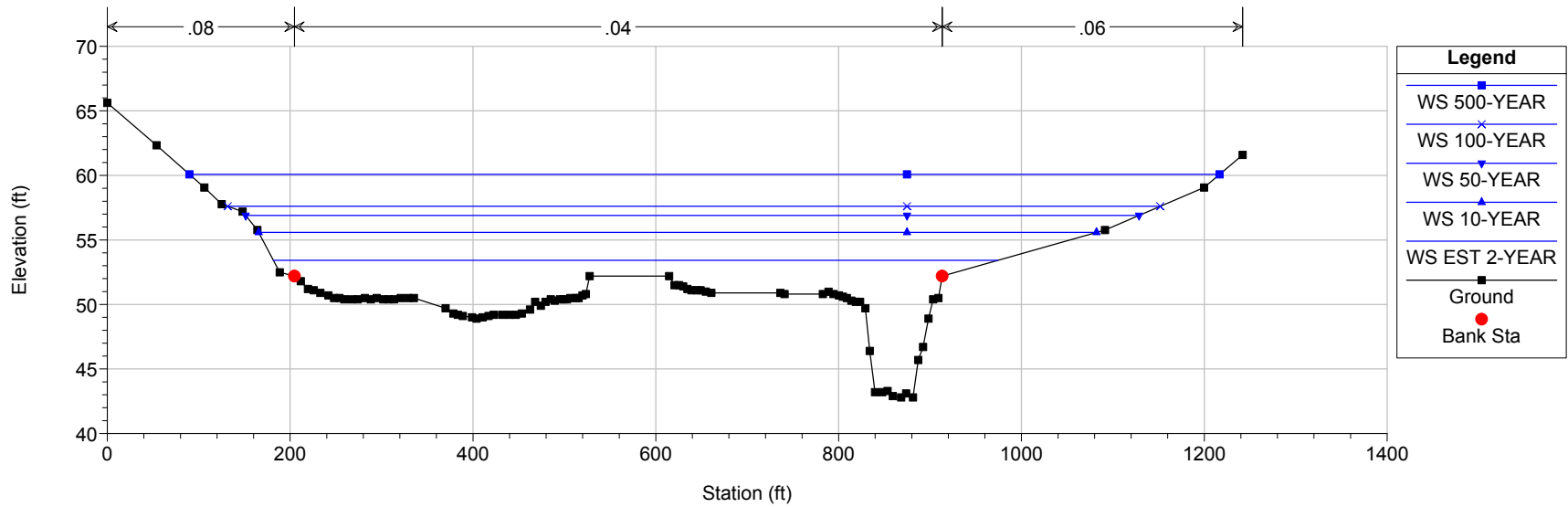
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 214745 Station 214745

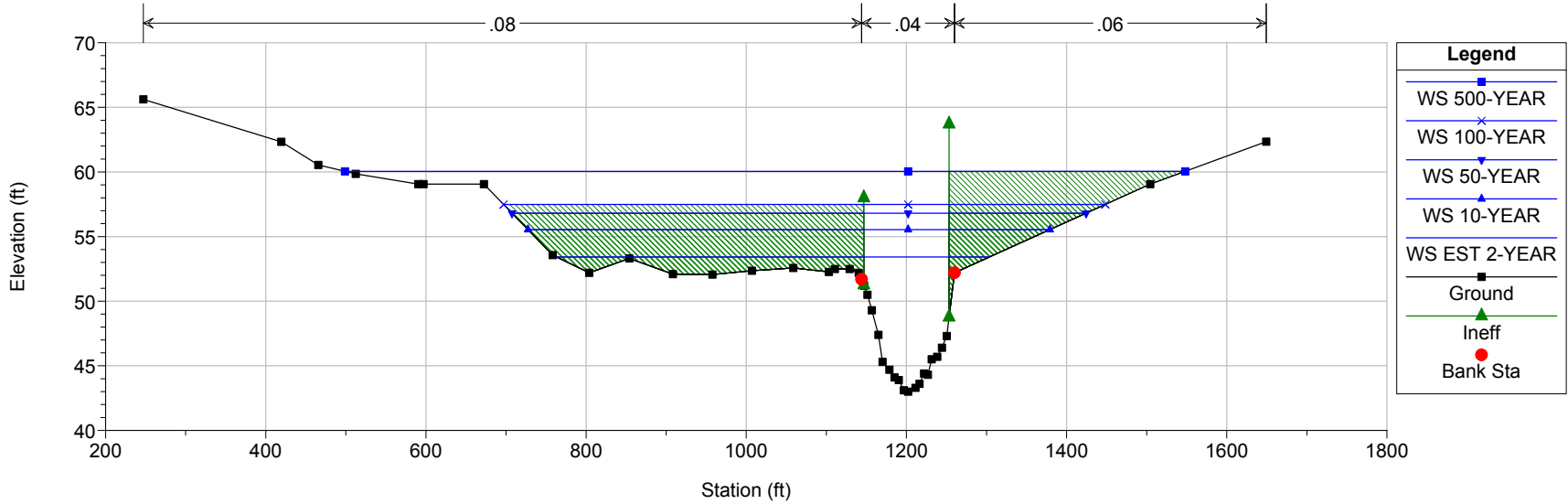


Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

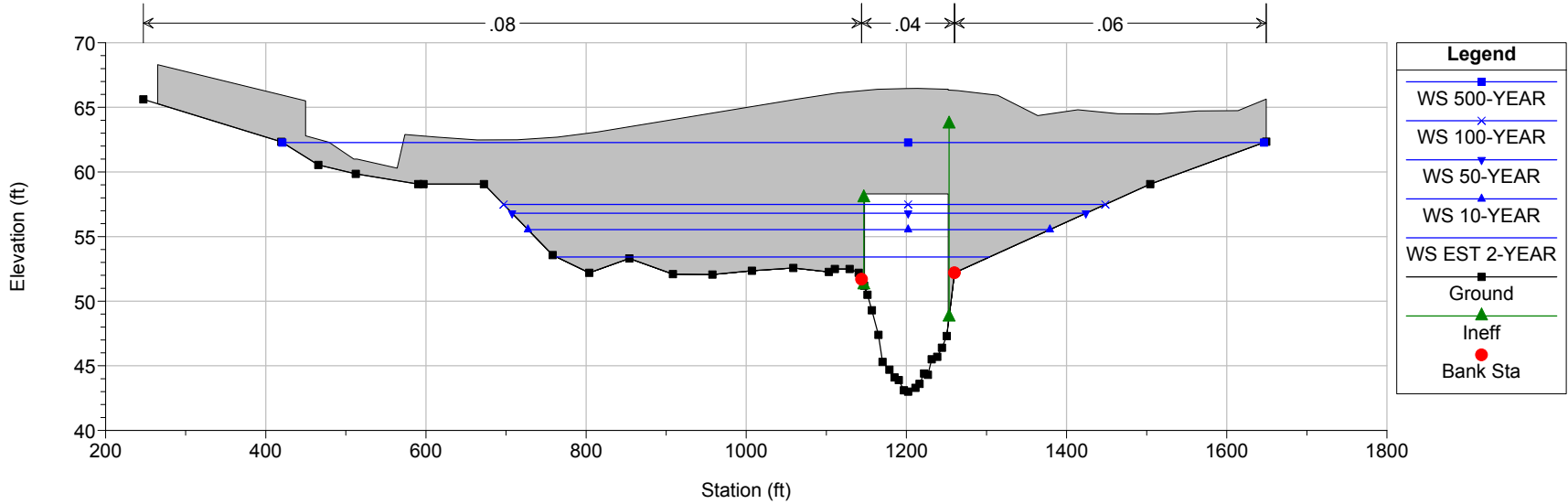
River = Millstone River Reach = Route One RS = 214885 Station 214885



Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015  
 River = Millstone River Reach = Route One RS = 214978 Station 214978 - Downstream Face of Route One Bridge

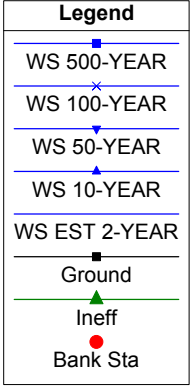
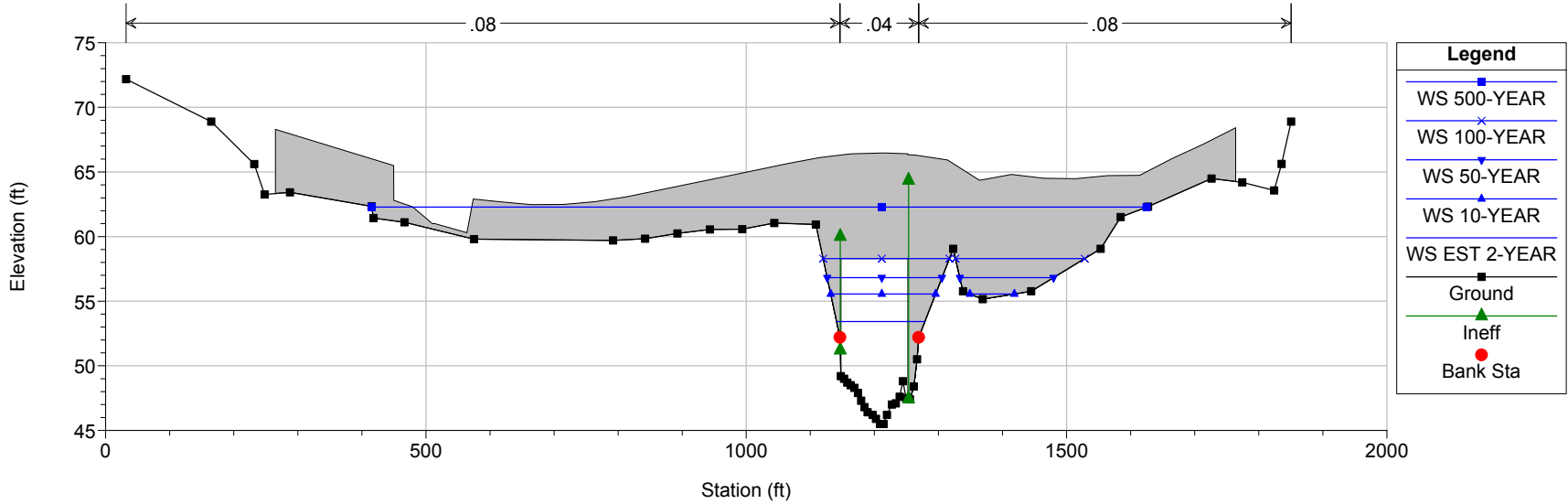


Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015  
 River = Millstone River Reach = Route One RS = 215045 BR



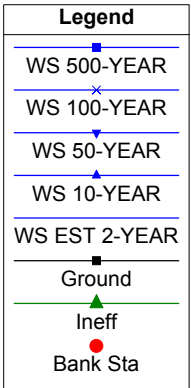
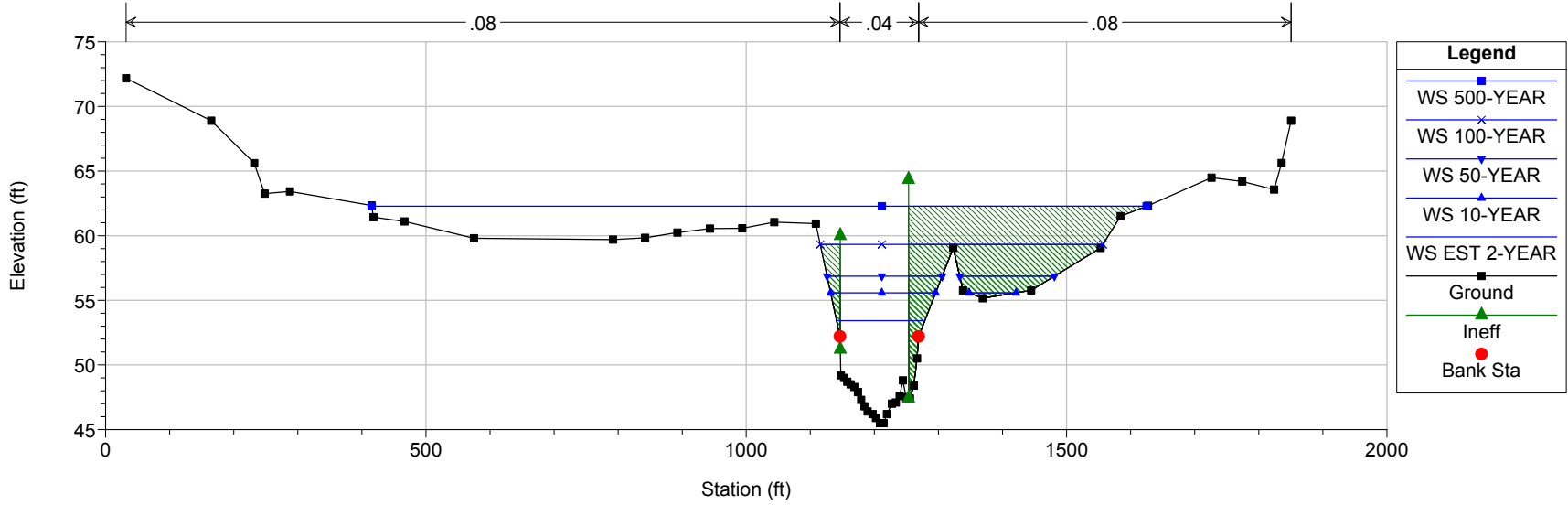
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 215045 BR



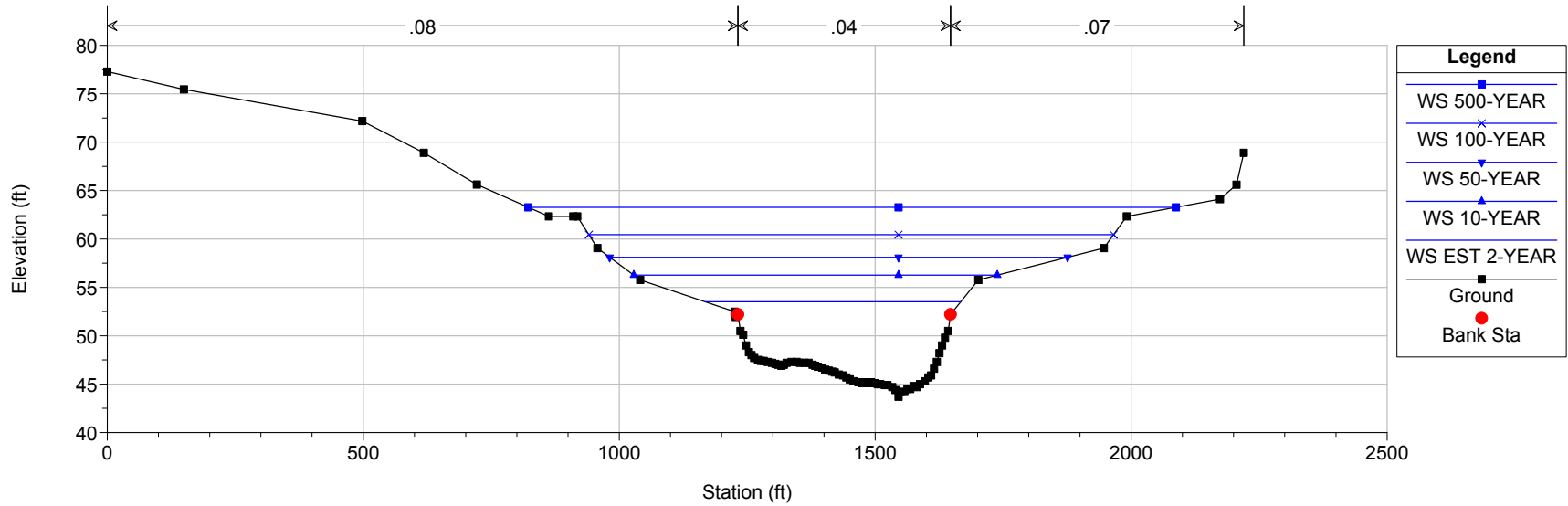
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 215112 Station 215112 - Upstream Face of Route One Bridge



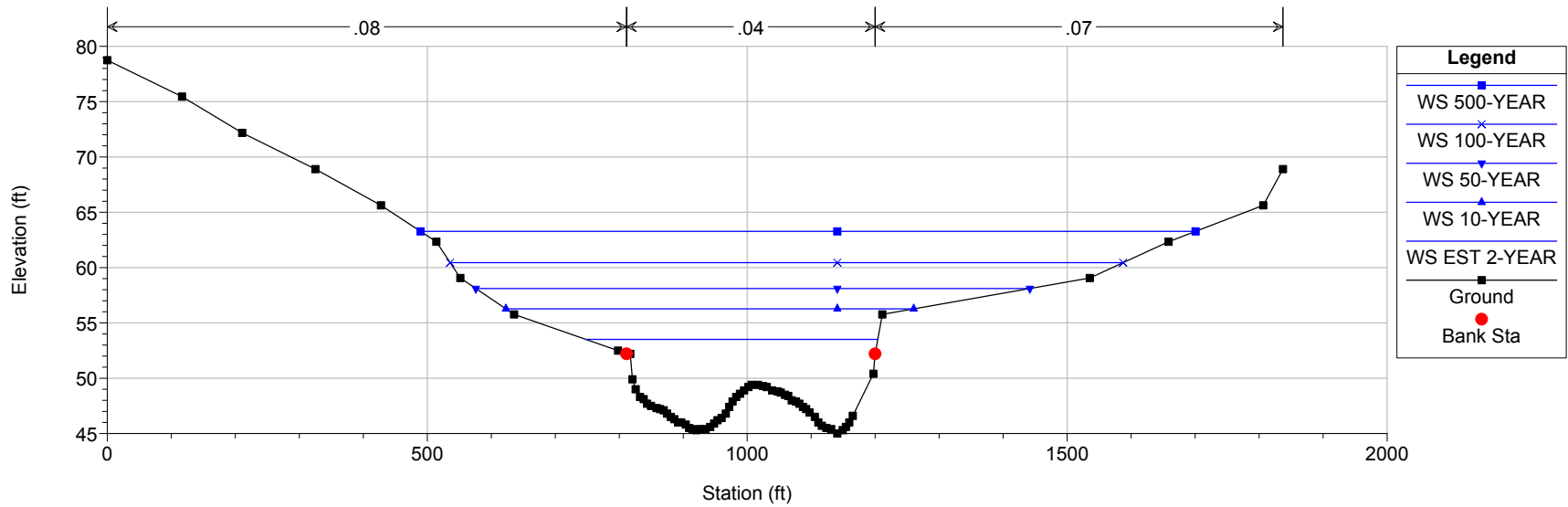
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 215205 Station 215205



Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

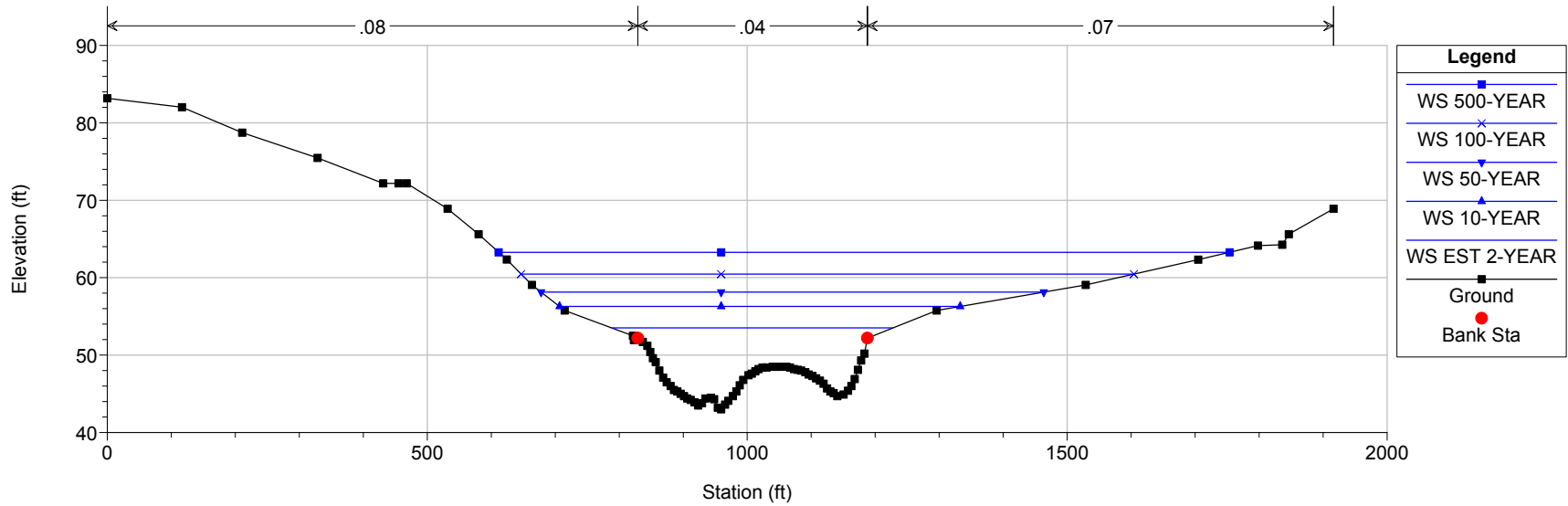
River = Millstone River Reach = Route One RS = 215355 Station 215355





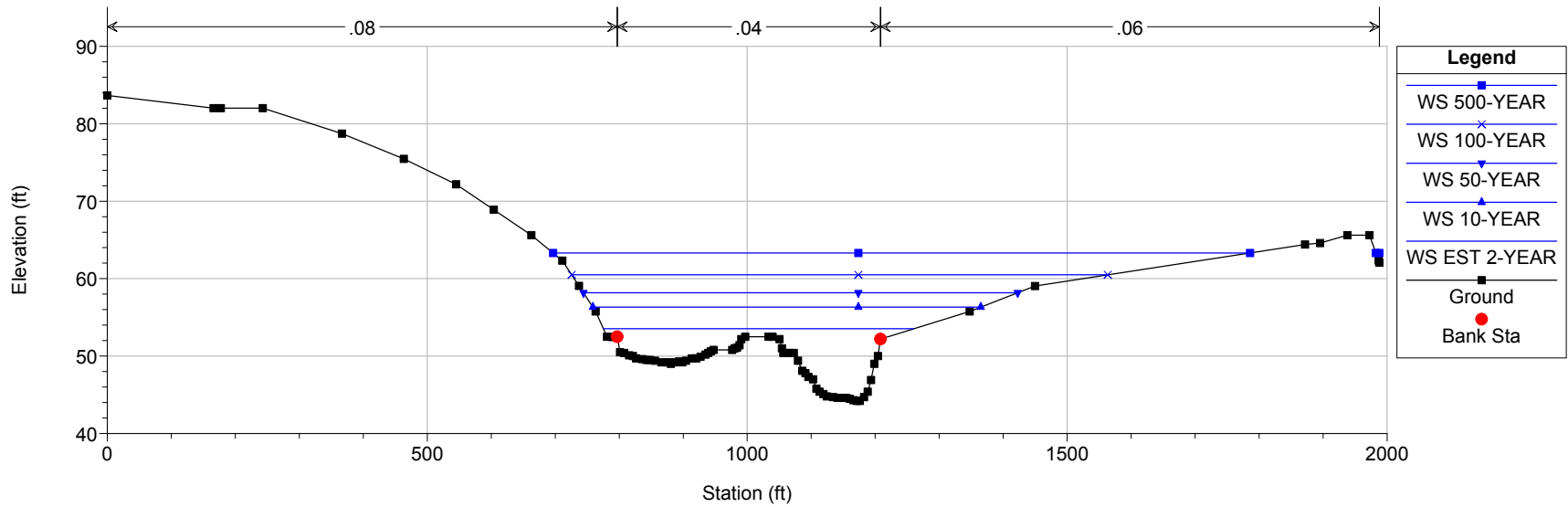
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 215610 Station 215610



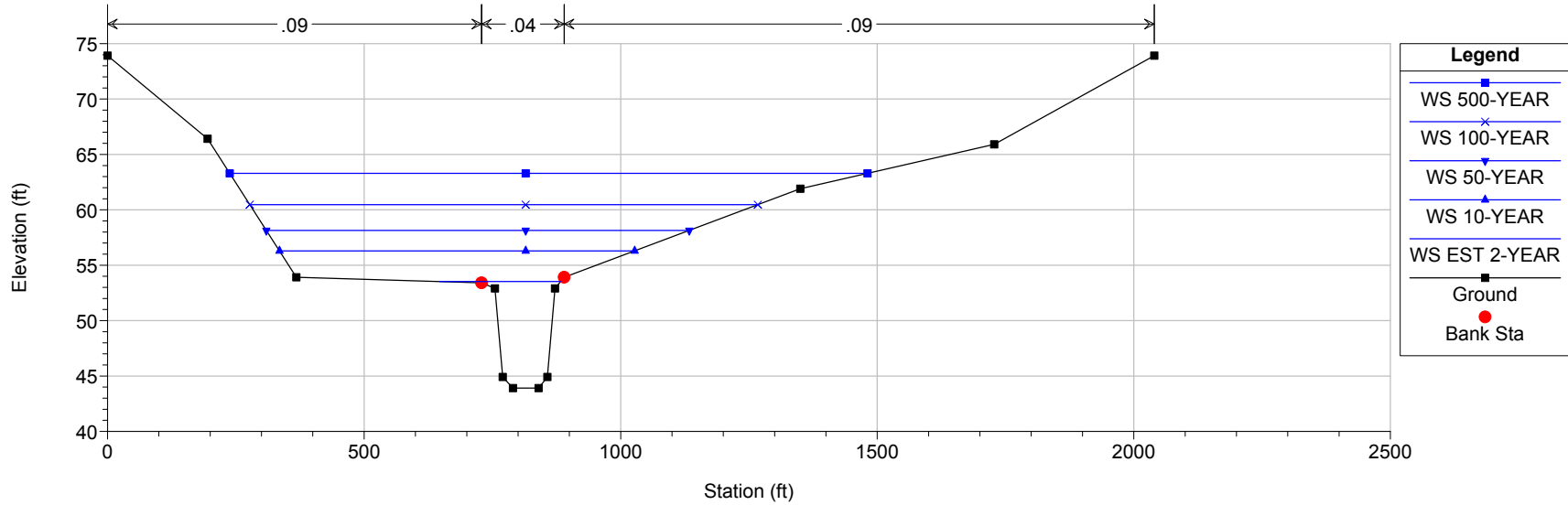
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 216110 Station 216110



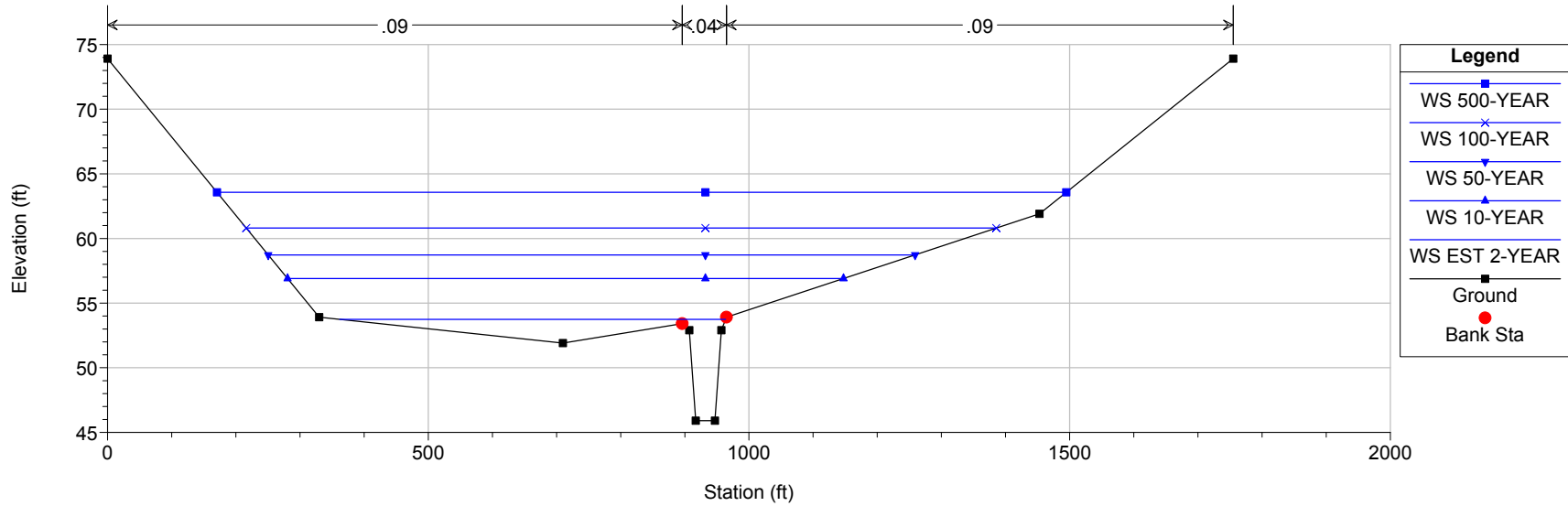
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 216240 Station 216240



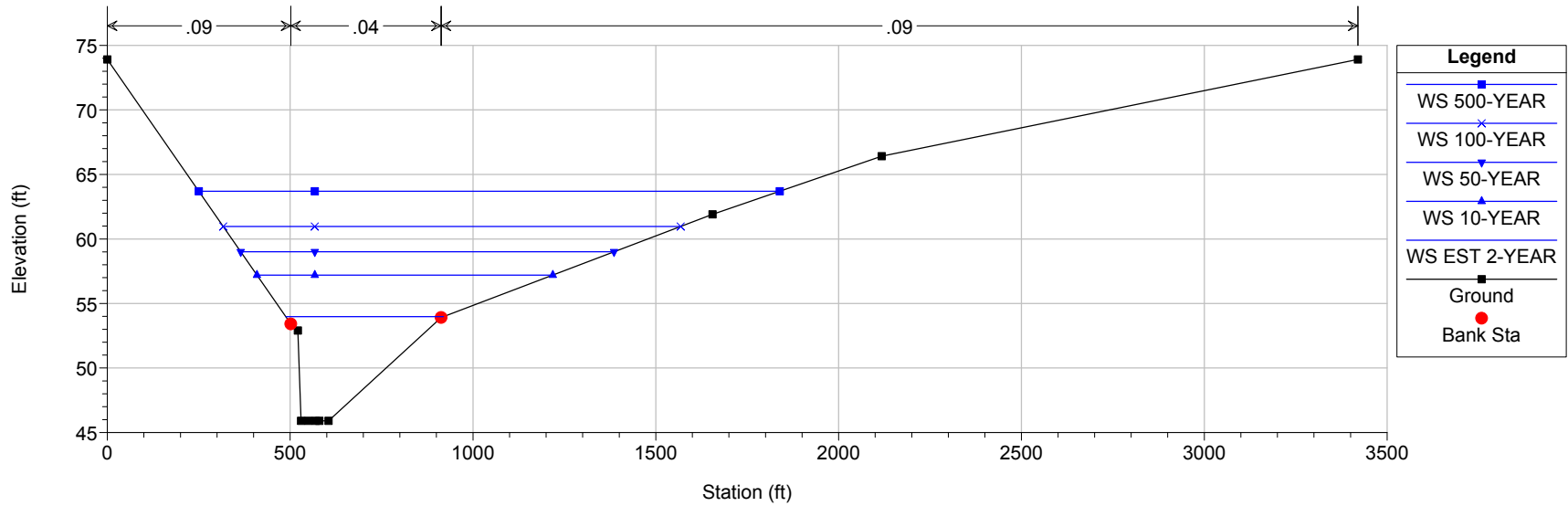
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 217440 Station 217440



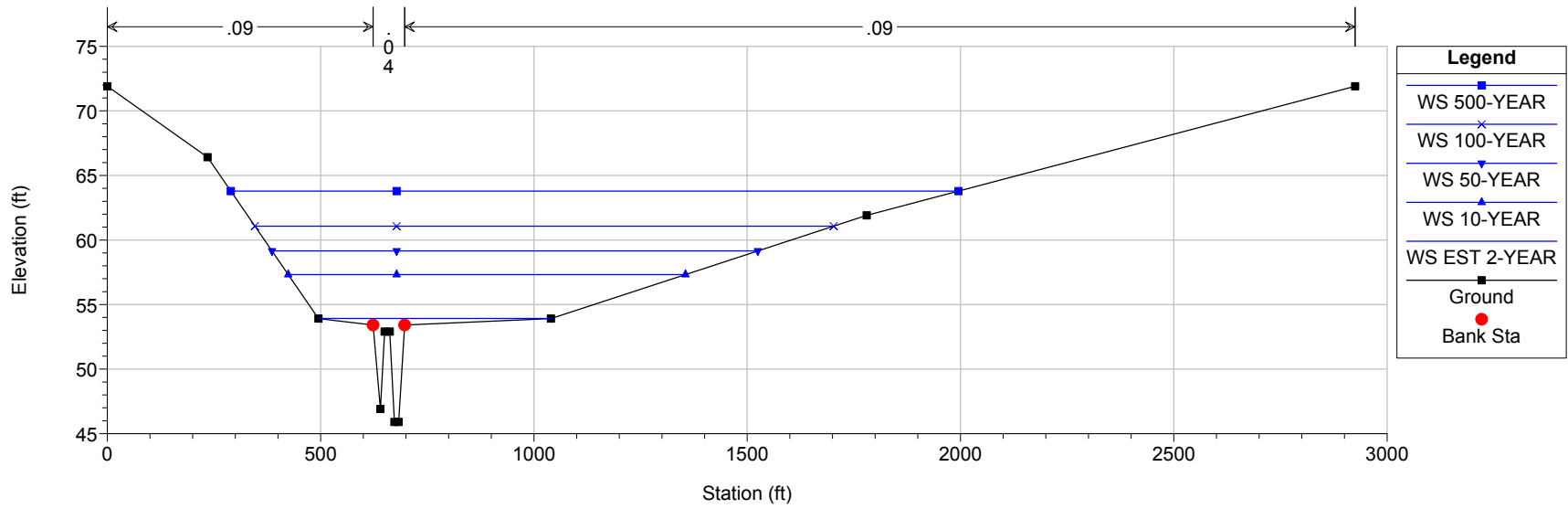
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 218500 Station 218500



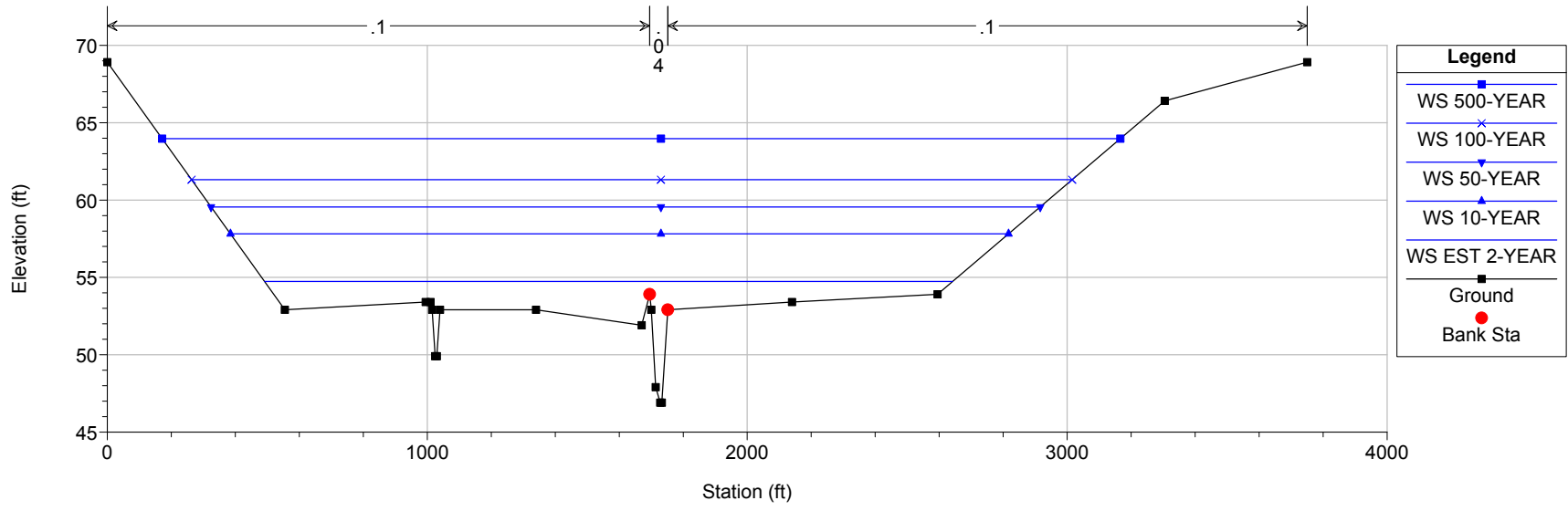
Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 219400 Station 219400



Millstone River Analysis Plan: SWM - FEMA 2- 500 Year - Exist - Rating 4/17/2015

River = Millstone River Reach = Route One RS = 221060 Station 221060



**HEC-RAS Unsteady Flow Model of Little Bear Brook**

LittleBearBrook.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   X
XXXXXXXX XXXX   X       XXX XXXX XXXXXX XXXX
X   X X       X       X   X   X   X       X
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PROJECT DATA

Project Title: SWM - Little Bear Brook  
Project File : LittleBearBrook.prj  
Run Date and Time: 4/20/2015 4:39:31 PM

Project in English units

Project Description:

SWM Flood Mitigation Analysis of Little Bear Brook

\*\*\*\*\*

PLAN DATA

Plan Title: 10-YEAR UNSTEADY IFAS - 1-8-15

Plan File : c:\Users\Joe\Documents\West Windsor Little Bear Brook and Regional SWM Plan\HEC-RAS\Little Bear Brook\LittleBearBrook.p34

Geometry Title: Updated Unsteady LBB - Int - IFAs 1-8-15

Geometry File : c:\Users\Joe\Documents\West Windsor Little Bear Brook and Regional SWM Plan\HEC-RAS\Little Bear Brook\LittleBearBrook.g14

Flow Title :  
Flow File :

Plan Description:

10-Year Unsteady Flow Model of LBB.  
FEMA/NJDEP HEC-2 Cross Sections with  
Interpolated Sections Added.  
Revised Washington and Alexander Road Bridges  
Based Upon Project Topo, Township Plans, and Field Measurements.  
Revised  
Contraction and Expansion Coefficients.

January 8, 215

Plan Summary Information:

Number of: Cross Sections	=	40	Multiple Openings	=	0
Culverts	=	0	Inline Structures	=	0
Bridges	=	3	Lateral Structures	=	0

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculation tolerance	=	0.01
Maximum number of iterations	=	20

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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

\*\*\*\*\*

GEOMETRY DATA

Geometry Title: Updated Unsteady LBB - Int - IFAs 1-8-15  
Geometry File : c:\Users\Joe\Documents\West Windsor\Little Bear Brook and Regional SWM Plan\HEC-RAS\Little Bear Brook\LittleBearBrook.g14

CROSS SECTION

RIVER: RIVER-1  
REACH: Reach-1 RS: 3098

INPUT

Description: Profile Station 12081

Adjusted Top of Right Bank

Station Elevation Data num= 18									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	70.9	1138	68.9	1539	64.9	1840	60.9	2725	58.9
2780	58.4	2780	55.9	2786	55.8	2787.5	55.6	2789	55.8
2790	55.9	2892	58.4	2910	58.9	3013	60.9	3675	62.9
4155	64.9	4330	66.9	4410	68.9				

Manning's n Values

num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2780	.035	2790	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	2780	2790	446.67	421	436.67	.1	.3	

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
REACH: Reach-1 RS: 3097.66\*

INPUT

Description:

Station Elevation Data num= 25									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	70.9	1140.33	69.08	1387.17	66.62	1548.08	64.88	1853.7	60.9
1854.16	60.9	2708.37	58.97	2754.07	58.45	2810	57.57	2810	55.9
2815.33	55.75	2816.67	55.6	2818.87	55.76	2819.72	55.81	2820.33	55.9
2922.52	57.92	2940.56	58.32	3043.75	60.01	3108.27	60.36	3327.46	61.47
3666.21	62.82	3706.97	63.04	4187.86	66.02	4363.19	67.96	4443.33	69.57

Manning's n Values

num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2810	.035	2820.33	.11

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Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2810 2820.33 446.67 421 436.67 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3097.33\*

INPUT

Description:

Station Elevation Data num= 25  

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	70.9	1142.65	69.27	1393.58	66.76	1557.17	64.85	1867.85	60.9
1868.31	60.9	2736.68	58.93	2783.15	58	2840	56.73	2840	55.9
2844.67	55.71	2845.83	55.6	2848.73	55.71	2849.86	55.75	2850.67	55.9
2953.04	57.44	2971.11	57.74	3074.49	59.12	3139.13	59.63	3358.73	61.19
3698.1	62.86	3738.94	63.18	4220.72	67.15	4396.37	69.02	4476.67	70.23

Manning's n Values num= 3  

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2840	.035	2850.67	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2840 2850.67 446.67 421 436.67 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3097

INPUT

Description: Profile Station 10818

Station Elevation Data num= 12  

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	70.9	1400	66.9	1882	60.9	2765	58.9	2870	55.9
2875	55.6	2880	55.7	2881	55.9	3170	58.9	3390	60.9
3730	62.9	4510	70.9						

Manning's n Values num= 3  

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2870	.035	2881	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2870 2881 466.67 426 425 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3096.66\*

INPUT

Description:

Station Elevation Data num= 19  

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	70.23	1188.51	67.54	1201.63	66.61	1226.69	66.43	1370.05	65.64
1423.55	65.25	1815.97	60.95	2175.21	59.65	2632.86	58.08	2730	55.9



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2731 55.83 2735 55.6 2740 55.73 2741 55.9 3016.69 58.38  
 3226.57 60.09 3309.91 60.58 3550.91 62.38 4295 70.23

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .11 2730 .035 2741 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2730 2741 466.67 426 425 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3096.33\*

INPUT

Description: Station Elevation Data num= 19  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 1000 69.57 1173.26 66.22 1185.32 64.51 1208.34 64.42 1340.11 64.39  
 1389.28 64.33 1749.94 61 2080.1 59.27 2500.72 57.25 2590 55.9  
 2591 55.81 2595 55.6 2600 55.77 2601 55.9 2863.39 57.87  
 3063.13 59.27 3142.46 59.74 3371.82 61.86 4080 69.57

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .11 2590 .035 2601 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2590 2601 466.67 426 425 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3096

INPUT

Description: Profile Station 9540 Station Elevation Data num= 13  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 1000 68.9 1158 64.9 1169 62.4 1190 62.4 1355 63.4  
 1985 58.9 2450 55.9 2451 55.8 2455 55.6 2460 55.8  
 2461 55.9 2975 58.9 3865 68.9

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .11 2450 .035 2461 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2450 2461 361.25 400 446.25 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3095.75\*

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INPUT

Description:

Station Elevation Data num= 20									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1168.9	65.06	1180.66	63.13	1203.1	63.02	1303.3	62.95
1379.48	63.22	1942.57	59.95	2052.93	59.22	2256.76	57.98	2277.7	57.88
2369.86	57.64	2482.97	56.95	2550	55.85	2551	55.76	2555	55.55
2559.79	55.76	2560.75	55.85	3014.44	59.5	3467.32	65.22	3800	68.9

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2550	.035	2560.75	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	2550	2560.75		361.25	400	446.25	.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 3095.5\*

INPUT

Description:

Station Elevation Data num= 20									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1179.79	65.23	1192.31	63.86	1216.21	63.64	1322.86	62.93
1403.97	63.03	2003.38	60.27	2120.86	59.55	2337.84	58.28	2360.14	58.22
2458.24	58.29	2578.65	57.6	2650	55.8	2651	55.72	2655	55.5
2659.58	55.72	2660.5	55.8	3053.87	60.1	3446.54	65.78	3735	68.9

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2650	.035	2660.5	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	2650	2660.5		361.25	400	446.25	.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 3095.25\*

INPUT

Description:

Station Elevation Data num= 20									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1190.69	65.39	1203.97	64.59	1229.31	64.26	1342.43	62.92
1428.45	62.85	2064.19	60.58	2188.79	59.87	2418.92	58.59	2442.57	58.56
2546.62	58.95	2674.32	58.25	2750	55.75	2751	55.68	2755	55.45
2759.38	55.69	2760.25	55.75	3093.31	60.7	3425.77	66.34	3670	68.9

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2750	.035	2760.25	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	2750	2760.25		361.25	400	446.25	.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3095

INPUT

Description: Profile Station 7940

Station Elevation Data num= 12									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1362	62.9	2125	60.9	2500	58.9	2525	58.9
2635	59.6	2770	58.9	2850	55.7	2855	55.4	2860	55.7
3405	66.9	3605	68.9						

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2850	.035	2860	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	2850	2860	391.67	396.67	408.33	.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3094.66\*

INPUT

Description:

Station Elevation Data num= 19									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1200.66	64.38	1317.91	62.72	1987.97	60.36	2068.35	59.91
2317.3	58.38	2339.25	58.33	2435.85	58.6	2554.41	57.88	2624.67	55.6
2625.56	55.5	2630	55.3	2634	55.53	2635	55.6	2892.79	59.84
3125.2	63.27	3236.25	66.6	3261.69	66.97	3491.67	68.9		

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2624.67	.035	2635	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	2624.67	2635	391.67	396.67	408.33	.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3094.33\*

INPUT

Description:

Station Elevation Data num= 19									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1172.83	63.64	1273.82	62.54	1850.95	59.81	1920.17	59.4
2134.59	57.86	2153.5	57.76	2236.71	57.59	2338.82	56.86	2399.33	55.5
2400.28	55.35	2405	55.2	2409	55.41	2410	55.5	2701.4	59.37
2964.1	62.09	3089.63	66.75	3118.38	67.03	3378.33	68.9		

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Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .11 2399.33 .035 2410 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2399.33 2410 391.67 396.67 408.33 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3094

INPUT

Description: Profile Station 6750

Station Elevation Data num= 12  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 1000 68.9 1145 62.9 1772 58.9 2174 55.4 2175 55.2  
 2180 55.1 2184 55.3 2185 55.4 2510 58.9 2803 60.9  
 2943 66.9 3265 68.9

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .11 2174 .035 2185 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2174 2185 450 483.33 480 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3093.66\*

INPUT

Description:

Station Elevation Data num= 27  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 1000 68.9 1107.42 65.44 1154.02 64.15 1461.02 62.34 1729.58 59.26  
 1820 58.95 2022.31 57.96 2235.36 55.96 2247 55.57 2248.5 54.91  
 2249.4 54.59 2251.2 54.38 2256 54.03 2260.89 54.48 2261.87 54.63  
 2262.11 54.68 2263.33 55.57 2272.6 55.96 2347.55 57.28 2402.29 57.47  
 2457.87 57.83 2621.94 59.64 2751.79 60.77 2945.23 62.29 3099.71 66.88  
 3106.34 66.92 3455 68.9

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .107 2247 .035 2263.33 .103

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2247 2263.33 450 483.33 480 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3093.33\*

INPUT

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Description:

Station Elevation Data num= 27

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1113.71	66.17	1163.03	65.39	1488.01	63.62	1772.29	59.08
1868.01	59	2082.15	58.68	2307.68	56.43	2320	55.73	2322	54.62
2323.2	54	2325.6	53.59	2332	52.97	2338.44	53.69	2339.73	53.97
2340.06	54.04	2341.67	55.73	2351.8	56.43	2433.78	58.34	2493.65	58.19
2554.44	58.37	2733.87	60.39	2875.9	61.83	3087.46	63.69	3256.41	66.85
3263.67	66.91	3645	68.9						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.103	2320	.035	2341.67	.097

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

2320	2341.67	450	483.33	480	.1	.3
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Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3093

INPUT  
 Description: Profile Station 5300

Adjusted Top of Banks  
 Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1120	66.9	1515	64.9	1815	58.9	2142	59.4
2380	56.9	2393	55.9	2397	53.4	2400	52.8	2408	51.9
2416	52.9	2418	53.4	2420	55.9	2431	56.9	2520	59.4
2585	58.9	2651	58.9	3000	62.9	3421	66.9	3835	68.9

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	2393	.035	2420	.09

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

2393	2420	30	30	30	.5	.8
------	------	----	----	----	----	----

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3092.6

INPUT  
 Description: Profile Station 5270 - US Face of Alexander Road Bridge

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1122	66.9	1435	64.9	1695	60.9	1775	60.4
2072	58.9	2125	56.9	2380	55.4	2384	52.4	2395	52.4
2406	52.4	2410	55.4	2423	56.5	2850	57	3071	59
3365	65.7	3475	66.9	3753	68.3				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2380	.035	2410	.09

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Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2380 2410 52 52 52 .1 .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 1000 2384 58.4 F  
 2406 3753 57.5 F  
 Sediment Elevation = 0

BRIDGE

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3092.4

INPUT  
 Description: Alexander Road Bridge

Distance from Upstream XS = 1  
 Deck/Roadway Width = 50  
 Weir Coefficient = 2.5  
 Upstream Deck/Roadway Coordinates

num= 26		Sta Hi Cord Lo Cord				Sta Hi Cord Lo Cord			
1435	64.9	1695	60.9	1972	60				
2005	59.41	2112	59	2166	58.72				
2214	58.4	2296	58.6	2316	59				
2385	59.6	2385	59.6	2395	59.6	57.6			
2405	59.6	2405	59.6	2438	59.59				
2496	59.3	2527	59	2609	58.58				
2693	58	2766	57.5	2834	58				
2914	58.3	2966	59	3043	59.5				
3071	60	3365	65.7						

Upstream Bridge Cross Section Data

Station Elevation Data num= 18		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
1000	68.9	1122	66.9	1435	64.9	1695	60.9	1775	60.4
2072	58.9	2125	56.9	2380	55.4	2384	52.4	2395	52.4
2406	52.4	2410	55.4	2423	56.5	2850	57	3071	59
3365	65.7	3475	66.9	3753	68.3				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 1000 .11 2380 .035 2410 .09

Bank Sta: Left Right Coeff Contr. Expan.  
 2380 2410 .1 .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 1000 2384 58.4 F  
 2406 3753 57.5 F  
 Sediment Elevation = 0

Downstream Deck/Roadway Coordinates

num= 26		Sta Hi Cord Lo Cord				Sta Hi Cord Lo Cord			
1435	64.9	1695	60.9	1972	60				
2005	59.41	2112	59	2166	58.72				
2214	58.4	2296	58.6	2316	59				
2385	59.6	2385	59.6	2395	59.6	57.6			
2405	59.6	2405	59.6	2438	59.59				
2496	59.3	2527	59	2609	58.58				

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2693	58	2766	57.5	2834	58
2914	58.3	2966	59	3043	59.5
3071	60	3365	65.7		

Downstream Bridge Cross Section Data

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1122	66.9	1435	64.9	1695	60.9	1775	60.4
2072	58.9	2125	56.9	2380	55.4	2384	53.2	2395	53.2
2406	53.2	2410	55.4	2423	56.5	2850	57	3071	59
3365	65.7	3475	66.9	3753	68.3				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2380	.035	2410	.09

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	2380	2410		.5	.8

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1000	2384	57.9	F
2406	3753	57	F

Sediment Elevation = 0

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 = .98  
 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

Selected Low Flow Methods = Energy

High Flow Method

Pressure and Weir flow  
 Submerged Inlet Cd =  
 Submerged Inlet + Outlet Cd = .79  
 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

CROSS SECTION

RIVER: RIVER-1

REACH: Reach-1 RS: 3092.1

INPUT

Description: Profile Station 5218 - DS Face of Alexander Road Bridge

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1122	66.9	1435	64.9	1695	60.9	1775	60.4
2072	58.9	2125	56.9	2380	55.4	2384	53.2	2395	53.2
2406	53.2	2410	55.4	2423	56.5	2850	57	3071	59

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3365 65.7 3475 66.9 3753 68.3

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .11 2380 .035 2410 .09

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2380 2410 9 9 9 .5 .8  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 1000 2384 57.9 F  
 2406 3753 57 F  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3091

INPUT

Description: Profile Station 5209

Station Elevation Data num= 17  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 1000 68.9 1170 66.9 1488 64.9 1785 60.9 1827 58.9  
 2137 56.9 2422 55.4 2422 51.9 2429 51.9 2435 52.5  
 2439 55.4 2449 58.9 2945 60.9 3053 62.9 3360 64.9  
 3488 66.9 3975 68.9

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .11 2422 .037 2439 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2422 2439 610 480 365 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3090.75\*

INPUT

Description:

Station Elevation Data num= 26  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 1000 70.1 1156.67 68.77 1449.74 67.16 1480.92 66.87 1694.05 60.31  
 1723.45 60.03 1762.15 58.93 2047.85 57.21 2092.99 56.97 2310.5 55.35  
 2311 51.85 2315 51.4 2318.5 51.4 2324.2 51.73 2326.94 52.8  
 2328 55.35 2336.96 57.14 2580.46 58.65 2699.33 59.92 2781.13 60.53  
 2877.84 62.05 3123.87 64.24 3152.76 64.41 3267.39 65.66 3474.82 66.58  
 3703.5 69.1

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .11 2310.5 .037 2328 .105

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2310.5 2328 610 480 365 .1 .3  
 Sediment Elevation = 0



CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3090.5

INPUT

Description: Profile Station 4249 - Additional Section of Subarea W Flows

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	71.3	1440	69.3	1635	59.3	2000	57.3	2199	55.3
2200	51.8	2208	50.9	2216	51	2217	55.3	2440	57.3
2545	59.3	2920	63.8	3230	65.3	3432	69.3		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2199	.037	2217	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2199 2217 350 350 350 .1 .3  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3090

INPUT

Description: Profile Station 3899

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	70.9	1440	68.9	1635	58.9	2000	56.9	2199	54.9
2200	51.4	2208	50.5	2216	50.6	2217	54.9	2440	56.9
2545	58.9	2920	63.4	3230	64.9	3432	68.9		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2199	.037	2217	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2199 2217 34 34 34 .5 .8  
 Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3089.6

INPUT

Description: Profile Station 3865 - US Face of NJ Transit Bridge

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	69.1	1650	59.1	1810	57.1	2087	55.1	2087	51.2
2087.6	51.2	2089.6	51.2	2094.4	51.2	2096.4	51.2	2097	51.2
2097	55.1	2220	57.1	2527	59.1	2900	64.1	2930	64.6
3215	69.1								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

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1000 .11 2087 .035 2097 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2087 2097 35 35 35 .1 .3

Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 1000 2086 66.4 F  
 2098 3215 66.4 F

Sediment Elevation = 0

BRIDGE

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3089.4

INPUT  
 Description: NJ Transit Bridge

Distance from Upstream XS = 1  
 Deck/Roadway Width = 33  
 Weir Coefficient = 2.5

Upstream Deck/Roadway Coordinates

num= 17									
Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
1000	70.6	68.9	1650	68.2	58.9	1810	67.5	56.9	
2087	66.4	51	2087	66.4	57	2087.6	66.4	59.4	
2089	66.4	61.4	2092	66.4	62	2094.4	66.4	61.4	
2096.4	66.4	59.4	2097	66.4	57	2097	66.4	51	
2220	67.2	56.9	2527	68.9	58.9	2900	72.4	63.9	
2930	72.9	64.4	3215	74.7	68.9				

Upstream Bridge Cross Section Data

Station Elevation Data num= 16									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	69.1	1650	59.1	1810	57.1	2087	55.1	2087	51.2
2087.6	51.2	2089.6	51.2	2094.4	51.2	2096.4	51.2	2097	51.2
2097	55.1	2220	57.1	2527	59.1	2900	64.1	2930	64.6
3215	69.1								

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 1000 .11 2087 .035 2097 .11

Bank Sta: Left Right Coeff Contr. Expan.  
 2087 2097 .1 .3

Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 1000 2086 66.4 F  
 2098 3215 66.4 F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates

num= 17									
Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
1000	70.6	68.9	1650	68.2	58.9	1810	67.5	56.9	
2087	66.4	51.2	2087	66.4	57	2087.6	66.4	59.4	
2089	66.4	61.4	2092	66.4	62	2094.4	66.4	61.4	
2096.4	66.4	59.4	2097	66.4	57	2097	66.4	51.2	
2220	67.2	56.9	2527	68.9	58.9	2900	72.4	64.1	
2930	72.9	64.4	3215	74.7	68.9				

Downstream Bridge Cross Section Data

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Station Elevation Data num= 16  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 1000 68.9 1650 58.9 1810 56.9 2087 54.9 2087 51  
 2087.6 51 2089.6 51 2094.4 51 2096.4 51 2097 51  
 2097 54.9 2220 56.9 2527 58.9 2900 63.9 2930 64.4  
 3215 68.9

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .11 2087 .035 2097 .11

Bank Sta: Left Right Coeff Contr. Expan.  
 2087 2097 .5 .8

Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 1000 2086 65.9 F  
 2098 3215 65.9 F

Sediment Elevation = 0

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 = .98  
 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  
 Selected Low Flow Methods = Energy

High Flow Method  
 Pressure and Weir flow  
 Submerged Inlet Cd =  
 Submerged Inlet + Outlet Cd = .84  
 Max Low Cord = 63.1

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

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3089.1

INPUT  
 Description: Profile Station 3830 - DS Face of NJ Transit Bridge

Station Elevation Data num= 16  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 1000 68.9 1650 58.9 1810 56.9 2087 54.9 2087 51  
 2087.6 51 2089.6 51 2094.4 51 2096.4 51 2097 51  
 2097 54.9 2220 56.9 2527 58.9 2900 63.9 2930 64.4  
 3215 68.9

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

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1000 .11 2087 .035 2097 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2087 2097 24 24 24 .5 .8

Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 1000 2086 65.9 F  
 2098 3215 65.9 F

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3088

INPUT

Description: Profile Station 3806

Station Elevation Data num= 13  

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1700	58.9	2115	56.9	2289	52.4	2290	49.9
2305	49.4	2320	50	2321	52.4	2475	56.9	2730	58.9
3070	64.9	3290	64.9	3450	68.9				

Manning's n Values num= 3  

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	2289	.035	2321	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2289 2321 326.67 376.67 333.33 .1 .3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3087.66\*

INPUT

Description:

Station Elevation Data num= 21  

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1713.11	59.69	1726.43	59.5	1850.14	58.52	2006.75	56.7
2157.1	56.08	2337.67	52.9	2338.85	50.57	2339.95	49.95	2356.67	49.5
2371.87	50.01	2374.48	50.91	2375.67	52.9	2400.8	53.72	2529.26	56.74
2737.6	58.66	2783.58	59.1	3122.68	64.56	3342.09	65.51	3355.89	65.8
3501.67	68.9								

Manning's n Values num= 3  

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	2337.67	.035	2375.67	.097

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2337.67 2375.67 326.67 376.67 333.33 .1 .3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3087.33\*

INPUT

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Description:

Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1739.06	60.29	1752.86	60.1	1881.07	58.71	2043.37	55.8
2199.19	55.26	2386.33	53.4	2387.71	51.25	2388.97	50.02	2408.33	49.6
2425.93	50.1	2428.96	51.83	2430.33	53.4	2455.4	54.31	2583.51	56.58
2791.3	58.78	2837.16	59.3	3175.35	64.22	3394.18	66.11	3407.94	66.35
3553.33	68.9								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	2386.33	.035	2430.33	.093

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	2386.33	2430.33		326.67	376.67	333.33	.1	.3

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3087

INPUT

Description: Profile Station 2676

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1765	60.9	1912	58.9	2080	54.9	2435	53.9
2438	50.1	2460	49.7	2480	50.2	2485	53.9	2510	54.9
2845	58.9	3460	66.9	3605	68.9				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.1	2435	.035	2485	.09

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	2435	2485		38	38	38	.5	.8

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3086.7

INPUT

Description: Profile Station 2638 - US of Washington Road Bridge

Adjusted

Top of Right Bank

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	67.6	1830	57	2150	56.4	2330	54.9	2344	53.4
2344	50.9	2347	50.5	2349	50.3	2353	50	2359	50.3
2362	50.9	2372	54.9	2660	58.4	3210	64	3380	67

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	2344	.035	2372	.11

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

2344 2372 3 3 3 .5 .8  
Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
REACH: Reach-1 RS: 3086.6

INPUT  
Description: Profile Station 2634 - US Face of Washington Road  
Bridge

Adjusted Top of Right Bank

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	67.6	1830	57	2150	56.4	2330	54.9	2344	53.4
2344	50.9	2347	50.5	2349	50.3	2353	50	2359	50.3
2362	50.9	2372	54.9	2660	58.4	3210	64	3380	67

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	2344	.035	2372	.11

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

2344	2372	54	54	54	.1	.3
------	------	----	----	----	----	----

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
1000	2343	56.9	F
2363	3380	57.4	F

Sediment Elevation = 0

BRIDGE

RIVER: RIVER-1  
REACH: Reach-1 RS: 3086.4

INPUT  
Description: Washington Road Bridge  
Distance from Upstream XS = 1  
Deck/Roadway Width = 52  
Weir Coefficient = 2.5

Upstream Deck/Roadway Coordinates num= 30

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
1000	67.6				1055	67.4				1138	66.3			
1262	65				1289	64.6				1541	61.3			
1577	61				1640	60				1722	59			
1799	58				1910	57.3				2082	56.9			
2284	57.3				2344	57.4				2344	57.4	54.9		
2344	60.4	54.9			2362	60.4	54.9			2362	57.4	54.9		
2362	57.4				2384	57.4				2517	58.5			
2657	59.5				2719	59.7				2813	60.6			
2882	61.6				2942	61.6				3128	63.6			
3207	64.6				3345	66.5				3380	67			

Upstream Bridge Cross Section Data

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	67.6	1830	57	2150	56.4	2330	54.9	2344	53.4
2344	50.9	2347	50.5	2349	50.3	2353	50	2359	50.3
2362	50.9	2372	54.9	2660	58.4	3210	64	3380	67

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Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .09 2344 .035 2372 .11

Bank Sta: Left Right Coeff Contr. Expan.  
 2344 2372 .1 .3

Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 1000 2343 56.9 F  
 2363 3380 57.4 F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates

num= 30  
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 \*\*\*\*\*  
 1000 67.6 1055 67.4 1138 66.3  
 1262 65 1289 64.6 1541 61.3  
 1577 61 1640 60 1722 59  
 1799 58 1910 57.3 2082 56.9  
 2284 57.3 2344 57.4 2344 57.4 54.9  
 2344 60.4 54.9 2362 60.4 54.9 2362 57.4 54.9  
 2362 57.4 2384 57.4 2517 58.5  
 2657 59.5 2719 59.7 2813 60.6  
 2882 61.6 2942 61.6 3128 63.6  
 3207 64.6 3345 66.5 3380 67

Downstream Bridge Cross Section Data

Station Elevation Data num= 15  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 1000 67.6 1830 57 2150 56.4 2330 54.9 2344 53.4  
 2344 50.9 2347 50.5 2349 50.3 2353 50 2359 50.3  
 2362 50.9 2372 54.9 2660 58.4 3210 64 3380 67

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 1000 .09 2344 .035 2372 .11

Bank Sta: Left Right Coeff Contr. Expan.  
 2344 2372 .5 .8

Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 1000 2343 55.92 F  
 2363 3380 56.4 F

Sediment Elevation = 0

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 = .98  
 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  
 Selected Low Flow Methods = Energy

High Flow Method

Pressure and Weir flow  
 Submerged Inlet Cd =

Submerged Inlet + Outlet Cd = .78  
 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

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3086.2

INPUT

Description: Profile Station 2581 - DS Face of Washington Road  
 Bridge

Adjusted Top of Right Bank

Station Elevation Data		num= 15		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	67.6	1830	57	2150	56.4	2330	54.9	2344	53.4		
2344	50.9	2347	50.5	2349	50.3	2353	50	2359	50.3		
2362	50.9	2372	54.9	2660	58.4	3210	64	3380	67		

Manning's n Values

num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	2344	.035	2372	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	2344	2372		3	3	.5	.8

Ineffective Flow

num= 2		Sta		Elev		Permanent	
Sta L	Sta R	Elev	Permanent	Sta	Elev	Permanent	Permanent
1000	2343	55.92	F				
2363	3380	56.4	F				

Sediment Elevation = 0

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3086.1

INPUT

Description: Profile Station 2578 - DS of Washington Road Bridge

Adjusted

Station Elevation Data		num= 15		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	67.6	1830	57	2150	56.4	2330	54.9	2344	53.4		
2344	50.9	2347	50.5	2349	50.3	2353	50	2359	50.3		
2362	50.9	2372	54.9	2660	58.4	3210	64	3380	67		

Manning's n Values

num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val
1000	.09	2344	.035	2372	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	2344	2372		98	118	.5	.8

Sediment Elevation = 0



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CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3085

INPUT

Description: Profile Station 2460 - Upstream of Removed Beaver Dam

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.9	1390	66.9	1870	58.9	2315	54.9	2330	50.4
2332	49.7	2340	49.4	2348	49.6	2350	50.4	2365	54.9
2920	58.9	3122	62.9	3325	64.9	3400	68.9		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2315	.035	2365	.11

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

2315	2365	300	300	300	.1	.3
------	------	-----	-----	-----	----	----

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 3084

INPUT

Description: Profile Station 2160 - Additional Section for Subarea M Lateral Inflows

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	68.5	1390	66.5	1870	58.5	2315	54.5	2330	50
2332	49.3	2340	49	2348	49.2	2350	50	2365	54.5
2920	58.5	3122	62.5	3325	64.5	3400	68.5		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2315	.035	2365	.11

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

2315	2365	480	432	360	.1	.3
------	------	-----	-----	-----	----	----

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 2874.4\*

INPUT

Description:

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	69.18	1444.99	66.42	1766.26	61.83	1992.66	58.45	2261.49	55.89
2491.03	54.34	2500.4	54.18	2511.92	50.12	2514.92	49.33	2516.86	48.74
2524.6	48.38	2527	48.38	2534.04	48.99	2535.8	49.74	2549	54.18
2574.39	54.44	2765.59	55.73	3061.64	59.49	3153.97	61.66	3248.22	63.68
3435.72	66.08	3505	69.58						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

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\*\*\*\*\*  
 1000 .11 2500.4 .035 2549 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2500.4 2549 480 432 360 .1 .3

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 2664.8\*

INPUT

Description:

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	69.86	1499.97	66.34	1860.95	61.84	2115.32	58.4	2417.37	55.39
2675.27	54.1	2685.8	53.86	2696.94	49.32	2699.84	48.67	2701.71	48.18
2709.2	47.76	2714	47.76	2720.08	48.78	2721.6	49.48	2733	53.86
2756.3	54.18	2931.7	55.27	3203.28	60.47	3287.98	62.85	3374.44	64.87
3546.45	67.67	3610	70.66						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2685.8	.035	2733	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2685.8 2733 480 432 360 .1 .3

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 2455.2\*

INPUT

Description:

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	70.54	1554.96	66.26	1955.63	61.86	2237.98	58.35	2573.24	54.89
2859.52	53.87	2871.2	53.54	2881.96	48.51	2884.76	48	2886.57	47.63
2893.8	47.14	2901	47.14	2906.12	48.56	2907.4	49.22	2917	53.54
2938.2	53.92	3097.8	54.82	3344.91	61.46	3421.98	64.03	3500.66	66.05
3657.17	69.25	3715	71.74						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	2871.2	.035	2917	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 2871.2 2917 480 432 360 .1 .3

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 2245.6\*

INPUT

Description:

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	70.54	1554.96	66.26	1955.63	61.86	2237.98	58.35	2573.24	54.89
2859.52	53.87	2871.2	53.54	2881.96	48.51	2884.76	48	2886.57	47.63
2893.8	47.14	2901	47.14	2906.12	48.56	2907.4	49.22	2917	53.54
2938.2	53.92	3097.8	54.82	3344.91	61.46	3421.98	64.03	3500.66	66.05
3657.17	69.25	3715	71.74						

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1000	71.22	1609.94	66.17	2050.32	61.88	2360.64	58.29	2729.12	54.4
3043.76	53.63	3056.6	53.22	3066.98	47.71	3069.68	47.33	3071.42	47.07
3078.4	46.52	3088	46.52	3092.16	48.35	3093.2	48.96	3101	53.22
3120.1	53.66	3263.9	54.36	3486.55	62.44	3555.99	65.22	3626.88	67.23
3767.9	70.84	3820	72.82						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	3056.6	.035	3101	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	3056.6	3101		480	432		.1	.3

CROSS SECTION

RIVER: RIVER-1  
 REACH: Reach-1 RS: 2036

INPUT  
 Description: Profile Station 0

Adjusted Top of Channel Banks

Station Elevation Data				num= 13					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
1000	71.9	2145	61.9	2885	53.9	3228	53.4	3242	52.9
3252	46.9	3263	45.9	3275	45.9	3285	52.9	3302	53.4
3430	53.9	3690	66.4	3925	73.9				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
1000	.11	3242	.035	3285	.11

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	3242	3285		0	0		.1	.3

SUMMARY OF MANNING'S N VALUES

River:RIVER-1

* Reach	* River Sta.	* n1	* n2	* n3
*Reach-1	* 3098	* .11*	* .035*	* .11*
*Reach-1	* 3097.66*	* .11*	* .035*	* .11*
*Reach-1	* 3097.33*	* .11*	* .035*	* .11*
*Reach-1	* 3097	* .11*	* .035*	* .11*
*Reach-1	* 3096.66*	* .11*	* .035*	* .11*
*Reach-1	* 3096.33*	* .11*	* .035*	* .11*
*Reach-1	* 3096	* .11*	* .035*	* .11*
*Reach-1	* 3095.75*	* .11*	* .035*	* .11*
*Reach-1	* 3095.5*	* .11*	* .035*	* .11*
*Reach-1	* 3095.25*	* .11*	* .035*	* .11*
*Reach-1	* 3095	* .11*	* .035*	* .11*
*Reach-1	* 3094.66*	* .11*	* .035*	* .11*
*Reach-1	* 3094.33*	* .11*	* .035*	* .11*
*Reach-1	* 3094	* .11*	* .035*	* .11*
*Reach-1	* 3093.66*	* .107*	* .035*	* .103*
*Reach-1	* 3093.33*	* .103*	* .035*	* .097*
*Reach-1	* 3093	* .1*	* .035*	* .09*
*Reach-1	* 3092.6	* .11*	* .035*	* .09*
*Reach-1	* 3092.4	*Bridge	*	*
*Reach-1	* 3092.1	* .11*	* .035*	* .09*

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*Reach-1      * 3091      *      .11*      .037*      .1*
*Reach-1      * 3090.75*   *      .11*      .037*      .105*
*Reach-1      * 3090.5     *      .11*      .037*      .11*
*Reach-1      * 3090       *      .11*      .037*      .11*
*Reach-1      * 3089.6     *      .11*      .035*      .11*
*Reach-1      * 3089.4     * *Bridge *      *      *
*Reach-1      * 3089.1     *      .11*      .035*      .11*
*Reach-1      * 3088       *      .1*      .035*      .1*
*Reach-1      * 3087.66*   *      .1*      .035*      .097*
*Reach-1      * 3087.33*   *      .1*      .035*      .093*
*Reach-1      * 3087       *      .1*      .035*      .09*
*Reach-1      * 3086.7     *      .09*      .035*      .11*
*Reach-1      * 3086.6     *      .09*      .035*      .11*
*Reach-1      * 3086.4     * *Bridge *      *      *
*Reach-1      * 3086.2     *      .09*      .035*      .11*
*Reach-1      * 3086.1     *      .09*      .035*      .11*
*Reach-1      * 3085       *      .11*      .035*      .11*
*Reach-1      * 3084       *      .11*      .035*      .11*
*Reach-1      * 2874.4*    *      .11*      .035*      .11*
*Reach-1      * 2664.8*    *      .11*      .035*      .11*
*Reach-1      * 2455.2*    *      .11*      .035*      .11*
*Reach-1      * 2245.6*    *      .11*      .035*      .11*
*Reach-1      * 2036       *      .11*      .035*      .11*

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SUMMARY OF REACH LENGTHS

River: RIVER-1

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* Reach      * River Sta. * Left * Channel * Right *
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*Reach-1    * 3098      * 446.67* 421* 436.67*
*Reach-1    * 3097.66*   * 446.67* 421* 436.67*
*Reach-1    * 3097.33*   * 446.67* 421* 436.67*
*Reach-1    * 3097      * 466.67* 426* 425*
*Reach-1    * 3096.66*   * 466.67* 426* 425*
*Reach-1    * 3096.33*   * 466.67* 426* 425*
*Reach-1    * 3096      * 361.25* 400* 446.25*
*Reach-1    * 3095.75*   * 361.25* 400* 446.25*
*Reach-1    * 3095.5*    * 361.25* 400* 446.25*
*Reach-1    * 3095.25*   * 361.25* 400* 446.25*
*Reach-1    * 3095      * 391.67* 396.67* 408.33*
*Reach-1    * 3094.66*   * 391.67* 396.67* 408.33*
*Reach-1    * 3094.33*   * 391.67* 396.67* 408.33*
*Reach-1    * 3094      * 450* 483.33* 480*
*Reach-1    * 3093.66*   * 450* 483.33* 480*
*Reach-1    * 3093.33*   * 450* 483.33* 480*
*Reach-1    * 3093      * 30* 30* 30*
*Reach-1    * 3092.6     * 52* 52* 52*
*Reach-1    * 3092.4     * *Bridge *      *
*Reach-1    * 3092.1     * 9* 9* 9*
*Reach-1    * 3091      * 610* 480* 365*
*Reach-1    * 3090.75*   * 610* 480* 365*
*Reach-1    * 3090.5     * 350* 350* 350*
*Reach-1    * 3090       * 34* 34* 34*
*Reach-1    * 3089.6     * 35* 35* 35*
*Reach-1    * 3089.4     * *Bridge *      *
*Reach-1    * 3089.1     * 24* 24* 24*
*Reach-1    * 3088       * 326.67* 376.67* 333.33*
*Reach-1    * 3087.66*   * 326.67* 376.67* 333.33*
*Reach-1    * 3087.33*   * 326.67* 376.67* 333.33*
*Reach-1    * 3087       * 38* 38* 38*
*Reach-1    * 3086.7     * 3* 3* 3*
*Reach-1    * 3086.6     * 54* 54* 54*
*Reach-1    * 3086.4     * *Bridge *      *

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LittleBearBrook.rep

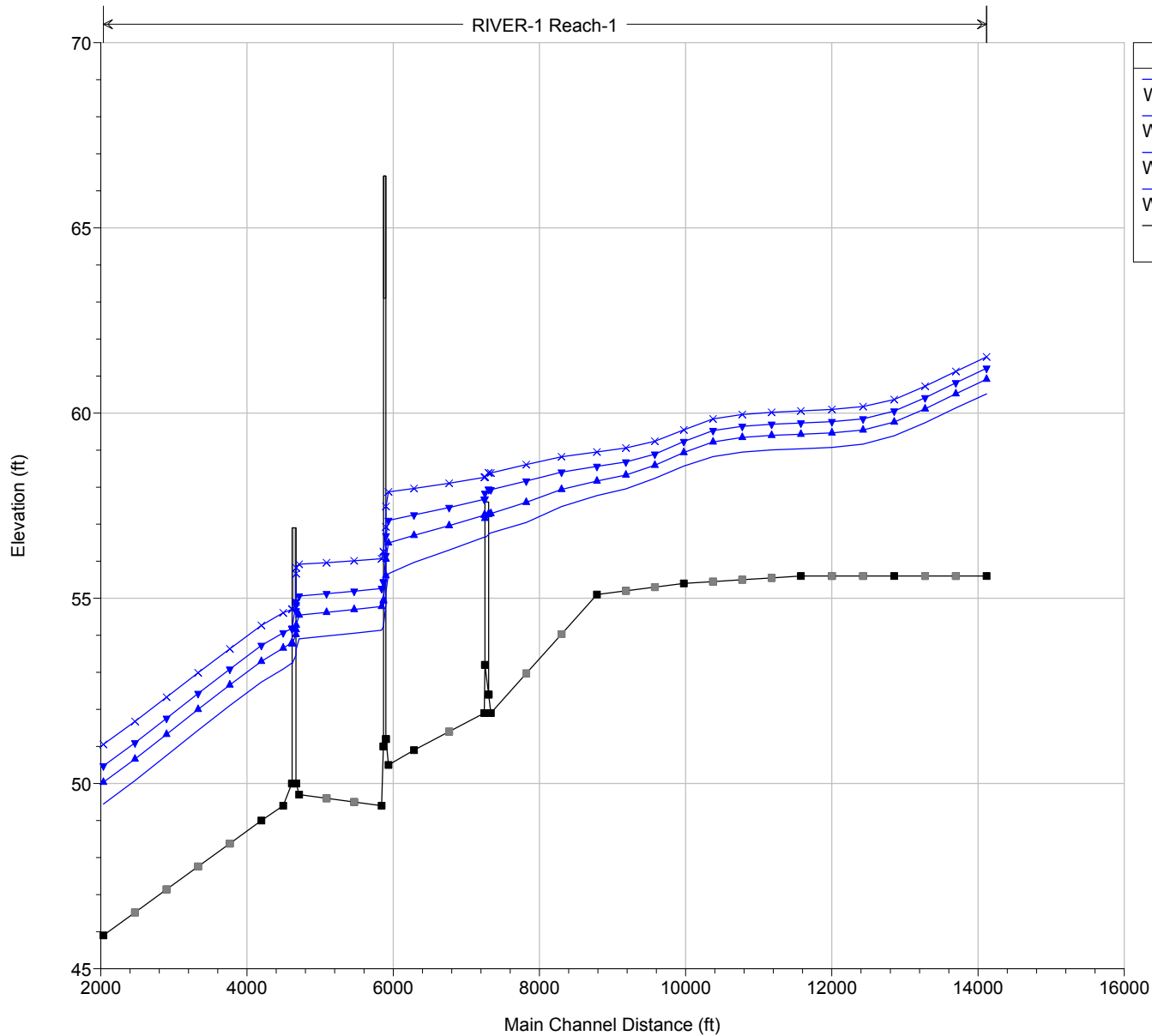
*Reach-1	*	3086.2	*	3*	3*	3*
*Reach-1	*	3086.1	*	98*	118*	118*
*Reach-1	*	3085	*	300*	300*	300*
*Reach-1	*	3084	*	480*	432*	360*
*Reach-1	*	2874.4*	*	480*	432*	360*
*Reach-1	*	2664.8*	*	480*	432*	360*
*Reach-1	*	2455.2*	*	480*	432*	360*
*Reach-1	*	2245.6*	*	480*	432*	360*
*Reach-1	*	2036	*	0*	0*	0*

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SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS  
River: RIVER-1

* Reach	* River Sta.	* Contr.	* Expan.
*Reach-1	* 3098	* .1*	* .3*
*Reach-1	* 3097.66**	* .1*	* .3*
*Reach-1	* 3097.33**	* .1*	* .3*
*Reach-1	* 3097	* .1*	* .3*
*Reach-1	* 3096.66**	* .1*	* .3*
*Reach-1	* 3096.33**	* .1*	* .3*
*Reach-1	* 3096	* .1*	* .3*
*Reach-1	* 3095.75**	* .1*	* .3*
*Reach-1	* 3095.5*	* .1*	* .3*
*Reach-1	* 3095.25**	* .1*	* .3*
*Reach-1	* 3095	* .1*	* .3*
*Reach-1	* 3094.66**	* .1*	* .3*
*Reach-1	* 3094.33**	* .1*	* .3*
*Reach-1	* 3094	* .1*	* .3*
*Reach-1	* 3093.66**	* .1*	* .3*
*Reach-1	* 3093.33**	* .1*	* .3*
*Reach-1	* 3093	* .5*	* .8*
*Reach-1	* 3092.6	* .1*	* .3*
*Reach-1	* 3092.4 *Bridge	* *	* *
*Reach-1	* 3092.1	* .5*	* .8*
*Reach-1	* 3091	* .1*	* .3*
*Reach-1	* 3090.75**	* .1*	* .3*
*Reach-1	* 3090.5	* .1*	* .3*
*Reach-1	* 3090	* .5*	* .8*
*Reach-1	* 3089.6	* .1*	* .3*
*Reach-1	* 3089.4 *Bridge	* *	* *
*Reach-1	* 3089.1	* .5*	* .8*
*Reach-1	* 3088	* .1*	* .3*
*Reach-1	* 3087.66**	* .1*	* .3*
*Reach-1	* 3087.33**	* .1*	* .3*
*Reach-1	* 3087	* .5*	* .8*
*Reach-1	* 3086.7	* .5*	* .8*
*Reach-1	* 3086.6	* .1*	* .3*
*Reach-1	* 3086.4 *Bridge	* *	* *
*Reach-1	* 3086.2	* .5*	* .8*
*Reach-1	* 3086.1	* .5*	* .8*
*Reach-1	* 3085	* .1*	* .3*
*Reach-1	* 3084	* .1*	* .3*
*Reach-1	* 2874.4*	* .1*	* .3*
*Reach-1	* 2664.8*	* .1*	* .3*
*Reach-1	* 2455.2*	* .1*	* .3*
*Reach-1	* 2245.6*	* .1*	* .3*
*Reach-1	* 2036	* .1*	* .3*

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Legend	
WS Max WS - SWM100YRUNIFASUP	x
WS Max WS - SWM50YRUNSIFASUP	▼
WS Max WS - SWM25YRUNSIFASUP	▲
WS Max WS - SWM10YRUNSIFASUP	▲
Ground	■



HEC-RAS River: RIVER-1 Reach: Reach-1 Profile: Max WS (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	3086.6	Max WS	SWM10YRUNSIFASUP	251.12	50.00	53.56	52.15	53.83	0.002459	4.16	60.42	26.13	0.41
Reach-1	3086.6	Max WS	SWM25YRUNSIFASUP	339.16	50.00	54.15	52.53	54.50	0.002521	4.73	72.34	33.18	0.43
Reach-1	3086.6	Max WS	SWM50YRUNSIFASUP	407.30	50.00	54.66	52.81	55.05	0.002382	5.00	82.48	39.18	0.43
Reach-1	3086.6	Max WS	SWM100YRUNIFASUP	465.14	50.00	55.67	53.04	55.99	0.001531	4.61	102.55	196.80	0.35
Reach-1	3086.7	Max WS	SWM10YRUNSIFASUP	251.12	50.00	53.63		53.84	0.002254	3.66	68.80	27.01	0.39
Reach-1	3086.7	Max WS	SWM25YRUNSIFASUP	339.46	50.00	54.28		54.52	0.002154	3.97	88.63	34.63	0.39
Reach-1	3086.7	Max WS	SWM50YRUNSIFASUP	407.77	50.00	54.82		55.07	0.001915	4.03	109.12	41.04	0.38
Reach-1	3086.7	Max WS	SWM100YRUNIFASUP	465.21	50.00	55.82		55.98	0.000963	3.36	237.19	228.50	0.28
Reach-1	3087	Max WS	SWM10YRUNSIFASUP	251.29	49.70	53.91		53.94	0.000204	1.38	182.25	52.25	0.13
Reach-1	3087	Max WS	SWM25YRUNSIFASUP	339.47	49.70	54.55		54.58	0.000206	1.55	294.02	296.09	0.13
Reach-1	3087	Max WS	SWM50YRUNSIFASUP	407.79	49.70	55.06		55.09	0.000177	1.54	492.33	450.11	0.12
Reach-1	3087	Max WS	SWM100YRUNIFASUP	508.45	49.70	55.92		55.94	0.000111	1.36	926.12	558.30	0.10
Reach-1	3087.33*	Max WS	SWM10YRUNSIFASUP	251.32	49.60	53.98		54.01	0.000210	1.46	192.75	118.62	0.13
Reach-1	3087.33*	Max WS	SWM25YRUNSIFASUP	339.60	49.60	54.62		54.66	0.000214	1.63	295.77	209.26	0.14
Reach-1	3087.33*	Max WS	SWM50YRUNSIFASUP	408.10	49.60	55.12		55.16	0.000197	1.68	420.84	288.22	0.13
Reach-1	3087.33*	Max WS	SWM100YRUNIFASUP	508.61	49.60	55.96		55.99	0.000146	1.60	760.87	514.18	0.12
Reach-1	3087.66*	Max WS	SWM10YRUNSIFASUP	251.36	49.50	54.06		54.09	0.000221	1.55	216.04	143.27	0.13
Reach-1	3087.66*	Max WS	SWM25YRUNSIFASUP	339.71	49.50	54.70		54.74	0.000224	1.71	327.65	206.63	0.14
Reach-1	3087.66*	Max WS	SWM50YRUNSIFASUP	408.31	49.50	55.19		55.23	0.000208	1.76	442.14	255.81	0.14
Reach-1	3087.66*	Max WS	SWM100YRUNIFASUP	508.72	49.50	56.01		56.05	0.000161	1.71	685.38	337.28	0.12
Reach-1	3088	Max WS	SWM10YRUNSIFASUP	251.39	49.40	54.14		54.18	0.000237	1.63	249.80	158.63	0.14
Reach-1	3088	Max WS	SWM25YRUNSIFASUP	339.81	49.40	54.78		54.82	0.000237	1.79	366.29	205.30	0.14
Reach-1	3088	Max WS	SWM50YRUNSIFASUP	408.45	49.40	55.26		55.31	0.000222	1.84	474.87	240.78	0.14
Reach-1	3088	Max WS	SWM100YRUNIFASUP	508.77	49.40	56.07		56.11	0.000177	1.80	692.27	299.44	0.13
Reach-1	3089.1	Max WS	SWM10YRUNSIFASUP	251.79	51.00	54.24		55.18	0.013611	7.77	32.39	10.00	0.76
Reach-1	3089.1	Max WS	SWM25YRUNSIFASUP	340.46	51.00	54.93		56.09	0.014510	8.67	39.32	15.56	0.77
Reach-1	3089.1	Max WS	SWM50YRUNSIFASUP	409.37	51.00	55.44		56.75	0.013902	9.20	45.43	117.33	0.77
Reach-1	3089.1	Max WS	SWM100YRUNIFASUP	509.41	51.00	56.26		57.68	0.011999	9.58	55.37	282.95	0.74
Reach-1	3089.4			Bridge									
Reach-1	3089.6	Max WS	SWM10YRUNSIFASUP	251.40	51.20	55.18	53.90	55.80	0.007573	6.32	39.94	25.87	0.56
Reach-1	3089.6	Max WS	SWM25YRUNSIFASUP	340.93	51.20	56.06	54.51	56.81	0.007089	6.98	50.45	201.09	0.56
Reach-1	3089.6	Max WS	SWM50YRUNSIFASUP	410.93	51.20	56.69	54.94	57.53	0.006776	7.40	58.03	327.41	0.56
Reach-1	3089.6	Max WS	SWM100YRUNIFASUP	509.91	51.20	57.48	55.57	58.45	0.006564	7.97	67.55	498.84	0.56
Reach-1	3090	Max WS	SWM10YRUNSIFASUP	251.77	50.50	55.67		55.78	0.000941	2.83	145.99	179.62	0.23
Reach-1	3090	Max WS	SWM25YRUNSIFASUP	341.06	50.50	56.49		56.58	0.000656	2.64	367.36	354.52	0.20
Reach-1	3090	Max WS	SWM50YRUNSIFASUP	410.97	50.50	57.10		57.15	0.000446	2.33	621.32	487.15	0.17



HEC-RAS River: RIVER-1 Reach: Reach-1 Profile: Max WS (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	3090	Max WS	SWM100YRUNIFASUP	509.97	50.50	57.87		57.90	0.000265	1.95	1066.94	668.40	0.13
Reach-1	3090.5	Max WS	SWM10YRUNSIFASUP	200.35	50.90	55.97		56.05	0.000658	2.34	129.64	159.26	0.19
Reach-1	3090.5	Max WS	SWM25YRUNSIFASUP	274.91	50.90	56.70		56.77	0.000543	2.34	301.99	313.20	0.18
Reach-1	3090.5	Max WS	SWM50YRUNSIFASUP	332.51	50.90	57.25		57.30	0.000400	2.15	505.89	429.12	0.16
Reach-1	3090.5	Max WS	SWM100YRUNIFASUP	413.95	50.90	57.96		57.99	0.000254	1.85	872.05	595.96	0.13
Reach-1	3090.75*	Max WS	SWM10YRUNSIFASUP	204.99	51.40	56.30		56.39	0.000719	2.46	140.77	150.10	0.21
Reach-1	3090.75*	Max WS	SWM25YRUNSIFASUP	276.17	51.40	56.96		57.04	0.000621	2.51	269.68	241.74	0.20
Reach-1	3090.75*	Max WS	SWM50YRUNSIFASUP	334.72	51.40	57.45		57.52	0.000522	2.44	418.21	379.24	0.18
Reach-1	3090.75*	Max WS	SWM100YRUNIFASUP	415.58	51.40	58.11		58.15	0.000354	2.17	736.88	593.69	0.15
Reach-1	3091	Max WS	SWM10YRUNSIFASUP	205.68	51.90	56.65		56.72	0.000700	2.35	221.09	257.82	0.20
Reach-1	3091	Max WS	SWM25YRUNSIFASUP	276.53	51.90	57.24		57.29	0.000523	2.22	406.08	360.33	0.18
Reach-1	3091	Max WS	SWM50YRUNSIFASUP	335.62	51.90	57.67		57.71	0.000416	2.10	575.28	428.09	0.16
Reach-1	3091	Max WS	SWM100YRUNIFASUP	417.04	51.90	58.27		58.29	0.000293	1.90	857.47	521.87	0.14
Reach-1	3092.1	Max WS	SWM10YRUNSIFASUP	205.69	53.20	56.65		56.76	0.000783	2.71	75.86	381.63	0.26
Reach-1	3092.1	Max WS	SWM25YRUNSIFASUP	276.55	53.20	57.25		57.31	0.000465	2.23	333.19	761.47	0.20
Reach-1	3092.1	Max WS	SWM50YRUNSIFASUP	335.65	53.20	57.68		57.72	0.000309	1.95	557.57	820.90	0.17
Reach-1	3092.1	Max WS	SWM100YRUNIFASUP	417.07	53.20	58.27		58.28	0.000089	1.11	1479.56	902.02	0.09
Reach-1	3092.4			Bridge									
Reach-1	3092.6	Max WS	SWM10YRUNSIFASUP	205.69	52.40	56.74	53.80	56.81	0.000363	2.15	95.50	476.58	0.18
Reach-1	3092.6	Max WS	SWM25YRUNSIFASUP	276.55	52.40	57.28	54.10	57.38	0.000445	2.58	107.36	766.01	0.21
Reach-1	3092.6	Max WS	SWM50YRUNSIFASUP	335.65	52.40	57.94	54.33	57.96	0.000149	1.54	721.15	856.50	0.12
Reach-1	3092.6	Max WS	SWM100YRUNIFASUP	418.36	52.40	58.39	54.64	58.41	0.000125	1.49	989.85	918.38	0.11
Reach-1	3093	Max WS	SWM10YRUNSIFASUP	205.70	51.90	56.76		56.83	0.000430	2.02	110.12	47.75	0.18
Reach-1	3093	Max WS	SWM25YRUNSIFASUP	276.57	51.90	57.29		57.37	0.000489	2.35	146.25	101.52	0.20
Reach-1	3093	Max WS	SWM50YRUNSIFASUP	335.66	51.90	57.93		58.01	0.000402	2.34	239.20	186.06	0.19
Reach-1	3093	Max WS	SWM100YRUNIFASUP	418.43	51.90	58.38		58.47	0.000412	2.51	336.05	244.86	0.19
Reach-1	3093.33*	Max WS	SWM10YRUNSIFASUP	205.99	52.97	57.05		57.15	0.000892	2.70	120.57	132.55	0.26
Reach-1	3093.33*	Max WS	SWM25YRUNSIFASUP	277.14	52.97	57.59		57.70	0.000790	2.82	213.93	210.48	0.25
Reach-1	3093.33*	Max WS	SWM50YRUNSIFASUP	336.64	52.97	58.17		58.24	0.000552	2.58	358.53	292.75	0.22
Reach-1	3093.33*	Max WS	SWM100YRUNIFASUP	420.51	52.97	58.61		58.68	0.000504	2.63	543.21	486.26	0.21
Reach-1	3093.66*	Max WS	SWM10YRUNSIFASUP	206.14	54.03	57.47		57.54	0.000904	2.60	276.56	329.06	0.26
Reach-1	3093.66*	Max WS	SWM25YRUNSIFASUP	278.52	54.03	57.94		57.99	0.000661	2.45	456.91	443.16	0.23
Reach-1	3093.66*	Max WS	SWM50YRUNSIFASUP	339.03	54.03	58.41		58.44	0.000434	2.16	695.85	579.24	0.19
Reach-1	3093.66*	Max WS	SWM100YRUNIFASUP	423.62	54.03	58.82		58.84	0.000345	2.06	959.80	700.89	0.17
Reach-1	3094	Max WS	SWM10YRUNSIFASUP	208.32	55.10	57.77		57.78	0.000353	1.49	612.39	503.60	0.16
Reach-1	3094	Max WS	SWM25YRUNSIFASUP	280.78	55.10	58.16		58.17	0.000302	1.52	826.03	585.12	0.16

HEC-RAS River: RIVER-1 Reach: Reach-1 Profile: Max WS (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	3094	Max WS	SWM50YRUNSIFASUP	342.77	55.10	58.56		58.57	0.000232	1.45	1073.66	667.26	0.14
Reach-1	3094	Max WS	SWM100YRUNIFASUP	427.76	55.10	58.95		58.96	0.000203	1.46	1351.37	753.62	0.13
Reach-1	3094.33*	Max WS	SWM10YRUNSIFASUP	211.58	55.20	57.96		57.98	0.000678	2.11	463.96	473.62	0.23
Reach-1	3094.33*	Max WS	SWM25YRUNSIFASUP	286.15	55.20	58.33		58.34	0.000548	2.07	654.42	553.20	0.21
Reach-1	3094.33*	Max WS	SWM50YRUNSIFASUP	347.05	55.20	58.68		58.69	0.000410	1.93	862.94	628.89	0.19
Reach-1	3094.33*	Max WS	SWM100YRUNIFASUP	433.02	55.20	59.06		59.07	0.000337	1.87	1115.64	709.88	0.17
Reach-1	3094.66*	Max WS	SWM10YRUNSIFASUP	219.39	55.30	58.24		58.27	0.000895	2.52	356.30	299.92	0.27
Reach-1	3094.66*	Max WS	SWM25YRUNSIFASUP	295.72	55.30	58.59		58.63	0.000869	2.69	496.53	528.20	0.27
Reach-1	3094.66*	Max WS	SWM50YRUNSIFASUP	366.07	55.30	58.89		58.92	0.000779	2.71	667.88	601.11	0.26
Reach-1	3094.66*	Max WS	SWM100YRUNIFASUP	452.10	55.30	59.24		59.26	0.000616	2.56	889.37	678.48	0.23
Reach-1	3095	Max WS	SWM10YRUNSIFASUP	225.48	55.40	58.57		58.61	0.000819	2.53	333.31	221.32	0.26
Reach-1	3095	Max WS	SWM25YRUNSIFASUP	313.24	55.40	58.94		58.98	0.000924	2.91	420.67	291.63	0.28
Reach-1	3095	Max WS	SWM50YRUNSIFASUP	396.29	55.40	59.23		59.28	0.001043	3.26	532.28	464.63	0.30
Reach-1	3095	Max WS	SWM100YRUNIFASUP	505.99	55.40	59.54		59.60	0.001068	3.49	707.02	648.64	0.31
Reach-1	3095.25*	Max WS	SWM10YRUNSIFASUP	229.55	55.45	58.82		58.84	0.000433	1.93	539.43	533.92	0.19
Reach-1	3095.25*	Max WS	SWM25YRUNSIFASUP	319.57	55.45	59.22		59.24	0.000421	2.05	788.06	687.83	0.19
Reach-1	3095.25*	Max WS	SWM50YRUNSIFASUP	411.00	55.45	59.53		59.54	0.000393	2.10	1011.47	763.88	0.19
Reach-1	3095.25*	Max WS	SWM100YRUNIFASUP	528.62	55.45	59.84		59.86	0.000382	2.17	1264.86	841.85	0.19
Reach-1	3095.5*	Max WS	SWM10YRUNSIFASUP	236.84	55.50	58.95		58.95	0.000199	1.33	889.76	724.37	0.13
Reach-1	3095.5*	Max WS	SWM25YRUNSIFASUP	325.66	55.50	59.34		59.35	0.000182	1.37	1196.80	828.13	0.13
Reach-1	3095.5*	Max WS	SWM50YRUNSIFASUP	417.28	55.50	59.64		59.65	0.000183	1.45	1457.03	906.13	0.13
Reach-1	3095.5*	Max WS	SWM100YRUNIFASUP	538.94	55.50	59.96		59.97	0.000189	1.55	1758.65	987.26	0.13
Reach-1	3095.75*	Max WS	SWM10YRUNSIFASUP	244.82	55.55	59.00		59.01	0.000103	0.96	1245.46	864.46	0.09
Reach-1	3095.75*	Max WS	SWM25YRUNSIFASUP	335.21	55.55	59.40		59.40	0.000101	1.02	1607.25	975.57	0.09
Reach-1	3095.75*	Max WS	SWM50YRUNSIFASUP	427.02	55.55	59.70		59.70	0.000103	1.09	1914.10	1049.89	0.10
Reach-1	3095.75*	Max WS	SWM100YRUNIFASUP	555.23	55.55	60.02		60.02	0.000111	1.19	2263.61	1125.45	0.10
Reach-1	3096	Max WS	SWM10YRUNSIFASUP	246.21	55.60	59.04		59.04	0.000056	0.70	1639.39	1020.97	0.07
Reach-1	3096	Max WS	SWM25YRUNSIFASUP	337.43	55.60	59.43		59.43	0.000056	0.76	2058.45	1111.00	0.07
Reach-1	3096	Max WS	SWM50YRUNSIFASUP	443.32	55.60	59.73		59.73	0.000063	0.85	2407.33	1180.72	0.07
Reach-1	3096	Max WS	SWM100YRUNIFASUP	580.23	55.60	60.06		60.06	0.000071	0.95	2802.23	1254.98	0.08
Reach-1	3096.33*	Max WS	SWM10YRUNSIFASUP	275.85	55.60	59.07		59.07	0.000126	1.07	1282.09	913.46	0.10
Reach-1	3096.33*	Max WS	SWM25YRUNSIFASUP	354.42	55.60	59.46		59.47	0.000109	1.07	1667.70	1052.85	0.10
Reach-1	3096.33*	Max WS	SWM50YRUNSIFASUP	468.91	55.60	59.77		59.77	0.000120	1.18	2006.18	1160.94	0.10
Reach-1	3096.33*	Max WS	SWM100YRUNIFASUP	615.77	55.60	60.10		60.10	0.000129	1.29	2403.25	1259.07	0.11
Reach-1	3096.66*	Max WS	SWM10YRUNSIFASUP	368.14	55.60	59.16		59.17	0.000355	1.82	1013.16	794.51	0.17
Reach-1	3096.66*	Max WS	SWM25YRUNSIFASUP	460.85	55.60	59.54		59.55	0.000289	1.76	1348.52	953.46	0.16
Reach-1	3096.66*	Max WS	SWM50YRUNSIFASUP	575.68	55.60	59.84		59.85	0.000280	1.82	1652.45	1074.61	0.16

HEC-RAS River: RIVER-1 Reach: Reach-1 Profile: Max WS (Continued)

Reach	River Sta	Profile	Plan	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach-1	3096.66*	Max WS	SWM100YRUNIFASUP	700.66	55.60	60.17		60.18	0.000254	1.83	2030.22	1210.73	0.15
Reach-1	3097	Max WS	SWM10YRUNSIFASUP	497.74	55.60	59.39		59.42	0.000720	2.71	889.90	674.53	0.25
Reach-1	3097	Max WS	SWM25YRUNSIFASUP	675.31	55.60	59.76		59.79	0.000752	2.95	1176.31	878.02	0.26
Reach-1	3097	Max WS	SWM50YRUNSIFASUP	857.55	55.60	60.05		60.08	0.000771	3.13	1459.59	1040.85	0.26
Reach-1	3097	Max WS	SWM100YRUNIFASUP	1073.74	55.60	60.37		60.39	0.000757	3.25	1811.56	1213.09	0.27
Reach-1	3097.33*	Max WS	SWM10YRUNSIFASUP	549.03	55.60	59.74		59.78	0.000944	3.12	893.67	774.33	0.28
Reach-1	3097.33*	Max WS	SWM25YRUNSIFASUP	749.14	55.60	60.11		60.15	0.000951	3.32	1222.78	991.15	0.28
Reach-1	3097.33*	Max WS	SWM50YRUNSIFASUP	958.42	55.60	60.41		60.45	0.000949	3.47	1549.78	1167.36	0.28
Reach-1	3097.33*	Max WS	SWM100YRUNIFASUP	1211.13	55.60	60.72		60.76	0.000930	3.59	1937.43	1346.71	0.28
Reach-1	3097.66*	Max WS	SWM10YRUNSIFASUP	612.56	55.60	60.14		60.18	0.000948	3.15	999.46	875.93	0.27
Reach-1	3097.66*	Max WS	SWM25YRUNSIFASUP	846.53	55.60	60.52		60.56	0.001003	3.43	1378.97	1116.94	0.28
Reach-1	3097.66*	Max WS	SWM50YRUNSIFASUP	1078.21	55.60	60.82		60.86	0.001009	3.58	1740.65	1307.89	0.28
Reach-1	3097.66*	Max WS	SWM100YRUNIFASUP	1375.48	55.60	61.13		61.16	0.000968	3.65	2165.12	1423.12	0.28
Reach-1	3098	Max WS	SWM10YRUNSIFASUP	731.36	55.60	60.52		60.55	0.000975	3.21	1172.55	983.74	0.26
Reach-1	3098	Max WS	SWM25YRUNSIFASUP	919.21	55.60	60.91		60.94	0.000792	3.05	1602.19	1178.70	0.24
Reach-1	3098	Max WS	SWM50YRUNSIFASUP	1281.77	55.60	61.21		61.24	0.001018	3.59	1968.29	1298.76	0.27
Reach-1	3098	Max WS	SWM100YRUNIFASUP	1493.62	55.60	61.52		61.55	0.000872	3.45	2386.71	1423.64	0.25

