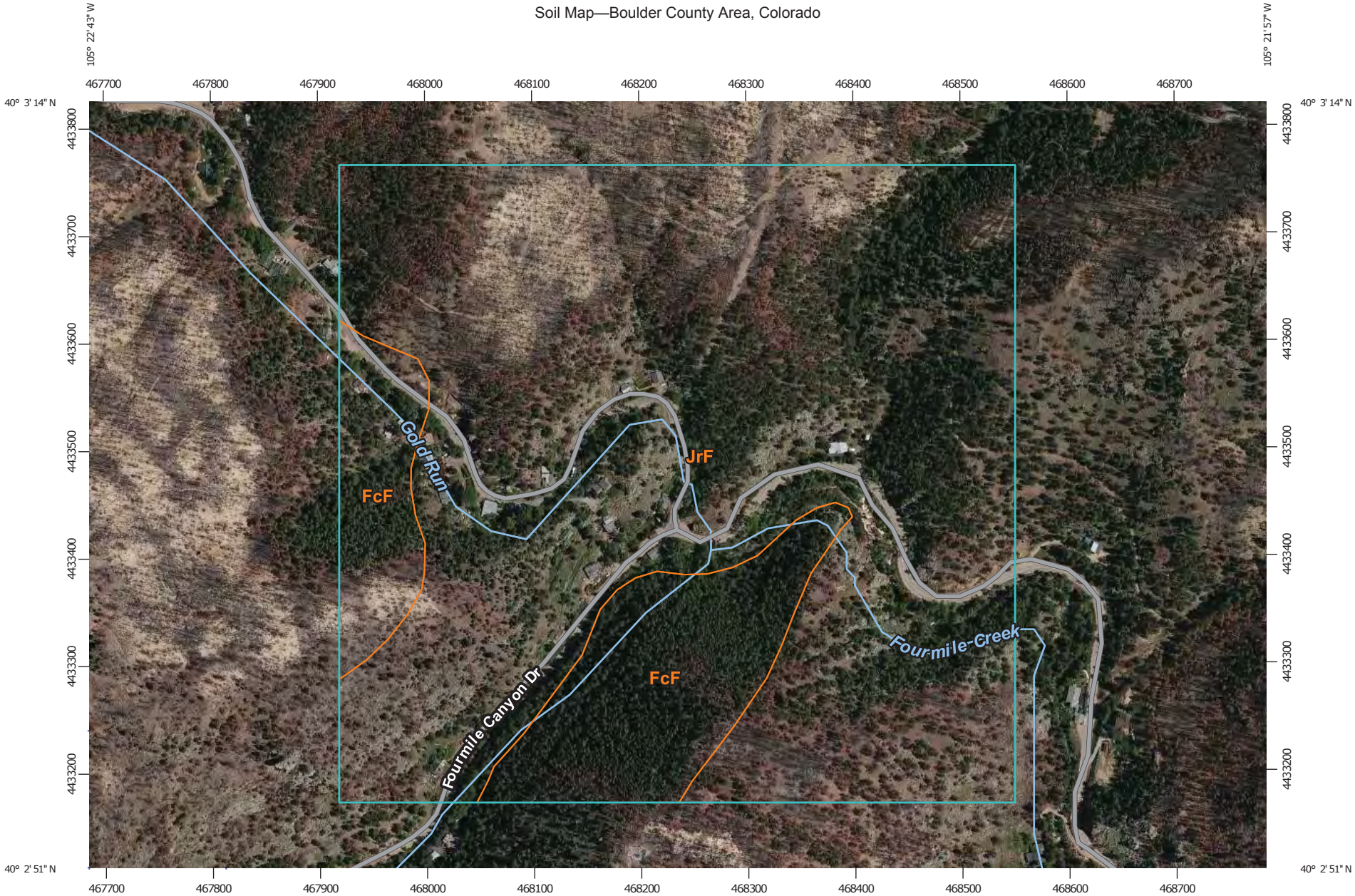
Appendix A3

Soil Survey, Land Use



Map Scale: 1:5,030 if printed on A landscape (11" x 8.5") sheet.

N

Meters: 0 50 100 200 300

Feet: 0 200 400 800 1200

Map projection: Web Mercator Corner coordinates: WGS84 Edge tics: UTM Zone 13N WGS84

MAP LEGEND

Area of Interest (AOI)

Area of Interest (AOI)

Soils

Soil Map Unit Polygons

Soil Map Unit Lines

Soil Map Unit Points

Special Point Features

Blowout

Borrow Pit

Clay Spot

Closed Depression

Gravel Pit

Gravelly Spot

Landfill

Lava Flow

Marsh or swamp

Mine or Quarry

Miscellaneous Water

Perennial Water

Rock Outcrop

Saline Spot

Sandy Spot

Severely Eroded Spot

Sinkhole

Slide or Slip

Sodic Spot

Spoil Area

Stony Spot

Very Stony Spot

Wet Spot

Other

Special Line Features

Water Features

Streams and Canals

Transportation

Rails

Interstate Highways

US Routes

Major Roads

Local Roads

Background

Aerial Photography

MAP INFORMATION

The soil surveys that comprise your AOI were mapped at 1:20,000.

Warning: Soil Map may not be valid at this scale.

Enlargement of maps beyond the scale of mapping can cause misunderstanding of the detail of mapping and accuracy of soil line placement. The maps do not show the small areas of contrasting soils that could have been shown at a more detailed scale.

Please rely on the bar scale on each map sheet for map measurements.

Source of Map: Natural Resources Conservation Service
Web Soil Survey URL: http://websoilsurvey.nrcs.usda.gov
Coordinate System: Web Mercator (EPSG:3857)

Maps from the Web Soil Survey are based on the Web Mercator projection, which preserves direction and shape but distorts distance and area. A projection that preserves area, such as the Albers equal-area conic projection, should be used if more accurate calculations of distance or area are required.

This product is generated from the USDA-NRCS certified data as of the version date(s) listed below.

Soil Survey Area: Boulder County Area, Colorado
Survey Area Data: Version 10, Dec 30, 2013

Soil map units are labeled (as space allows) for map scales 1:50,000 or larger.

Date(s) aerial images were photographed: Apr 28, 2011—Aug 29, 2012

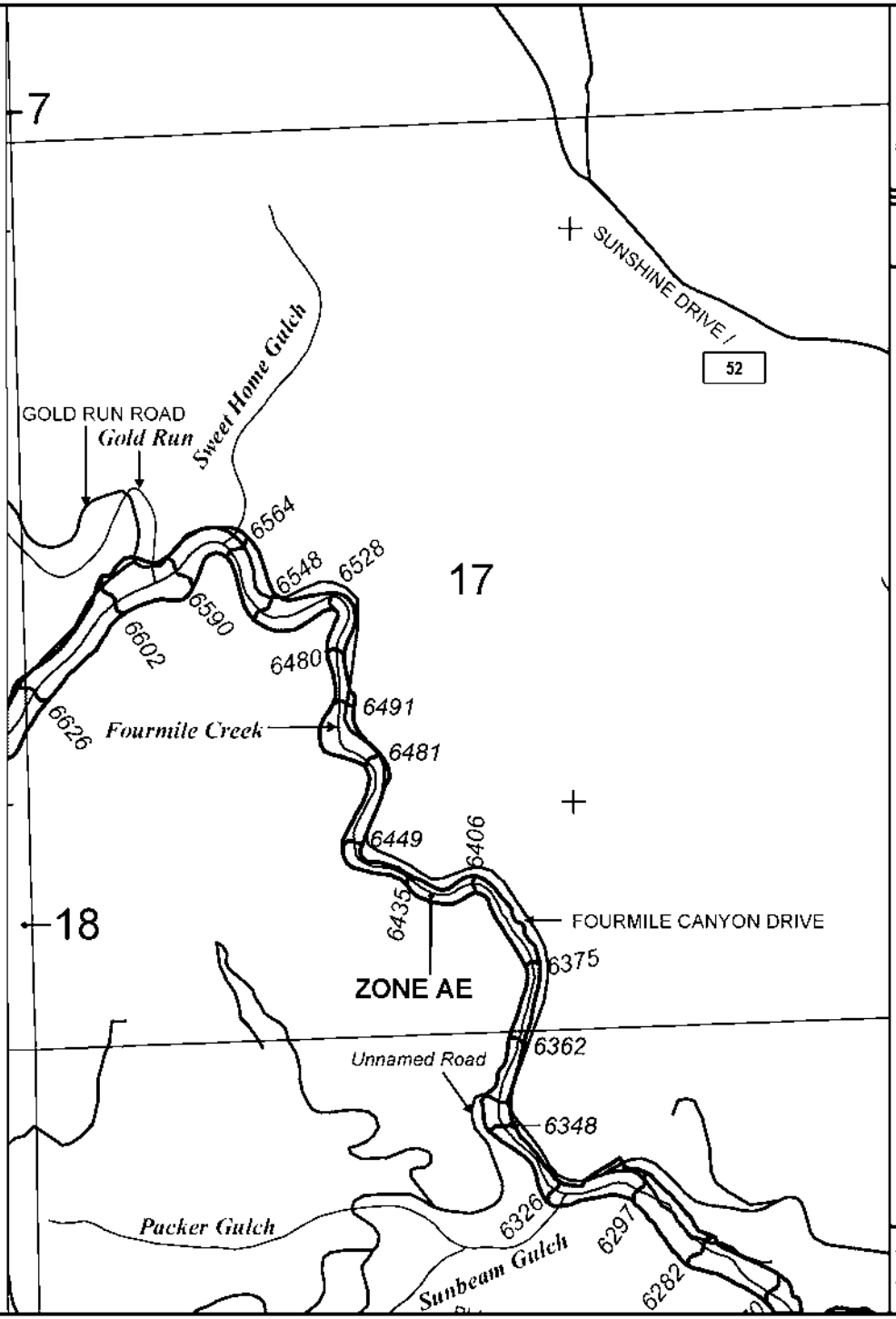
The orthophoto or other base map on which the soil lines were compiled and digitized probably differs from the background imagery displayed on these maps. As a result, some minor shifting of map unit boundaries may be evident.

Map Unit Legend

Boulder County Area, Colorado (CO643)			
Map Unit Symbol	**Map Unit Name**	**Acres in AOI**	**Percent of AOI**
FcF	Fern Cliff-Allens Park-Rock outcrop complex, 15 to 60 percent slopes	16.0	17.2%
JrF	Juget-Rock outcrop complex, 9 to 55 percent slopes	76.9	82.8%
Totals for Area of Interest		**92.9**	**100.0%**

Appendix A4

FIRM



MAP SCALE 1" = 1000'

500 0 1000 2000 FEET

METER

NFIP

NATIONAL FLOOD INSURANCE PROGRAM

PANEL 0390J

FIRM

FLOOD INSURANCE RATE MAP

BOULDER COUNTY, COLORADO

AND INCORPORATED AREAS

PANEL 390 OF 615

(SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
BOULDER COUNTY	080023	0390	J

Notice to User: The **Map Number** shown below should be used when placing map orders; the **Community Number** shown above should be used on insurance applications for the subject community.

MAP NUMBER
08013C0390J

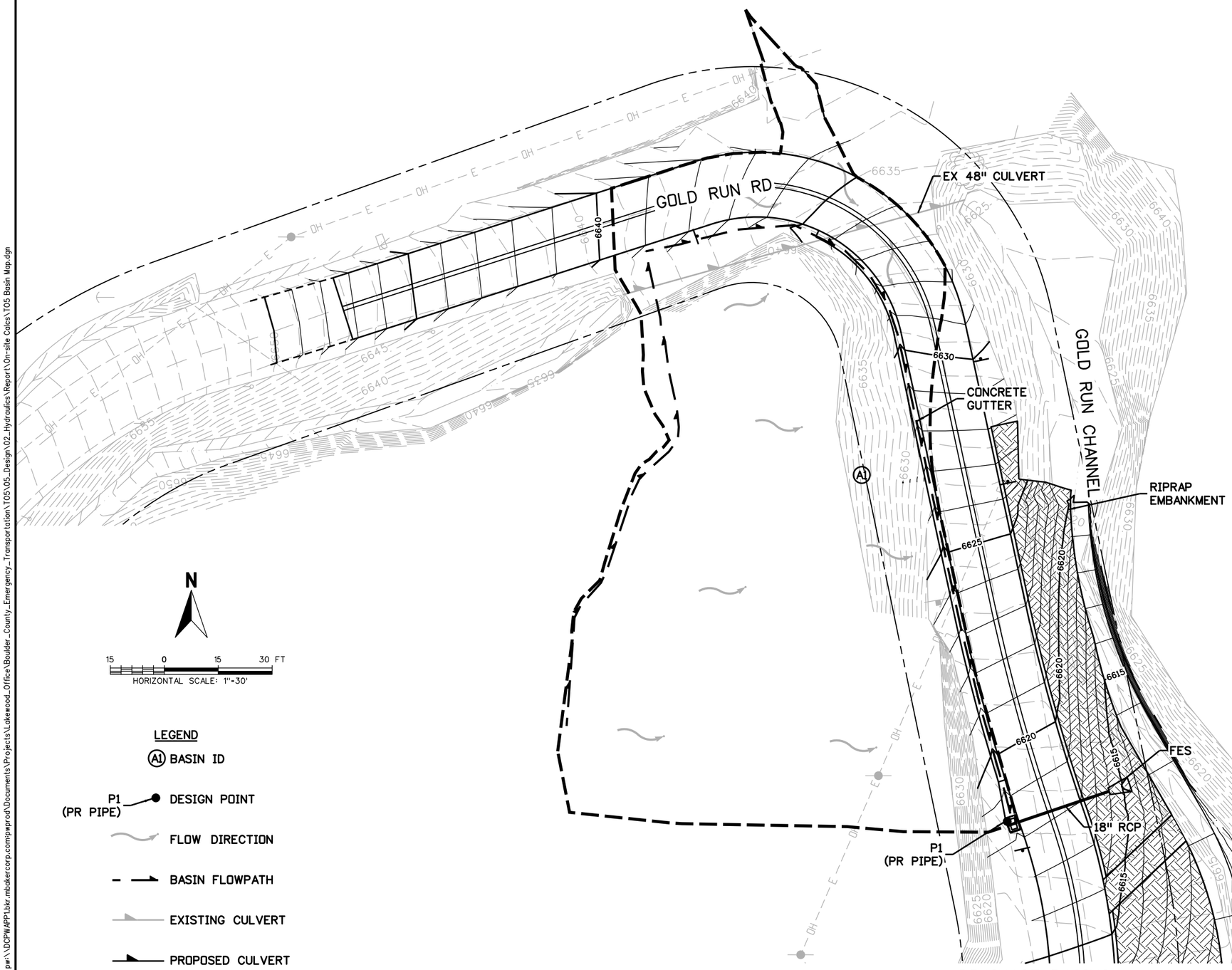
MAP REVISED
DECEMBER 18, 2012

Federal Emergency Management Agency

This is an official copy of a portion of the above referenced flood map. It was extracted using F-MIT On-Line. This map does not reflect changes or amendments which may have been made subsequent to the date on the title block. For the latest product information about National Flood Insurance Program flood maps check the FEMA Flood Map Store at www.msc.fema.gov

Appendix A5

Basin Map



DRAINAGE BASINS

CALL UTILITY NOTIFICATION CENTER OF COLORADO
811
CALL 2-BUSINESS DAYS IN ADVANCE BEFORE YOU DIG, GRADE, OR EXCAVATE FOR THE MARKING OF UNDERGROUND MEMBER UTILITIES

REVISIONS:	NO.	DATE	REVISION DESCRIPTION:

Boulder County

BOULDER COUNTY TRANSPORTATION DEPARTMENT
ENGINEERING DIVISION

DESIGNED:	CAD:	CHECKED:	DATE:
JLW	JLW	JPZ	

SALINA JUNCTION
DRAINAGE BASIN MAP

PROJECT NO: | SHEET NO:

jessica.wray 3:38:28 PM pw:\\DCPWAPP1.bkr.mbakercorp.com:pwprod\Documents\Projects\Lakewood_Office\Boulder_County_Emergency_Transportation\T05\05_Design\02_Hydraulics\Report\On-site Calcs\T05 Basin Map.dgn

Appendix B

Hydraulic Analysis

Appendix B1

Existing & Proposed HEC-RAS Models

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
XXXXXXX 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: SalinaJunctionDesignFinal
Project File : SalinaJunctionFinal.prj
Run Date and Time: 4/3/2015 11:58:05 AM

Project in English units

Project Description:
Gold Run Notes

Created for: Post September 2013 flood recovery effort.
Baker TO#138601
The HEC-RAS model was developed in support of culvert design
at Salina, Colorado as part of September 2013 flood recovery effort. Cross
section geometries are based on survey data collected at the site. Discharges
were developed from a Michael Baker Jr. Inc. hydrologic analysis for Gold Run.

Performed by:
Colin McKernan P.E. CFM
Michael Baker Jr. Inc.
165 S.
Union Blvd Suite 200
Lakewood, CO 80228
cmckernan@mbakercorp.com

PLAN DATA

Plan Title: Existing
Plan File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.p18

Geometry Title: Existing
Geometry File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.g15

Flow Title : Existing
Flow File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.f07

Plan Description:
Post-Flood conditions of Gold Run at Salina Junction. Geometry developed from
Microstation DGN (Surface source - Survey DEM)

(Updated 8/12/14)

Plan Summary Information:
Number of: Cross Sections = 17 Multiple Openings = 0
Culverts = 1 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 40
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: Existing
Flow File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.f07

Flow Data (cfs)

River	Reach	RS	10yr	25yr	100yr
GoldRun	Main	537.2529	402	617	1326

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
GoldRun	Main	10yr		Known WS = 6592.5
GoldRun	Main	25yr		Known WS = 6592.5
GoldRun	Main	100yr		Known WS = 6592.5

GEOMETRY DATA

Geometry Title: Existing
Geometry File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.g15

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 537.2529

INPUT
Description:
Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6672.85	.96	6672.06	1.58	6671.58	1.99	6671.27	3.78	6669.94

5.42 6668.73 6.02 6668.29 7.28 6666.84 7.44 6666.65 8.76 6665.57
9.5 6665.01 10.64 6663.96 11.17 6663.37 12.31 6662.27 12.86 6661.73
14.22 6660.65 14.92 6660.09 16.14 6659.22 19.42 6656.81 21.25 6655.61
21.91 6655.17 22.3 6654.91 23.58 6654.07 24.2 6653.66 24.4 6653.53
26.3 6652.22 26.75 6651.89 28.17 6650.84 28.99 6650.25 30.02 6649.47
30.43 6649.15 31.34 6648.61 33.11 6647.1 33.25 6646.97 33.63 6646.63
35.01 6645.33 35.34 6645 35.61 6644.7 36.52 6643.69 37.9 6642.18
38.02 6642.05 38.04 6642.17 38.15 6642.82 38.55 6641.65 39.7 6640.07
40.61 6639 41.15 6638.24 41.56 6637.71 42.24 6636.58 43.58 6634.41
48.05 6632.76 58.23 6630.52 60.17 6630.22 61.69 6629.76 70.27 6626.86
76.03 6624.36 77.49 6623.75 78.17 6623.71 78.25 6623.69 80 6623.66
82.11 6623.62 82.3 6623.63 82.4 6623.72 83.01 6624.33 91.61 6633.03
91.94 6633.23 92.46 6633.2 100.55 6632.78 103.36 6632.56 110.65 6632.16
111.79 6632.11 112.52 6632.07 112.91 6632.18 114.51 6632.9 120.59 6639.54
120.74 6639.66 123.66 6641.03 128.16 6642.8 130.35 6643.69 130.59 6643.83
132.87 6645.33 133.05 6645.42 133.4 6645.57 134.3 6645.99 135.54 6646.55
135.74 6646.66 136.05 6646.83 136.31 6646.97 137.21 6647.34 138.04 6647.7
140.2 6648.38 140.44 6648.48 140.88 6648.61 141.37 6648.79 141.73 6648.89
143.04 6649.32 145.17 6650.01 145.54 6650.12 145.9 6650.25 148.04 6651.33
149.21 6651.89 150.12 6652.38 150.53 6652.61 152.03 6653.53 153.03 6654.38
154 6655.17 154.34 6655.44 154.9 6655.71 155.53 6656.09 156.71 6656.81
158.03 6657.7 159.35 6658.54 160 6658.96

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 48.05 .06 91.94 .02 114.51 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
48.05 91.94 12.25 12.25 12.25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 525

INPUT
Description:
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6671.03 .03 6671.01 1.62 6669.94 1.97 6669.69 2.51 6669.31
3.79 6668.4 3.96 6668.29 5.61 6666.93 5.93 6666.65 7.04 6665.58
7.63 6665.01 7.79 6664.86 9.17 6663.37 9.37 6663.16 10.75 6661.73
11.71 6660.76 12.42 6660.09 16.13 6657.26 16.65 6656.81 16.89 6656.67
19.66 6655.17 21.28 6653.97 22.02 6653.53 22.76 6652.96 24.3 6651.89
26.56 6650.24 28.86 6648.71 28.99 6648.61 30.89 6647.02 30.93 6646.99
30.95 6646.97 32.36 6645.99 32.81 6645.73 33.49 6645.33 33.92 6645.03
35.55 6643.69 36.1 6643.21 36.7 6642.69 37.48 6642.05 38.28 6641.15
38.37 6641.02 38.8 6640.41 39.18 6639.79 39.85 6638.77 40.23 6638.15
40.45 6637.77 40.81 6637.13 41.4 6635.98 41.69 6635.49 41.72 6635.05
41.82 6634.26 42.73 6630.74 51.75 6629.61 58.48 6628.63 59.43 6628.64
66.3 6625.38 68.3 6624.44 68.57 6624.35 68.75 6624.28 78.49 6623.63
79.73 6623.34 80 6623.34 81.63 6623.31 87.14 6627.33 88.76 6629.02
93.67 6631.67 94.31 6632.06 95.79 6631.98 98.86 6631.81 103.77 6631.43
108.95 6631.01 112.53 6630.79 113.92 6630.68 116.04 6631.1 116.93 6631.31
118.45 6631.82 121.5 6634.11 129.14 6638.29 139.25 6643.8 142.13 6645.33
143.06 6645.93 143.22 6646.03 143.97 6646.5 144.85 6646.97 146.47 6647.8
148.04 6648.61 148.97 6648.89 149.15 6648.95 150.53 6649.47 151.87 6649.92
152.54 6650.23 152.57 6650.25 154.57 6651.29 155.05 6651.54 155.7 6651.89
156.46 6652.38 158.6 6653.53 158.96 6653.77 160 6654.44

Manning's n Values num= 4

Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 42.73 .06 94.31 .02 118.45 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
42.73 94.31 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 500

INPUT
Description:
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6665.96 1.76 6664.9 2.52 6664.34 3.22 6663.78 3.67 6663.4
5.23 6662.07 5.75 6661.73 6.81 6661.1 8.09 6659.96 8.28 6659.74
9.39 6658.43 10.15 6657.49 10.79 6656.81 11.77 6655.96 12.87 6655.08
13.62 6654.57 13.88 6654.35 14.25 6654.14 15 6653.53 15.81 6652.9
16.21 6652.78 16.48 6652.76 17 6652.62 17.21 6652.58 17.39 6652.53
18.17 6652.24 18.78 6651.97 19.4 6651.67 19.53 6651.65 20.06 6651.42
20.53 6651.19 21.64 6650.25 21.94 6649.96 22.3 6649.58 23.01 6648.86
23.22 6648.61 24.57 6646.97 25.82 6645.33 26.07 6645.01 28.02 6642.42
28.28 6642.05 29.03 6641.13 29.55 6640.41 30.03 6639.84 30.8 6638.77
31.02 6638.55 31.64 6637.75 32.04 6637.27 32.15 6637.13 34.15 6635.76
34.43 6635.49 34.5 6635.49 36.93 6634.32 37.86 6633.85 40.55 6632.21
42.93 6630.56 43.59 6630.09 44.21 6629.69 47.16 6627.17 48.26 6626.31
48.75 6626.42 52.51 6623.46 58.53 6622.99 61.95 6622.88 69.51 6623.07
75.35 6623 78.63 6622.71 80 6622.73 80.11 6622.73 80.88 6622.57
82.82 6623.71 88.99 6628.15 91.29 6629.68 93.51 6630.42 93.94 6630.17
96.37 6630.05 97.75 6630.21 98.01 6630.23 98.27 6630.19 103.75 6629.94
114.81 6629.37 117.45 6629.31 118.65 6629.69 120.38 6630.22 125.77 6632.44
125.89 6632.56 127.86 6633.98 137.71 6641.2 142.84 6645.33 145.36 6646.97
147.29 6648.2 147.96 6648.61 148.74 6648.9 152.21 6650.25 152.29 6650.25
153.13 6650.7 155.2 6651.89 157.52 6653.53 160 6655.39

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 48.75 .06 93.51 .02 118.65 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
48.75 93.51 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 475

INPUT
Description:
Station Elevation Data num= 108
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6676.75 .53 6676.5 2.4 6675.57 3.82 6674.86 6.61 6673.38
6.92 6673.22 7.07 6673.15 10.28 6671.58 11.74 6670.69 12.96 6669.94
14.38 6669.01 15.52 6668.29 16.41 6667.62 17.67 6666.65 19.71 6665.15
19.89 6665.01 21.09 6664.06 21.98 6663.37 22.54 6662.86 23.73 6661.73
24.66 6660.64 25.08 6660.09 25.76 6659.37 28.27 6656.81 29.17 6655.96
29.89 6655.17 30.43 6654.63 31.63 6653.53 32.68 6652.74 33.78 6651.89
35.1 6650.79 35.56 6650.41 35.77 6650.25 36.29 6649.73 37.53 6648.61
38.1 6647.78 38.62 6646.97 39.72 6645.37 39.74 6645.33 39.76 6645.31

39.78 6645.29 40.97 6644.11 41.32 6643.69 42.34 6642.79 43.29 6642.05
44.45 6641.08 45.05 6640.62 45.33 6640.41 46.77 6639.58 48.48 6638.77
48.73 6638.63 49.12 6638.36 50.88 6637.13 52.68 6635.96 52.97 6635.85
53.42 6635.49 53.79 6634.99 54.5 6634.09 54.68 6633.85 55.47 6632.79
55.92 6632.21 55.96 6632.21 59.62 6627.63 61.94 6624.92 62.41 6624.27
64.02 6622.3 64.33 6622.31 66.94 6621.76 67.37 6621.76 76.96 6621.36
77.73 6621.27 77.87 6621.25 80 6621.14 81.4 6621.06 81.53 6621.06
81.91 6621.29 89.07 6625.72 92.17 6627.62 92.92 6628.11 93.13 6628.13
96.45 6628.21 98.43 6628.07 102.1 6627.69 102.41 6627.72 103.35 6627.58
103.83 6627.55 108.21 6627.38 112.83 6627.17 120.61 6626.94 121.51 6626.94
123.69 6627.83 123.73 6627.84 123.93 6627.98 129.25 6631.37 133.35 6633.59
135.56 6635.35 140.73 6638.5 146.93 6642.25 150.28 6644.35 151.39 6645.4
154.95 6647.88 155.99 6648.61 156.59 6649 157.88 6649.89 158.4 6650.25
158.77 6650.54 159.88 6651.41 160 6651.49

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 59.62 .06 93.13 .02 121.51 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
59.62 93.13 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 450

INPUT
Description:
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6664.53 1.3 6664.11 1.95 6663.95 2.14 6663.91 2.56 6663.85
3.44 6663.61 4.39 6663.37 4.47 6663.35 4.48 6663.35 5.47 6663.12
5.61 6663.08 6.42 6662.98 6.69 6662.89 7.23 6662.82 7.65 6662.69
7.98 6662.57 8.89 6662.28 10.11 6661.86 10.21 6661.83 10.86 6661.73
11.89 6661.59 11.91 6661.58 12.07 6661.55 13.36 6661.22 13.54 6661.17
13.74 6661.1 13.99 6661 14.17 6660.93 14.51 6660.76 14.53 6660.74
14.94 6660.56 15.95 6660.09 17.8 6659.18 19.44 6658.05 20.61 6657.35
21.29 6656.81 21.8 6656.54 24.13 6655.17 25.04 6654.66 27.15 6653.53
28.81 6652.17 31.11 6650.25 32.98 6648.77 35.24 6646.97 36.28 6646.03
37.08 6645.33 39.11 6643.69 40.87 6642.51 41.6 6642.05 44.79 6640.41
44.84 6640.41 45.08 6640.2 47.42 6638.77 48.01 6638.47 50.15 6637.13
50.63 6636.75 52.36 6635.49 53.04 6635.04 54.74 6633.85 57.02 6632.21
57.99 6631.35 58.57 6630.88 58.69 6630.76 63.88 6624.98 66.29 6622.2
66.72 6621.79 67.06 6621.55 68.73 6620.51 69.62 6620.31 74.14 6619.96
78.82 6619.9 80 6619.95 81.6 6620.03 82.08 6620.03 83.43 6620.6
88.25 6624.11 92.27 6626.55 93.23 6627.47 93.63 6627.44 98.44 6625.99
99.1 6625.94 110.9 6625.82 116.84 6625.78 117.89 6625.85 118.7 6626.2
119.71 6626.6 123.34 6628.46 130.75 6633.68 135.49 6636.92 140.36 6640.03
149.11 6645.74 150.35 6647.16 152.63 6648.76 154.88 6650.25 155.18 6650.47
157.27 6651.89 157.74 6652.19 159.65 6653.53 160 6653.76

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 63.88 .06 93.23 .02 118.7 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
63.88 93.23 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 425

INPUT
Description:
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6659.47 .41 6659.29 .87 6659.22 1.61 6658.96 1.77 6658.93
2.25 6658.77 2.85 6658.66 3.28 6658.51 3.57 6658.41 4.6 6658.24
5.1 6658.06 6.55 6657.74 8.1 6657.33 8.34 6657.25 9 6657.08
9.19 6657.02 9.93 6656.81 11.07 6656.41 11.67 6656.23 12.22 6656.06
13.71 6655.61 14.11 6655.48 14.42 6655.4 15.2 6655.17 16.09 6654.91
16.41 6654.86 16.47 6654.85 16.93 6654.72 17.29 6654.6 18.69 6654.27
20.1 6653.72 20.21 6653.68 20.55 6653.53 21.39 6652.88 22.69 6651.89
23.49 6651.49 23.54 6651.46 26.06 6650.25 26.25 6650.13 26.44 6650.05
27.68 6649.47 29.04 6648.87 29.41 6648.7 29.61 6648.61 31.64 6647.48
32.51 6646.97 34.14 6646.15 34.19 6646.12 35.63 6645.33 37.72 6643.77
37.84 6643.69 38.39 6643.15 39.55 6642.05 40.93 6640.9 41.6 6640.41
42.62 6639.58 43.8 6638.77 44.42 6638.29 44.83 6638.02 46.16 6637.16
46.2 6637.14 49.96 6635.49 54.16 6633.85 55.91 6633.32 59.15 6632.96
61.45 6631.77 67.39 6627.82 71.93 6624.13 74.48 6621.36 77.12 6619.45
80 6619.39 82.44 6619.59 86.76 6621.51 89.54 6623.29 90.04 6623.06
95.83 6623.31 110.16 6623.4 112.84 6623.27 115.07 6623.69 116.2 6623.25
116.61 6623.6 116.8 6623.59 117.06 6623.85 122.57 6625.63 125.21 6628.46
125.64 6629.21 126.69 6629.6 128.46 6632 131.89 6635.15 134.67 6638.28
135.78 6638.77 138.43 6641.4 139.85 6643.69 143.24 6646.51 144.92 6648.13
146.57 6650.11 149.93 6653.02 156.84 6660.09 160 6662.94

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 71.93 .06 90.04 .02 117.06 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
71.93 89.54 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 400

INPUT
Description:
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6660.97 .04 6660.95 .4 6660.79 1.82 6660.09 2.17 6659.94
2.35 6659.88 2.67 6659.76 5.05 6658.81 5.62 6658.61 7.54 6657.88
10.48 6656.81 10.74 6656.69 11.04 6656.56 12.01 6656.15 14.35 6655.17
14.71 6655.02 14.88 6654.95 16.56 6654.26 18.21 6653.77 18.23 6653.76
18.34 6653.72 18.41 6653.69 18.89 6653.53 19.06 6653.53 19.13 6653.53
20.26 6653.2 20.59 6653.04 20.81 6652.89 21.21 6652.58 22.03 6651.89
24.08 6650.91 25.46 6650.25 28.04 6648.88 28.58 6648.61 31.01 6647.42
31.9 6646.97 35.02 6645.65 35.8 6645.33 37.3 6644.53 39.14 6643.69
40.38 6643.26 43.77 6642.05 43.94 6642.05 45.6 6641.18 47.12 6640.41
47.89 6639.96 50.09 6638.77 53.58 6637.18 53.69 6637.13 55.48 6635.94
56.15 6635.49 56.52 6635.27 57.61 6634.72 58.02 6634.53 58.12 6634.48
59.77 6633.62 61.47 6633.14 66.12 6630.06 71.92 6625.17 74.22 6623.02
78.28 6618.39 80 6618.54 80.4 6618.58 82.55 6618.5 86.16 6620.4
88.13 6621.64 91.16 6621.21 92.77 6620.93 93.4 6620.65 97.43 6620.61
103.26 6620.48 106.22 6620.43 113.71 6620.23 114.57 6620.17 119.61 6619.82
120.63 6619.68 121.84 6619.66 122.29 6618.8 122.51 6618.36 123.5 6618.93

124.15 6619.16 126.14 6623.49 134.6 6637.21 137.42 6641.17 138.4 6642.05
140.59 6644.57 141.64 6645.65 143.07 6646.97 144.69 6648.95 145.95 6650.25
149.4 6653.01 150.77 6653.89 151.5 6654.5 152.19 6655.17 154.59 6659.75
155.75 6661.73 157.11 6663.37 159.14 6665.01 160 6665.52

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 80 .06 93.4 .02 124.15 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
80 88.13 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 375

INPUT
Description:
Station Elevation Data num= 100
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6659.05 1.4 6658.05 2.87 6656.81 3.66 6656.36 6.02 6655.17
6.74 6654.78 9.33 6653.53 9.57 6653.39 9.83 6653.25 12.19 6651.89
12.92 6651.52 13.74 6651.05 15.13 6650.25 16 6649.86 18.75 6648.61
19.13 6648.42 19.47 6648.24 19.5 6648.22 21.81 6646.97 22.44 6646.54
23.99 6645.33 24.5 6644.86 26.1 6643.69 26.44 6643.44 27.35 6642.92
28.01 6642.54 28.38 6642.31 28.89 6642.05 29.96 6641.58 30.46 6641.29
30.83 6641.12 32.14 6640.41 32.32 6640.32 32.4 6640.29 33.47 6639.87
34.13 6639.62 34.2 6639.6 36.08 6638.81 36.13 6638.79 36.19 6638.77
38.07 6638.1 39.48 6637.58 40.3 6637.25 40.45 6637.19 43 6635.8
43.5 6635.49 43.89 6635.16 46.62 6633.85 47.76 6632.9 48.1 6632.77
49.7 6631.83 50.08 6631.73 51.54 6631.66 52.04 6631.42 52.21 6631.46
52.66 6631.42 53.06 6631.31 53.58 6631.29 54.19 6631.08 55.21 6631.05
56.22 6631.16 56.58 6631.29 56.95 6631.35 57.14 6631.45 58.39 6631.78
59.32 6632.11 59.93 6632.08 60.85 6632.21 61.81 6632.21 63.31 6631.84
63.85 6631.63 67.32 6629.43 71.48 6626.88 73.69 6625.04 74.42 6624.11
76.27 6621.33 78.57 6616.53 80 6616.46 82.25 6616.38 82.26 6616.38
84.61 6618.26 87.7 6619.9 88.31 6619.18 90.74 6618.97 95.7 6618.95
103.57 6618.52 110.96 6618.34 116.6 6618.28 119.61 6618.13 127.4 6617.56
131.09 6617.4 132.06 6616.43 133.61 6616.75 135.74 6618.92 137.49 6622.49
140.91 6626.33 147.94 6637.56 151.7 6641.01 158.38 6646.1 159.99 6648.3

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 76.27 .06 88.31 .02 133.61 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
76.27 87.7 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 350

INPUT
Description:
Station Elevation Data num= 100
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6648.93 .1 6648.89 .83 6648.61 1.67 6648.25 2.39 6647.93
3.43 6647.49 3.54 6647.44 4.5 6646.97 6.63 6645.82 7.64 6645.33

9.5 6644.72 12.98 6643.69 13.14 6643.69 14.16 6643.35 14.44 6643.27
15.58 6643 16.06 6642.89 17.38 6642.49 18.69 6642.05 18.71 6642.04
18.92 6641.93 21.61 6640.52 21.81 6640.41 21.99 6640.3 22.14 6640.23
23.1 6639.75 25.08 6638.77 28.29 6637.93 30.82 6637.31 31.18 6637.22
31.2 6637.21 31.56 6637.13 33.64 6636.6 34.82 6636.29 36.29 6635.97
38.59 6635.49 43.63 6635.49 50.19 6634.31 50.84 6634.24 51.57 6634.19
52.79 6633.85 55 6633.85 55.22 6633.77 58.39 6632.21 59.54 6631.5
60.97 6630.56 61.54 6630.19 61.83 6630.04 62.48 6629.68 63.81 6628.92
64.04 6628.81 64.14 6628.78 64.17 6628.77 64.77 6628.5 65.95 6627.96
66.85 6627.57 66.94 6627.52 67.51 6627.28 69.16 6626.1 69.75 6625.64
70.08 6625.26 71.15 6624 71.56 6623.89 73.73 6622.75 74.05 6622.96
77.34 6616.13 77.81 6614.68 78.09 6614.11 80 6614.04 82 6613.97
82.02 6613.98 82.1 6614.05 87.29 6618.29 89.14 6618.41 90.66 6618.29
91.42 6618.31 91.88 6618.32 98.54 6617.67 99.43 6617.57 101.3 6617.32
107.51 6616.49 110.14 6616.49 116.58 6616.46 120.99 6616.51 122.78 6616.49
127.03 6616.22 131.2 6615.97 134.62 6615.81 136.23 6615.66 138.48 6615.66
140.03 6614.46 140.36 6614.22 141.1 6614.82 141.42 6614.93 143.95 6618.33
152.76 6626.32 153.31 6626.92 153.55 6627.19 153.8 6627.34 160 6634.04

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 74.05 .06 107.51 .02 141.1 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
74.05 87.29 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 325

INPUT
Description:
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6658.34 .3 6658.22 .49 6658.14 .6 6658.08 .92 6658
1.24 6657.89 1.59 6657.74 2.93 6656.81 2.96 6656.81 3.18 6656.69
3.35 6656.58 4.52 6655.91 5.65 6655.29 5.67 6655.28 5.89 6655.17
5.92 6655.17 6.04 6655.12 6.1 6655.09 8.2 6654.34 8.67 6654.07
8.89 6653.94 8.96 6653.91 9.79 6653.53 10.24 6653.37 10.67 6653.11
11.74 6652.57 11.82 6652.52 12.98 6651.89 13.07 6651.85 14.46 6651.19
15.49 6650.61 16.15 6650.25 17.21 6649.8 17.5 6649.71 18.93 6649.17
19.41 6649.03 20.06 6648.83 20.74 6648.61 20.94 6648.52 21.94 6647.96
23.47 6647.11 23.72 6646.97 26.22 6645.91 26.4 6645.84 26.57 6645.76
27.59 6645.33 29.46 6644.4 29.7 6644.28 31.03 6643.69 31.13 6643.65
34.36 6642.05 36.93 6640.64 37.33 6640.41 38.8 6639.66 39.37 6639.36
40.13 6638.98 40.51 6638.77 40.73 6638.66 40.8 6638.63 41.05 6638.52
41.5 6638.31 44.1 6637.13 45.32 6636.57 46.31 6636.1 47.61 6635.49
47.75 6635.42 49.68 6634.52 51.02 6633.85 52.76 6633.04 54.77 6632.21
56.8 6630.96 57.34 6630.62 57.42 6630.56 57.63 6630.45 60.51 6628.92
61.02 6628.53 62.59 6627.28 64.01 6626.36 65.18 6625.64 66.17 6624.95
67.34 6624 67.86 6623.4 69.18 6622.36 69.69 6621.94 71.05 6620.72
71.31 6620.45 72.28 6619.08 72.46 6618.77 73.09 6617.44 74.08 6615.83
74.1 6615.8 74.27 6619.1 77.83 6613.54 80 6612.69 81.12 6612.54
85.78 6616.64 142.46 6615.59 144.9 6613.83 160 6632.02

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 74.27 .06 85.78 .02 144.9 .08

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

74.27 85.78 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 300

INPUT
Description:
Station Elevation Data num= 162
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6665.01 4.46 6665.01 4.87 6665.01 5.39 6665.01 5.69 6665.01
6.87 6665.01 7.19 6665.01 7.62 6665.01 7.72 6665.01 8.03 6665.01
8.69 6665.01 10.98 6665.01 11.09 6665.01 12.1 6665.01 12.22 6665.01
12.77 6665.01 12.8 6665.01 13.78 6665.01 13.97 6665.01 14.72 6664.11
14.92 6663.86 15.51 6663.37 16.22 6662.76 16.57 6662.42 17.57 6661.73
17.88 6661.52 18.22 6661.25 19.58 6660.38 19.87 6660.2 20.07 6660.09
21.52 6659.27 21.74 6659.17 22.04 6659.04 23.17 6658.76 23.86 6658.71
24.82 6658.89 25.35 6659.02 26.46 6658.96 27.01 6659.01 27.46 6658.81
27.85 6658.46 28.55 6657.78 28.88 6657.44 29.66 6656.81 29.76 6656.7
29.86 6656.6 30.36 6656.17 30.66 6655.96 31.33 6655.39 31.41 6655.3
31.66 6655.17 32.91 6654.25 33.06 6654.07 33.61 6653.58 33.62 6653.56
33.67 6653.53 34.13 6653.1 34.46 6652.74 34.71 6652.44 35.2 6651.89
35.35 6651.71 36.03 6650.83 36.36 6650.35 36.6 6650.26 36.61 6650.25
37.41 6649.6 37.76 6649.28 38.05 6649.05 38.18 6648.91 38.4 6648.61
39.13 6647.43 39.44 6646.97 39.83 6646.26 40.31 6645.33 40.73 6644.45
41.12 6643.69 41.38 6643.16 41.93 6642.05 42.21 6641.5 42.75 6640.41
43.09 6639.93 43.26 6639.8 43.6 6639.48 43.91 6639.2 44.29 6638.77
44.49 6638.62 44.96 6638.22 45.26 6637.99 45.61 6637.71 46.17 6637.22
46.22 6637.21 46.25 6637.19 46.31 6637.13 47.52 6636.52 47.9 6636.43
48.41 6636.02 48.51 6635.97 49.02 6635.49 49.64 6635.08 51.07 6633.85
51.52 6633.61 53.97 6632.31 54.13 6632.22 54.17 6632.21 55.78 6630.93
56.22 6630.56 57.52 6629.26 57.84 6628.92 58.86 6627.74 59.23 6627.28
60.53 6626.26 61.28 6625.64 62.39 6624.73 63.3 6624 64.9 6622.85
65.5 6622.36 66.26 6621.63 67.17 6620.72 68.54 6619.35 68.77 6619.08
69.18 6618.64 70.43 6617.44 70.53 6617.42 72.1 6616.97 72.18 6616.36
72.25 6615.8 73.76 6615.02 74.08 6614.84 74.52 6615.25 77.83 6612.45
78.57 6611.51 80 6611.68 80.34 6611.72 81.07 6611.75 82.3 6612.23
85.73 6614.18 86.1 6613.99 93.32 6614.45 93.62 6614.43 94.24 6614.49
94.83 6614.44 101.31 6614.36 108.13 6613.82 108.39 6613.81 108.63 6613.8
114.47 6613.63 114.55 6613.67 116.46 6613.69 122.39 6613.62 122.43 6613.62
122.65 6613.62 136.22 6613.45 136.8 6613.45 138.7 6613.57 140.96 6613.37
143.75 6613.32 150.02 6614.45 150.83 6614.61 152.79 6614.78 153.45 6614.79
153.55 6614.97 160 6620.87

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 74.08 .06 101.31 .02 153.45 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
74.08 85.73 50 50 50 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 250

INPUT
Description:
Station Elevation Data num= 99

```
   Sta    Elev    Sta    Elev    Sta    Elev    Sta    Elev    Sta    Elev
     0 6637.69     .2 6637.78    2.17 6638.77    2.19 6638.77    3.07 6639.11
  3.23 6639.12     3.4 6639.17    3.72  6639.2    7.36 6639.73    8.72 6639.93
  9.08 6640.03    9.26 6640.02    9.72 6640.14   10.63 6640.41   13.23 6641.34
 14.26 6641.37   15.67 6641.56   16.28 6641.61   17.16 6641.65   20.17 6642.15
 20.37 6642.17   21.99 6642.45   22.47  6642.5   23.74 6642.71   26.14 6642.98
 27.15 6643.04   28.58 6642.89   29.21 6642.77   29.94 6642.81   30.44 6642.65
 30.78 6642.65    31.9 6642.43    32.1 6642.42   32.89 6642.21   35.23 6641.39
  37.7 6640.41   39.41 6639.56   40.75 6638.77   42.68 6637.43   43.08 6637.13
 44.22 6636.33   45.47 6635.49   45.99  6635.2    46.5 6634.88   48.24 6633.85
 52.88 6630.33   54.63 6628.92   55.87 6627.55   56.09 6627.28   57.19 6625.64
 58.08    6624    58.6 6623.05   59.03 6622.36   60.25 6620.72   63.05 6619.08
 65.28 6617.44   66.94  6615.8   68.48 6614.16   69.98  6612.5   70.12 6612.66
 72.11  6614.4   72.12 6614.47   72.31 6613.12   73.04 6613.55   74.18 6610.27
 74.69 6610.12    76.5 6610.06   77.13 6609.26   77.59 6609.15   78.61    6609
    80    6609    82.5    6609    83.1 6608.88   84.33 6609.37   89.77 6610.01
 95.01 6611.43   97.39 6611.37  103.75 6611.65  105.16 6611.67  105.69 6611.74
110.53 6611.76  112.85 6611.42  114.38 6612.11  116.37 6612.36   120.7 6612.53
127.05 6612.54  130.11  6612.5  132.78 6612.41  133.24 6612.47  136.23 6612.43
137.73 6612.51     144 6613.36  148.41 6613.39  152.33 6613.71  156.02 6613.84
156.22 6614.28  159.09 6616.64  159.54 6617.08     160 6617.83

Manning's n Values        num=       4
   Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
     0     .08   74.18     .06  114.38     .02     144     .08

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       74.18   95.01              50      50      50           .1      .3

CROSS SECTION


RIVER: GoldRun
REACH: Main              RS: 200

INPUT
Description:
Station Elevation Data    num=      99
   Sta    Elev    Sta    Elev    Sta    Elev    Sta    Elev    Sta    Elev
     0    6624    3.67    6624    5.34    6624    6.84 6623.65    7.24 6623.54
  8.81 6623.25    9.55 6623.03   10.34 6622.87   10.83 6622.72   11.55 6622.52
 11.73 6622.49   12.13 6622.36    12.3  6622.3   12.41 6622.27   14.26 6621.73
 15.07 6621.55   15.33 6621.54   15.47 6621.51   15.89 6621.46   16.23 6621.42
 16.71 6621.51   17.49 6621.55   18.03 6621.64   18.48 6621.73   18.99 6621.73
 19.49 6621.73    19.7 6621.73   20.02 6621.85   20.59 6621.83    22.8 6621.98
 24.28 6621.97   24.53 6621.93   24.92 6621.94   25.07 6621.91   25.47 6621.91
 26.01 6621.81   26.56 6621.77   27.18  6621.7   27.97 6621.57   28.81 6621.43
 29.13  6621.4   29.38 6621.39   29.57 6621.39   30.31 6621.48   30.57 6621.48
 31.05 6621.52   31.39 6621.55   31.87 6621.65   32.27 6621.69   32.81 6621.75
 33.45 6621.84   33.62 6621.85   34.39 6621.97   34.41 6621.97   36.19 6622.36
 36.31 6622.41   36.37 6622.44   36.42 6622.46   38.19 6623.24   39.38 6623.67
 39.63 6623.75   39.77 6623.79   39.83  6623.8   39.88 6623.81   40.84 6623.97
 41.97 6624.23    45.4 6625.23   46.52 6625.64   50.95 6625.64   51.83 6625.26
  53.7 6624.59      57 6622.36   58.79 6620.72   59.99 6619.08   60.44 6618.29
 61.11 6617.44   61.48 6617.44   61.53 6618.88   61.57 6618.99   61.66 6619.64
 61.88 6618.04   61.93 6618.09   65.76 6614.02   72.28 6607.47   76.38 6606.18
    80 6606.14   83.22 6606.16   93.07 6609.03  103.47 6609.73  106.39 6609.49
106.78 6609.36  107.32 6609.34  110.08 6609.55  113.86 6609.96   130.9 6611.26
136.55 6610.95  152.87 6612.98  155.45 6613.12     160  6613.7

Manning's n Values        num=       4
   Sta   n Val     Sta   n Val     Sta   n Val     Sta   n Val
```

0 .08 72.28 .06 106.39 .02 136.55 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
72.28 93.07 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 175

INPUT
Description:
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6620.04 .6 6617.5 .67 6617.44 .99 6617.69 2.06 6618.21
2.69 6618.44 2.97 6618.56 3.97 6619.08 8.82 6619.08 12.53 6617.58
12.79 6617.44 14.2 6615.8 15.72 6614.47 16.04 6614.16 16.82 6613.71
18.78 6613.13 19.49 6613.63 19.88 6613.58 20.28 6613.61 20.42 6613.6
20.85 6612.7 20.94 6612.69 21.5 6612.73 21.59 6612.73 21.69 6613.67
22.01 6613.68 28.09 6614.13 30.24 6614.13 32.36 6613.91 33.86 6613.67
34.45 6613.51 34.88 6613.47 36.42 6613.18 36.69 6613.21 36.97 6613.27
37.18 6613.26 38.03 6613.58 38.16 6613.58 39.41 6614.16 39.84 6614.38
41.88 6615.8 43.09 6616.68 44.2 6617.44 45.08 6617.83 45.72 6618.04
47.06 6618.57 47.75 6618.71 48.91 6618.89 49.54 6618.97 49.99 6619
51.47 6618.87 51.62 6618.89 52.26 6618.83 52.34 6618.84 52.99 6618.77
53.29 6618.81 54.04 6618.78 55.76 6618.64 57.15 6618.62 57.37 6618.59
60.12 6617.44 62.14 6617.44 62.35 6617.33 67.31 6615.84 68.06 6615.53
71.05 6613.73 71.27 6613.51 72.18 6611.93 72.92 6611.24 75.59 6604.98
76.54 6604.66 77.29 6604.64 79.53 6604.52 80 6604.4 81.04 6604.15
86.37 6606.19 90.02 6607.44 90.28 6607.35 91.43 6607.31 96.35 6607.49
106.75 6607.95 109.58 6608.2 112.73 6608.57 114.33 6608.49 117.15 6608.58
121.11 6608.81 126.72 6608.82 126.79 6610.38 126.89 6612.74 127.82 6610.61
128.77 6608.86 134.22 6609.68 141.14 6610.53 144.18 6612.86 146.82 6615.37
148.34 6615.97 152.61 6618.51 158.73 6623.35 160 6624.45

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 72.92 .06 91.43 .02 126.72 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
72.92 90.02 25 25 25 .1 .3

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 150

INPUT
Description:
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6624.71 .16 6624.68 .98 6624.56 3.04 6624.17 3.25 6624.14
3.83 6624 7.23 6622.6 7.81 6622.36 8.06 6622.24 9.93 6621.36
10.5 6621.16 10.62 6621.11 10.88 6621 11.03 6620.95 11.95 6620.84
12.07 6620.82 12.12 6620.81 13.08 6620.75 13.09 6620.75 13.11 6620.75
13.79 6620.89 15.1 6620.72 21.34 6620.72 25.36 6619.12 30.63 6617.35
32.03 6617.01 34.41 6616.63 34.93 6616.59 35.2 6616.53 35.76 6616.46
36.22 6616.47 36.46 6616.42 36.77 6616.41 38.03 6616.05 40.54 6615.78
42.24 6615.77 43.95 6615.95 44.82 6616.33 45.04 6616.48 45.67 6616.73
47 6617.08 48.22 6617.44 50.43 6617.8 51.11 6617.77 52.35 6617.6

54.32 6617.44 55.94 6617.23 57.62 6617.12 59.47 6616.95 59.88 6616.94
61.22 6616.8 61.58 6616.71 61.93 6616.02 62.43 6615.82 64.36 6615.67
65.04 6615.48 66.04 6614.92 68.07 6614.3 69.68 6614.33 71.12 6613.49
72.53 6611.77 74.01 6609.78 75.02 6609.15 79.77 6602.37 80 6602.35
80.27 6602.32 80.94 6601.97 81.04 6602.08 81.51 6602.75 82.16 6603.39
83.78 6604.2 85 6604.29 89.6 6604.43 92.19 6604.54 99.67 6604.73
101.11 6604.81 102.61 6604.64 113.08 6604.91 113.26 6606.89 113.27 6607.24
113.76 6605.81 115.89 6606.03 120.25 6607.48 120.26 6607.41 122.53 6608.45
126.23 6609.02 127.2 6609.04 129.3 6608.9 139.66 6609.24 146.76 6609.81
150.13 6609.98 151.07 6609.97 152.71 6610.06 153.72 6610.17 154.05 6610.17
156.25 6610.53 157.94 6610.88 158.06 6610.88 160 6612.16

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 75.02 .06 85 .02 113.76 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
75.02 83.78 25 25 25 .3 .5

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 125

INPUT
Description:
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6619.1 .56 6619.27 1.01 6619.3 1.99 6619.36 2.28 6619.42
3.41 6619.63 3.99 6619.8 4.89 6619.86 5.7 6620.01 6.09 6619.88
6.64 6619.68 6.93 6619.55 7.17 6619.44 7.33 6619.38 7.41 6619.35
8.42 6619.08 9.13 6618.88 9.33 6618.88 10.2 6618.71 10.21 6618.71
10.84 6618.56 11.5 6618.63 11.95 6618.67 12.55 6618.72 13.53 6619.08
14.11 6619.26 14.37 6619.35 14.57 6619.43 14.68 6619.37 15.95 6619.47
16.67 6619.45 16.86 6619.39 17.83 6619.08 18.49 6619.08 19.04 6619.08
19.69 6619.08 20.93 6619.08 20.99 6619.08 21.03 6619.08 21.34 6618.92
21.55 6618.81 22.09 6618.5 23.04 6618 24.05 6617.44 24.49 6617.08
26.13 6615.8 26.62 6615.42 26.82 6615.26 26.95 6615.15 28.09 6614.16
28.21 6614.38 28.42 6614.91 28.92 6616.4 29.27 6613.47 29.38 6612.52
30.13 6611.8 32.05 6609.95 32.78 6609.21 35.8 6605.72 39.69 6605.43
41.82 6604.7 43.06 6604.49 47.59 6604.14 50.94 6603.02 52.43 6602.8
55.03 6604.14 58.8 6602.97 65.17 6600.77 66.8 6598.99 70.38 6598.83
70.39 6598.82 71.73 6599.45 76.19 6600.44 80 6602.27 81.61 6602.47
88.76 6602.4 100.61 6602.64 101.51 6602.79 103.66 6602.61 114.08 6603.08
114.13 6605.81 114.15 6606.96 115.31 6604.94 118.95 6605.07 120.38 6606.59
125.57 6607.8 127.14 6607.93 133.65 6609.11 133.97 6609.07 137.63 6606
138.7 6605.31 139.51 6604.61 141.01 6604.62 141.48 6604.75 145.84 6604.32
152.89 6604.32 155.41 6604.77 159.29 6605.96 160 6606.38

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 65.17 .06 81.61 .02 115.31 .08

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
65.17 80 100 100 100 .3 .5

CULVERT

RIVER: GoldRun
REACH: Main RS: 50

INPUT
Description: Existing Culvert
Distance from Upstream XS = 10
Deck/Roadway Width = 70
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
65.17 6600.77 80 6602.27

Upstream Bridge Cross Section Data
Station Elevation Data num= 99
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6619.1 .56 6619.27 1.01 6619.3 1.99 6619.36 2.28 6619.42
3.41 6619.63 3.99 6619.8 4.89 6619.86 5.7 6620.01 6.09 6619.88
6.64 6619.68 6.93 6619.55 7.17 6619.44 7.33 6619.38 7.41 6619.35
8.42 6619.08 9.13 6618.88 9.33 6618.88 10.2 6618.71 10.21 6618.71
10.84 6618.56 11.5 6618.63 11.95 6618.67 12.55 6618.72 13.53 6619.08
14.11 6619.26 14.37 6619.35 14.57 6619.43 14.68 6619.37 15.95 6619.47
16.67 6619.45 16.86 6619.39 17.83 6619.08 18.49 6619.08 19.04 6619.08
19.69 6619.08 20.93 6619.08 20.99 6619.08 21.03 6619.08 21.34 6618.92
21.55 6618.81 22.09 6618.5 23.04 6618 24.05 6617.44 24.49 6617.08
26.13 6615.8 26.62 6615.42 26.82 6615.26 26.95 6615.15 28.09 6614.16
28.21 6614.38 28.42 6614.91 28.92 6616.4 29.27 6613.47 29.38 6612.52
30.13 6611.8 32.05 6609.95 32.78 6609.21 35.8 6605.72 39.69 6605.43
41.82 6604.7 43.06 6604.49 47.59 6604.14 50.94 6603.02 52.43 6602.8
55.03 6604.14 58.8 6602.97 65.17 6600.77 66.8 6598.99 70.38 6598.83
70.39 6598.82 71.73 6599.45 76.19 6600.44 80 6602.27 81.61 6602.47
88.76 6602.4 100.61 6602.64 101.51 6602.79 103.66 6602.61 114.08 6603.08
114.13 6605.81 114.15 6606.96 115.31 6604.94 118.95 6605.07 120.38 6606.59
125.57 6607.8 127.14 6607.93 133.65 6609.11 133.97 6609.07 137.63 6606
138.7 6605.31 139.51 6604.61 141.01 6604.62 141.48 6604.75 145.84 6604.32
152.89 6604.32 155.41 6604.77 159.29 6605.96 160 6606.38

Manning's n Values num= 4
Sta n Val Sta n Val Sta n Val Sta n Val
0 .08 65.17 .06 81.61 .02 115.31 .08

Bank Sta: Left Right Coeff Contr. Expan.
65.17 80 .3 .5

Downstream Deck/Roadway Coordinates
num= 2
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
0 6597.5 113.36 6597.5

Downstream Bridge Cross Section Data
Station Elevation Data num= 25
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6586.94 3.74 6586.67 4.81 6586.55 5.73 6586.49 18.85 6586.25
18.97 6586.25 19 6586.25 32.47 6588.68 34.25 6589.04 43.55 6593.16
45.95 6593.65 55.7 6594.61 57.34 6594.72 61.58 6596.45 70.4 6597.12
80 6594.01 84.76 6592.48 94.16 6589.89 95.66 6590.26 96 6590.14
99.15 6589.66 104.37 6590.74 107.48 6591.51 110.73 6592.46 113.36 6592.87

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .08 0 .06 113.36 .08

Bank Sta: Left Right Coeff Contr. Expan.
0 113.36 .3 .5

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 Culverts = 1

Culvert Name Shape Rise Span
Culvert #1 Circular 3.5
FHWA Chart # 2 - Corrugated Metal Pipe Culvert
FHWA Scale # 3 - Pipe projecting from fill
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	3.5	94.13	.027	.027	0	.9	1

Upstream Elevation = 6596.2
Centerline Station = 70
Downstream Elevation = 6587.8
Centerline Station = 100

CROSS SECTION

RIVER: GoldRun
REACH: Main RS: 25

INPUT
Description:
Station Elevation Data num= 25

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6586.94	3.74	6586.67	4.81	6586.55	5.73	6586.49	18.85	6586.25
18.97	6586.25	19	6586.25	32.47	6588.68	34.25	6589.04	43.55	6593.16
45.95	6593.65	55.7	6594.61	57.34	6594.72	61.58	6596.45	70.4	6597.12
80	6594.01	84.76	6592.48	94.16	6589.89	95.66	6590.26	96	6590.14
99.15	6589.66	104.37	6590.74	107.48	6591.51	110.73	6592.46	113.36	6592.87

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.08	0	.06	113.36	.08

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	113.36	0	0	0	.3	.5

SUMMARY OF MANNING'S N VALUES

River:GoldRun

Reach	River Sta.	n1	n2	n3	n4
Main	537.2529	.08	.06	.02	.08
Main	525	.08	.06	.02	.08
Main	500	.08	.06	.02	.08
Main	475	.08	.06	.02	.08
Main	450	.08	.06	.02	.08
Main	425	.08	.06	.02	.08
Main	400	.08	.06	.02	.08
Main	375	.08	.06	.02	.08

Main	350	.08	.06	.02	.08
Main	325	.08	.06	.02	.08
Main	300	.08	.06	.02	.08
Main	250	.08	.06	.02	.08
Main	200	.08	.06	.02	.08
Main	175	.08	.06	.02	.08
Main	150	.08	.06	.02	.08
Main	125	.08	.06	.02	.08
Main	50	Culvert			
Main	25	.08	.06	.08	

SUMMARY OF REACH LENGTHS

River: GoldRun

Reach	River Sta.	Left	Channel	Right
Main	537.2529	12.25	12.25	12.25
Main	525	25	25	25
Main	500	25	25	25
Main	475	25	25	25
Main	450	25	25	25
Main	425	25	25	25
Main	400	25	25	25
Main	375	25	25	25
Main	350	25	25	25
Main	325	25	25	25
Main	300	50	50	50
Main	250	50	50	50
Main	200	25	25	25
Main	175	25	25	25
Main	150	25	25	25
Main	125	100	100	100
Main	50	Culvert		
Main	25	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: GoldRun

Reach	River Sta.	Contr.	Expan.
Main	537.2529	.1	.3
Main	525	.1	.3
Main	500	.1	.3
Main	475	.1	.3
Main	450	.1	.3
Main	425	.1	.3
Main	400	.1	.3
Main	375	.1	.3
Main	350	.1	.3
Main	325	.1	.3
Main	300	.1	.3
Main	250	.1	.3
Main	200	.1	.3
Main	175	.1	.3

Main	150	.3	.5
Main	125	.3	.5
Main	50	Culvert	
Main	25	.3	.5

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft/ft)	E.G. Slope (ft/s)	Vel Chnl (sq ft)	Flow Area (ft)	Top Width	Froude # Chl
Main	537.2529	10yr	402.00	6623.62	6627.67	6627.67	6628.88	0.045167	8.84	45.47	18.43	0.99
Main	537.2529	25yr	617.00	6623.62	6628.58	6628.58	6630.03	0.043488	9.65	63.93	22.03	1.00
Main	537.2529	100yr	1326.00	6623.62	6630.72	6630.72	6632.60	0.039642	11.00	120.55	31.99	1.00
Main	525	10yr	402.00	6623.31	6626.57	6626.57	6627.64	0.043347	8.27	48.62	22.32	0.99
Main	525	25yr	617.00	6623.31	6627.35	6627.35	6628.67	0.041195	9.20	67.06	25.02	0.99
Main	525	100yr	1326.00	6623.31	6629.38	6629.38	6631.09	0.038060	10.52	126.10	36.07	0.99
Main	500	10yr	402.00	6622.57	6625.17	6624.73	6625.70	0.023556	5.85	68.66	34.50	0.73
Main	500	25yr	617.00	6622.57	6626.04	6625.33	6626.63	0.017624	6.17	99.94	36.83	0.66
Main	500	100yr	1326.00	6622.57	6628.27	6626.82	6629.04	0.011656	7.08	189.75	43.30	0.58
Main	475	10yr	402.00	6621.06	6624.50	6623.91	6625.13	0.021093	6.35	63.29	24.86	0.70
Main	475	25yr	617.00	6621.06	6625.15	6624.66	6626.08	0.025237	7.73	79.86	26.41	0.78
Main	475	100yr	1326.00	6621.06	6626.95	6626.53	6628.53	0.028211	10.08	131.50	32.24	0.86
Main	450	10yr	402.00	6619.90	6624.36	6622.80	6624.73	0.008879	4.89	82.23	24.23	0.47
Main	450	25yr	617.00	6619.90	6624.89	6623.57	6625.54	0.013778	6.46	95.55	25.58	0.59
Main	450	100yr	1326.00	6619.90	6625.68	6625.60	6627.70	0.035597	11.40	116.48	27.58	0.97
Main	425	10yr	402.00	6619.39	6623.74	6623.74	6624.38	0.019715	6.58	62.80	44.66	0.67
Main	425	25yr	617.00	6619.39	6624.08	6624.08	6625.07	0.022933	7.52	78.15	45.79	0.73
Main	425	100yr	1326.00	6619.39	6625.52	6625.52	6627.12	0.010947	6.61	148.62	52.01	0.54
Main	400	10yr	402.00	6618.50	6621.55	6621.55	6622.26	0.007859	3.31	70.13	48.94	0.41
Main	400	25yr	617.00	6618.50	6622.01	6622.01	6622.96	0.007227	3.60	93.28	50.36	0.40
Main	400	100yr	1326.00	6618.50	6623.29	6623.29	6624.81	0.005811	4.27	158.78	52.12	0.39
Main	375	10yr	402.00	6616.38	6619.33	6619.33	6619.96	0.008605	3.03	69.55	57.16	0.38
Main	375	25yr	617.00	6616.38	6619.78	6619.78	6620.59	0.006750	2.88	95.57	58.82	0.34
Main	375	100yr	1326.00	6616.38	6620.88	6620.88	6622.21	0.005286	3.15	161.33	60.22	0.32
Main	350	10yr	402.00	6613.97	6617.33	6617.33	6618.01	0.009352	3.44	67.43	51.33	0.40
Main	350	25yr	617.00	6613.97	6617.80	6617.80	6618.67	0.007975	3.38	92.55	56.46	0.37
Main	350	100yr	1326.00	6613.97	6618.97	6618.97	6620.17	0.006310	3.57	168.36	68.69	0.34
Main	325	10yr	402.00	6612.54	6616.75	6616.75	6617.29	0.013843	4.50	70.62	72.18	0.49
Main	325	25yr	617.00	6612.54	6617.12	6617.12	6617.84	0.010215	4.14	97.27	72.97	0.43
Main	325	100yr	1326.00	6612.54	6618.12	6618.12	6619.27	0.006352	3.79	171.24	75.01	0.35
Main	300	10yr	402.00	6611.51	6614.70	6614.70	6615.20	0.008168	3.18	76.70	76.71	0.40
Main	300	25yr	617.00	6611.51	6615.04	6615.04	6615.69	0.007645	3.28	103.36	79.44	0.39
Main	300	100yr	1326.00	6611.51	6615.93	6615.93	6616.98	0.006366	3.66	175.46	82.36	0.37
Main	250	10yr	402.00	6608.88	6612.22	6612.22	6612.96	0.026923	7.20	63.48	41.71	0.81
Main	250	25yr	617.00	6608.88	6612.92	6612.92	6613.54	0.017783	6.92	103.42	68.27	0.69
Main	250	100yr	1326.00	6608.88	6613.75	6613.75	6614.78	0.018535	8.27	166.30	83.85	0.73
Main	200	10yr	402.00	6606.14	6609.28	6609.28	6610.33	0.038167	8.28	50.01	26.23	0.96
Main	200	25yr	617.00	6606.14	6610.27	6610.27	6611.12	0.020899	7.78	89.27	48.40	0.76
Main	200	100yr	1326.00	6606.14	6611.48	6611.48	6612.60	0.018167	8.94	161.13	72.51	0.74

Main	175	10yr	402.00	6604.15	6608.23	6608.23	6609.07	0.027569	7.26	54.83	35.64	0.77
Main	175	25yr	617.00	6604.15	6608.88	6608.88	6609.78	0.020644	7.06	82.19	52.96	0.68
Main	175	100yr	1326.00	6604.15	6610.24	6610.24	6611.56	0.009342	5.69	161.14	64.16	0.47
Main	150	10yr	402.00	6601.97	6606.16	6606.16	6606.96	0.006987	3.11	63.12	38.70	0.34
Main	150	25yr	617.00	6601.97	6606.74	6606.74	6607.75	0.006042	3.16	86.25	41.10	0.32
Main	150	100yr	1326.00	6601.97	6608.15	6608.15	6609.72	0.005482	3.55	148.15	46.15	0.31
Main	125	10yr	402.00	6598.82	6603.37	6603.04	6603.75	0.008412	4.82	87.29	60.23	0.46
Main	125	25yr	617.00	6598.82	6603.75	6603.40	6604.35	0.009165	5.40	110.51	63.30	0.49
Main	125	100yr	1326.00	6598.82	6604.88	6604.88	6605.95	0.007748	5.91	194.56	89.35	0.47
Main	50		Culvert									
Main	25	10yr	402.00	6586.25	6592.50	6588.57	6592.54	0.000915	1.64	245.21	68.35	0.15
Main	25	25yr	617.00	6586.25	6592.50	6589.18	6592.60	0.002154	2.52	245.21	68.35	0.23
Main	25	100yr	1326.00	6586.25	6592.50	6590.80	6592.95	0.009951	5.41	245.21	68.35	0.50

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
XXXXXXX  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: SalinaJunctionDesignFinal
Project File : SalinaJunctionFinal.prj
Run Date and Time: 3/26/2015 3:45:51 PM

Project in English units

Project Description:
Gold Run Notes

Created for: Post September 2013 flood recovery effort.
Baker TO#138601
The HEC-RAS model was developed in support of culvert design
at Salina, Colorado as part of September 2013 flood recovery effort. Cross
section geometries are based on survey data collected at the site. Discharges
were developed from a Michael Baker Jr. Inc. hydrologic analysis for Gold Run.

Performed by:
Colin McKernan P.E. CFM
Michael Baker Jr. Inc.
165 S.
Union Blvd Suite 200
Lakewood, CO 80228
cmckernan@mbakercorp.com

PLAN DATA

Plan Title: Final March 2015
Plan File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.p08

Geometry Title: FinalMar2015
Geometry File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.g09

Flow Title : final
Flow File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.f01

Plan Description:
Proposed Salina Junction box culvert. Gold Run channelization and downstream
box culvert incorporated.

Plan Summary Information:
Number of: Cross Sections = 21 Multiple Openings = 0
Culverts = 1 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 40
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

Computation Options
Critical depth computed at all cross sections
Conveyance Calculation Method: At breaks in n values only
Friction Slope Method: Average Conveyance
Computational Flow Regime: Subcritical Flow

FLOW DATA

Flow Title: final
Flow File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.f01

Flow Data (cfs)

River	Reach	RS	10yr	25yr	100yr
Stream	Reach	533.4468	402	617	1326

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Stream	Reach	10yr		Known WS = 6592.5
Stream	Reach	25yr		Known WS = 6592.5
Stream	Reach	100yr		Known WS = 6592.5

GEOMETRY DATA

Geometry Title: FinalMar2015
Geometry File : r:\138067_BoulderCounty_Trans_Flood\TO5 - 138601\05_Design-seePW\02_Hydraulics\RAS\SalinaJunctionFinal.g09

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 533.4468

INPUT
Description:
Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	6660.86	35.52	6646.23	35.62	6646.16	54.5	6634.94	62.09	6632.05
72.55	6628.06	72.98	6628.12	75.43	6627.36	75.55	6627.4	75.61	6627.42

75.64 6627.43 75.68 6627.45 75.71 6627.46 75.75 6627.47 75.81 6627.49
75.86 6627.51 75.9 6627.53 75.92 6627.53 75.98 6627.56 76.03 6627.57
76.11 6627.6 76.13 6627.61 76.16 6627.62 76.2 6627.63 76.22 6627.64
76.25 6627.65 76.27 6627.79 76.29 6627.8 76.37 6627.83 76.43 6627.85
76.45 6627.85 76.49 6627.87 76.55 6627.89 76.57 6627.9 76.6 6627.91
76.63 6627.92 77.21 6628.2 77.31 6628.25 77.34 6628.27 77.55 6628.4
77.61 6628.44 77.84 6628.58 77.99 6628.67 78.01 6628.68 78.18 6628.78
78.21 6628.8 78.38 6628.91 78.75 6629.13 80 6629.62 82.59 6630.62
82.78 6630.79 82.82 6630.82 82.92 6630.91 83.14 6631.09 83.39 6631.3
83.59 6631.47 83.91 6631.74 84.43 6632.18 84.48 6632.22 85.07 6632.72
85.43 6633.02 85.82 6633.35 86.11 6633.59 86.17 6633.64 86.73 6633.6
86.76 6633.6 87.92 6633.52 88.12 6633.51 88.66 6633.48 89.55 6633.42
91.37 6633.3 91.4 6633.3 91.43 6633.3 91.7 6633.36 91.97 6633.43
96.85 6633.24 100.97 6633.06 105.09 6632.89 109.97 6632.68 110.65 6632.56
110.97 6632.51 111.29 6632.56 111.97 6632.67 113.37 6632.81 113.92 6632.86
113.96 6632.88 113.97 6632.88 114.49 6633.08 114.64 6633.14 115.16 6633.34
115.28 6633.39 115.7 6633.55 116.75 6634.48 124.18 6642.43

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 62.09 .045 86.11 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
62.09 86.11 12.25 12.25 12.25 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 521.1821

INPUT
Description:
Station Elevation Data num= 49
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6662.14 42.83 6630.92 43.16 6630.71 46.96 6632.21 51.12 6630.29
65.68 6625.53 68.54 6624.59 68.91 6624.59 71.34 6624.53 76.38 6624.48
76.77 6624.41 77.81 6624.52 80 6624.69 80.98 6624.76 81.07 6624.77
84.32 6627.17 90.77 6632.09 91.14 6632.33 91.44 6632.31 92.41 6632.24
93.1 6632.36 93.49 6632.44 97.4 6632.22 98.61 6632.14 99.71 6632.08
100.17 6632.05 101.18 6631.99 102.77 6631.89 107.28 6631.61 111.04 6631.33
112.17 6631.25 112.63 6631.16 113.23 6631.04 113.39 6631.06 113.76 6631.11
114.19 6631.16 114.3 6631.17 114.41 6631.18 115.13 6631.21 115.18 6631.25
115.64 6631.56 115.81 6631.67 116.34 6631.88 116.73 6632.03 116.96 6632.12
117.17 6632.2 123.22 6636.71 126.76 6637.84 131.37 6641.05

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 46.96 .045 90.77 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
46.96 90.77 25.59 25.59 25.59 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 495.5928

INPUT
Description:
Station Elevation Data num= 42

Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6671.68 45.89 6630.41 54.24 6623.85 64.28 6623.65 66.56 6623.6
69.29 6623.55 70.58 6623.48 74.3 6623.24 76.07 6623.07 77.51 6622.94
77.52 6622.81 78.67 6623.03 81.13 6623.42 81.46 6623.42 84.32 6625.26
84.57 6625.41 85.36 6625.91 86.33 6626.52 86.62 6626.71 92.55 6630.44
92.59 6630.47 93.3 6630.51 97.36 6630.84 102.67 6630.56 106.47 6630.37
109.8 6630.19 115.58 6629.92 115.76 6629.89 116.59 6629.74 117.47 6629.87
117.6 6629.89 118.87 6630 119 6630.01 119.02 6630 119.05 6630.01
123.94 6632.13 126.46 6633.22 126.76 6633.35 126.87 6633.4 126.96 6633.44
127.5 6633.72 135.22 6640.83

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 45.89 .045 92.59 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
45.89 92.59 25.13 25.13 25.13 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 470.4639

INPUT
Description:
Station Elevation Data num= 31
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6672.19 61.5 6629.53 64.81 6622.77 67.23 6622.33 69.61 6621.9
75.31 6621.37 76.7 6621.24 83.26 6622.47 83.89 6622.35 91.86 6627.77
92.37 6628.15 92.42 6628.18 98.7 6628.26 101.22 6628.29 102.47 6628.25
107.22 6628.09 110.33 6628 117.16 6627.78 119.43 6627.72 119.85 6627.64
120.44 6627.54 121.04 6627.63 121.46 6627.69 121.77 6628.32 121.92 6628.61
121.94 6628.61 121.97 6628.63 122.68 6628.96 124.25 6629.69 134.55 6634.47
142.83 6639.47

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 61.5 .045 92.37 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
61.5 92.37 33.29 33.29 33.29 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 437.1738

INPUT
Description:
Station Elevation Data num= 66
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6664.36 65.46 6630.29 66 6629.85 66.06 6629.8 66.67 6629.31
66.84 6629.17 67.07 6628.98 69.31 6626.66 71.17 6624.72 71.34 6624.55
72.34 6623.51 74.1 6621.68 74.44 6621.32 74.46 6621.28 74.49 6621.17
74.51 6621.17 74.55 6621.16 74.58 6621.16 74.59 6621.16 74.6 6621.16
77.44 6619.89 77.5 6619.86 78.89 6619.86 78.96 6619.86 80 6619.86
81.26 6619.85 82.5 6619.85 82.51 6619.86 83.5 6620.21 84.81 6620.67
86.64 6621.32 88.8 6622.09 89.49 6622.33 90.87 6622.82 93.29 6623.68
94.13 6623.98 95.06 6624.31 96.03 6624.65 97.21 6625.07 97.73 6625.26
98.32 6625.35 98.5 6625.38 100.49 6625.72 100.73 6625.75 100.76 6625.76

100.78 6625.77 100.83 6625.78 100.88 6625.76 103.15 6625.79 109.87 6625.91
110.86 6625.93 116.52 6626.01 119.01 6626.04 119.6 6625.96 120.03 6625.89
120.5 6625.98 121.05 6626.07 121.68 6626.15 122.38 6626.23 122.41 6626.23
122.43 6626.23 124.06 6627.13 125.93 6627.99 127.47 6628.73 132.53 6632.31
142.68 6638.68

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 66 .045 100.88 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
66 100.88 17.47 17.47 17.47 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 419.709

INPUT
Description:
Station Elevation Data num= 38
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6659.23 64.25 6629.25 68.27 6627.37 71.42 6624.91 71.47 6624.87
71.54 6624.61 73.16 6618.12 75.51 6618.11 75.66 6618.11 75.81 6618.11
78.16 6618.1 79.1 6618.47 91.14 6623.19 91.59 6623.26 94.14 6623.68
94.16 6623.68 94.19 6623.68 97.31 6623.74 103.14 6623.84 106.99 6623.9
112.14 6623.99 112.7 6623.9 113.14 6623.83 113.69 6623.92 114.14 6623.99
116.93 6624.28 120.55 6624.64 120.58 6624.63 120.6 6624.65 132.49 6634.12
133.68 6635.07 134.98 6636.12 135.07 6636.19 135.3 6636.37 135.36 6636.42
135.42 6636.47 135.73 6636.69 135.87 6636.78

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 71.54 .045 91.59 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
71.54 91.59 22.94 22.94 22.94 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 396.771

INPUT
Description:
Station Elevation Data num= 53
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6661.79 60.6 6633.71 72.52 6628.18 72.74 6627.91 73.95 6625.65
74.13 6625.32 75.3 6623.14 75.35 6623.05 77.02 6616.39 77.16 6615.81
79.46 6615.81 79.66 6615.81 80.44 6615.82 82.55 6615.81 92.01 6619.36
94.75 6620.38 95.88 6620.81 98.64 6621.27 98.88 6621.31 98.89 6621.31
98.93 6621.31 98.94 6621.31 98.96 6621.31 98.97 6621.31 98.99 6621.31
99.19 6621.31 99.22 6621.31 99.26 6621.31 99.28 6621.31 99.31 6621.31
99.34 6621.31 99.35 6621.31 99.36 6621.31 102.32 6621.35 105.7 6621.39
106.85 6621.4 107.92 6621.42 115.12 6621.5 116.6 6621.52 116.95 6621.53
117 6621.52 117.95 6621.35 118.86 6621.5 118.96 6621.51 121.87 6621.78
122.5 6621.84 122.55 6621.96 123.26 6623.61 123.98 6625.27 124.56 6626.62
125.86 6629.65 126.68 6631.56 127.84 6635.23

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val
0 .065 72.74 .045 95.88 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
72.74 95.88 26.03 26.03 26.03 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 370.7422

INPUT
Description:
Station Elevation Data num= 79
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6664.1 68.45 6629.64 68.55 6629.54 68.6 6629.49 68.79 6629.28
68.93 6629.14 71.74 6626.23 72.3 6625.65 72.36 6625.59 73.15 6624.74
77.36 6620.22 77.4 6620.17 78.76 6614.78 79.09 6613.47 79.57 6613.47
81.59 6613.47 86.56 6613.46 87.09 6613.46 88.22 6613.82 93.81 6615.45
96.04 6616.11 99 6616.97 102.34 6617.96 102.83 6618.09 105.68 6618.55
105.86 6618.58 105.91 6618.58 105.92 6618.58 105.94 6618.58 106.31 6618.58
106.34 6618.58 106.54 6618.58 106.61 6618.58 106.7 6618.57 106.78 6618.57
106.81 6618.57 106.84 6618.57 107 6618.57 107.06 6618.57 107.24 6618.57
107.32 6618.57 107.42 6618.57 107.47 6618.57 107.65 6618.57 107.75 6618.57
107.89 6618.57 107.97 6618.57 108.06 6618.57 108.08 6618.57 108.2 6618.57
108.25 6618.57 108.27 6618.57 108.38 6618.57 108.46 6618.57 108.48 6618.57
108.54 6618.57 108.62 6618.57 108.67 6618.57 108.73 6618.57 108.77 6618.57
110.98 6618.57 114.37 6618.56 114.86 6618.56 115.14 6618.56 119.03 6618.56
124.42 6618.56 124.46 6618.55 124.75 6618.52 126 6618.37 126.14 6618.36
127.56 6618.47 127.85 6618.49 131.74 6618.49 134.95 6618.49 134.98 6618.58
135 6618.62 135.85 6619.85 136.66 6621.04 143.46 6632.46

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 77.36 .045 102.83 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
77.36 102.83 24.74 24.74 24.74 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 345.998

INPUT
Description:
Station Elevation Data num= 120
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6670.53 67.87 6625.16 68.47 6624.58 68.5 6624.55 69.36 6623.71
70.49 6622.61 71.2 6621.91 73.77 6619.41 76.12 6617.12 78.39 6614.89
78.42 6614.87 78.45 6614.84 78.61 6614.59 78.67 6614.51 79.3 6613.65
79.74 6612.94 79.97 6612.64 80.06 6612.49 80.13 6612.38 80.26 6612.38
80.47 6612.39 80.54 6612.39 80.9 6612.39 81.09 6612.39 81.31 6612.39
81.53 6612.39 81.66 6612.39 82.37 6612.39 82.59 6612.39 82.63 6612.39
82.77 6612.39 83.38 6612.39 83.65 6612.39 83.89 6612.4 83.98 6612.4
84.36 6612.4 84.49 6612.4 85.23 6612.4 85.43 6612.4 85.95 6612.4
86.07 6612.4 86.4 6612.4 86.46 6612.4 86.69 6612.4 86.73 6612.4
87.1 6612.4 87.16 6612.4 87.42 6612.4 87.45 6612.4 87.55 6612.4
87.66 6612.41 87.67 6612.41 87.69 6612.41 87.77 6612.41 87.98 6612.41
87.99 6612.41 88.03 6612.41 88.04 6612.41 88.07 6612.41 88.13 6612.41

88.24 6612.42 88.27 6612.42 88.76 6612.49 88.87 6612.51 88.98 6612.53
89.07 6612.54 89.16 6612.55 89.24 6612.56 89.31 6612.57 89.38 6612.58
89.44 6612.59 90.96 6612.86 91.24 6612.91 91.78 6613.01 92.27 6613.1
92.33 6613.12 92.58 6613.16 93.9 6613.41 96.43 6613.89 99.9 6614.54
100.29 6614.61 103.23 6615.17 108.69 6616.2 111.74 6616.75 111.76 6616.75
111.86 6616.75 111.91 6616.76 115.28 6616.77 115.36 6616.77 120.97 6616.78
124.84 6616.78 128.18 6616.78 129.84 6616.78 130.21 6616.78 130.36 6616.78
131.4 6616.78 131.41 6616.78 131.45 6616.77 133.34 6616.71 134.5 6616.67
134.65 6616.66 135.16 6616.65 135.42 6616.64 135.58 6616.63 141.91 6615.9
143.21 6615.85 146.18 6620.56 146.21 6620.6 146.31 6620.76 149.22 6625.36
149.42 6625.68 149.98 6626.58 150 6626.61 150.24 6627.01 150.42 6627.34
150.44 6627.37 150.57 6627.59 150.81 6627.95 150.97 6628.19 152.31 6630.56

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 78.39 .045 111.74 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
78.39 111.74 23.87 23.87 23.87 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
111.99 152.31 6616.82 F

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 322.124

INPUT
Description:
Station Elevation Data num= 92
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6675.73 82.73 6620.83 83.25 6620.28 85.21 6618.26 86.38 6617.04
88.05 6615.31 88.21 6615.15 89.48 6613.82 89.66 6613.65 89.71 6613.62
90.79 6612.81 90.82 6612.79 90.89 6612.73 92.03 6611.89 92.08 6611.84
92.74 6611.35 92.76 6611.35 93.11 6611.35 93.16 6611.35 94.79 6611.35
94.86 6611.35 95.24 6611.35 95.26 6611.35 95.64 6611.35 95.68 6611.35
96.48 6611.35 96.52 6611.35 97.61 6611.35 97.67 6611.35 98.19 6611.35
98.48 6611.35 98.51 6611.35 98.96 6611.35 98.97 6611.35 99.27 6611.35
99.29 6611.35 99.35 6611.35 99.52 6611.35 99.54 6611.35 99.72 6611.35
99.74 6611.35 99.85 6611.35 100.18 6611.35 100.2 6611.35 100.61 6611.35
100.62 6611.35 100.67 6611.36 100.73 6611.36 100.77 6611.35 112.34 6612.99
113.31 6613.13 115.89 6613.49 122.45 6614.4 125.79 6614.86 125.86 6614.87
127.61 6615.09 128.2 6615.17 128.42 6615.2 128.91 6615.24 129.01 6615.23
129.06 6615.24 133.87 6615.27 138.07 6615.28 142.16 6615.31 147.23 6615.31
149.21 6615.32 150.29 6615.32 152.2 6615.32 152.26 6615.31 152.48 6615.31
156.52 6615.19 157.66 6615.17 159.34 6615.14 160.55 6615.13 160.66 6615.14
160.72 6615.15 160.78 6615.15 160.81 6615.15 160.82 6615.16 160.98 6615.17
161.01 6615.18 161.19 6615.19 161.22 6615.2 163.16 6617.77 163.54 6618.1
165.54 6619.81 165.61 6619.86 165.85 6620.07 167.17 6621.2 167.84 6621.77
168.48 6622.91 174.16 6629.06

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 88.21 .045 127.61 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
88.21 127.61 24.44 24.44 24.44 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
128.17 174.16 6615.47 F

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 297.687

INPUT
Description:
Station Elevation Data num= 79
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6660.48 76.06 6619.09 76.12 6619.03 76.27 6618.87 77.08 6618
77.66 6617.39 78.48 6616.51 78.6 6616.38 79.27 6615.67 79.56 6615.37
80.23 6614.66 80.84 6614 82.37 6612.38 82.59 6612.14 82.61 6612.13
83.23 6611.23 83.58 6610.79 83.85 6610.4 83.94 6610.29 84.65 6610.29
85 6610.29 85.64 6610.29 86.02 6610.29 86.39 6610.29 86.42 6610.29
86.44 6610.29 86.66 6610.29 87.21 6610.29 87.35 6610.29 87.94 6610.29
88.15 6610.29 88.54 6610.29 88.76 6610.29 89.07 6610.29 89.21 6610.29
89.66 6610.29 89.77 6610.29 90.11 6610.29 90.27 6610.29 90.56 6610.29
90.68 6610.29 91.09 6610.29 91.19 6610.29 91.6 6610.29 91.72 6610.29
91.76 6610.29 91.79 6610.29 91.81 6610.29 91.84 6610.29 91.87 6610.29
91.94 6610.29 112.82 6613.07 118.91 6613.89 119.61 6613.91 121.91 6613.94
121.98 6613.94 122.01 6613.94 122.04 6613.94 122.06 6613.94 126.02 6614.01
130.92 6614.09 135.52 6614.17 139.93 6614.23 141.33 6614.45 141.81 6614.55
141.84 6614.55 141.86 6614.56 141.94 6614.56 142.81 6614.54 143.47 6614.54
143.6 6614.54 143.62 6614.54 144.38 6614.57 145.08 6614.62 150.97 6614.91
158.95 6615.43 159.08 6615.45 159.46 6616.19 166.05 6624.67

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 79.56 .045 118.91 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
79.56 118.91 25.03 25.03 25.03 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 272.6538

INPUT
Description:
Station Elevation Data num= 87
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6646.27 74.34 6617.47 74.39 6617.24 74.71 6615.91 74.97 6614.76
75.02 6614.52 75.18 6613.85 75.3 6613.67 75.93 6612.78 77.54 6610.5
77.57 6610.47 77.59 6610.43 78.02 6610.3 78.5 6610.15 79.2 6609.86
79.32 6609.83 79.88 6609.66 80.35 6609.46 80.77 6609.29 81.06 6609.2
81.21 6609.2 81.55 6609.2 81.9 6609.2 82.39 6609.2 82.77 6609.2
83.15 6609.2 83.28 6609.2 83.43 6609.2 83.55 6609.2 83.56 6609.2
83.76 6609.2 83.99 6609.2 84.13 6609.2 84.48 6609.2 84.81 6609.2
85.23 6609.2 85.58 6609.2 85.85 6609.2 86.26 6609.2 86.42 6609.2
86.69 6609.2 86.92 6609.2 87.07 6609.2 87.3 6609.2 87.6 6609.2
87.88 6609.2 88.1 6609.2 88.23 6609.2 88.42 6609.2 88.67 6609.2
88.78 6609.2 88.83 6609.2 88.9 6609.2 88.91 6609.2 88.94 6609.2
88.96 6609.21 89.02 6609.2 89.06 6609.2 103.08 6610.96 110.71 6611.93
115.67 6612.56 116.23 6612.57 118.68 6612.64 118.71 6612.64 118.78 6612.64
118.79 6612.64 118.83 6612.64 126.4 6612.85 127.71 6612.89 133.84 6613.06
134.48 6613.08 136.27 6613.13 136.74 6613.14 136.86 6613.17 139.12 6613.75
139.14 6613.75 139.17 6613.75 139.33 6613.75 139.49 6613.75 140.35 6613.89
143.23 6614.33 144.26 6614.49 155.22 6615.14 156 6615.21 157.6 6615.33

162.93 6620.88 163.89 6622.24

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 75.93 .045 115.67 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
75.93 115.67 24.44 24.44 24.44 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 248.2139

INPUT
Description:
Station Elevation Data num= 64
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6637.54 77.34 6611.83 77.65 6611.44 77.69 6611.39 78.44 6608.43
78.6 6607.8 80.62 6607.8 81.08 6607.8 81.1 6607.8 83.65 6607.8
84.4 6607.8 84.71 6607.8 84.78 6607.8 85.14 6607.8 85.2 6607.8
85.47 6607.8 85.49 6607.8 85.55 6607.8 85.76 6607.8 85.81 6607.8
86.38 6607.8 86.41 6607.8 86.43 6607.8 86.45 6607.8 86.47 6607.8
86.51 6607.8 86.54 6607.8 86.61 6607.8 94.43 6608.93 96.51 6609.23
96.92 6609.29 97.1 6609.31 100.34 6609.77 100.59 6609.8 108 6610.85
109.49 6611.06 110.58 6611.21 111.28 6611.24 113.65 6611.32 113.71 6611.33
113.76 6611.33 113.78 6611.33 113.81 6611.33 117 6611.44 122.87 6611.67
124.85 6611.75 128.94 6611.9 132.13 6612.04 134.69 6612.71 135.76 6613
135.94 6613.05 136.83 6613.28 136.84 6613.28 136.88 6613.29 138.27 6613.52
141.97 6614.14 144 6614.47 150.28 6615.1 152.99 6615.61 155.53 6616.43
155.85 6616.85 161.96 6622.67 162.1 6622.81 162.23 6622.94

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 77.65 .045 111.28 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
77.65 111.28 22.78 22.78 22.78 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 225.4341

INPUT
Description:
Station Elevation Data num= 100
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6628.86 69.14 6616.06 69.17 6615.95 69.27 6615.83 69.29 6615.81
69.34 6615.75 69.41 6615.67 69.42 6615.65 69.56 6615.49 69.73 6615.29
69.77 6615.24 69.91 6615.08 70.19 6614.75 70.34 6614.57 70.65 6614.2
71.01 6613.77 71.95 6612.65 72 6612.59 72.88 6611.56 74.85 6609.23
74.9 6609.16 75.13 6608.89 75.57 6608.37 75.61 6608.32 75.93 6608.11
78.77 6606.5 79.01 6606.35 81.07 6606.35 81.51 6606.35 82.27 6606.35
86.64 6606.35 86.77 6606.35 86.86 6606.35 86.96 6606.35 87.01 6606.35
90.33 6607.02 90.47 6607.05 90.89 6607.12 90.93 6607.13 91.22 6607.19
91.76 6607.29 92.71 6607.47 92.76 6607.48 92.78 6607.48 92.81 6607.49
95.41 6607.97 96.02 6608.09 97.56 6608.38 97.81 6608.42 105.26 6609.82
105.59 6609.83 106.1 6609.85 106.93 6609.89 107.37 6609.91 107.43 6610.19
107.53 6610.49 107.55 6610.5 107.58 6610.49 108.32 6610.48 108.9 6610.46

108.93 6610.07 108.95 6610.01 109.02 6609.98 109.1 6609.99 112.05 6610.11
114.98 6610.25 115 6610.25 115.01 6610.25 116.26 6610.31 118.24 6610.4
118.4 6610.41 119.05 6610.44 119.63 6610.47 119.71 6610.47 121.49 6610.56
126.8 6610.82 127.18 6610.83 128.67 6610.91 129.09 6611.01 129.4 6611.08
131.6 6611.6 132.58 6611.85 133.03 6611.96 134.17 6612.25 134.21 6612.25
134.53 6612.28 136.23 6612.41 137.14 6612.51 137.85 6612.6 138.54 6612.69
148.55 6613.29 148.67 6613.3 151.22 6613.66 152.63 6613.99 153.67 6613.98
154.76 6614 155.95 6613.97 156.21 6616.35 163.93 6624.92 163.97 6624.96

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 74.9 .045 105.26 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
74.9 105.26 25.43 25.43 25.43 .1 .3
Ineffective Flow num= 1
Sta L Sta R Elev Permanent
107.91 163.97 6610.58 F

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 200

INPUT
Description:
Station Elevation Data num= 67
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6612.96 67.04 6612.7 67.71 6612.7 67.79 6612.43 67.94 6612.26
68.58 6611.56 69.12 6610.97 69.65 6610.38 69.72 6610.3 69.95 6610.06
70.46 6609.49 71.23 6608.65 71.31 6608.56 71.43 6608.42 71.46 6608.39
71.9 6608.31 72.09 6608.27 72.11 6608.43 72.14 6608.74 72.42 6608.73
73.17 6608.71 73.2 6607.23 76.14 6606.2 77.55 6605.7 78.21 6605.47
78.29 6605.44 80.23 6604.74 80.24 6604.73 84.24 6604.73 88.23 6604.73
88.25 6604.73 97.67 6606.8 99.49 6607.2 99.59 6607.21 99.88 6607.28
100.02 6607.29 102.09 6607.44 102.24 6611.42 102.25 6611.77 102.55 6611.78
102.57 6611.78 103.41 6611.81 103.69 6611.82 103.74 6609.03 108.2 6608.55
109.84 6608.64 111.89 6608.75 112.58 6608.79 114.35 6608.88 115.39 6608.94
115.76 6608.96 115.91 6608.97 119.68 6609.18 122.59 6609.35 122.77 6609.37
123.59 6609.41 124.04 6609.44 124.52 6609.47 125.1 6609.56 129.14 6610.11
129.2 6610.12 131.21 6610.48 131.27 6610.82 131.38 6611.55 131.54 6612.61
131.8 6614.25 132.2 6616.82

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 73.2 .045 102.09 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
73.2 102.09 15.54 15.54 15.54 .1 .3
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 73.01 6611.68 F
103.24 132.2 6611.77 F

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 184.4609

INPUT

Description:
Station Elevation Data num= 76
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6609.64 53.83 6609.5 63.99 6609.47 65.22 6607.63 66.12 6606.54
66.24 6606.4 66.29 6606.34 66.39 6606.71 66.42 6606.8 66.71 6606.75
67.93 6606.52 68.88 6606.65 68.96 6606.67 69.01 6607.15 69.06 6607.15
69.3 6607.15 69.88 6607.13 70.03 6607.13 70.07 6600.19 70.51 6600.02
70.89 6599.9 71.23 6599.79 71.52 6599.69 71.79 6599.6 72.03 6599.52
72.24 6599.45 72.44 6599.38 72.61 6599.33 72.77 6599.27 72.92 6599.22
73.06 6599.18 73.19 6599.13 76.92 6599.5 77.19 6599.55 77.85 6599.57
80.49 6599.85 81.33 6599.78 81.41 6599.8 81.69 6599.85 81.83 6599.88
82 6599.91 82.34 6599.98 82.71 6600.05 83.14 6600.13 83.62 6600.22
83.85 6600.27 83.96 6600.29 84.17 6600.33 84.8 6600.45 85.53 6600.6
86.41 6600.77 87.13 6600.91 87.47 6600.98 87.85 6601.06 87.89 6604.19
87.9 6605.2 87.95 6606.9 88.05 6610 88.16 6610 88.3 6610
88.65 6610 88.82 6610 88.85 6607.76 88.87 6606.5 92.8 6606.53
95.77 6606.56 96.34 6606.56 98.48 6606.58 106.83 6606.67 107.54 6606.68
107.98 6606.75 112.34 6607.46 112.37 6607.59 112.39 6607.68 112.59 6608.57
113.17 6611.14

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 70.03 .065 87.95 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
70.03 87.95 13.84 13.84 13.84 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 69.55 6610.78 F
88.06 113.17 6611.86 F

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 170.6172

INPUT
Description:
Station Elevation Data num= 52
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6621.07 69.35 6612.52 84.77 6610.61 84.96 6610.46 85.23 6610.05
85.45 6609.71 85.62 6609.45 86.07 6608.75 86.59 6607.96 87.47 6606.6
87.71 6606.24 87.99 6605.81 88.25 6605.76 88.97 6605.63 89.08 6605.61
89.11 6605.6 90.4 6605.65 90.5 6605.66 90.6 6605.66 90.66 6606.07
90.67 6606.15 91.25 6606.11 91.78 6606.07 92.15 6606.04 92.22 6597.29
92.23 6595.33 92.49 6595.2 92.78 6595.07 93.22 6595.01 93.32 6595.01
93.48 6595.01 93.77 6595 94.47 6594.99 97.6 6594.94 101.38 6594.94
101.4 6597.32 101.44 6604.04 101.81 6606.02 102.35 6608.84 102.39 6606.24
102.4 6605.34 102.74 6605.34 111.97 6605.46 112.06 6605.46 121.01 6605.58
122.04 6605.78 125.81 6606.54 125.84 6606.56 125.86 6606.58 126.26 6606.89
126.58 6607.13 126.85 6607.81

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 92.15 .065 101.81 .02

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
92.15 101.81 115 115 115 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 92.07 6609.71 F

102.18 126.85 6611.76 F

CULVERT

RIVER: Stream
REACH: Reach RS: 100

INPUT
Description: Proposed Salina Junction Culvert
Distance from Upstream XS = 5
Deck/Roadway Width = 107
Weir Coefficient = 2.6
Upstream Deck/Roadway Coordinates
num= 2
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
87.47 6606.6 125.81 6606.54

Upstream Bridge Cross Section Data
Station Elevation Data num= 52
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6621.07 69.35 6612.52 84.77 6610.61 84.96 6610.46 85.23 6610.05
85.45 6609.71 85.62 6609.45 86.07 6608.75 86.59 6607.96 87.47 6606.6
87.71 6606.24 87.99 6605.81 88.25 6605.76 88.97 6605.63 89.08 6605.61
89.11 6605.6 90.4 6605.65 90.5 6605.66 90.6 6605.66 90.66 6606.07
90.67 6606.15 91.25 6606.11 91.78 6606.07 92.15 6606.04 92.22 6597.29
92.23 6595.33 92.49 6595.2 92.78 6595.07 93.22 6595.01 93.32 6595.01
93.48 6595.01 93.77 6595 94.47 6594.99 97.6 6594.94 101.38 6594.94
101.4 6597.32 101.44 6604.04 101.81 6606.02 102.35 6608.84 102.39 6606.24
102.4 6605.34 102.74 6605.34 111.97 6605.46 112.06 6605.46 121.01 6605.58
122.04 6605.78 125.81 6606.54 125.84 6606.56 125.86 6606.58 126.26 6606.89
126.58 6607.13 126.85 6607.81

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 92.15 .065 101.81 .02

Bank Sta: Left Right Coeff Contr. Expan.
92.15 101.81 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 92.07 6609.71 F
102.18 126.85 6611.76 F

Downstream Deck/Roadway Coordinates
num= 2
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord
0 6599.5 95 6599.5

Downstream Bridge Cross Section Data
Station Elevation Data num= 402
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6596.86 .6 6596.88 .81 6596.88 .83 6596.88 .88 6596.88
1.33 6596.87 1.88 6596.71 5.65 6595.56 5.82 6595.56 6.13 6595.58
6.18 6596.05 8.33 6596.1 13 6596.17 13.95 6596.19 14.11 6596.19
14.36 6596.19 14.41 6596.19 14.44 6596.19 14.47 6596.19 14.93 6596.14
15.01 6596.13 15.71 6596.06 15.86 6596.05 16.37 6596 16.47 6595.99
16.73 6595.97 16.97 6595.95 17.2 6595.94 17.21 6595.94 17.23 6595.93
17.35 6595.92 17.54 6595.91 17.65 6595.9 17.88 6595.89 17.9 6595.89
18.3 6595.87 18.42 6595.86 18.7 6595.85 18.92 6595.84 19.1 6595.84
19.41 6595.83 21.88 6595.14 22.06 6595.13 22.77 6595.07 22.79 6595.06
23.51 6595.02 23.64 6595.01 24.23 6594.98 24.51 6594.97 24.95 6594.96

25.37 6594.95 25.66 6594.95 26.23 6594.95 26.78 6594.96 27.43 6594.98
27.96 6595 28.56 6595.03 28.85 6595.05 29.31 6595.09 29.69 6595.12
29.77 6595.13 30.07 6595.15 30.7 6595.22 30.85 6595.23 31.65 6595.33
31.68 6595.33 32.46 6595.44 32.69 6595.47 33.31 6595.56 33.76 6595.64
34.18 6595.71 34.88 6595.83 35.09 6595.87 35.78 6596 36.03 6596.04
36.08 6596.05 36.81 6596.19 37.02 6596.23 37.36 6596.3 40.26 6596.99
40.27 6596.99 40.28 6596.99 40.31 6597.19 40.36 6597.52 41.78 6597.95
41.98 6598.01 42 6596.01 42.03 6592.14 42.05 6587.94 44.58 6587.16
45.49 6587.02 47.29 6587.03 48.25 6586.97 49.21 6587.03 51.01 6587.02
51.92 6587.16 54.44 6587.94 54.47 6592.15 54.49 6596.01 54.51 6598.69
54.63 6599.18 56.14 6599.16 56.2 6598.69 61.15 6599.01 61.18 6599.01
61.37 6599.03 61.45 6599.03 61.64 6599.05 62.37 6599.1 63.62 6599.19
64.67 6599.26 64.93 6599.28 65.4 6599.31 65.89 6599.35 66.41 6599.39
66.85 6599.42 67.63 6599.48 67.68 6599.48 67.95 6599.5 70.61 6599.7
70.67 6599.7 70.7 6599.7 70.81 6599.7 70.82 6599.7 70.9 6599.7
70.91 6599.7 70.93 6599.71 70.95 6599.71 70.99 6599.71 71.02 6599.71
71.05 6599.71 71.08 6599.71 71.1 6599.71 71.11 6599.71 71.16 6599.71
71.18 6599.71 71.2 6599.71 71.21 6599.71 71.23 6599.71 71.25 6599.71
71.27 6599.71 71.29 6599.71 71.33 6599.71 71.34 6599.71 71.35 6599.71
71.4 6599.72 71.41 6599.72 71.43 6599.72 71.46 6599.72 71.48 6599.72
71.49 6599.72 71.54 6599.72 71.58 6599.72 71.61 6599.72 71.67 6599.72
71.7 6599.72 71.74 6599.72 71.83 6599.73 71.86 6599.73 71.94 6599.73
71.95 6599.73 71.96 6599.73 72.05 6599.73 72.07 6599.73 72.2 6599.73
72.26 6599.73 72.28 6599.74 72.34 6599.74 72.38 6599.74 72.43 6599.74
72.47 6599.74 72.49 6599.74 72.5 6599.74 72.59 6599.74 72.64 6599.74
72.8 6599.75 72.83 6599.75 72.97 6599.75 73 6599.75 73.07 6599.75
73.08 6599.75 73.15 6599.75 73.16 6599.75 73.31 6599.76 73.39 6599.76
73.44 6599.76 73.46 6599.76 73.56 6599.76 73.63 6599.77 73.65 6599.77
73.7 6599.77 73.76 6599.77 73.78 6599.77 73.81 6599.77 73.89 6599.77
73.95 6599.77 74.1 6599.78 74.13 6599.78 74.15 6599.78 74.3 6599.78
74.33 6599.78 74.34 6599.78 74.43 6599.78 74.47 6599.78 74.54 6599.79
74.56 6599.79 74.65 6599.79 74.78 6599.79 74.89 6599.79 75.04 6599.8
75.22 6599.8 75.29 6599.8 75.4 6599.81 75.44 6599.81 75.46 6599.81
75.47 6599.81 75.54 6599.81 75.57 6599.81 75.64 6599.81 75.7 6599.81
75.75 6599.81 75.81 6599.81 75.87 6599.82 75.98 6599.82 76.02 6599.82
76.17 6599.82 76.18 6599.82 76.21 6599.82 76.23 6599.82 76.3 6599.83
76.33 6599.83 76.35 6599.83 76.38 6599.83 76.42 6599.83 76.51 6599.83
76.6 6599.83 76.76 6599.84 76.81 6599.84 76.91 6599.84 76.93 6599.84
76.96 6599.84 77.02 6599.84 77.05 6599.84 77.21 6599.85 77.26 6599.85
77.46 6599.85 77.48 6599.85 77.57 6599.85 77.61 6599.85 77.81 6599.86
77.84 6599.86 77.86 6599.86 78.02 6599.86 78.08 6599.86 78.17 6599.87
78.24 6599.87 78.31 6599.87 78.41 6599.87 78.52 6599.87 78.58 6599.88
78.66 6599.88 78.81 6599.88 78.83 6599.88 78.92 6599.88 79.08 6599.89
79.14 6599.89 79.21 6599.89 79.3 6599.89 79.41 6599.89 79.42 6599.89
79.64 6599.9 79.66 6599.9 79.81 6599.9 79.84 6599.9 79.89 6599.9
80.13 6599.91 80.15 6599.91 80.17 6599.91 80.4 6599.91 80.47 6599.92
80.52 6599.92 80.54 6599.92 80.62 6599.92 80.75 6599.92 80.78 6599.92
80.92 6599.93 81 6599.93 81.23 6599.93 81.37 6599.94 81.44 6599.94
81.47 6599.94 81.49 6599.94 81.84 6599.94 81.87 6599.95 81.92 6599.95
82.24 6599.95 82.45 6599.96 82.54 6599.96 82.69 6599.96 82.78 6599.96
82.9 6599.97 83.02 6599.97 83.14 6599.97 83.24 6599.97 83.28 6599.98
83.38 6599.98 83.42 6599.98 83.5 6599.98 83.54 6599.98 83.56 6599.98
83.76 6599.98 83.83 6599.99 83.91 6599.99 83.95 6599.99 84.09 6599.99
84.2 6599.99 84.36 6600 84.52 6600 84.59 6600 84.66 6600
84.74 6600 84.9 6600.01 85.12 6600.01 85.17 6600.01 85.31 6600.02
85.33 6600.02 85.34 6600.02 85.5 6600.02 85.52 6600.02 85.53 6600.02
85.81 6600.03 85.87 6600.03 85.99 6600.03 86.33 6600.04 86.43 6600.04
86.58 6600.04 86.8 6600.05 86.91 6600.05 87.27 6600.06 87.28 6600.06
87.33 6600.06 87.38 6600.06 87.49 6600.06 87.7 6600.06 87.83 6600.07
88.03 6600.07 88.33 6600.08 88.36 6600.08 88.38 6600.08 88.61 6600.08
88.68 6600.08 89.06 6600.09 89.58 6600.1 89.6 6600.1 89.63 6600.1
89.99 6600.11 90.1 6600.11 90.24 6600.11 90.32 6600.12 90.36 6600.12

90.38 6600.12 90.48 6600.12 90.58 6600.12 90.79 6600.12 91.18 6600.13
91.27 6600.13 91.31 6600.14 91.68 6600.14 91.81 6600.14 92.15 6600.15
92.49 6600.16 92.8 6600.16 92.96 6600.17 93.12 6600.17 93.15 6600.17
93.37 6600.17 93.54 6600.18 93.72 6600.18 93.87 6600.18 94.24 6600.19
94.3 6600.19 94.32 6600.19 94.79 6600.2 95.02 6600.21 95.24 6600.21
95.57 6600.22 95.6 6600.22 95.74 6600.22 95.8 6600.22 95.81 6600.22
96.15 6600.23 96.19 6600.24 96.3 6600.24 96.34 6600.24 96.47 6600.25
96.51 6600.25 96.66 6600.25 96.7 6600.26 96.81 6600.26 96.85 6600.26
96.96 6600.27 100.78 6600.4

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 41.98 .065 54.63 .065

Bank Sta: Left Right Coeff Contr. Expan.
41.98 54.63 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 41.67 6599.18 F
54.78 100.78 6599.78 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 = .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 Culverts = 1

Culvert Name Shape Rise Span
Culvert #1 Box 8 8
FHWA Chart # 9 - flared wingwalls and Inlet top edge bevel
FHWA Scale # 1 - 45 deg Wingwall flare; inlet top edge bevel=0.043D
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist Length Top n Bottom n Depth Blocked Entrance Loss Coef Exit Loss Coef
2.5 110 .015 .06 0 .7 1
Upstream Elevation = 6594.31
Centerline Station = 96.62
Downstream Elevation = 6588.54
Centerline Station = 48.25

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 55.61914

INPUT
Description:
Station Elevation Data num= 402
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6596.86 .6 6596.88 .81 6596.88 .83 6596.88 .88 6596.88
1.33 6596.87 1.88 6596.71 5.65 6595.56 5.82 6595.56 6.13 6595.58
6.18 6596.05 8.33 6596.1 13 6596.17 13.95 6596.19 14.11 6596.19
14.36 6596.19 14.41 6596.19 14.44 6596.19 14.47 6596.19 14.93 6596.14
15.01 6596.13 15.71 6596.06 15.86 6596.05 16.37 6596 16.47 6595.99
16.73 6595.97 16.97 6595.95 17.2 6595.94 17.21 6595.94 17.23 6595.93
17.35 6595.92 17.54 6595.91 17.65 6595.9 17.88 6595.89 17.9 6595.89
18.3 6595.87 18.42 6595.86 18.7 6595.85 18.92 6595.84 19.1 6595.84
19.41 6595.83 21.88 6595.14 22.06 6595.13 22.77 6595.07 22.79 6595.06

23.51 6595.02 23.64 6595.01 24.23 6594.98 24.51 6594.97 24.95 6594.96
25.37 6594.95 25.66 6594.95 26.23 6594.95 26.78 6594.96 27.43 6594.98
27.96 6595 28.56 6595.03 28.85 6595.05 29.31 6595.09 29.69 6595.12
29.77 6595.13 30.07 6595.15 30.7 6595.22 30.85 6595.23 31.65 6595.33
31.68 6595.33 32.46 6595.44 32.69 6595.47 33.31 6595.56 33.76 6595.64
34.18 6595.71 34.88 6595.83 35.09 6595.87 35.78 6596 36.03 6596.04
36.08 6596.05 36.81 6596.19 37.02 6596.23 37.36 6596.3 40.26 6596.99
40.27 6596.99 40.28 6596.99 40.31 6597.19 40.36 6597.52 41.78 6597.95
41.98 6598.01 42 6596.01 42.03 6592.14 42.05 6587.94 44.58 6587.16
45.49 6587.02 47.29 6587.03 48.25 6586.97 49.21 6587.03 51.01 6587.02
51.92 6587.16 54.44 6587.94 54.47 6592.15 54.49 6596.01 54.51 6598.69
54.63 6599.18 56.14 6599.16 56.2 6598.69 61.15 6599.01 61.18 6599.01
61.37 6599.03 61.45 6599.03 61.64 6599.05 62.37 6599.1 63.62 6599.19
64.67 6599.26 64.93 6599.28 65.4 6599.31 65.89 6599.35 66.41 6599.39
66.85 6599.42 67.63 6599.48 67.68 6599.48 67.95 6599.5 70.61 6599.7
70.67 6599.7 70.7 6599.7 70.81 6599.7 70.82 6599.7 70.9 6599.7
70.91 6599.7 70.93 6599.71 70.95 6599.71 70.99 6599.71 71.02 6599.71
71.05 6599.71 71.08 6599.71 71.1 6599.71 71.11 6599.71 71.16 6599.71
71.18 6599.71 71.2 6599.71 71.21 6599.71 71.23 6599.71 71.25 6599.71
71.27 6599.71 71.29 6599.71 71.33 6599.71 71.34 6599.71 71.35 6599.71
71.4 6599.72 71.41 6599.72 71.43 6599.72 71.46 6599.72 71.48 6599.72
71.49 6599.72 71.54 6599.72 71.58 6599.72 71.61 6599.72 71.67 6599.72
71.7 6599.72 71.74 6599.72 71.83 6599.73 71.86 6599.73 71.94 6599.73
71.95 6599.73 71.96 6599.73 72.05 6599.73 72.07 6599.73 72.2 6599.73
72.26 6599.73 72.28 6599.74 72.34 6599.74 72.38 6599.74 72.43 6599.74
72.47 6599.74 72.49 6599.74 72.5 6599.74 72.59 6599.74 72.64 6599.74
72.8 6599.75 72.83 6599.75 72.97 6599.75 73 6599.75 73.07 6599.75
73.08 6599.75 73.15 6599.75 73.16 6599.75 73.31 6599.76 73.39 6599.76
73.44 6599.76 73.46 6599.76 73.56 6599.76 73.63 6599.77 73.65 6599.77
73.7 6599.77 73.76 6599.77 73.78 6599.77 73.81 6599.77 73.89 6599.77
73.95 6599.77 74.1 6599.78 74.13 6599.78 74.15 6599.78 74.3 6599.78
74.33 6599.78 74.34 6599.78 74.43 6599.78 74.47 6599.78 74.54 6599.79
74.56 6599.79 74.65 6599.79 74.78 6599.79 74.89 6599.79 75.04 6599.8
75.22 6599.8 75.29 6599.8 75.4 6599.81 75.44 6599.81 75.46 6599.81
75.47 6599.81 75.54 6599.81 75.57 6599.81 75.64 6599.81 75.7 6599.81
75.75 6599.81 75.81 6599.81 75.87 6599.82 75.98 6599.82 76.02 6599.82
76.17 6599.82 76.18 6599.82 76.21 6599.82 76.23 6599.82 76.3 6599.83
76.33 6599.83 76.35 6599.83 76.38 6599.83 76.42 6599.83 76.51 6599.83
76.6 6599.83 76.76 6599.84 76.81 6599.84 76.91 6599.84 76.93 6599.84
76.96 6599.84 77.02 6599.84 77.05 6599.84 77.21 6599.85 77.26 6599.85
77.46 6599.85 77.48 6599.85 77.57 6599.85 77.61 6599.85 77.81 6599.86
77.84 6599.86 77.86 6599.86 78.02 6599.86 78.08 6599.86 78.17 6599.87
78.24 6599.87 78.31 6599.87 78.41 6599.87 78.52 6599.87 78.58 6599.88
78.66 6599.88 78.81 6599.88 78.83 6599.88 78.92 6599.88 79.08 6599.89
79.14 6599.89 79.21 6599.89 79.3 6599.89 79.41 6599.89 79.42 6599.89
79.64 6599.9 79.66 6599.9 79.81 6599.9 79.84 6599.9 79.89 6599.9
80.13 6599.91 80.15 6599.91 80.17 6599.91 80.4 6599.91 80.47 6599.92
80.52 6599.92 80.54 6599.92 80.62 6599.92 80.75 6599.92 80.78 6599.92
80.92 6599.93 81 6599.93 81.23 6599.93 81.37 6599.94 81.44 6599.94
81.47 6599.94 81.49 6599.94 81.84 6599.94 81.87 6599.95 81.92 6599.95
82.24 6599.95 82.45 6599.96 82.54 6599.96 82.69 6599.96 82.78 6599.96
82.9 6599.97 83.02 6599.97 83.14 6599.97 83.24 6599.97 83.28 6599.98
83.38 6599.98 83.42 6599.98 83.5 6599.98 83.54 6599.98 83.56 6599.98
83.76 6599.98 83.83 6599.99 83.91 6599.99 83.95 6599.99 84.09 6599.99
84.2 6599.99 84.36 6600 84.52 6600 84.59 6600 84.66 6600
84.74 6600 84.9 6600.01 85.12 6600.01 85.17 6600.01 85.31 6600.02
85.33 6600.02 85.34 6600.02 85.5 6600.02 85.52 6600.02 85.53 6600.02
85.81 6600.03 85.87 6600.03 85.99 6600.03 86.33 6600.04 86.43 6600.04
86.58 6600.04 86.8 6600.05 86.91 6600.05 87.27 6600.06 87.28 6600.06
87.33 6600.06 87.38 6600.06 87.49 6600.06 87.7 6600.06 87.83 6600.07
88.03 6600.07 88.33 6600.08 88.36 6600.08 88.38 6600.08 88.61 6600.08
88.68 6600.08 89.06 6600.09 89.58 6600.1 89.6 6600.1 89.63 6600.1

89.99 6600.11 90.1 6600.11 90.24 6600.11 90.32 6600.12 90.36 6600.12
90.38 6600.12 90.48 6600.12 90.58 6600.12 90.79 6600.12 91.18 6600.13
91.27 6600.13 91.31 6600.14 91.68 6600.14 91.81 6600.14 92.15 6600.15
92.49 6600.16 92.8 6600.16 92.96 6600.17 93.12 6600.17 93.15 6600.17
93.37 6600.17 93.54 6600.18 93.72 6600.18 93.87 6600.18 94.24 6600.19
94.3 6600.19 94.32 6600.19 94.79 6600.2 95.02 6600.21 95.24 6600.21
95.57 6600.22 95.6 6600.22 95.74 6600.22 95.8 6600.22 95.81 6600.22
96.15 6600.23 96.19 6600.24 96.3 6600.24 96.34 6600.24 96.47 6600.25
96.51 6600.25 96.66 6600.25 96.7 6600.26 96.81 6600.26 96.85 6600.26
96.96 6600.27 100.78 6600.4

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 41.98 .065 54.63 .065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
41.98 54.63 8.87 8.87 8.87 .6 .8
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 41.67 6599.18 F
54.78 100.78 6599.78 F

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 46.75

INPUT
Description:
Station Elevation Data num= 357
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6592.92 1.18 6594.33 1.71 6594.96 3.03 6595.86 3.12 6595.91
3.18 6595.91 3.85 6595.86 3.91 6595.86 4.22 6595.83 4.27 6595.85
4.33 6595.88 4.41 6595.85 4.54 6595.82 5.19 6595.62 7.26 6595.01
7.32 6595 7.43 6594.97 10.21 6594.7 11.47 6594.43 12.67 6594.31
16.53 6593.22 18.61 6592.59 23.04 6591.37 23.11 6591.36 23.42 6591.33
23.74 6591.31 23.79 6591.31 24.04 6591.3 24.16 6591.29 24.35 6591.29
24.53 6591.28 24.65 6591.28 24.9 6591.28 25.13 6591.29 25.41 6591.29
25.64 6591.3 25.9 6591.32 26.02 6591.33 26.22 6591.34 26.38 6591.36
26.41 6591.36 26.54 6591.37 26.81 6591.4 26.87 6591.4 27.22 6591.45
27.23 6591.45 27.57 6591.49 27.66 6591.51 27.93 6591.55 28.12 6591.58
28.3 6591.61 28.6 6591.66 28.69 6591.68 29.09 6591.75 29.11 6591.76
29.51 6591.84 29.67 6591.87 29.96 6591.93 30.26 6592 30.42 6592.04
30.91 6592.16 30.95 6592.42 30.99 6592.67 31.6 6592.86 32.61 6593.14
32.66 6588.71 32.68 6588.54 33.63 6588.54 35.75 6588.54 35.82 6588.5
35.88 6588.48 40.75 6586.04 40.78 6586.04 40.99 6586.04 41.28 6586.04
42.22 6586.04 45.96 6586.04 47.75 6586.04 51.21 6586.04 54.32 6586.04
54.72 6586.04 54.75 6586.04 59.68 6588.5 59.75 6588.54 61.81 6589.42
62.75 6589.93 62.81 6589.96 62.85 6596.56 62.88 6598.99 63.46 6598.98
64.5 6598.97 64.55 6598.64 64.58 6598.47 77.45 6599.44 77.86 6599.47
77.92 6599.48 78.45 6599.52 78.47 6599.52 78.61 6599.53 78.77 6599.55
78.85 6599.56 79.01 6599.57 79.06 6599.57 79.15 6599.57 79.16 6599.57
79.21 6599.57 79.23 6599.57 79.25 6599.57 79.26 6599.57 79.29 6599.57
79.3 6599.57 79.36 6599.58 79.37 6599.58 79.45 6599.58 79.47 6599.58
79.6 6599.58 79.71 6599.58 79.75 6599.58 79.85 6599.58 79.87 6599.58
79.91 6599.59 79.92 6599.59 79.93 6599.59 79.98 6599.59 80 6599.59
80.01 6599.59 80.02 6599.59 80.08 6599.59 80.09 6599.59 80.12 6599.59
80.14 6599.59 80.16 6599.59 80.22 6599.59 80.26 6599.59 80.27 6599.59
80.32 6599.59 80.34 6599.59 80.47 6599.6 80.51 6599.6 80.61 6599.6
80.71 6599.6 80.74 6599.6 80.79 6599.6 80.8 6599.6 80.87 6599.6
80.9 6599.6 80.96 6599.61 81.03 6599.61 81.05 6599.61 81.14 6599.61

81.2 6599.61 81.21 6599.61 81.24 6599.61 81.26 6599.61 81.3 6599.61
81.39 6599.61 81.42 6599.61 81.44 6599.61 81.45 6599.61 81.63 6599.62
81.65 6599.62 81.69 6599.62 81.74 6599.62 81.85 6599.62 81.88 6599.62
81.96 6599.62 82.02 6599.63 82.14 6599.63 82.21 6599.63 82.24 6599.63
82.27 6599.63 82.36 6599.63 82.39 6599.63 82.41 6599.63 82.55 6599.64
82.56 6599.64 82.57 6599.64 82.66 6599.64 82.67 6599.64 82.75 6599.64
82.85 6599.64 82.86 6599.64 82.92 6599.64 82.98 6599.64 83.02 6599.64
83.07 6599.64 83.08 6599.65 83.12 6599.65 83.14 6599.65 83.17 6599.65
83.23 6599.65 83.32 6599.65 83.39 6599.65 83.42 6599.65 83.59 6599.65
83.74 6599.66 83.78 6599.66 83.89 6599.66 83.94 6599.66 83.95 6599.66
84.18 6599.67 84.35 6599.67 84.41 6599.67 84.56 6599.67 84.61 6599.67
84.64 6599.67 84.81 6599.68 84.97 6599.68 85.02 6599.68 85.08 6599.68
85.31 6599.69 85.35 6599.69 85.48 6599.69 85.59 6599.69 85.71 6599.69
85.79 6599.7 86 6599.7 86.11 6599.7 86.53 6599.71 86.56 6599.71
86.63 6599.71 86.9 6599.72 87.21 6599.72 87.39 6599.73 87.5 6599.73
87.58 6599.73 87.72 6599.73 87.8 6599.73 87.91 6599.74 88.1 6599.74
88.21 6599.74 88.38 6599.74 88.43 6599.75 88.62 6599.75 88.64 6599.75
88.77 6599.75 88.89 6599.75 88.91 6599.75 89.05 6599.76 89.1 6599.76
89.22 6599.76 89.34 6599.76 89.51 6599.77 89.67 6599.77 89.79 6599.77
89.99 6599.78 90.02 6599.78 90.28 6599.78 90.35 6599.78 90.36 6599.78
90.37 6599.78 90.4 6599.78 90.46 6599.78 90.95 6599.79 90.98 6599.79
91.05 6599.8 91.08 6599.8 91.5 6599.8 91.6 6599.81 91.63 6599.81
91.74 6599.81 91.76 6599.81 91.8 6599.81 91.87 6599.81 91.94 6599.81
92.18 6599.82 92.24 6599.82 92.3 6599.82 92.43 6599.82 92.83 6599.83
92.97 6599.83 93.04 6599.83 93.16 6599.84 93.17 6599.84 93.22 6599.84
93.25 6599.84 93.34 6599.84 93.45 6599.84 93.52 6599.84 93.62 6599.85
93.73 6599.85 93.99 6599.85 94.02 6599.85 94.03 6599.85 94.32 6599.86
94.35 6599.86 94.45 6599.86 94.47 6599.86 94.5 6599.86 94.67 6599.87
94.69 6599.87 94.86 6599.87 94.92 6599.87 95.02 6599.87 95.08 6599.88
95.1 6599.88 95.3 6599.88 95.37 6599.88 95.59 6599.89 95.72 6599.89
95.74 6599.89 96.02 6599.89 96.17 6599.9 96.27 6599.9 96.55 6599.9
96.64 6599.91 96.81 6599.91 96.85 6599.91 97.14 6599.92 97.4 6599.92
97.48 6599.92 97.49 6599.92 97.86 6599.93 97.92 6599.93 98.04 6599.93
98.19 6599.94 98.24 6599.94 98.39 6599.94 98.56 6599.94 98.79 6599.95
99 6599.95 99.16 6599.96 99.2 6599.96 99.28 6599.96 99.44 6599.96
99.57 6599.97 99.74 6599.97 99.85 6599.97 100.16 6599.98 100.17 6599.98
100.5 6599.98 100.54 6599.99 100.58 6599.99 100.97 6599.99 101.05 6600
101.4 6600 101.53 6600.01 101.57 6600.01 101.64 6600.01 101.67 6600.01
101.93 6600.01 102.31 6600.02 102.62 6600.03 102.74 6600.03 102.79 6600.03
102.86 6600.03 102.87 6600.03 103.8 6600.06 106.7 6600.15 106.73 6600.15
107 6600.16 107.19 6600.17 107.27 6600.17 107.29 6600.17 107.46 6600.17
107.47 6600.17 109.37 6600.08

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 32.61 .065 62.88 .065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
32.61 62.88 19.54 19.54 19.54 .1 .3
Ineffective Flow num= 2
Sta L Sta R Elev Permanent
0 32.12 6593.6 F
63.25 109.37 6599.38 F

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 27.21289

INPUT
Description:

Station Elevation Data num= 69
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6594.27 .94 6594 1.88 6593.48 1.99 6593.4 14.07 6588.66
14.17 6588.62 14.27 6588.58 14.35 6588.55 14.42 6588.52 14.49 6588.48
14.55 6588.44 15.94 6588.52 15.96 6588.52 15.97 6588.52 15.98 6588.52
16 6588.52 16.01 6588.52 16.19 6588.54 19.55 6588.54 19.86 6588.54
23.11 6588.54 23.6 6588.54 26.33 6588.54 26.59 6588.54 26.89 6588.54
29.4 6588.54 29.8 6588.54 32.65 6588.57 33.76 6588.59 34.66 6588.58
35.47 6588.6 35.89 6588.64 39.13 6589 39.26 6589.03 39.89 6589.16
40.15 6589.21 40.63 6589.32 41.53 6589.52 42.68 6589.77 43.71 6589.99
43.94 6590.01 44.01 6590.02 44.87 6590.07 45.54 6590.1 46.08 6590.13
46.48 6590.19 46.64 6590.24 47.13 6590.34 47.39 6590.39 48.06 6590.52
53.32 6592.14 53.83 6592.25 54.32 6592.35 54.49 6592.39 54.8 6592.47
55.25 6592.58 57.7 6593 60.24 6593.39 61.56 6593.56 64.66 6594
64.96 6594.03 65.21 6594.06 68.61 6594.49 72.15 6595 72.38 6595.03
80.56 6597.83 80.71 6597.86 80.9 6597.9 80.96 6597.9

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 14.07 .065 35.89 .065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
14.07 35.89 7.01 7.01 7.01 .1 .3

CROSS SECTION

RIVER: Stream
REACH: Reach RS: 20.20703

INPUT
Description:
Station Elevation Data num= 86
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
0 6593.27 .02 6593.25 1.5 6592.36 1.9 6592.05 7.23 6589.59
7.96 6589.24 8.64 6588.92 9.29 6588.61 9.89 6588.32 10.47 6587.93
11.01 6587.51 11.63 6587.53 12.15 6587.35 12.65 6587.38 13.12 6587.4
13.57 6587.42 13.99 6587.44 14.4 6587.46 14.79 6587.48 14.99 6587.49
16.51 6587.66 18.98 6587.84 19.17 6587.84 19.31 6587.85 19.6 6587.86
19.87 6587.87 20.15 6587.88 22.91 6588 22.97 6588 23.2 6588.01
23.41 6588.02 23.62 6588.02 26.79 6588.07 26.98 6588.08 27.17 6588.09
27.35 6588.09 27.39 6588.09 27.57 6588.1 27.65 6588.1 29.72 6588.11
35.15 6587.99 35.16 6587.99 35.18 6587.99 37.93 6587.92 38.01 6587.92
38.06 6587.92 39.43 6587.92 39.46 6587.92 39.54 6587.92 40.93 6587.95
40.95 6587.95 42.01 6588 42.45 6588.05 43.71 6588.23 44.42 6588.38
46.92 6589 47.39 6589.09 47.49 6589.12 57.11 6592.89 57.88 6593.19
60.08 6594.09 60.49 6594.25 60.73 6594.41 61.13 6594.55 61.39 6594.74
61.77 6594.86 62.05 6595.12 62.38 6595.2 62.73 6595.46 62.84 6595.48
62.94 6595.53 63 6595.5 63.19 6595.53 64.97 6595.79 66.08 6595.76
67.15 6595.74 67.7 6595.72 68.03 6595.72 69.31 6595.69 69.33 6595.69
69.43 6595.69 70.09 6595.68 70.16 6595.68 70.4 6595.67 73.71 6595.6
75.25 6595.48

Manning's n Values num= 3
Sta n Val Sta n Val Sta n Val
0 .065 9.89 .065 44.42 .065

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
9.89 44.42 0 0 0 .1 .3

SUMMARY OF MANNING'S N VALUES

River:Stream

Reach	River Sta.	n1	n2	n3
Reach	533.4468	.065	.045	.02
Reach	521.1821	.065	.045	.02
Reach	495.5928	.065	.045	.02
Reach	470.4639	.065	.045	.02
Reach	437.1738	.065	.045	.02
Reach	419.709	.065	.045	.02
Reach	396.771	.065	.045	.02
Reach	370.7422	.065	.045	.02
Reach	345.998	.065	.045	.02
Reach	322.124	.065	.045	.02
Reach	297.687	.065	.045	.02
Reach	272.6538	.065	.045	.02
Reach	248.2139	.065	.045	.02
Reach	225.4341	.065	.045	.02
Reach	200	.065	.045	.02
Reach	184.4609	.065	.065	.02
Reach	170.6172	.065	.065	.02
Reach	100	Culvert		
Reach	55.61914	.065	.065	.065
Reach	46.75	.065	.065	.065
Reach	27.21289	.065	.065	.065
Reach	20.20703	.065	.065	.065

SUMMARY OF REACH LENGTHS

River: Stream

Reach	River Sta.	Left	Channel	Right
Reach	533.4468	12.25	12.25	12.25
Reach	521.1821	25.59	25.59	25.59
Reach	495.5928	25.13	25.13	25.13
Reach	470.4639	33.29	33.29	33.29
Reach	437.1738	17.47	17.47	17.47
Reach	419.709	22.94	22.94	22.94
Reach	396.771	26.03	26.03	26.03
Reach	370.7422	24.74	24.74	24.74
Reach	345.998	23.87	23.87	23.87
Reach	322.124	24.44	24.44	24.44
Reach	297.687	25.03	25.03	25.03
Reach	272.6538	24.44	24.44	24.44
Reach	248.2139	22.78	22.78	22.78
Reach	225.4341	25.43	25.43	25.43
Reach	200	15.54	15.54	15.54
Reach	184.4609	13.84	13.84	13.84
Reach	170.6172	115	115	115
Reach	100	Culvert		
Reach	55.61914	8.87	8.87	8.87
Reach	46.75	19.54	19.54	19.54
Reach	27.21289	7.01	7.01	7.01
Reach	20.20703	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Stream

Reach	River Sta.	Contr.	Expan.
Reach	533.4468	.1	.3
Reach	521.1821	.1	.3
Reach	495.5928	.1	.3
Reach	470.4639	.1	.3
Reach	437.1738	.1	.3
Reach	419.709	.1	.3
Reach	396.771	.1	.3
Reach	370.7422	.1	.3
Reach	345.998	.1	.3
Reach	322.124	.1	.3
Reach	297.687	.1	.3
Reach	272.6538	.1	.3
Reach	248.2139	.1	.3
Reach	225.4341	.1	.3
Reach	200	.1	.3
Reach	184.4609	.6	.8
Reach	170.6172	.6	.8
Reach	100	Culvert	
Reach	55.61914	.6	.8
Reach	46.75	.1	.3
Reach	27.21289	.1	.3
Reach	20.20703	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft/ft)	E.G. Slope (ft/s)	Vel Chnl (sq ft)	Flow Area (ft)	Top Width	Froude # Chl
Reach	533.4468	10yr	402.00	6627.36	6631.67	6631.67	6632.79	0.024906	8.50	47.29	20.73	0.99
Reach	533.4468	25yr	617.00	6627.36	6632.44	6632.44	6633.87	0.023861	9.59	64.55	23.69	1.00
Reach	533.4468	100yr	1326.00	6627.36	6634.31	6634.31	6635.57	0.011730	9.09	151.34	60.41	0.75
Reach	521.1821	10yr	402.00	6624.41	6627.30	6627.30	6628.30	0.024185	8.04	49.99	24.22	0.99
Reach	521.1821	25yr	617.00	6624.41	6628.05	6628.05	6629.28	0.022840	8.89	69.38	27.50	0.99
Reach	521.1821	100yr	1326.00	6624.41	6629.81	6629.81	6631.57	0.021146	10.65	124.55	35.19	1.00
Reach	495.5928	10yr	402.00	6622.81	6625.33	6625.33	6626.18	0.026378	7.41	54.22	32.08	1.01
Reach	495.5928	25yr	617.00	6622.81	6625.94	6625.94	6627.01	0.023482	8.29	74.43	33.83	0.98
Reach	495.5928	100yr	1326.00	6622.81	6628.46	6627.45	6629.42	0.009552	7.87	168.54	41.02	0.68
Reach	470.4639	10yr	402.00	6621.24	6624.41	6624.27	6625.34	0.020630	7.75	51.84	22.91	0.91
Reach	470.4639	25yr	617.00	6621.24	6625.21	6625.02	6626.39	0.019300	8.70	70.89	24.48	0.90
Reach	470.4639	100yr	1326.00	6621.24	6626.93	6626.93	6628.96	0.021668	11.44	115.90	27.85	0.99
Reach	437.1738	10yr	402.00	6619.85	6623.44	6623.44	6624.57	0.024552	8.55	46.99	20.19	0.99
Reach	437.1738	25yr	617.00	6619.85	6624.30	6624.30	6625.66	0.023264	9.38	65.76	23.44	0.99
Reach	437.1738	100yr	1326.00	6619.85	6626.67	6626.67	6627.92	0.013080	9.15	149.04	53.93	0.79
Reach	419.709	10yr	402.00	6618.10	6622.18	6622.18	6623.50	0.028095	9.20	43.68	16.43	0.99
Reach	419.709	25yr	617.00	6618.10	6623.17	6623.17	6624.75	0.026871	10.08	61.21	19.18	0.99
Reach	419.709	100yr	1326.00	6618.10	6625.19	6625.19	6626.61	0.013321	9.43	138.85	50.23	0.74
Reach	396.771	10yr	402.00	6615.81	6619.78	6619.78	6621.06	0.027504	9.07	44.31	16.96	0.99

Reach	396.771	25yr	617.00	6615.81	6620.71	6620.71	6622.28	0.027000	10.04	61.45	19.69	1.00
Reach	396.771	100yr	1326.00	6615.81	6622.70	6622.70	6624.18	0.014239	9.59	135.88	47.43	0.76
Reach	370.7422	10yr	402.00	6613.46	6616.80	6616.80	6617.94	0.026523	8.58	46.85	20.17	0.99
Reach	370.7422	25yr	617.00	6613.46	6617.66	6617.66	6619.04	0.025088	9.41	65.57	23.30	0.99
Reach	370.7422	100yr	1326.00	6613.46	6619.59	6619.59	6620.83	0.013025	9.01	148.37	58.12	0.75
Reach	345.998	10yr	402.00	6612.38	6615.37	6615.37	6616.32	0.024629	7.85	51.32	26.36	0.98
Reach	345.998	25yr	617.00	6612.38	6616.08	6616.08	6617.24	0.023121	8.67	71.75	33.88	0.99
Reach	345.998	100yr	1326.00	6612.38	6617.64	6617.64	6618.76	0.012853	8.58	158.35	68.75	0.79
Reach	322.124	10yr	402.00	6611.35	6614.11	6614.11	6614.97	0.025488	7.43	54.08	31.14	0.99
Reach	322.124	25yr	617.00	6611.35	6614.76	6614.76	6615.78	0.023983	8.12	75.94	36.44	0.99
Reach	322.124	100yr	1326.00	6611.35	6616.17	6616.17	6617.21	0.013377	8.27	162.10	74.72	0.80
Reach	297.687	10yr	402.00	6610.29	6613.08	6613.08	6613.93	0.025263	7.37	54.51	31.19	0.98
Reach	297.687	25yr	617.00	6610.29	6613.66	6613.66	6614.74	0.026135	8.34	73.96	36.03	1.03
Reach	297.687	100yr	1326.00	6610.29	6615.19	6615.19	6616.22	0.013436	8.27	162.67	75.47	0.79
Reach	272.6538	10yr	402.00	6609.20	6611.78	6611.78	6612.63	0.026448	7.36	54.59	32.91	1.01
Reach	272.6538	25yr	617.00	6609.20	6612.39	6612.39	6613.41	0.025228	8.11	76.05	38.10	1.01
Reach	272.6538	100yr	1326.00	6609.20	6613.82	6613.82	6614.97	0.014590	8.67	154.36	64.69	0.84
Reach	248.2139	10yr	402.00	6607.80	6610.67	6610.67	6611.57	0.026621	7.63	52.70	28.85	0.99
Reach	248.2139	25yr	617.00	6607.80	6611.38	6611.38	6612.43	0.023914	8.23	75.17	37.41	0.97
Reach	248.2139	100yr	1326.00	6607.80	6612.78	6612.78	6614.03	0.014646	8.91	149.02	60.47	0.82
Reach	225.4341	10yr	402.00	6606.35	6609.24	6609.24	6610.18	0.025104	7.78	51.67	27.35	1.00
Reach	225.4341	25yr	617.00	6606.35	6609.95	6609.95	6611.08	0.022199	8.53	72.65	33.14	0.98
Reach	225.4341	100yr	1326.00	6606.35	6611.52	6611.52	6612.77	0.012702	9.06	149.90	58.37	0.80
Reach	200	10yr	402.00	6604.73	6607.59	6607.59	6608.48	0.024160	7.57	53.08	28.90	0.98
Reach	200	25yr	617.00	6604.73	6608.17	6608.17	6609.38	0.022709	8.82	69.94	28.94	1.00
Reach	200	100yr	1326.00	6604.73	6609.81	6609.81	6611.80	0.018766	11.32	117.48	55.20	0.99
Reach	184.4609	10yr	402.00	6599.13	6602.38	6602.38	6603.64	0.059374	9.02	44.57	17.81	1.00
Reach	184.4609	25yr	617.00	6599.13	6604.31	6603.23	6605.26	0.025796	7.81	79.04	17.84	0.65
Reach	184.4609	100yr	1326.00	6599.13	6609.86	6605.47	6610.71	0.010112	7.40	179.87	112.11	0.41
Reach	170.6172	10yr	402.00	6594.94	6601.54	6598.91	6602.23	0.022170	6.66	60.32	9.24	0.46
Reach	170.6172	25yr	617.00	6594.94	6603.99	6600.21	6604.85	0.023572	7.43	82.99	9.27	0.44
Reach	170.6172	100yr	1326.00	6594.94	6608.06	6603.67	6609.88	0.036366	10.85	122.46	40.16	0.54
Reach	100	Culvert										
Reach	55.61914	10yr	402.00	6586.97	6592.49	6590.47	6593.08	0.016912	6.17	65.10	12.44	0.48
Reach	55.61914	25yr	617.00	6586.97	6592.48	6591.53	6593.88	0.040029	9.49	64.99	12.44	0.73
Reach	55.61914	100yr	1326.00	6586.97	6594.36	6594.36	6597.85	0.082125	15.01	88.36	12.47	0.99
Reach	46.75	10yr	402.00	6586.04	6592.56	6588.70	6592.65	0.001564	2.41	166.65	42.45	0.18
Reach	46.75	25yr	617.00	6586.04	6592.64	6589.37	6592.85	0.003519	3.64	169.29	42.77	0.27
Reach	46.75	100yr	1326.00	6586.04	6593.74	6590.96	6594.30	0.008360	6.16	231.39	48.82	0.42
Reach	27.21289	10yr	402.00	6588.44	6592.47	6590.55	6592.60	0.003244	3.23	145.64	50.42	0.29
Reach	27.21289	25yr	617.00	6588.44	6592.41	6591.11	6592.74	0.008055	5.05	142.96	50.08	0.45
Reach	27.21289	100yr	1326.00	6588.44	6592.47	6592.47	6593.91	0.035291	10.66	145.64	50.42	0.95
Reach	20.20703	10yr	402.00	6587.35	6592.50	6589.53	6592.57	0.001206	2.18	203.12	54.85	0.18
Reach	20.20703	25yr	617.00	6587.35	6592.50	6590.05	6592.66	0.002840	3.34	203.12	54.85	0.27
Reach	20.20703	100yr	1326.00	6587.35	6592.50	6591.35	6593.23	0.013119	7.18	203.12	54.85	0.59

Appendix B2

HY-8 Culvert Analysis Reports

HY-8 Culvert Analysis Report

Crossing Discharge Data

Discharge Selection Method: Specify Minimum, Design, and Maximum Flow

Minimum Flow: 100 cfs

Design Flow: 402 cfs

Maximum Flow: 1326 cfs

Table 1 - Summary of Culvert Flows at Crossing: Final Box Culvert

Headwater Elevation (ft)	Total Discharge (cfs)	Final Box Culvert Discharge (cfs)	Roadway Discharge (cfs)	Iterations
6596.77	100.00	100.00	0.00	1
6598.51	222.60	222.60	0.00	1
6600.09	345.20	345.20	0.00	1
6600.78	402.00	402.00	0.00	1
6602.98	590.40	590.40	0.00	1
6604.47	713.00	713.00	0.00	1
6606.08	835.60	835.60	0.00	1
6606.91	958.20	894.53	63.57	5
6607.18	1080.80	913.31	167.30	5
6607.40	1203.40	928.59	274.25	4
6607.60	1326.00	942.09	383.55	4
6606.60	873.10	873.10	0.00	Overtopping

Rating Curve Plot for Crossing: Final Box Culvert

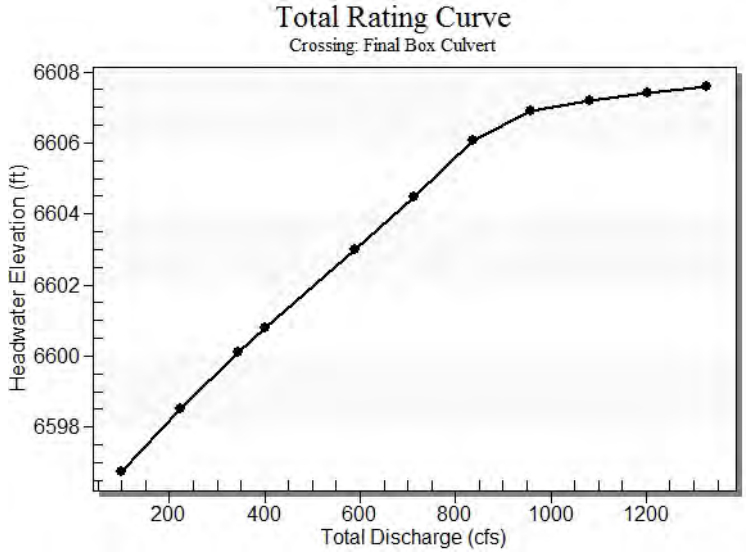


Table 2 - Culvert Summary Table: Final Box Culvert

Total Discharge (cfs)	Culvert Discharge (cfs)	Headwater Elevation (ft)	Inlet Control Depth (ft)	Outlet Control Depth (ft)	Flow Type	Normal Depth (ft)	Critical Depth (ft)	Outlet Depth (ft)	Tailwater Depth (ft)	Outlet Velocity (ft/s)	Tailwater Velocity (ft/s)
100.00	100.00	6596.77	2.456	0.0*	1-S2n	0.608	1.693	0.712	6.500	17.557	0.000
222.60	222.60	6598.51	4.204	0.0*	1-S2n	1.059	2.886	1.328	6.500	20.945	0.000
345.20	345.20	6600.09	5.785	0.0*	1-S2n	1.454	3.867	1.901	6.500	22.697	0.000
402.00	402.00	6600.78	6.468	0.0*	1-S2n	1.603	4.280	2.155	6.500	23.315	0.000
590.40	590.40	6602.98	8.672	1.587	5-S2n	2.094	5.530	2.960	6.500	24.932	0.000
713.00	713.00	6604.47	10.160	4.030	5-S2n	2.389	6.272	3.459	6.500	25.767	0.000
835.60	835.60	6606.08	11.767	5.375	5-S2n	2.675	6.971	3.942	6.500	26.497	0.000
958.20	894.53	6606.91	12.595	6.072	5-S2n	2.812	7.295	4.169	6.500	26.819	0.000
1080.80	913.31	6607.18	12.868	6.300	5-S2n	2.856	7.397	4.241	6.500	26.920	0.000
1203.40	928.59	6607.40	13.093	6.489	5-S2n	2.891	7.479	4.299	6.500	26.998	0.000
1326.00	942.09	6607.60	13.294	6.658	5-S2n	2.922	7.552	4.350	6.500	27.070	0.000

* Full Flow Headwater elevation is below inlet invert.

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Straight Culvert

Inlet Elevation (invert): 6594.31 ft, Outlet Elevation (invert): 6588.54 ft

Culvert Length: 110.15 ft, Culvert Slope: 0.0525

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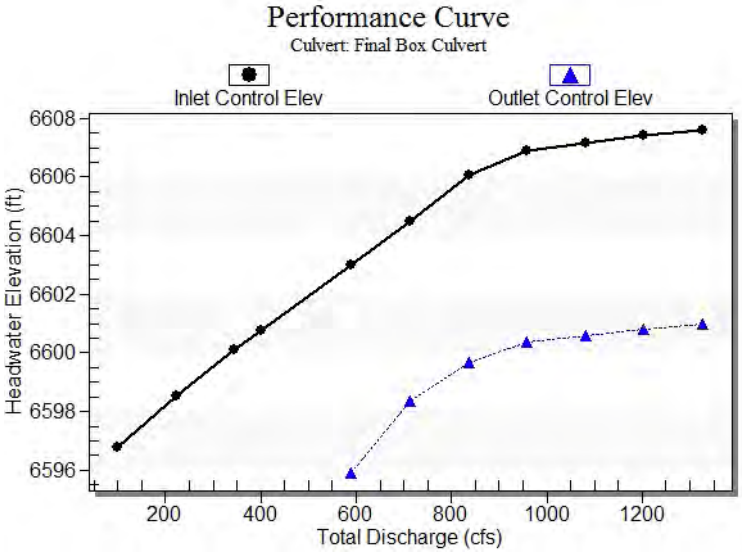
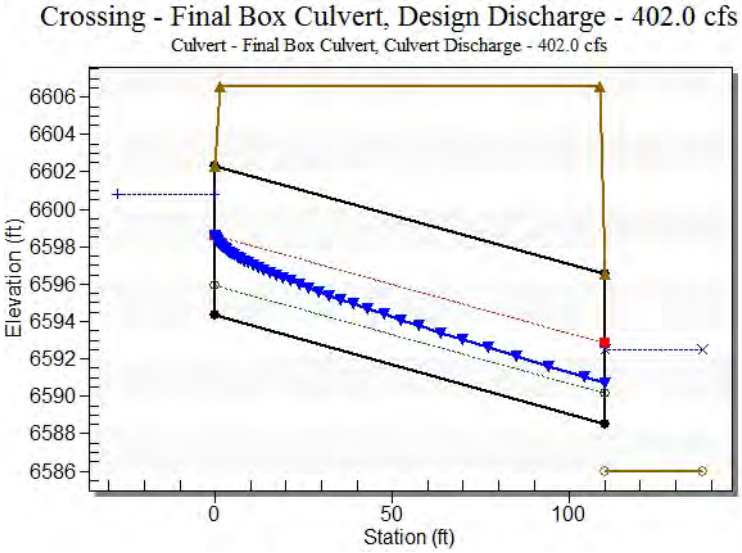
Culvert Performance Curve Plot: Final Box Culvert



Water Surface Profile Plot for Culvert: Final Box Culvert



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Inlet Station: 0.00 ft

Inlet Elevation: 6594.31 ft

Outlet Station: 110.00 ft

Outlet Elevation: 6588.54 ft

Number of Barrels: 1

Culvert Data Summary - Final Box Culvert

Barrel Shape: Concrete Box

Barrel Span: 8.00 ft

Barrel Rise: 8.00 ft

Barrel Material: Concrete

Embedment: 0.00 in

Barrel Manning's n: 0.0120

Culvert Type: Straight

Inlet Configuration: 1:1 Bevel (45º flare) Wingwall

Inlet Depression: NONE

Table 3 - Downstream Channel Rating Curve (Crossing: Final Box Culvert)

Flow (cfs)	Water Surface Elev (ft)	Depth (ft)
100.00	6592.50	6.50
222.60	6592.50	6.50
345.20	6592.50	6.50
402.00	6592.50	6.50
590.40	6592.50	6.50
713.00	6592.50	6.50
835.60	6592.50	6.50
958.20	6592.50	6.50
1080.80	6592.50	6.50
1203.40	6592.50	6.50
1326.00	6592.50	6.50

Tailwater Channel Data - Final Box Culvert

Tailwater Channel Option: Enter Constant Tailwater Elevation

Constant Tailwater Elevation: 6592.50 ft

Roadway Data for Crossing: Final Box Culvert

Roadway Profile Shape: Constant Roadway Elevation

Crest Length: 125.81 ft

Crest Elevation: 6606.60 ft

Roadway Surface: Paved

Roadway Top Width: 107.00 ft

Appendix C

Erosion Control

Appendix C1

Erosion Control

HY-8 Energy Dissipation Report

External Energy Dissipator

Parameter	Value	Units
Select Culvert and Flow		
Crossing	March Box Culvert	
Culvert	March Culvert	
Flow	523.00	cfs
Culvert Data		
Culvert Width (including multiple b	8.0	ft
Culvert Height	8.0	ft
Outlet Depth	2.70	ft
Outlet Velocity	24.25	ft/s
Froude Number	2.60	
Tailwater Depth	7.29	ft
Tailwater Velocity	0.00	ft/s
Tailwater Slope (SO)	0.0519	
External Dissipator Data		
External Dissipator Category	Streambed Level Structures	
External Dissipator Type	Riprap Basin	
Restrictions		
Froude Number	<3	
Input Data		
Condition to be used to Compute I Outlet Velocity	Best Fit Curve	
D50 of the Riprap Mixture		
Note:	Minimum HS/D50 = 2 is Obtained 1.042 ft	
D50 of the Riprap Mixture	1.000	ft
DMax of the Riprap Mixture	2.000	ft
Results		
Brink Depth	2.696	ft
Brink Velocity	24.245	ft/s
Depth (YE)	2.696	ft
Riprap Thickness	3.000	ft
Riprap Foreslope	4.0000	ft
Check HS/D50		
Note:	OK if HS/D50 > 2.0	
HS/D50	2.323	
HS/D50 Check	HS/D50 is OK	
Check HS/D50		
Note:	OK if 0.1 < D50/YE < 0.7	
Check D50/YE	0.371	
D50/YE Check	D50/YE is OK	
Basin Length (LB)	35.613	ft
Basin Width	31.742	ft
Apron Length	11.613	ft
Pool Length	24.000	ft
Pool Depth (HS)	2.323	ft
TW/YE	2.704	
Tailwater Depth (TW)	7.290	ft
Average Velocity with TW	1.549	ft/s
Critical Depth (Yc)	1.951	ft
Average Velocity with Yc	7.522	ft/s
Downstream Riprap for High TW		
Distance: 1 LB		
Velocity	19.006	ft/s
Size	2.355	ft
Distance: 2 LB		
Velocity	10.820	ft/s
Size	0.763	ft

Distance: 3 LB		
Velocity	7.192	ft/s
Size	0.337	ft
Distance: 4 LB		
Velocity	5.383	ft/s
Size	0.189	ft

Hydraulic Analysis Report

Project Data

Project Title:

Designer:

Project Date: Thursday, July 10, 2014

Project Units: U.S. Customary Units

Notes:

Channel Lining Analysis: Channel Lining Design Analysis

Notes:

Lining Input Parameters

Channel Lining Type: Riprap, Cobble, or Gravel

D50: 2 ft

Riprap Specific Weight: 165 lb/ft^3

Water Specific Weight: 62.4 lb/ft^3

Riprap Shape is Angular

Safety Factor: 1

Calculated Safety Factor: 1.50016

Lining Results

Angle of Repose: 42.1 degrees

Relative Flow Depth: 0.954788 ft

Manning's n method: Bathurst

Manning's n: 0.0654994

Channel Bottom Shear Results

V*: 2.68608

Reynold's Number: 441426

Shield's Parameter: 0.15

shear stress on channel bottom: 13.9819 lb/ft^2

Permissible shear stress for channel bottom: 18.2099 lb/ft^2

channel bottom is NOT stable

Stable D50: 2.30369 ft

Channel Side Shear Results

K1: 0.835

K2: 1

Kb: 0

shear stress on side of channel: 13.9819 lb/ft^2

Permissible shear stress for side of channel: 18.2099 lb/ft^2

Stable Side D50: 1.92358 lb/ft^2

side of channel is stable

Channel Lining Stability Results

the channel is NOT stable

Channel Summary

Name of Selected Channel: Channel Analysis