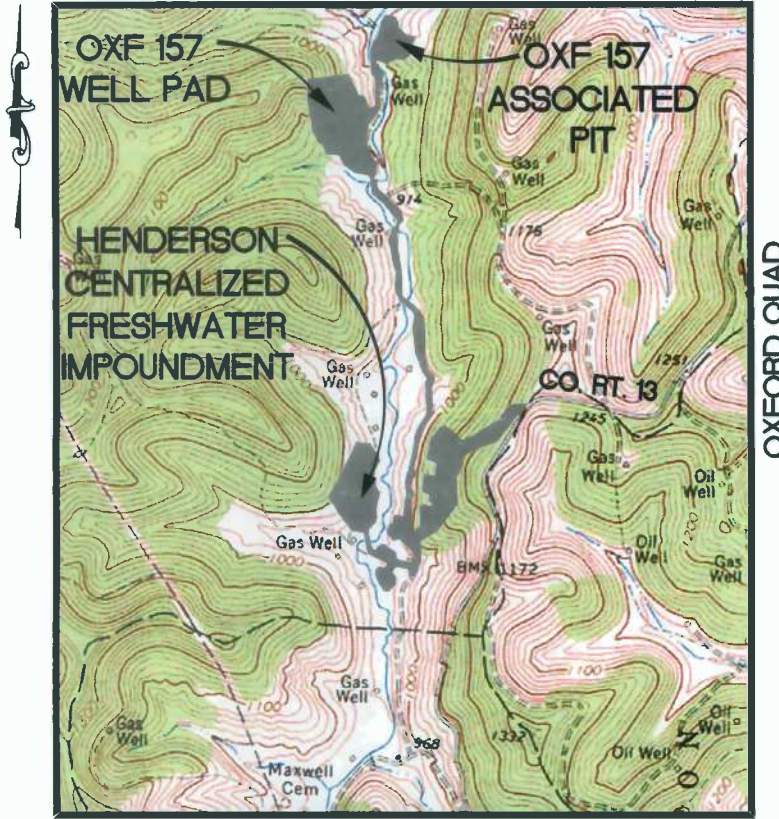


#13-113

FLOODPLAIN ANALYSIS OF  
BLUESTONE CREEK  
OXF 157 WELL PAD  
HENDERSON CENTRALIZED FRESHWATER  
IMPOUNDMENT



VICINITY MAP  
1" = 2,000'



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Prepared For:  
EQT Production Company  
115 Professional Place  
P.O. Box 280  
Bridgeport, WV 26330

Contact:  
Victoria J. Roark  
Permitting Supervisor  
(304) 848-0076

Designed By:  
Navitus Engineering Inc.

Project Manager:  
Chandler Pearson  
cpearson@navituseng.com



Surface Owner (s)  
Justin L. Henderson

Tax Parcel:  
Map 6 Parcel 1

Location:  
West Union District, Doddridge  
County  
West Virginia

Revised: June 3, 2014  
Date: December 4, 2013

FN# 7889

# NAVITUS

ENERGY ENGINEERING

151 Windy Hill Lane, Winchester, VA 22602

June 3, 2014

Doddridge County Commission  
118 East Court Street  
West Union, WV 26456

Attn: Bo Wriston, Doddridge County Floodplain Administrator

Re: OXF 157 and Henderson Centralized Freshwater Impoundment Access Road Stream  
Crossings - Floodplain Analysis

Dear Mr. Wriston:

Navitus Engineering has completed a revised floodplain analysis (previously submitted December 4, 2013) of the proposed OXF 157 Well Pad site, Henderson Centralized Freshwater Impoundment and access road stream crossings over Bluestone Creek located south of West Union, along a well access road adjacent to County Route 13 in Doddridge County, West Virginia. Portions of these two sites are located within a FEMA Flood Zone "A", as shown on the Flood Insurance Rate Map (FIRM) from the National Flood Insurance Program (NFIP), Map Number 54017C0225C dated October 4, 2011. Being that the site is located in a Flood Zone "A", base flood elevations for this area have not been established and detailed study information was not found in the Flood Insurance Study for Doddridge County, dated October 4, 2011.

In order to establish base flood elevations for this site, a hydrologic and hydraulic analysis was performed as outlined in the current Doddridge County Floodplain Ordinance, enacted May 21st, 2013. Using field shot data, 10-foot interval topography converted from 3 meter West Virginia GIS Technical Center DEM data, and information taken from USGS 7.5 Minute Series Topographic Maps, a drainage analysis was performed for the Bluestone Creek drainage shed. Upon establishing the peak flow drainage calculations for the 100-year storm event, a HEC-RAS river analysis was conducted for a section of Bluestone Creek adjacent to the OXF 157 and OXF 159 Well Pad Sites and Base Flood Elevations (BFE) were established. The resulting BFEs were used to establish adjusted floodplain boundaries for the segment of Bluestone Creek being studied. These boundaries are shown on the attached Existing Conditions Plan. In addition to establishing BFEs, a temporary and proposed conditions analysis was performed to determine the impacts of proposed grading from pads, pits and stockpiles as well as the proposed access roads, and stream crossings over Bluestone Creek. The temporary condition analysis represents the use of temporary 40' steel bridges placed on timber abutments with a 32' opening at stream crossing locations. The permanent condition analysis represents the use of a 20' wide x 12" thick concrete low water ford that maintains the existing streambed grade. The proposed grading, culverts and bridges were added into the cross sections of the respective models and the manning's "n" values were adjusted where necessary. The models were run with these changes to determine the proposed impacts to the floodplain.

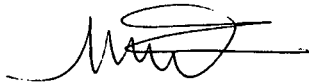
The results of this analysis indicate that the proposed improvements in the temporary condition will cause a maximum increase of 0.7' in the BFEs in this area and no upstream or downstream properties will be adversely impacted. The maximum increase in the BFE occurs at River Station 99+89.380. Impacts occur immediately upstream from the temporary bridge crossing locations and BFE increases return to 0.0'

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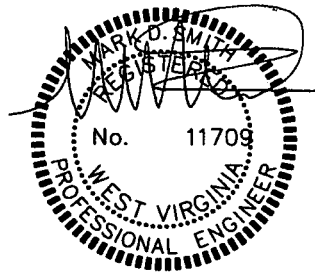
downstream quickly. In the permanent condition the results of the analysis indicate that the proposed improvements will cause a maximum increase of 0.1' in the BFEs in this area and no upstream or downstream properties will be adversely impacted. The maximum increase in the BFE occurs at River Station 99+89.380. Impacts occur immediately upstream from the temporary bridge crossing locations and BFE increases return to 0.0'

Should any questions or comments arise during the review, please let us know and we will work to address them. Copies of all permits required for this site will be provided by the operator. Please let me know if you should need additional information. You can reach me by phone (888) 662-4185 or email [msmith@navituseng.com](mailto:msmith@navituseng.com).

Sincerely,  
Navitus Engineering, Inc.

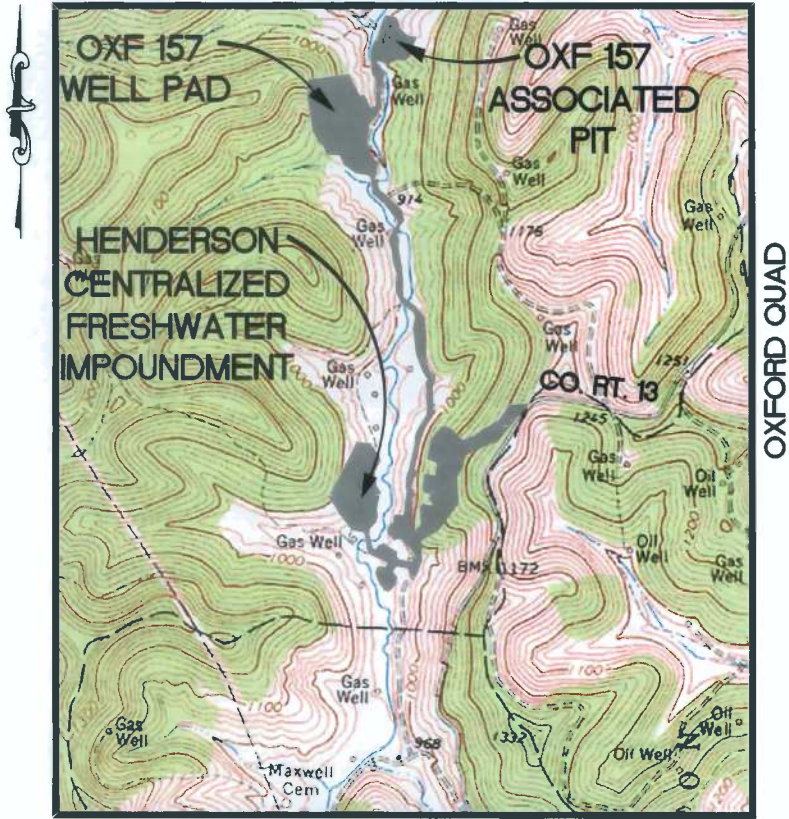


Mark D. Smith, PE, LS,  
President



Enclosure:  
Floodplain Analysis of Bluestone Creek

FLOODPLAIN ANALYSIS OF  
 BLUESTONE CREEK  
 OXF 157 WELL PAD  
 HENDERSON CENTRALIZED FRESHWATER  
 IMPOUNDMENT



VICINITY MAP

1" = 2,000'



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Prepared For:  
 EQT Production Company  
 115 Professional Place  
 P.O. Box 280  
 Bridgeport, WV 26330

Contact:  
 Victoria J. Roark  
 Permitting Supervisor  
 (304) 848-0076

Designed By:  
 Navitus Engineering Inc.

Project Manager:  
 Chandler Pearson  
 cpearson@navituseng.com



Surface Owner (s)  
 Justin L. Henderson

Tax Parcel:  
 Map 6 Parcel 1

Location:  
 West Union District, Doddridge  
 County  
 West Virginia

Revised: June 3, 2014  
 Date: December 4, 2013

FN# 7889



## 1. Objective

The objective of this floodplain analysis was to establish boundaries for the existing, temporary and proposed conditions of the 100 year base flood elevations (BFE). The temporary condition includes 40' bridges at all stream crossing locations and proposed grading impacts from the OXF 157 Well Pad Plans and the Henderson Centralized Freshwater Impoundment. The proposed permanent condition includes replacing all proposed stream crossing locations with low water ford crossings and proposed grading impacts from the OXF 157 Well Pad Plans and Henderson Centralized Freshwater Impoundment. Crossing locations, access roads and portions of the site plans are located within the FEMA Flood Zone "A".

## 2. Existing Conditions

### 2.1. Property Description

This site is located in Doddridge County, West Virginia along Bluestone Creek and existing well access roads south of West Union in the Southwest and West Union Districts. Proposed access roads tie into existing well access roads, County Route 13 (Maxwell Rd) and County Route 23/2 (Big Run Rd).

### 2.2. Floodplain Delineation

The approximate limit of the 100-year floodplain (a flood event that has a 1% chance of being equaled or exceeded in any given year) is shown on FEMA Flood Insurance Rate Map (FIRM) for Doddridge County on panels 54017C0225C effective October 4, 2011. This floodplain is located in flood zone designation "A" and base flood elevations have not been established. Detailed study information was not found in the Flood Insurance Study for Doddridge County, dated October 4, 2011.

### 2.3. Floodplain Ordinance

This site is administered under the Doddridge County Floodplain Ordinance, enacted May 31st, 2013.

Per Section 4.4.A of the ordinance, when a site is located in FEMA Flood Zone designation "A" the Floodplain Administrator shall use elevation and floodway information from Federal, State, or other acceptable sources when available to determine the elevation above which development will reasonably safe from flooding.

Per Section 4.4.B. of the ordinance, when data from an acceptable source is not available, the Floodplain Administrator shall review, or shall cause to be reviewed; all proposed development to determine (1) the amount being invested and (2) the specific flood risk at the site. The Floodplain Administrator shall then require the applicant to determine the elevation above which the development and adjacent properties including but not limited to existing buildings will be reasonably safe from flooding using hydrologic and hydraulic analyses or

other techniques. When hydrologic and hydraulic analyses are required, they shall only be prepared by a registered professional engineer who shall certify that the methods used correctly reflect currently accepted technical concepts. The resulting study shall include a cover letter, signed by the responsible professional, providing a statement of findings in basic terms. In addition, studies, analyses, computations, etc. shall be submitted in sufficient detail to allow a thorough review by the Floodplain Administrator.

Per Section 4.4.C. of the ordinance, any development and/or use of land shall be permitted provided that all such uses, activities and/or development shall be undertaken in strict compliance with the flood-proofing and related provisions contained herein and in all other applicable Federal and State Laws, Ordinances and Regulations.

Per Section 4.4.D. of the ordinance, within any apportioned Floodplain Zone (Zone A) without Floodway Area, no new construction or development shall be allowed unless it is demonstrated that the cumulative impact of the proposed development, when combined with all other existing and anticipated development, will not increase the elevation of the 100-year flood more than one (1) foot at any point.

Per Section 4.5.A of the ordinance, any developer shall notify in writing, by certified mail, Doddridge County's Floodplain Administrator, the State Coordinating Office, and adjacent communities and any adjacent property owners of all such intended activities prior to the alteration of the stream. Copies of all required notifications must be submitted to the Federal Insurance Administration. In addition prior to issuing the local permit the Floodplain Administrator shall require copies of all necessary permits from those government agencies from which Federal or State Law requires approval.

Per Section 4.5.B a stream crossing analyses for the proposed permanent crossings of Bluestone Creek have been provided under separate cover and include a cover letter signed by the responsible professional, a detailed report, hydraulic and hydrologic computations and a sitemap detailing the planned construction.

Per Section 4.5.C of this ordinance the stream crossings have been designed with "best practice" techniques in mind. In the temporary condition, Bluestone Creek will be crossed at five different locations within the mapped limits of FEMA Floodplain Zone "A" by a 40' steel bridge that has a 32' clear opening. The bridges are placed on timber abutments directly on top of the existing stream banks and anchored down. All fill within the limits of the 100-year floodplain will be capped with 4-6" large angular durable rock base to minimize erosion during storm events. In the proposed permanent condition, the temporary bridges will be replaced in 3 locations with a variable width 12" thick concrete low water ford, the existing stream bed elevation will be maintained. These crossings are designed to only pass the normal flow in the stream. Sandbag cofferdams and a dewatering bag system will be utilized during construction to minimize erosion and allow for construction in the stream channel. The temporary bridge crossings to the associated pit on the OXF 157 Site Plan and to the Henderson Centralized Freshwater Impoundment will be removed and the crossing sites will be reclaimed to the existing condition.

Per Section 4.5.D of this ordinance the bridges and low water fords will be properly anchored as required.

Per Section 4.5.E of this ordinance the Developer shall provide Doddridge County with all required legal agreements detailing inspections and maintenance.

Per Section 5.1 of this ordinance Permits are required for the construction of the temporary and permanent stream crossings. The format of the permit will coincide with the requirements set forth in Section 5.2 of the ordinance.

Per Section 6.1E of this ordinance the fill associated with this plan has been designed to not adversely affect adjacent properties. The access roads, grading impacts and crossings were located to minimize floodway constriction and the height above the existing grade was minimized to allow as much flow as possible to be unimpeded. Impacts to the 100 year base flood elevation are demonstrated later in this report, however, increases to the 100 year base flood elevations were limited to a maximum increase of 0.7' in the temporary condition and a maximum increase of 0.1' during the permanent condition. Fill as stated above shall consist of suitable material and capped with a 4-6" large angular durable rock. No less than 2:1 slopes will be utilized in the construction of the proposed crossing.

Per Section 6.1F structures have has been placed with the longitudinal axis parallel to the direction of flood flow and to maintain the same flood-flow lines of the adjoining structures.

Per Section 6.1.K of this ordinance, positive drainage has been taken into account along all access roads and at each crossing location to reduce exposure to flood hazard.

All other specific requirements covered in Section 6.1 of this ordinance are not applicable to this design. (Sections 6.1.A, 6.1.B, 6.1.C, 6.1.D, 6.1.F, 6.1.G, 6.1.H, 6.1 I, 6.1.J, and 6.1.L)

The developer shall conform with all administrative procedures as outline in Article 7 of this ordinance.

#### *2.4. Bluestone Creek Characteristics*

Bluestone Creek is located in the Southwest and West Union Districts of Doddridge County and flows in a northern direction. The drainage area flowing to Bluestone Creek at the furthest downstream crossing area is approximately 2.219 square miles of forested and agricultural land with an average basin slope of 31.92%.

### **3. Analysis Information**

#### *3.1. HEC-RAS*

A HEC-RAS hydraulic analysis was performed for the portion of the Bluestone Creek that has an impact on the BFE's across the property. HEC-RAS is designed to perform one-dimensional hydraulic calculations for a full network of natural and constructed channels.

The steady flow system is designed for applications in floodplain management and flood insurance studies.

### 3.2. Analysis Limits

The analysis information is based upon two foot interval field shot topography by Smith Land Surveying. The upstream analysis limit for Bluestone Creek is located approximately 2,025 feet upstream from the furthest upstream stream crossing and represents the 146+59.362 section. The downstream analysis limit for Bluestone Creek is located approximately 1,832 feet downstream of the furthest downstream proposed stream crossing and represents the 10+29.896 section. These limits were selected so that the HEC-RAS model would accurately determine the base flood elevations on site and off site.

### 3.3. Flow Data

The hydrologic analysis utilized USDA soil surveys for computation of drainage shed curve numbers, 2 ft field shot topography by Smith Land Survey and 3 meter West Virginia GIS Technical Center DEM to determine the drainage area(s) and time of concentration path(s). The peak 100-year discharge within the inundation area was determined through TR-55 SCS methodology. Time of concentration paths were calculated utilizing the SCS lag method. The hydrologic calculations for the drainage area were performed using HEC-HMS. See the table below for a summary of the flow conditions, and see Supplement 1 for the complete Drainage Computations.

Stream	Drainage Area	Flow (cfs)	Note
Bluestone Creek	564.47 Ac.	443.8	Upstream
Bluestone Creek	834.55 Ac.	601.9	Sta. 11+904.55
Bluestone Creek	1,066.87 Ac.	763.6	Sta. 99+89.380
Bluestone Creek	1,249.91 Ac.	855.6	Sta. 61+79.412
Bluestone Creek	1,420.15 Ac.	914.4	Sta. 47+04.612
Bluestone Creek	1,692.15 Ac.	1021.2	Downstream

### 3.4. Cross Section Data

The cross sections were employed at significant changes in site features. This includes major bends in the stream channel, areas of major contraction and expansion of the floodplain area, upstream and downstream of existing culverts, and at building obstructions (cross sections were compiled using field shot topography by Smith Land Survey).

### 3.5. Manning's n-value

The channel and overbank areas were assigned manning's n-values based on field review, site photographs, and close inspection of existing aerial photography. The chart below describes the manning's n values used in this study.



<b>Manning's n value</b>	<b>Description</b>	<b>Portion Used</b>
.035	Clean, straight, full, no rifts or deep pools, stones and weeds	Main Channel
.1	Heavy stand of timber, few down trees, little undergrowth, flow below branches	Floodplains (Normal)
.013	Asphalt	Floodplains
.035	High grass	Floodplains
.033	Rip Rap Dry Rubble	Floodplains
.06	Light Brush and trees, in summer	Floodplains

#### 4. Results

##### 4.1. Existing Conditions

Since the site is in Zone "A" floodplain area as shown on the FIRM, there has not been a detailed study analysis with one foot interval base flood elevations established within the Doddridge County Flood Insurance Study (FIS) effective October 4, 2011. An existing conditions model was prepared based upon field shot topography and existing drainage computations. This information was processed in HEC-RAS to determine the existing conditions of the Base Flood Elevations.

##### 4.2. Proposed Conditions

The temporary conditions model was based on the proposed topography for the bridge crossings, access roads and grading from the Well Pad sites and Henderson Centralized Freshwater Impoundment. For the permanent proposed conditions the model was based upon the proposed topography for the low water fords, access roads and grading from the Well Pad sites and Henderson Centralized Freshwater Impoundment. The low water fords were modeled as inline fords. This information was added into the existing conditions cross sections, and then was processed in HEC-RAS to determine the temporary and proposed conditions of the Base Flood Elevations. A summary of elevation changes showing the existing and proposed BFEs at the various cross sections has been provided in the appendix. As shown in the table, the temporary development will not increase the existing BFEs more than 0.7' throughout the project area and return to 0.0' at the upstream and downstream termini of the study area. The permanent proposed development will not increase the existing BFEs more than 0.1' throughout the project area and return to 0.0' at the upstream and downstream termini of the study area.

#### 5. Conclusion

The results of this floodplain analysis indicate that there will be minimal changes in the 100 year base flood elevation and no impacts to upstream and downstream adjacent properties

along Bluestone Creek. The largest increase in base flood elevation is 0.7' in the temporary condition and 0.1' in the proposed permanent condition all impacts are located on site directly upstream of the proposed temporary and permanent stream crossing locations.

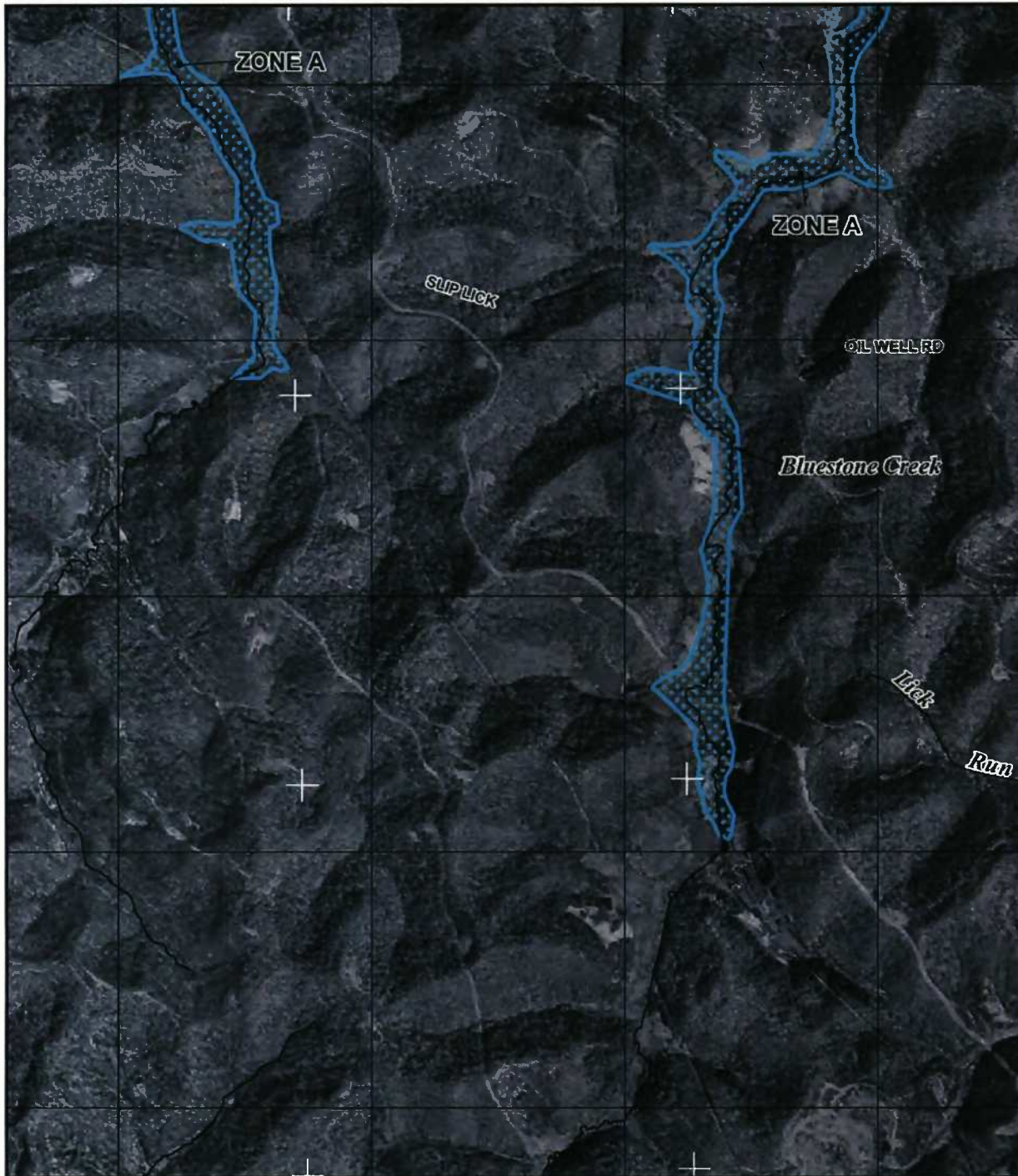
**APPENDIX**

Exhibit A	FIRM Panel 54017C0225C
Exhibit B	Overall Plan
Exhibit C	Existing Conditions Plan
Exhibit D	Temporary Conditions Plan
Exhibit E	Proposed Conditions Plan
Supplement 1	Drainage Computations
Supplement 2	Summary of Computed Elevations
Supplement 3	HEC-RAS Analysis –Existing Conditions Summary
Supplement 4	HEC-RAS Analysis –Temporary Conditions Summary w/ Cross Sections
Supplement 5	HEC-RAS Analysis –Proposed Conditions Summary w/ Cross Sections

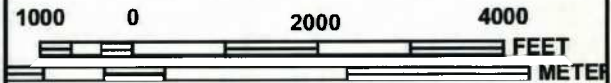
**Exhibit A**

**FIRM Panel 54017C0225C**





MAP SCALE 1" = 2000'



NATIONAL FLOOD INSURANCE PROGRAM  
 JOINING PANEL 0220

PANEL 0225C

## FIRM

FLOOD INSURANCE RATE MAP  
 DODDRIDGE COUNTY,  
 WEST VIRGINIA  
 AND INCORPORATED AREAS

PANEL 225 OF 325  
 (SEE MAP INDEX FOR FIRM PANEL LAYOUT)

CONTAINS:

COMMUNITY	NUMBER	PANEL	SUFFIX
DODDRIDGE COUNTY	540024	0225	C

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.



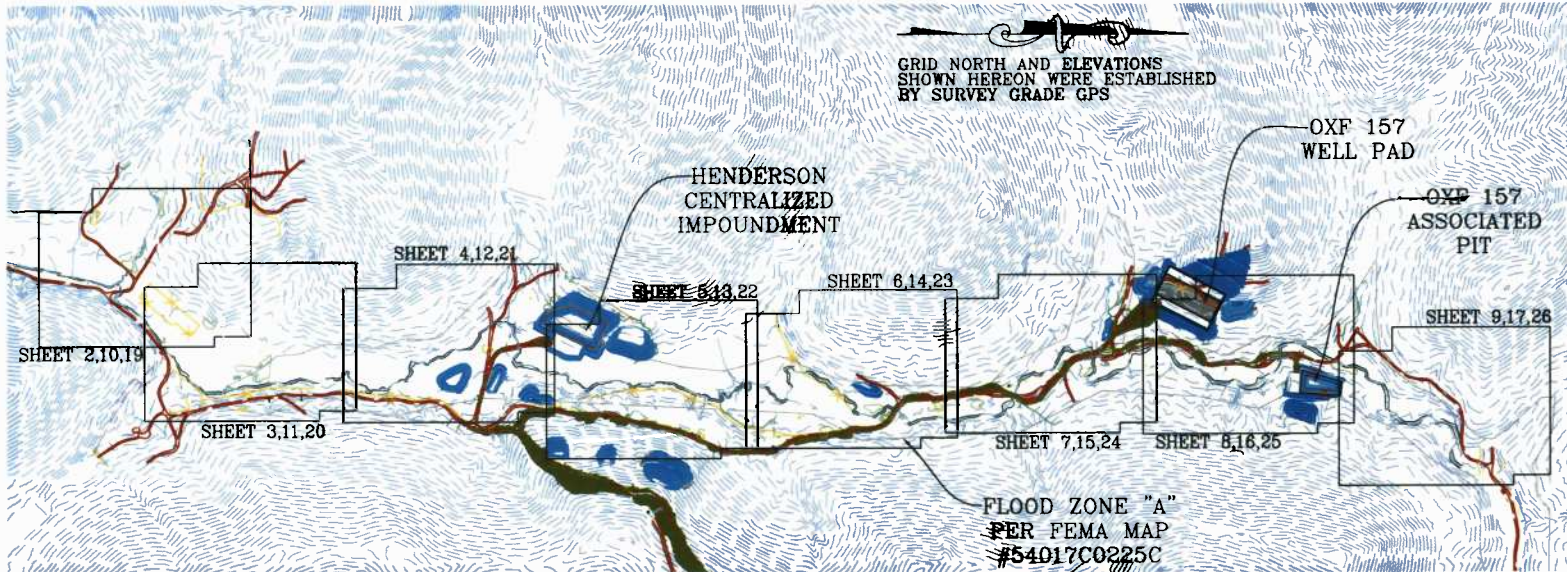
MAP NUMBER  
 54017C0225C  
 MAP REVISED  
 OCTOBER 4, 2011

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](http://www.msc.fema.gov)

**Exhibit B**  
**Overall Plan**





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OVERALL PLAN  
 OXF 157 WELL PAD AND HENDERSON CENTRALIZED FRESHWATER IMPOUNDMENT FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 1 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 800'


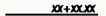



**Exhibit C**  
**Existing Conditions Plan**

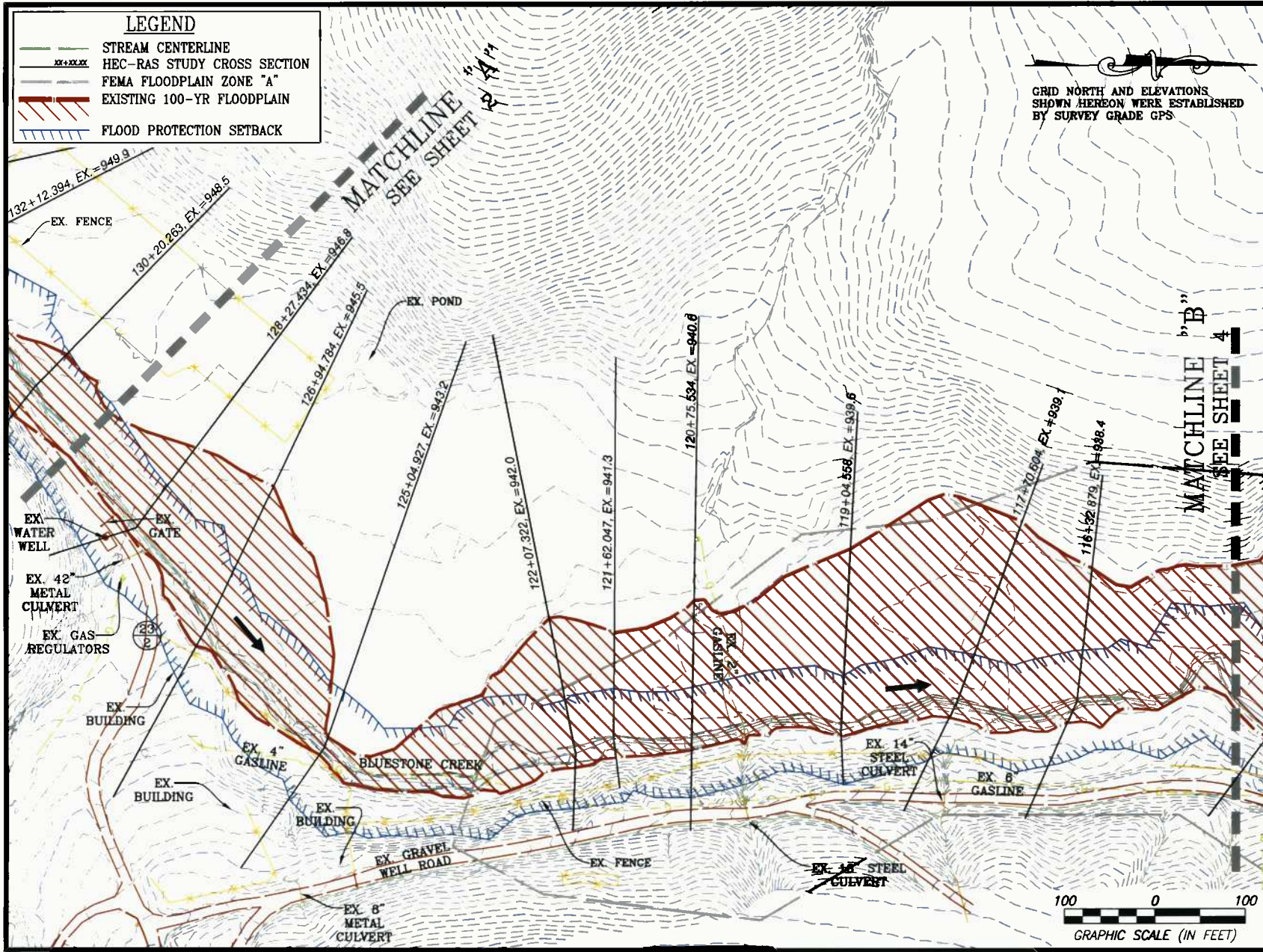






**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  FEMA FLOODPLAIN ZONE "A"
-  EXISTING 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK



GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY GRADE GPS

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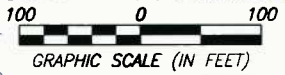
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



EXISTING CONDITIONS PLAN  
 OXF 157 WELL PAD AND  
 HENDERSON CENTRALIZED  
 FRESHWATER IMPOUNDMENT  
 FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 3 OF 26  
 OXF 157  
 JOB NO. 7889  
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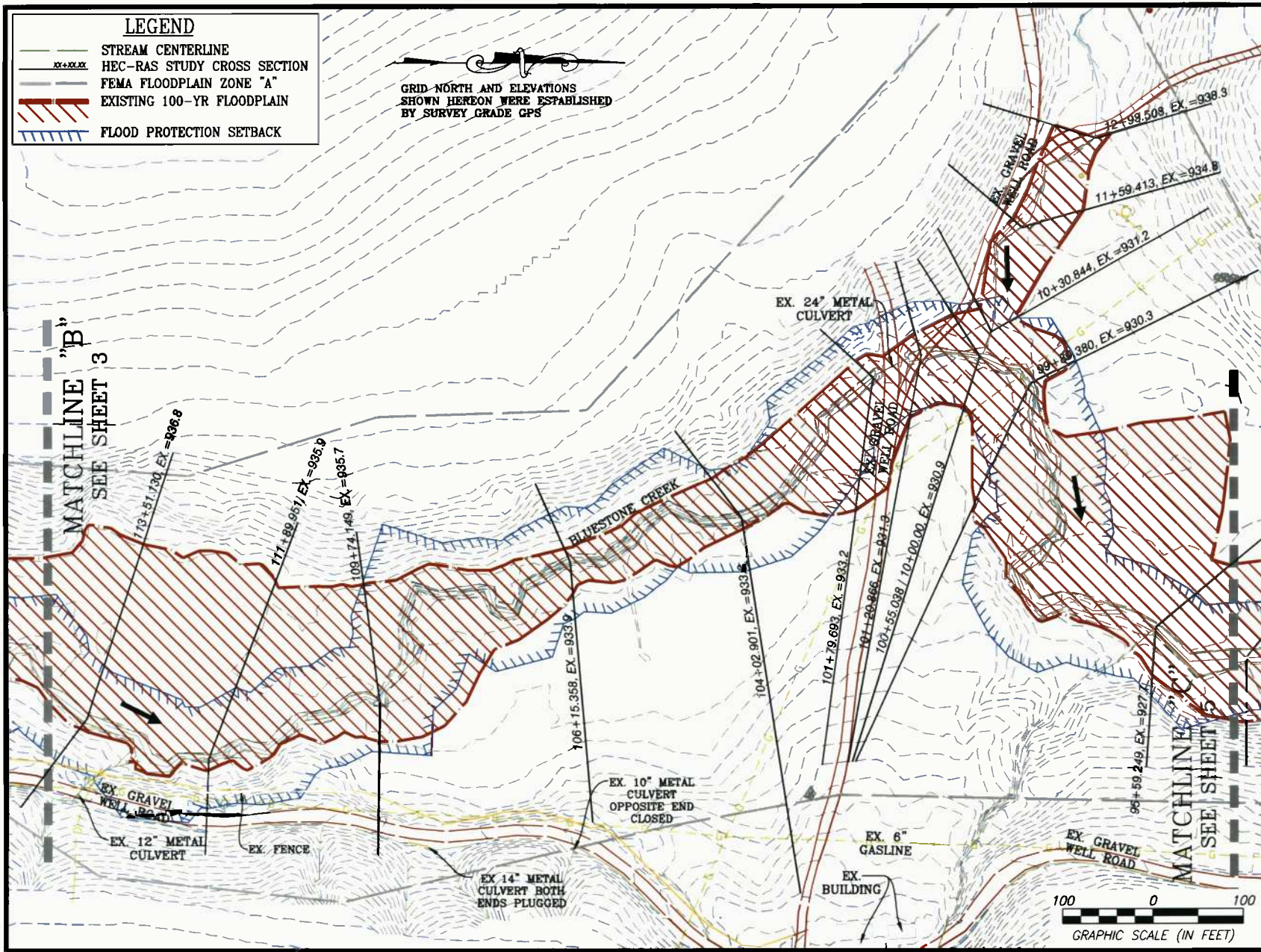




**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  FEMA FLOODPLAIN ZONE "A"
-  EXISTING 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

GRID-NORTH AND ELEVATIONS  
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MATCHLINE "B"  
SEE SHEET 3

MATCHLINE "C"  
SEE SHEET 5

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06/03/2014

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



EXISTING CONDITIONS PLAN  
**OXF 157 WELL PAD AND  
HENDERSON CENTRALIZED  
FRESHWATER IMPOUNDMENT  
FLOODPLAIN STUDY**  
WEST UNION DISTRICT  
DODDRIDGE COUNTY WV

SHEET 4 OF 26  
OXF 157  
JOB NO. 7889  
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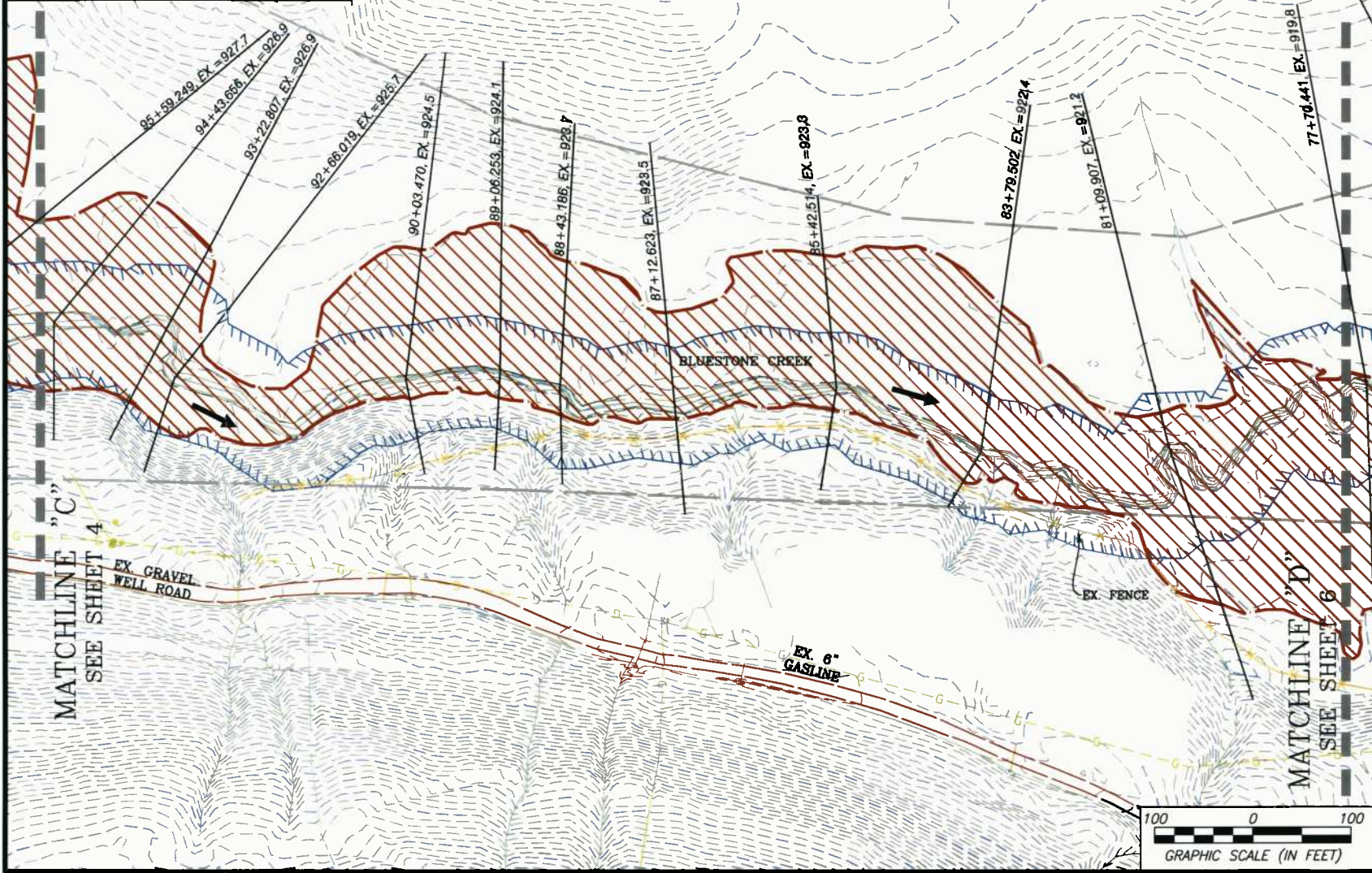




**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  FEMA FLOODPLAIN ZONE "A"
-  EXISTING 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

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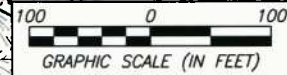


No. 11709  
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 06/03/2014

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 NAVITUS ENGINEERING INC  
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



EXISTING CONDITIONS PLAN  
 OXF 157 WELL PAD AND  
 HENDERSON CENTRALIZED  
 FRESHWATER IMPOUNDMENT  
 FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

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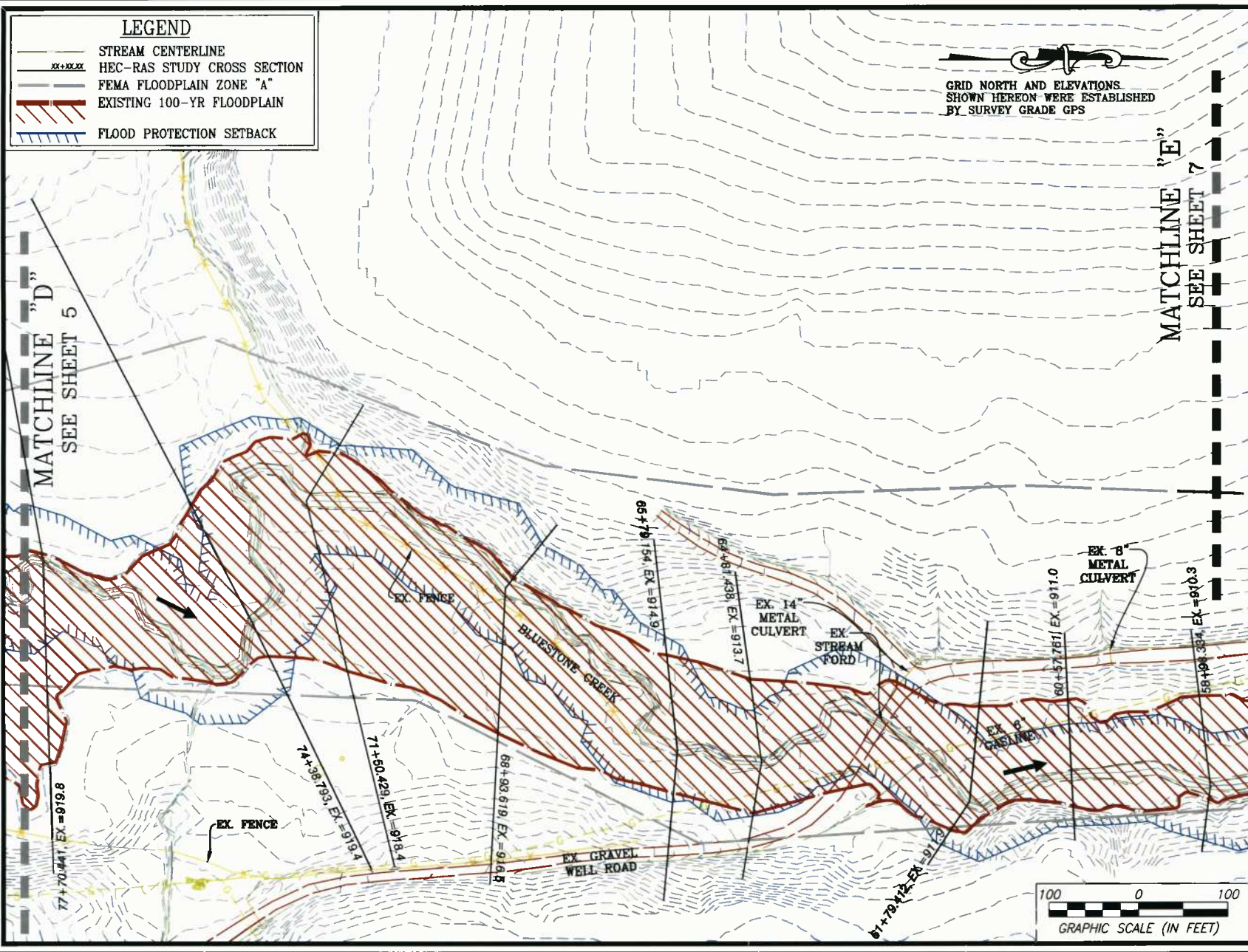




**LEGEND**

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-  EXISTING 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY GRADE GPS



MATCHLINE "D" SEE SHEET 5

MATCHLINE "E" SEE SHEET 7

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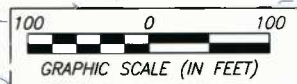
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 ENGINEERS  
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EXISTING CONDITIONS PLAN  
 OXF 157 WELL PAD AND HENDERSON CENTRALIZED FRESHWATER IMPOUNDMENT FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIIDGE COUNTY, WV

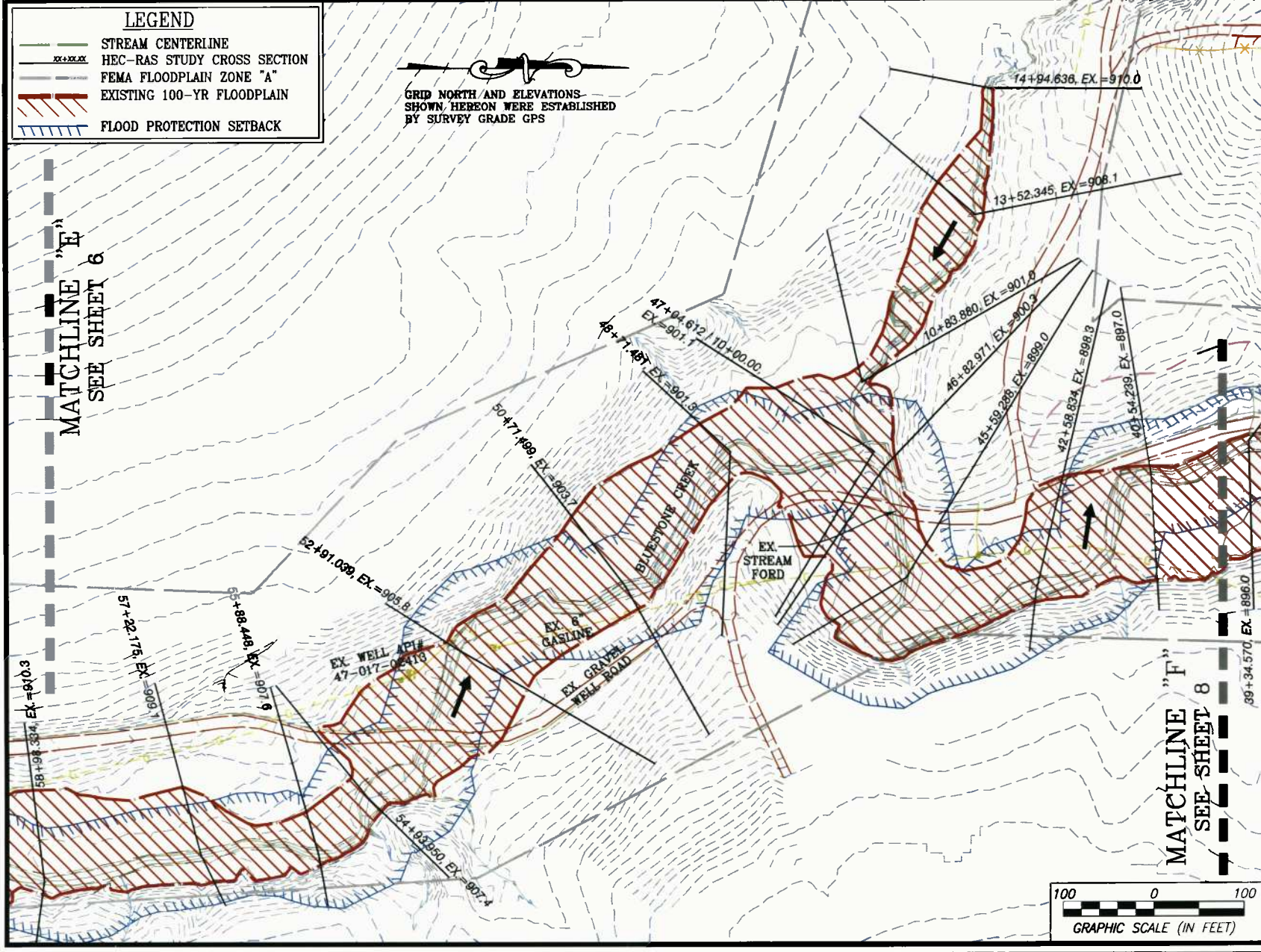
SHEET 6 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 100'





- LEGEND**
-  STREAM CENTERLINE
  -  HEC-RAS STUDY CROSS SECTION
  -  FEMA FLOODPLAIN ZONE "A"
  -  EXISTING 100-YR FLOODPLAIN
  -  FLOOD PROTECTION SETBACK

GRID NORTH AND ELEVATIONS—  
SHOWN HEREON WERE ESTABLISHED  
BY SURVEY GRADE GPS



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www.sillladperkins.com

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OXF 157 WELL PAD AND  
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FRESHWATER IMPOUNDMENT  
FLOODPLAIN STUDY  
WEST UNION DISTRICT  
DODDRIDGE COUNTY, WV

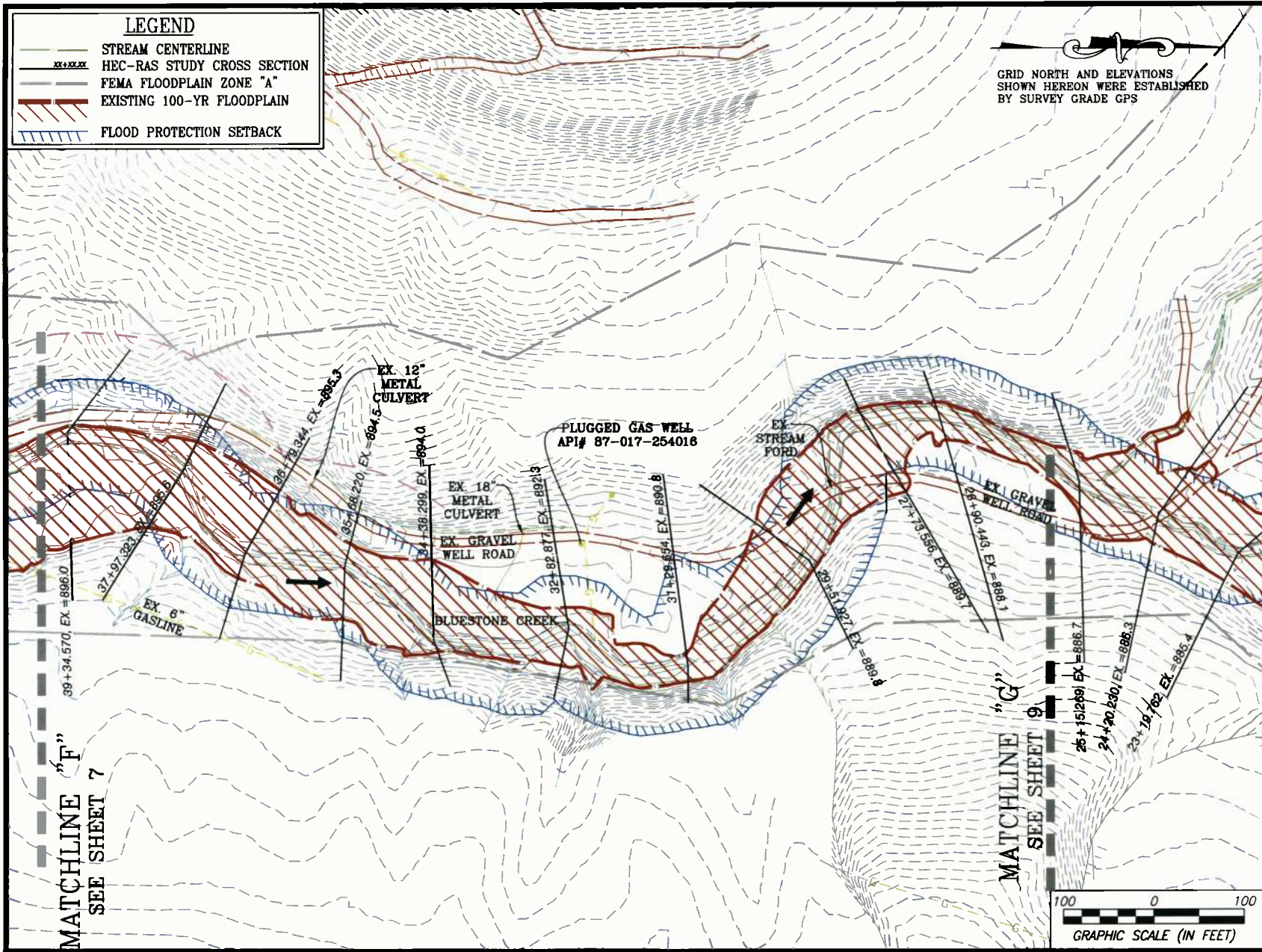
SHEET 7 OF 26  
OXF 157  
JOB NO. 7889  
DATE: 06/03/14  
SCALE: 1" = 100'



**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  FEMA FLOODPLAIN ZONE "A"
-  EXISTING 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

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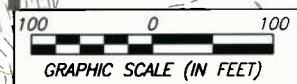
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 OXF 157 WELL PAD AND  
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 FRESHWATER IMPOUNDMENT  
 FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
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SHEET 8 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 100'








MATCHLINE "F"  
 SEE SHEET 7

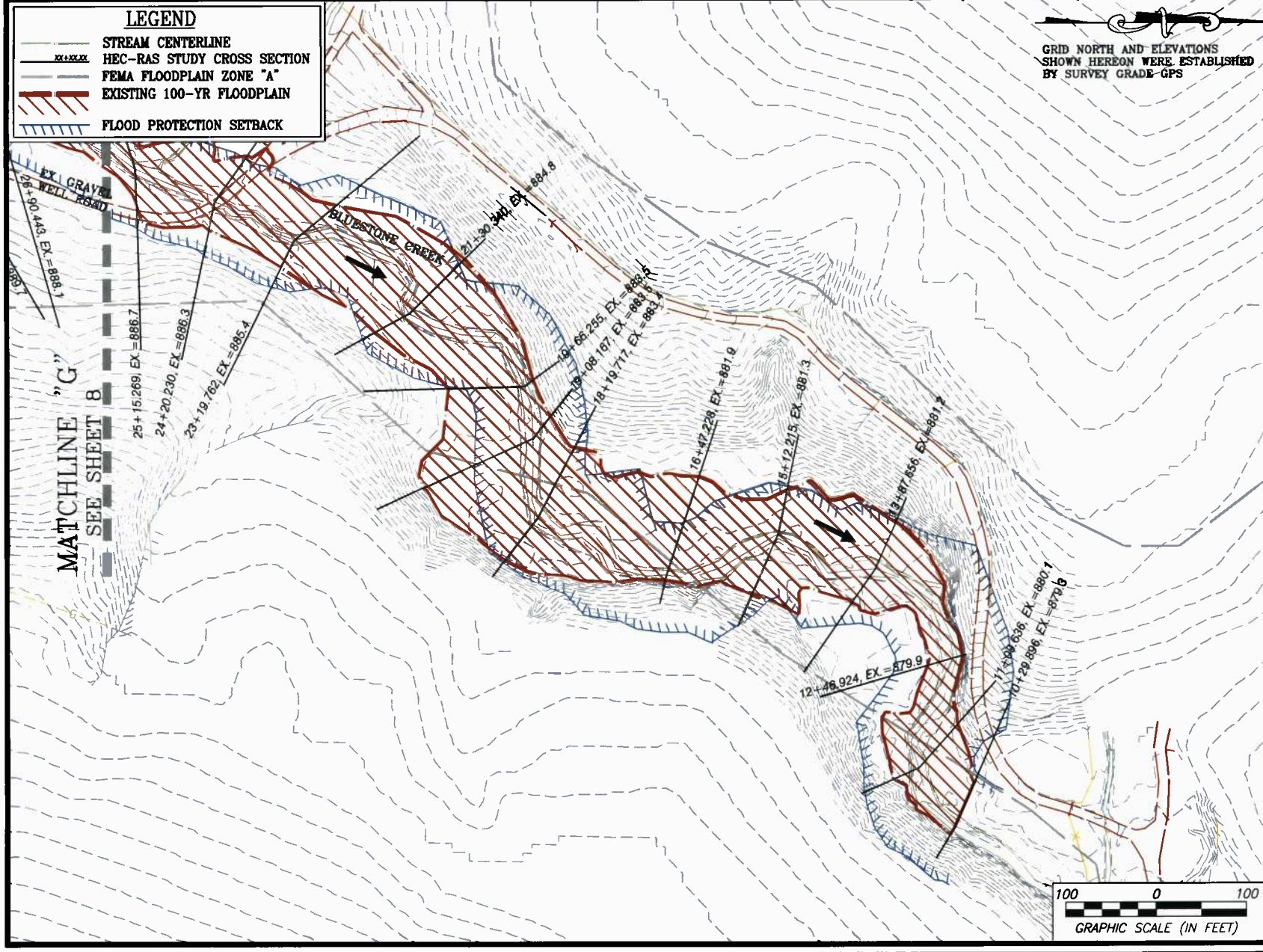
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 SEE SHEET 9



**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  FEMA FLOODPLAIN ZONE "A"
-  EXISTING 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

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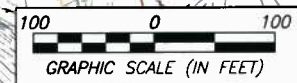
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OXF 157 WELL PAD AND  
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FRESHWATER IMPOUNDMENT  
FLOODPLAIN STUDY  
WEST UNION DISTRICT  
DODDRIDGE COUNTY, WV

SHEET 9 OF 26

OXF 157  
JOB NO. 7889

DATE: 06/03/14

SCALE: 1" = 100'








**Exhibit D**  
**Temporary Conditions Plan**



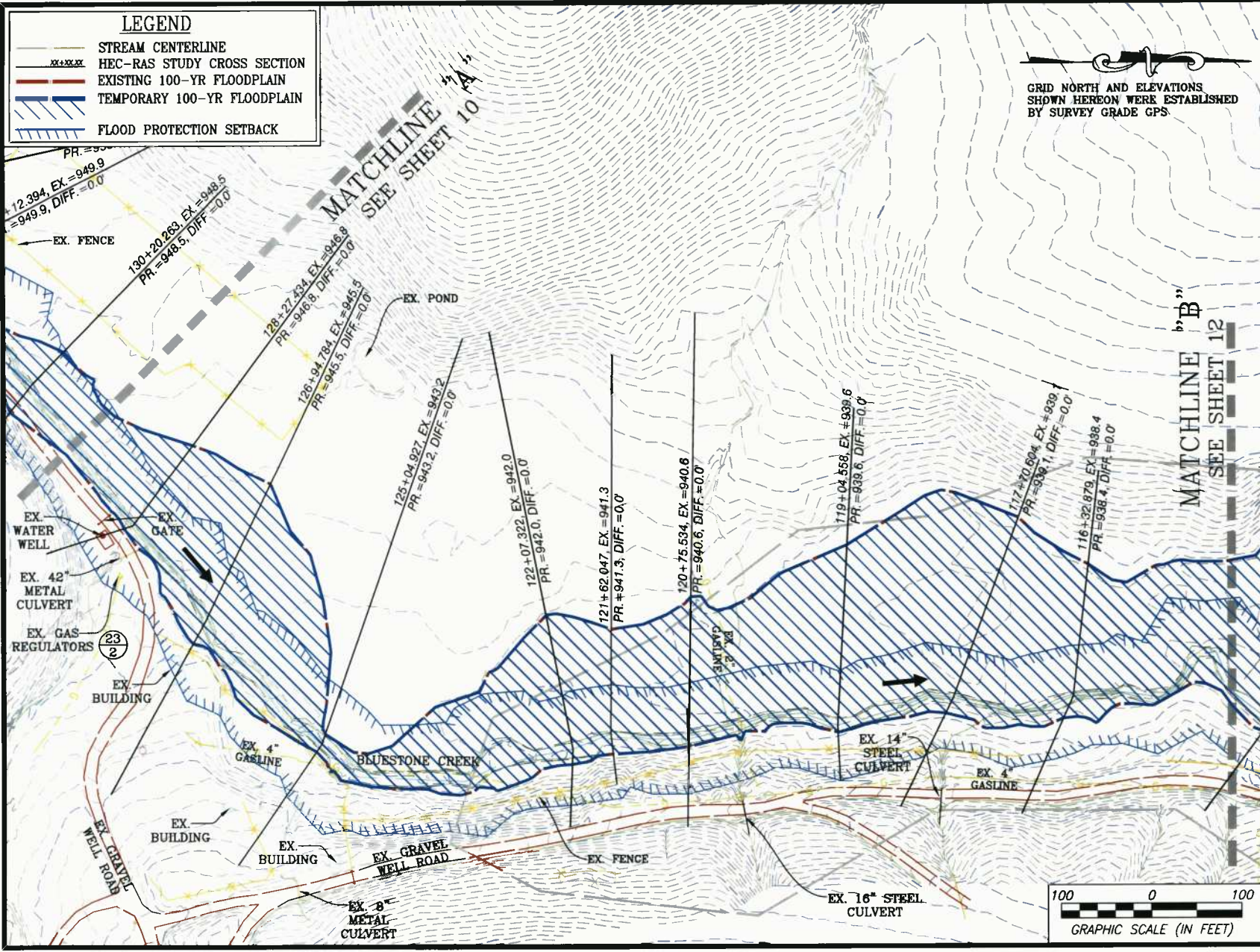




**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  TEMPORARY 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

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



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TEMPORARY CONDITIONS PLAN  
 OXF 157 WELL PAD AND HENDERSON CENTRALIZED FRESHWATER IMPOUNDMENT FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

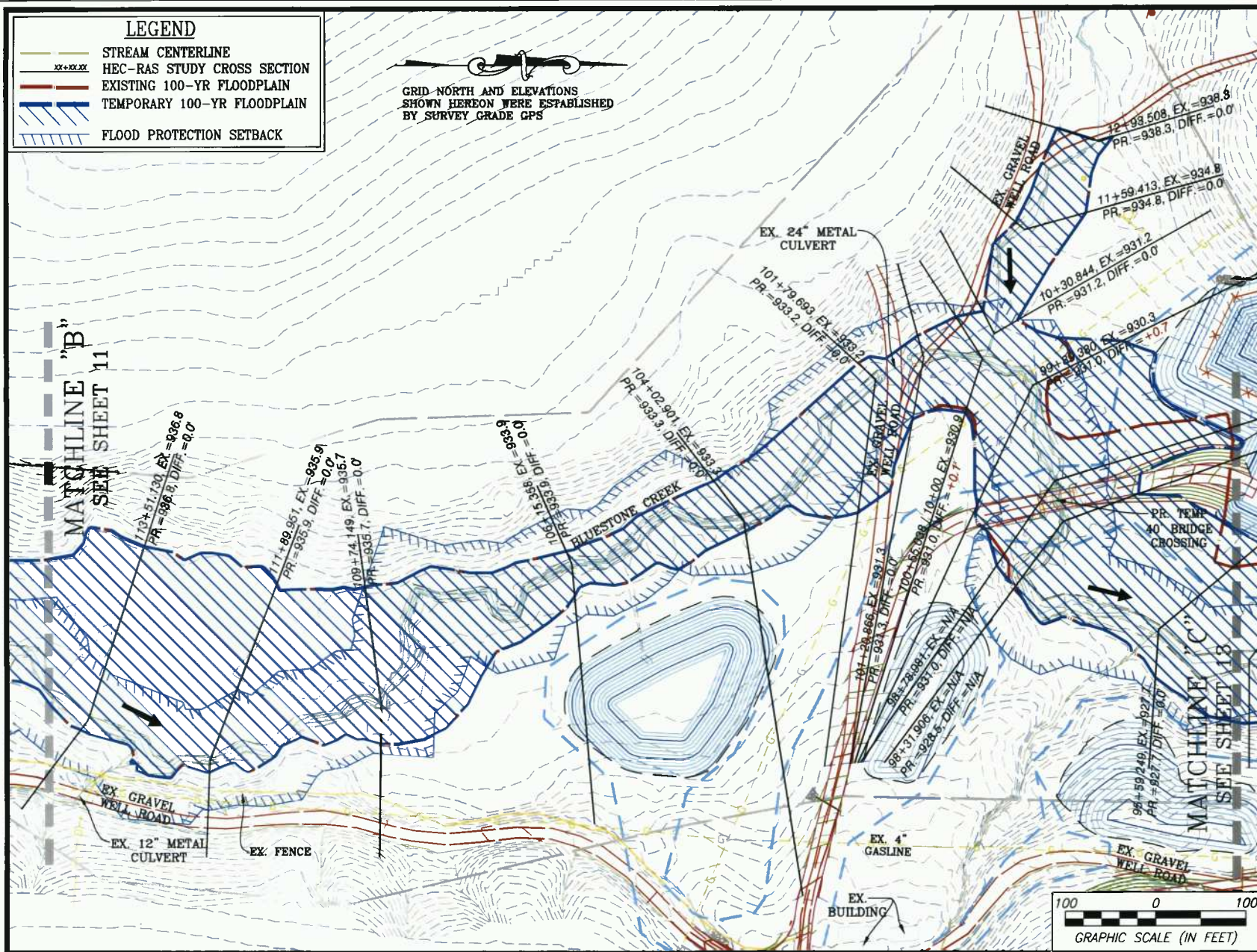
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**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
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-  FLOOD PROTECTION SETBACK

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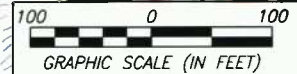
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



TEMPORARY CONDITIONS PLAN  
 OXF 157 WELL PAD AND  
 HENDERSON CENTRALIZED  
 FRESHWATER IMPOUNDMENT  
 FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 12 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
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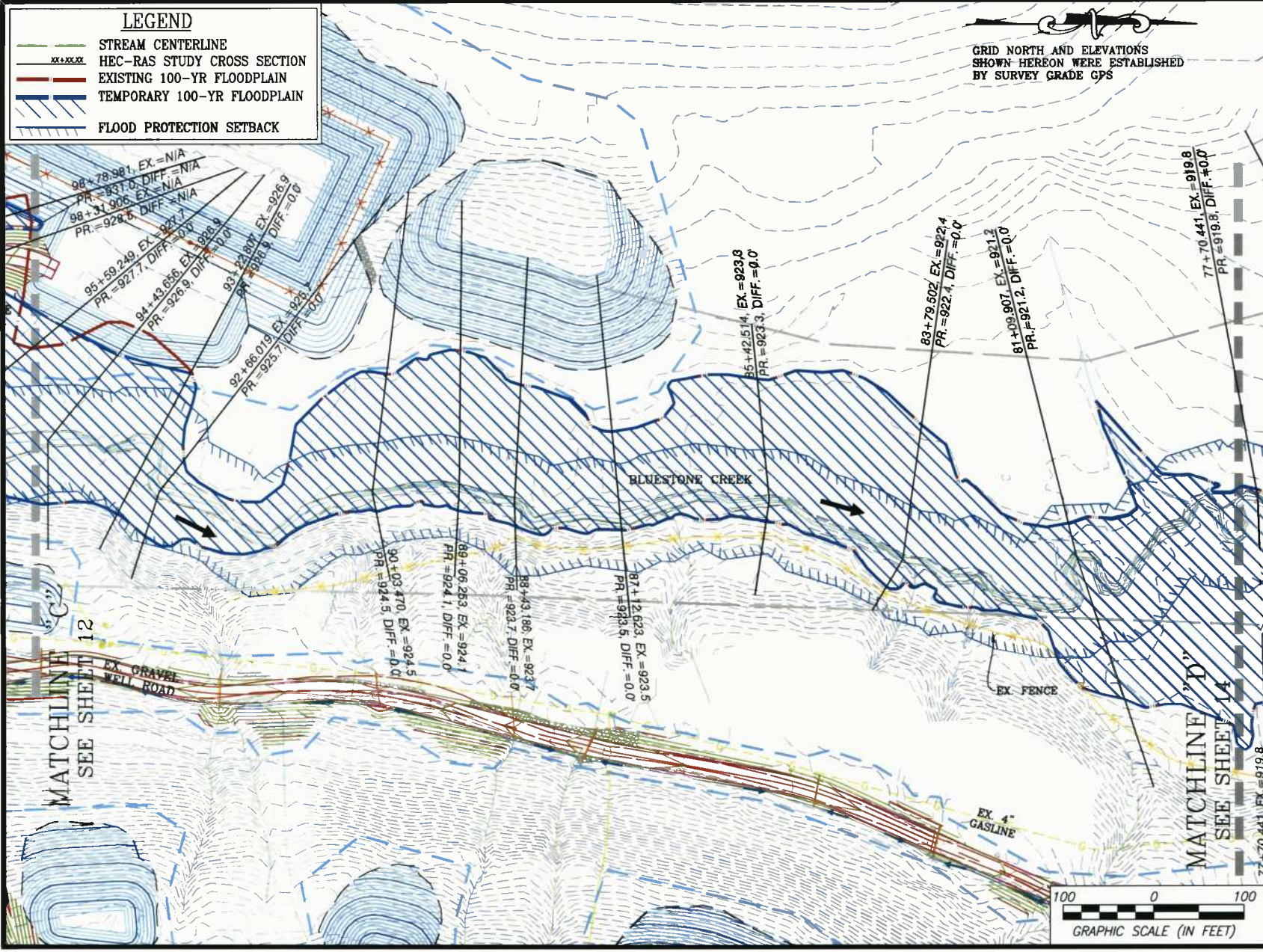




**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  TEMPORARY 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

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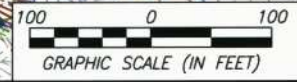
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



TEMPORARY CONDITIONS PLAN  
 OXF 157 WELL PAD AND HENDERSON CENTRALIZED FRESHWATER IMPOUNDMENT FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 13 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 100'

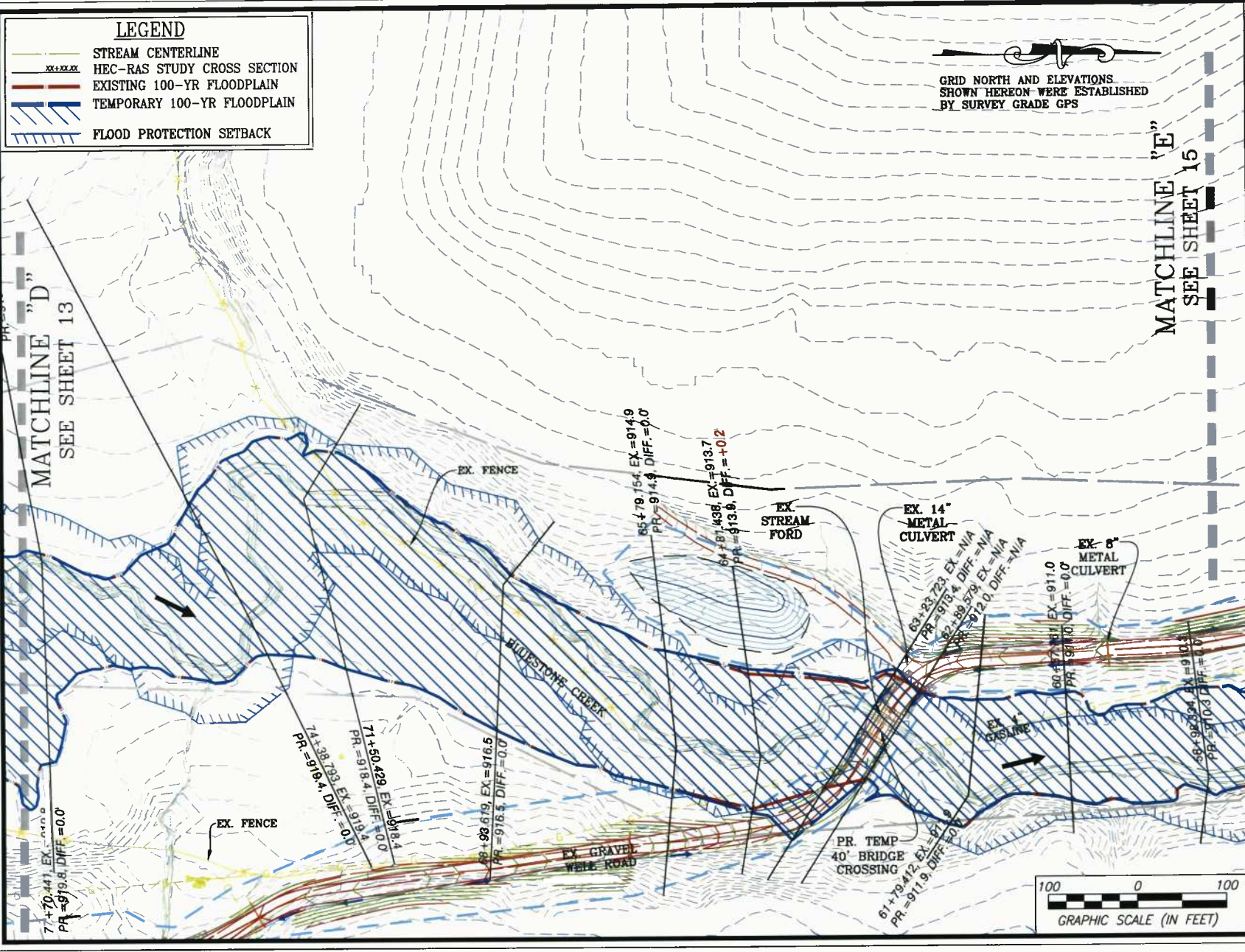




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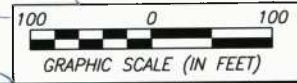
-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
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-  TEMPORARY 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

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MATCHLINE "D"  
SEE SHEET 13

MATCHLINE "E"  
SEE SHEET 15



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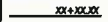



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TEMPORARY CONDITIONS PLAN  
**OXF 157 WELL PAD AND  
HENDERSON CENTRALIZED  
FRESHWATER IMPOUNDMENT  
FLOODPLAIN STUDY**  
WEST UNION DISTRICT  
DODDRIDGE COUNTY, WV

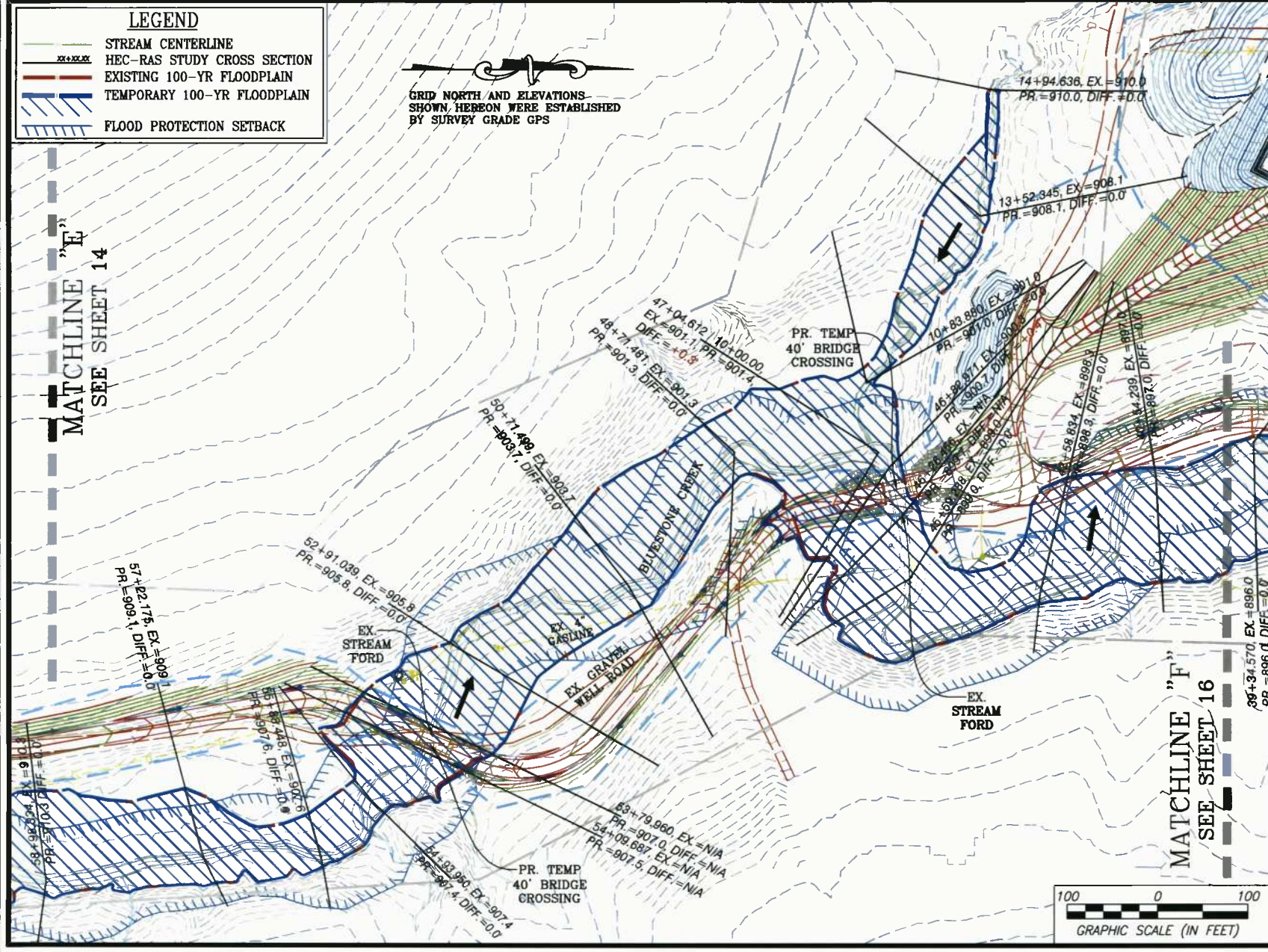
SHEET 14 OF 26  
OXF 157  
JOB NO. 7889  
DATE: 06/03/14  
SCALE: 1" = 100'



**LEGEND**

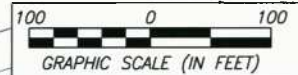
-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  TEMPORARY 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY GRADE GPS



MATCHLINE "E"  
SEE SHEET 14

MATCHLINE "F"  
SEE SHEET 16



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



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 OXF 157 WELL PAD AND  
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 FRESHWATER IMPOUNDMENT  
 FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

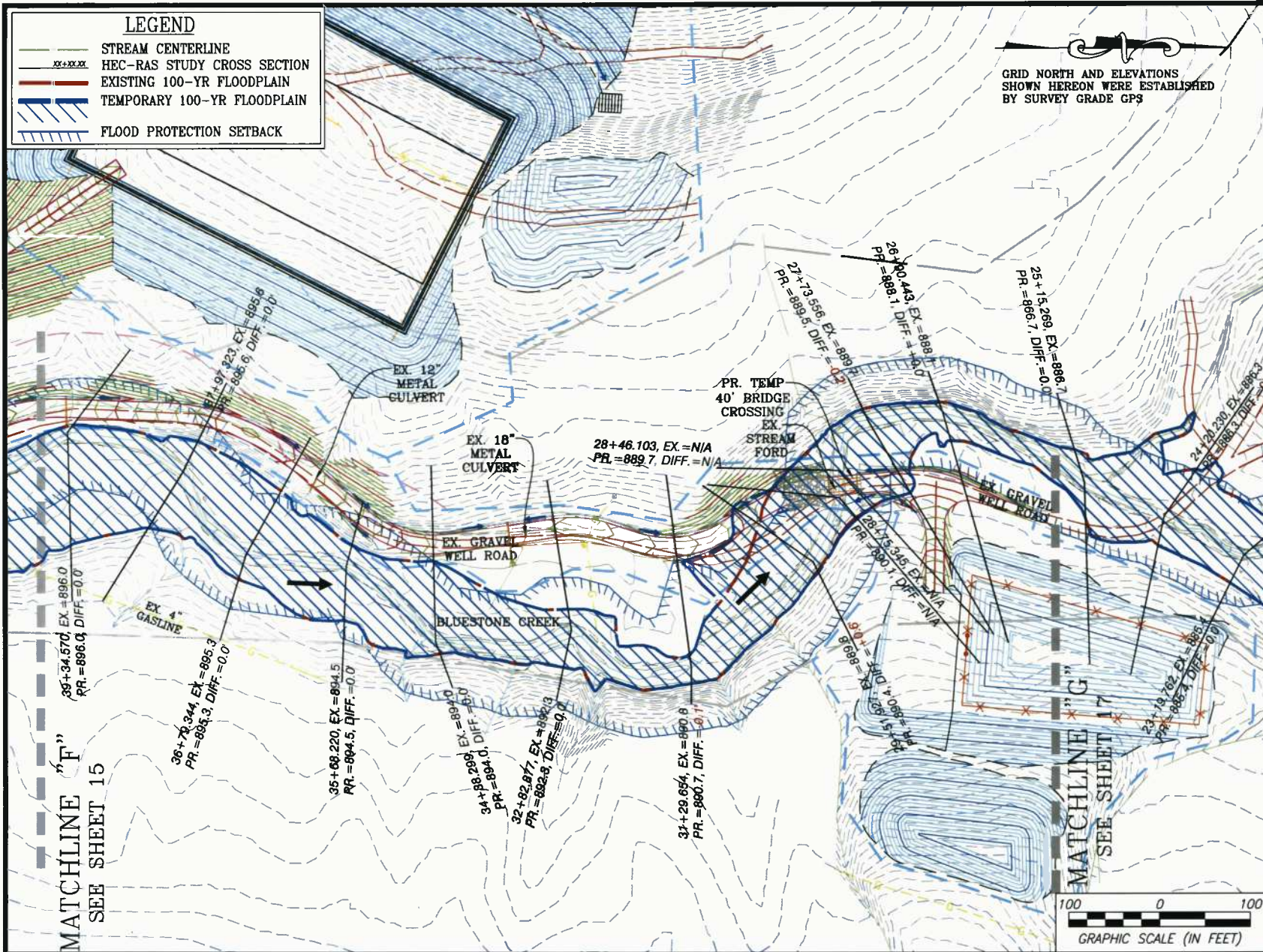
SHEET 15 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 100'



**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
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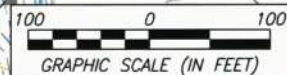
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TEMPORARY CONDITIONS PLAN  
**OXF 157 WELL PAD AND HENDERSON CENTRALIZED FRESHWATER IMPOUNDMENT FLOODPLAIN STUDY**  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 16 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 100'








MATCHLINE "F"  
 SEE SHEET 15

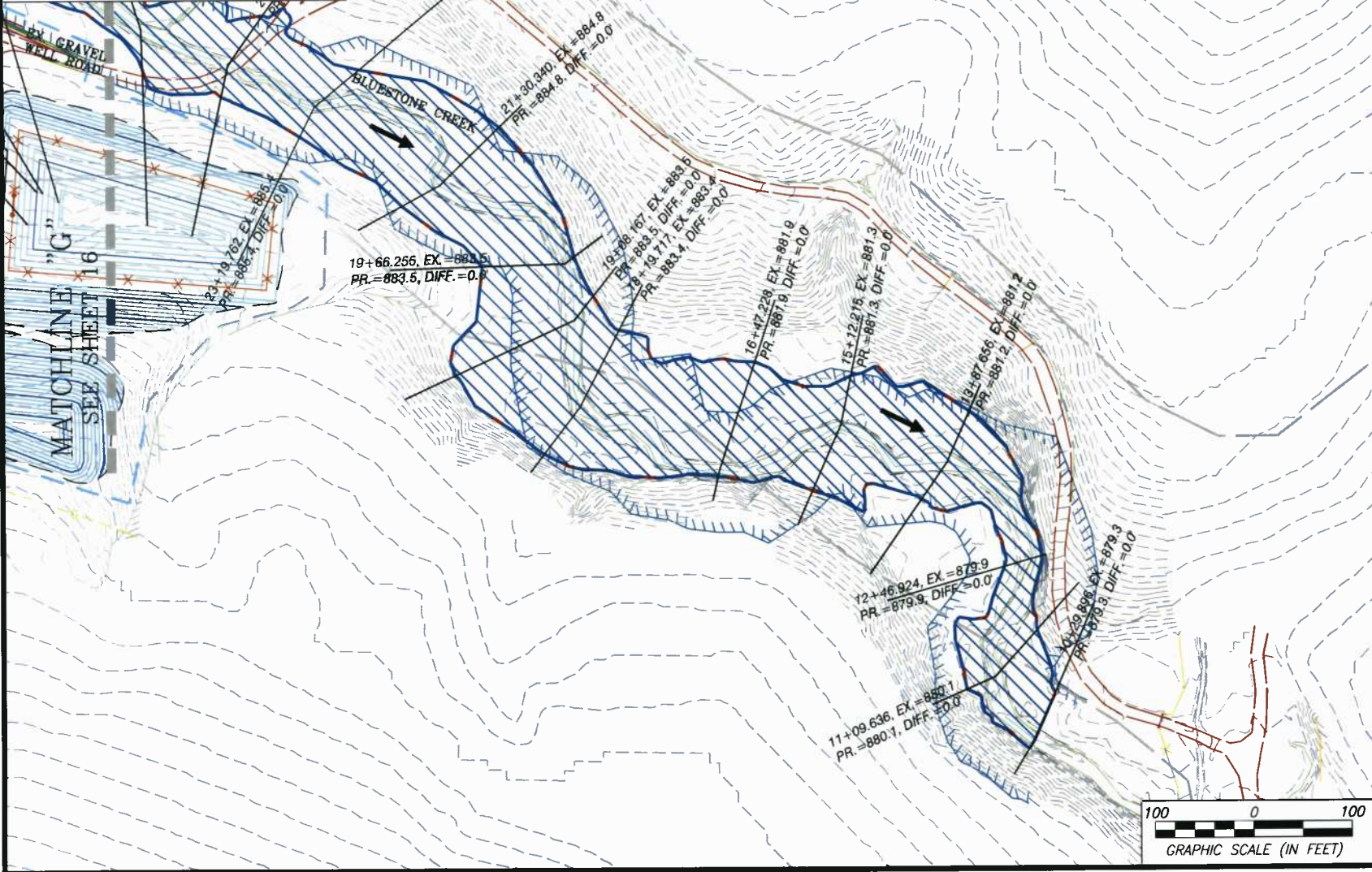
MATCHLINE "G"  
 SEE SHEET 17



**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  TEMPORARY 100-YR FLOODPLAIN
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GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY GRADE GPS



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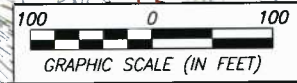
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 OXF 157 WELL PAD AND  
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 FRESHWATER IMPOUNDMENT  
 FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV






SHEET 17 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
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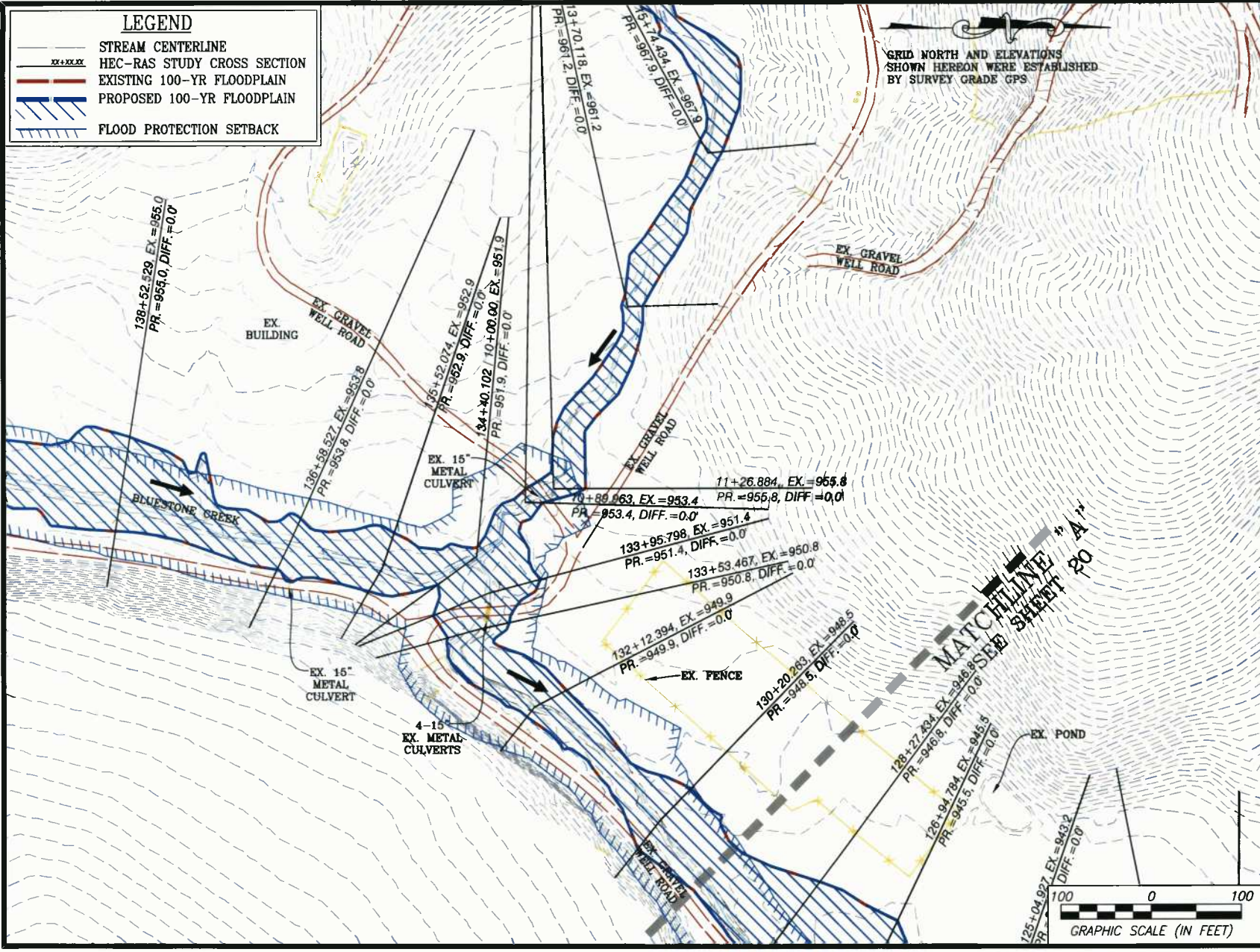


**Exhibit E**  
**Proposed Conditions Plan**



**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  PROPOSED 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK



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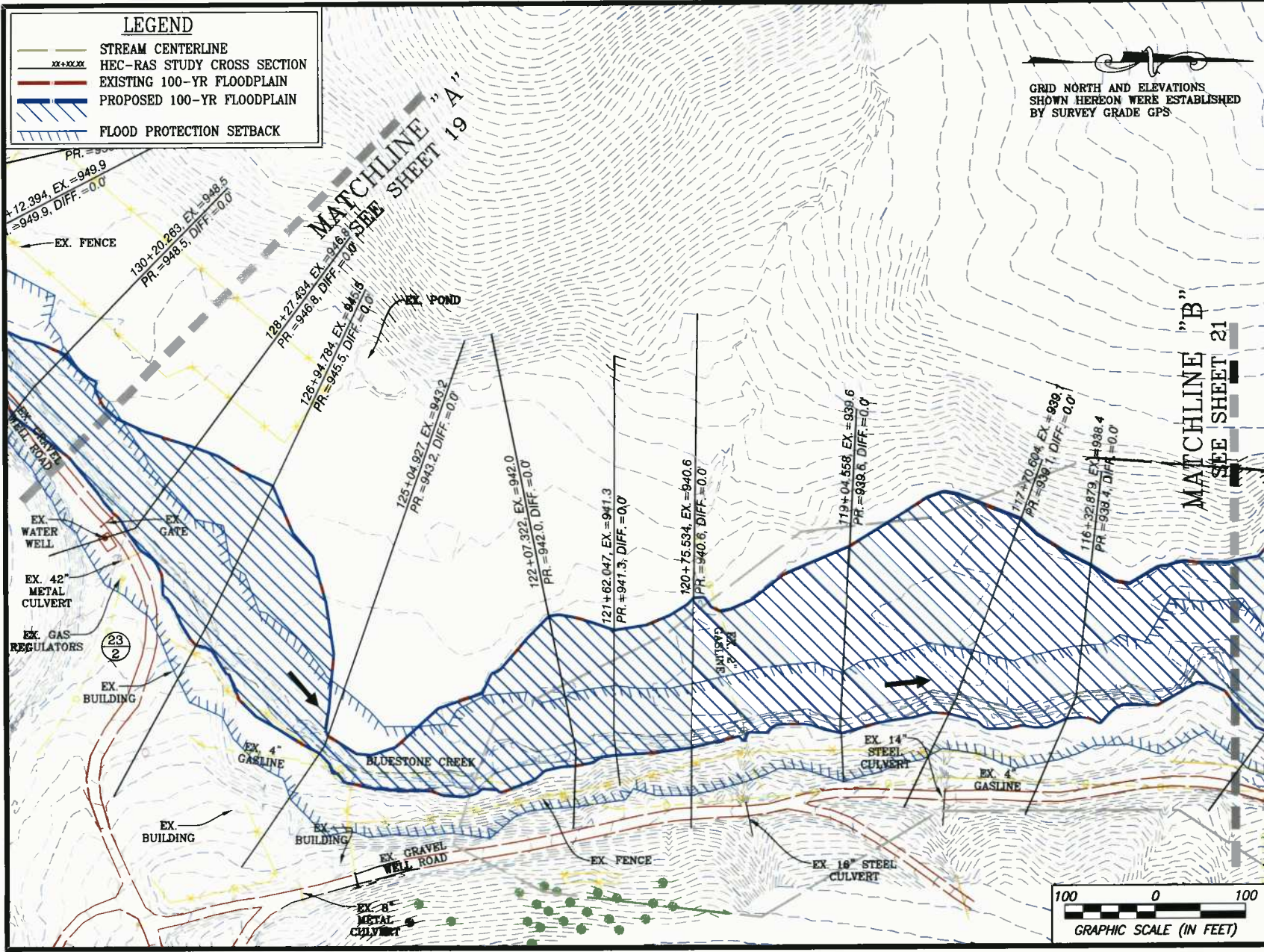
PROPOSED CONDITIONS PLAN  
**OXF 157 WELL PAD AND HENDERSON CENTRALIZED FRESHWATER IMPOUNDMENT FLOODPLAIN STUDY**  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 19 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 100'



**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
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-  FLOOD PROTECTION SETBACK



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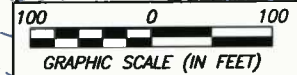
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



PROPOSED CONDITIONS PLAN  
 OXF 157 WELL PAD AND  
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 FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
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SHEET 20 OF 26  
 OXF 157  
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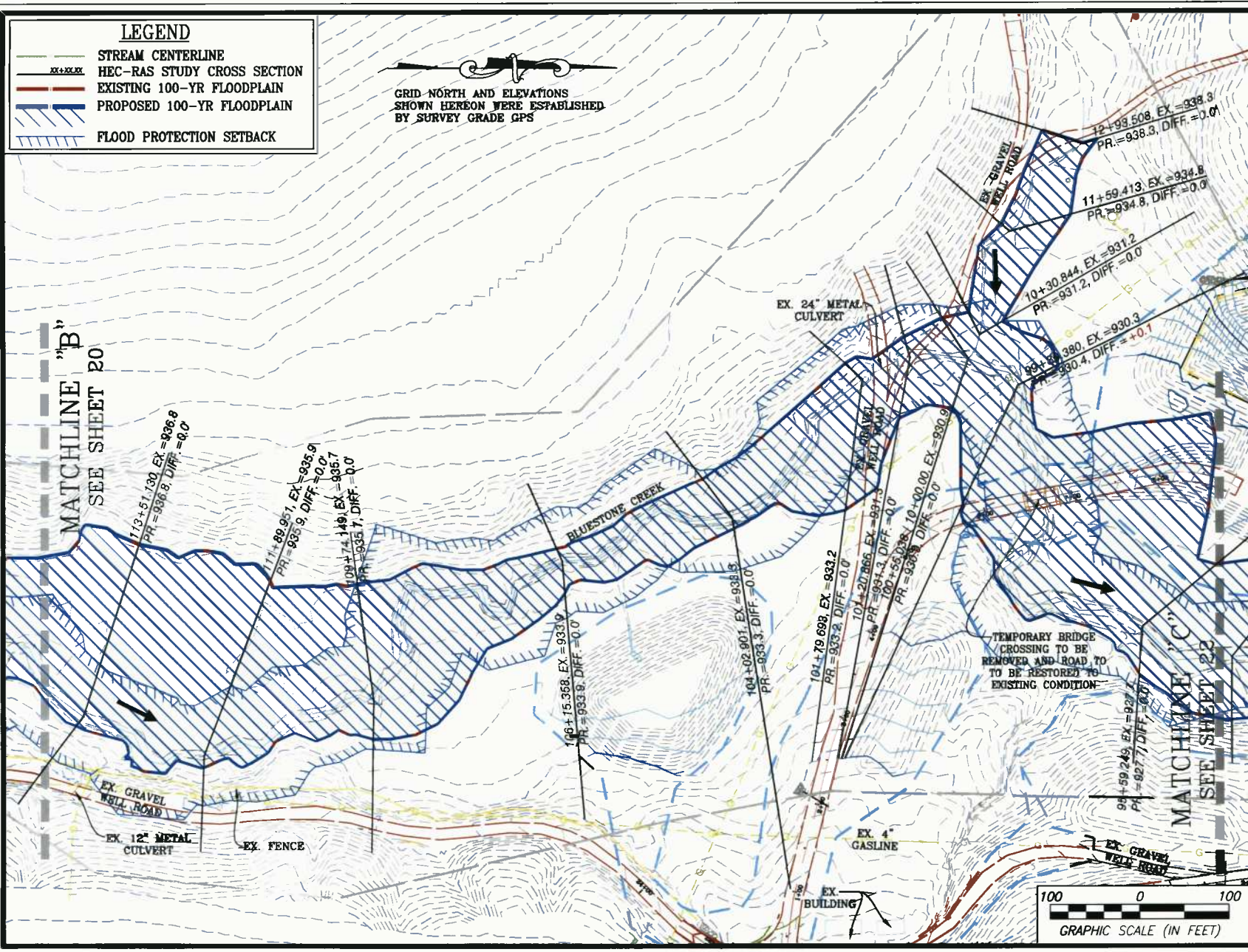




**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  PROPOSED 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

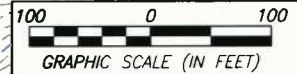
GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY GRADE GPS



MATCHLINE "B"  
SEE SHEET 20

MATCHLINE "C"  
SEE SHEET 23

TEMPORARY BRIDGE CROSSING TO BE REMOVED AND ROAD TO BE RESTORED TO EXISTING CONDITION



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MARK O. SMITH  
WEST VIRGINIA  
No. 11709  
PROFESSIONAL ENGINEER  
06/03/2014

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PROPOSED CONDITIONS PLAN  
OXF 157 WELL PAD AND  
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SHEET 21 OF 26  
OXF 157  
JOB NO. 7889  
DATE: 06/03/14  
SCALE: 1" = 100'



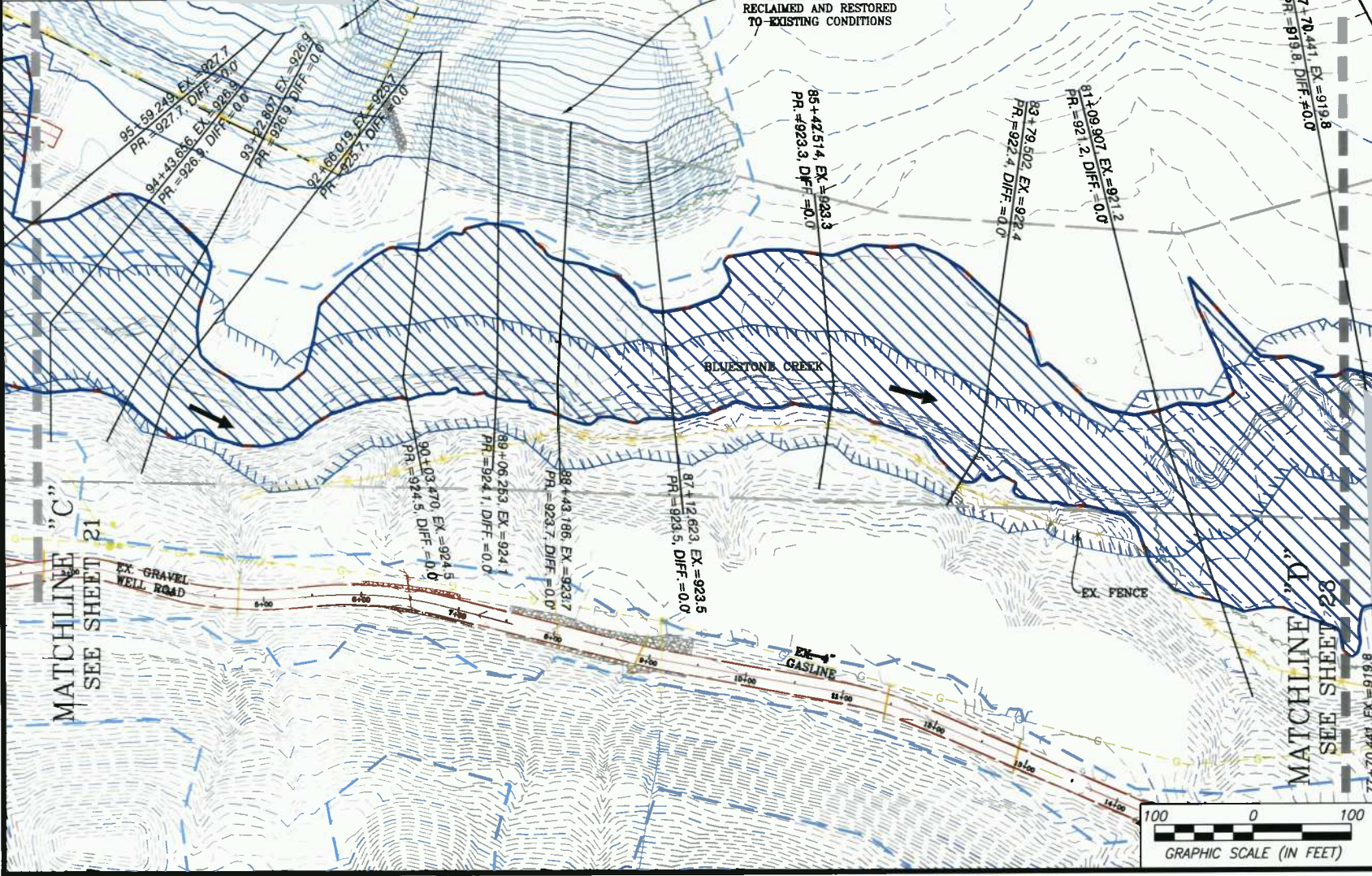
**LEGEND**

- STREAM CENTERLINE
- HEC-RAS STUDY CROSS SECTION
- EXISTING 100-YR FLOODPLAIN
- PROPOSED 100-YR FLOODPLAIN
- FLOOD PROTECTION SETBACK

CENTRALIZED FRESHWATER  
IMPOUNDMENT TO BE  
RECLAIMED AND RESTORED  
TO EXISTING CONDITIONS

STOCKPILE TO BE  
RECLAIMED AND RESTORED  
TO EXISTING CONDITIONS

GRID NORTH AND ELEVATIONS  
SHOWN HEREON WERE ESTABLISHED  
BY SURVEY GRADE GPS



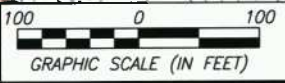
**NAVITUS**  
**ENERGY ENGINEERING**  
 Telephone: (888) 662-4185 | www.NavitusEng.com  
 Professional Energy Consultants  
 Address: 4410 University Blvd, Charleston, WV 25309  
 SURVEYORS  
 ENVIRONMENTAL  
 PROJECT MGMT.  
 www.surveynv.com  
 (801) 465-0400

WEST VIRGINIA  
 PROFESSIONAL ENGINEER  
 No. 11709  
 06/03/2014

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 FOR: EQT PRODUCTION  
 COMPANY






PROPOSED CONDITIONS PLAN  
 OXF 157 WELL PAD AND  
 HENDERSON CENTRALIZED  
 FRESHWATER IMPOUNDMENT  
 FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 22 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 100'

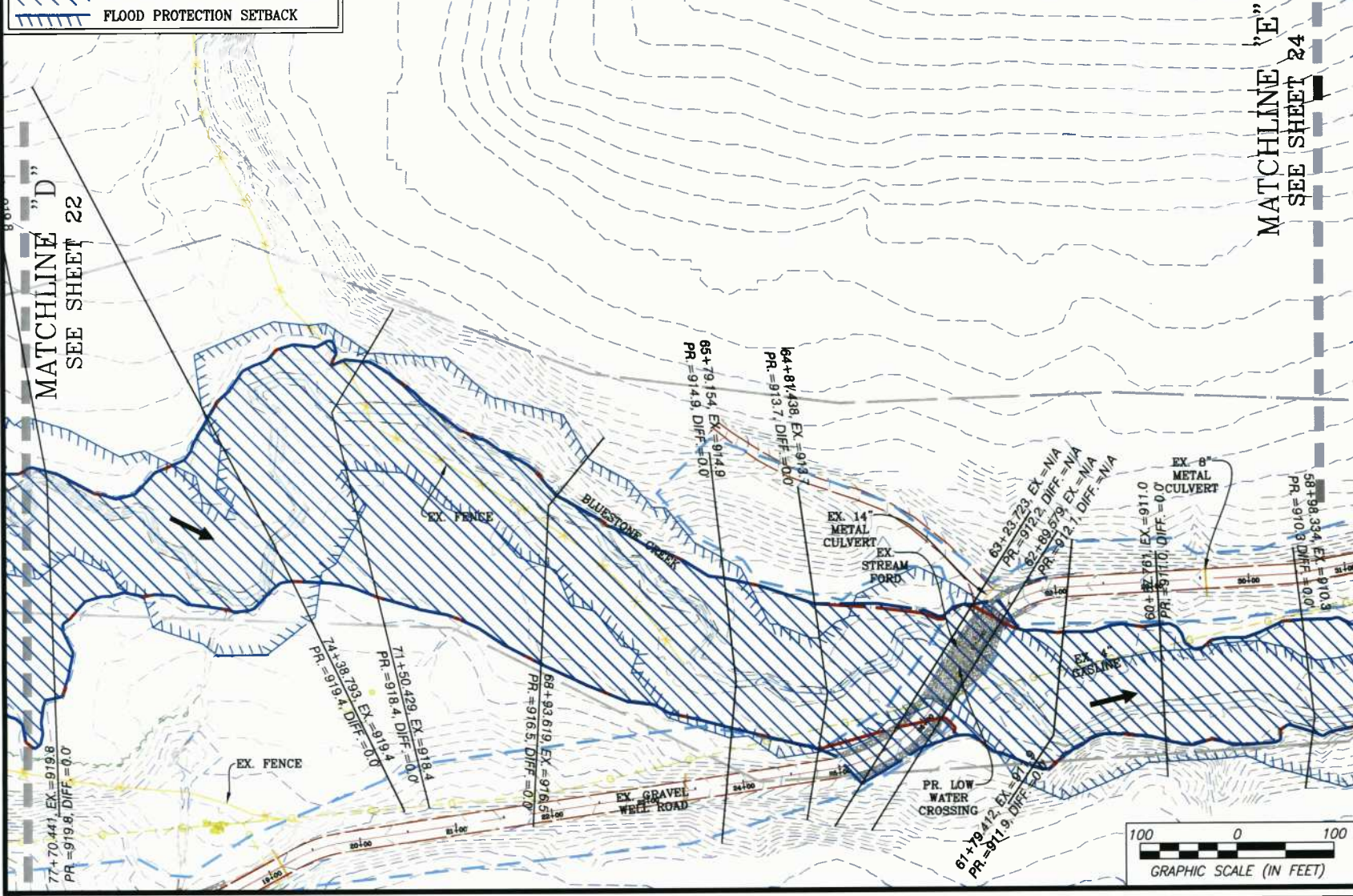




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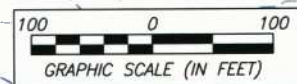
-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  PROPOSED 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

GRID NORTH AND ELEVATIONS  
SHOWN HEREON WERE ESTABLISHED  
BY SURVEY GRADE GPS



MATCHLINE "D"  
SEE SHEET 22

MATCHLINE "E"  
SEE SHEET 24



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MARK D. SMITH  
WEST VIRGINIA  
PROFESSIONAL ENGINEER  
No. 11709  
06/03/2014






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FOR: EQT PRODUCTION  
COMPANY

PROPOSED CONDITIONS PLAN  
OXF 157 WELL PAD AND  
HENDERSON CENTRALIZED  
FRESHWATER IMPOUNDMENT  
FLOODPLAIN STUDY  
WEST UNION DISTRICT  
DODDRIDGE COUNTY, WV

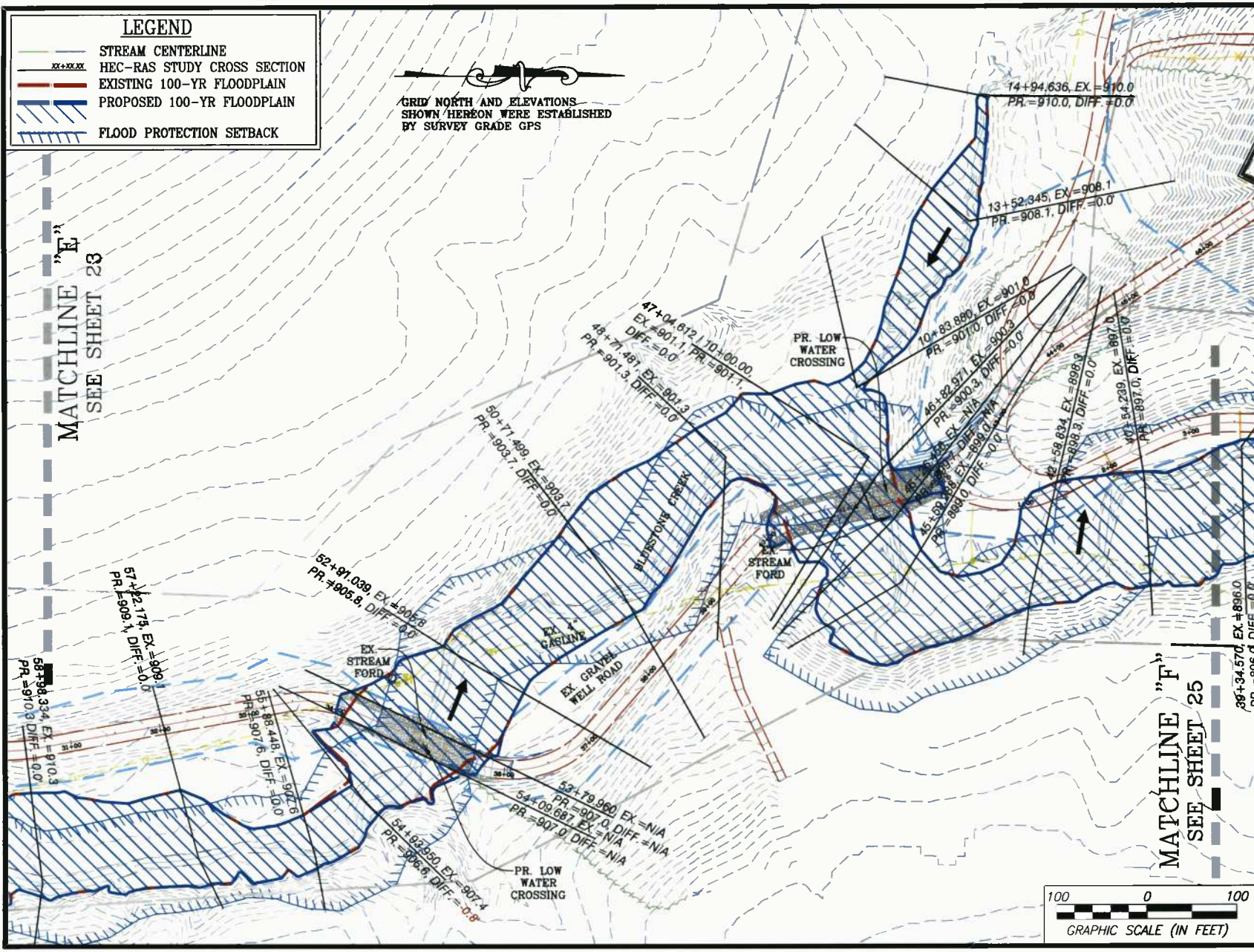
SHEET 23 OF 26  
OXF 157  
JOB NO. 7889  
DATE: 06/03/14  
SCALE: 1" = 100'



**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  PROPOSED 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

GRID NORTH AND ELEVATIONS  
SHOWN HEREON WERE ESTABLISHED  
BY SURVEY GRADE GPS



MATCHLINE "E"  
SEE SHEET 23

MATCHLINE "F"  
SEE SHEET 25



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ENVIRONMENTAL  
PRODUCT MGMT.




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06/03/2014






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PROPOSED CONDITIONS PLAN  
OXF 157 WELL PAD AND  
HENDERSON CENTRALIZED  
FRESHWATER IMPOUNDMENT  
FLOODPLAIN STUDY  
WEST UNION DISTRICT  
DODDRIDGE COUNTY, WV

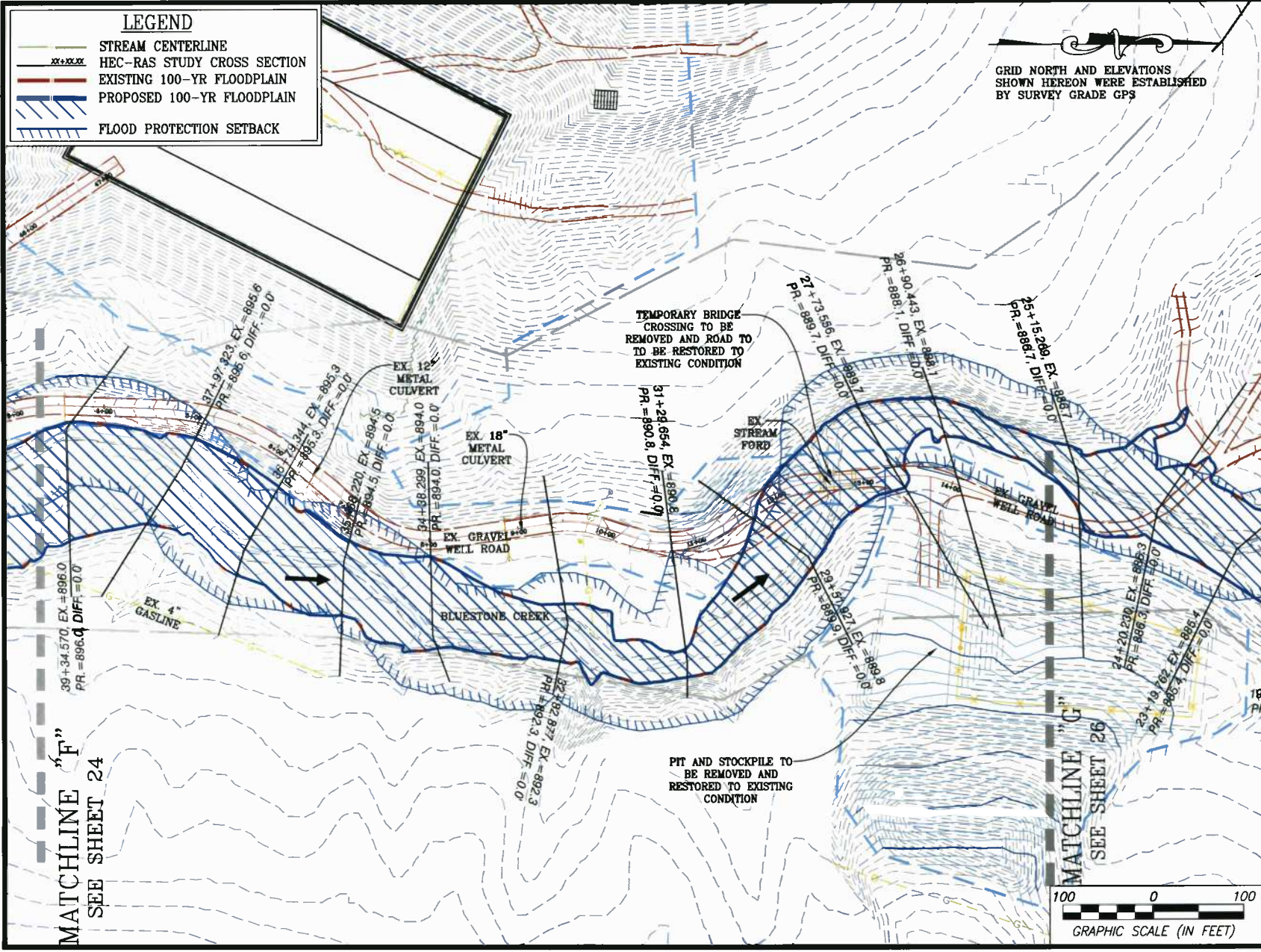
SHEET 24 OF 26  
OXF 157  
JOB NO. 7889  
DATE: 06/03/14  
SCALE: 1" = 100'



**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  PROPOSED 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY GRADE GPS



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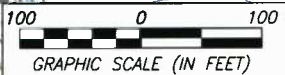
**Professional Energy Consultants**  
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 www.slssurveyors.com

Professional Engineer Seal:  
 No. 11709  
 WEST VIRGINIA  
 PROFESSIONAL ENGINEER  
 06/03/2014

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 FOR: EQT PRODUCTION COMPANY

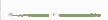
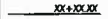



PROPOSED CONDITIONS PLAN  
**OXF 157 WELL PAD AND HENDERSON CENTRALIZED FRESHWATER IMPOUNDMENT FLOODPLAIN STUDY**  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 25 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 100'

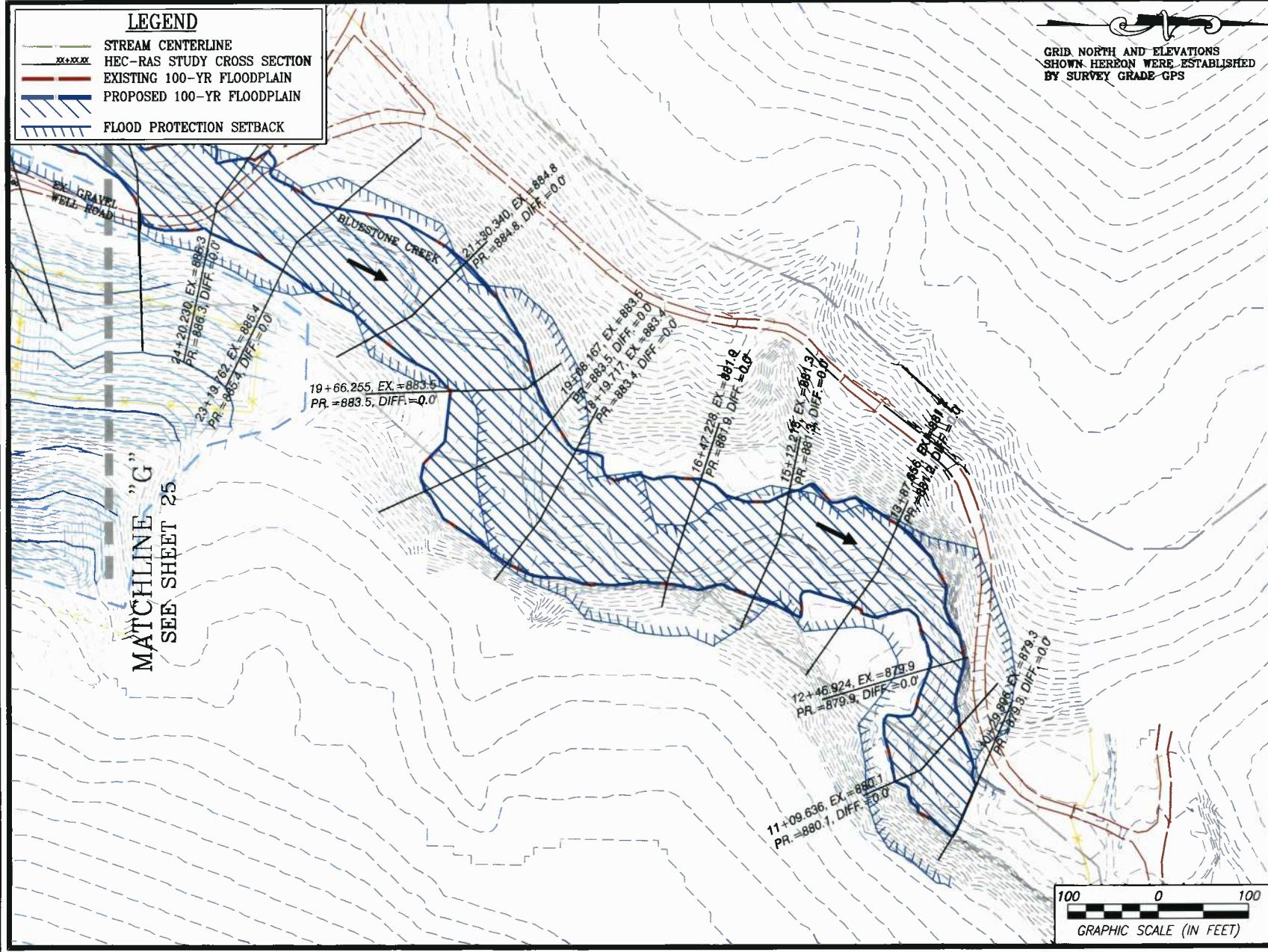




**LEGEND**

-  STREAM CENTERLINE
-  HEC-RAS STUDY CROSS SECTION
-  EXISTING 100-YR FLOODPLAIN
-  PROPOSED 100-YR FLOODPLAIN
-  FLOOD PROTECTION SETBACK

GRID NORTH AND ELEVATIONS SHOWN HEREON WERE ESTABLISHED BY SURVEY GRADE GPS



MATCHLINE "G"  
SEE SHEET 25

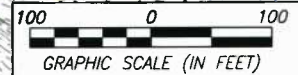
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 Professional Energy Consultants  
 ADVISORS FOR WATER AND WASTE  
 SURVEYORS ENVIRONMENTAL PROJECT MGMT.  
 www.surveyns.com  
 P.O. BOX 404

WEST VIRGINIA PROFESSIONAL ENGINEER  
 No. 11709  
 06/03/2014

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 FOR: EQT PRODUCTION COMPANY

PROPOSED CONDITIONS PLAN  
 OXF 157 WELL PAD AND HENDERSON CENTRALIZED FRESHWATER IMPOUNDMENT FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 26 OF 26  
 OXF 157  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 100'

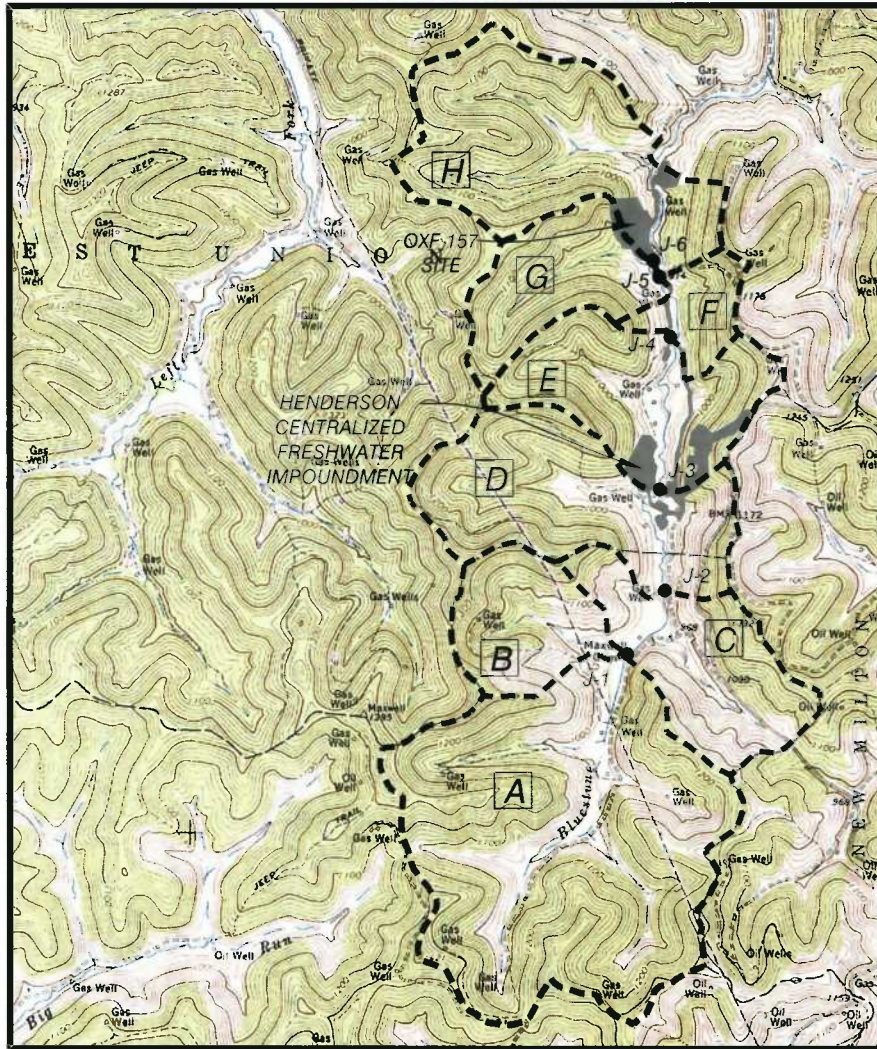




**Supplement 1**  
**Drainage Computations**

USGS 7.5 OXFORD QUAD MAP

# DRAINAGE MAP



WEST VIRGINIA STATE PLANE  
 COORDINATE SYSTEM  
 NORTH ZONE, NAD83  
 ELEVATION BASED ON NAVD83  
 ESTABLISHED BY SURVEY GRADE GPS  
 & OPUS POST-PROCESSING

KEY	HYDROLOGIC ELEMENT	DRAINAGE AREA (SQ. MI.)
A	UPPER BLUESTONE	0.882
B	UPPER1 BLUESTONE	0.170
C	MIDDLE1 BLUESTONE	0.252
D	MIDDLE BLUESTONE	0.363
E	LOWER BLUESTONE	0.286
F	LOWER1 BLUESTONE	0.078
G	LOWER2 BLUESTONE	0.188
H	LOWER3 BLUESTONE	0.425
	<b>TOTAL</b>	<b>2.644</b>

J-1	=	JUNCTION 1
J-2	=	JUNCTION 2
J-3	=	JUNCTION 3
J-4	=	JUNCTION 4
J-5	=	JUNCTION 5
J-6	=	JUNCTION 6



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Professional Engineer  
 No. 11709  
 WEST VIRGINIA  
 PROFESSIONAL ENGINEER  
 06/03/2014

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 FOR: EQT PRODUCTION  
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DRAINAGE MAP  
 OXF 157 WELL PAD AND  
 HENDERSON CENTRALIZED  
 FRESHWATER IMPOUNDMENT  
 FLOODPLAIN STUDY  
 WEST UNION DISTRICT  
 DODDRIDGE COUNTY, WV

SHEET 1 OF 1  
 OXF 157/159  
 JOB NO. 7889  
 DATE: 06/03/14  
 SCALE: 1" = 2000'

Project: OXF 159/157

Simulation Run: 100 YR

Start of Run: 04Sep2013, 00:00

Basin Model: Existing

End of Run: 05Sep2013, 00:05

Meteorologic Model: 100 YR

Compute Time: 04Sep2013, 09:58

Control Specifications: Control 1

Hydrologic Element	Drainage Area (MI <sup>2</sup> )	Peak Discharge (CFS)	Time of Peak	Volume (AC-FT)
Upper Bluestone	0.882	443.8	04Sep2013, 12:55	95.5
Upper1 Bluestone	0.17	221.9	04Sep2013, 12:10	20.3
Junction-1	1.052	482.7	04Sep2013, 12:50	115.8
Reach-1	1.052	482.7	04Sep2013, 13:00	115.4
Middle1 Bluestone	0.252	189.6	04Sep2013, 12:30	28.7
Junction-2	1.304	601.9	04Sep2013, 12:50	144.1
Reach-2	1.304	601	04Sep2013, 13:10	143.1
Middle Bluestone	0.363	303	04Sep2013, 12:25	41.4
Junction-3	1.667	763.6	04Sep2013, 12:40	184.5
Reach-3	1.667	762	04Sep2013, 13:00	183.2
Lower Bluestone	0.286	238.7	04Sep2013, 12:20	31.4
Junction-4	1.953	855.6	04Sep2013, 13:00	214.6
Reach-4	1.953	853.6	04Sep2013, 13:05	214.2
Lower1 Bluestone	0.078	130	04Sep2013, 12:00	9
Junction-5	2.031	865	04Sep2013, 13:05	223.1
Reach-5	2.031	865	04Sep2013, 13:10	222.7
Lower2 Bluestone	0.188	175.7	04Sep2013, 12:20	22.3
Junction-6	2.219	914.4	04Sep2013, 13:10	245
Reach-6	2.219	910.4	04Sep2013, 13:25	243.8
Lower3 Bluestone	0.425	337.3	04Sep2013, 12:30	50.2
Downstream	2.644	1021.2	04Sep2013, 13:20	294



**Supplement 2**  
**Summary of Computed Elevations**

**OXF-157-159 WELL PAD  
FLOODPLAIN STUDY  
SUMMARY OF COMPUTED ELEVATIONS**

CROSS SECTION STATION	RIVER NAME	EXISTING CONDITIONS MODEL	TEMPORARY CONDITIONS BRIDGE MODEL	PROPOSED DIFFERENCE
14659.36	Bluestone Creek	964.6	964.6	0.0
14572.23	Bluestone Creek	963.8	963.8	0.0
14557.54	Bluestone Creek	Culvert		
14543.33	Bluestone Creek	962.5	962.5	0.0
14371.96	Bluestone Creek	960.1	960.1	0.0
14193.22	Bluestone Creek	958.6	958.6	0.0
14044.56	Bluestone Creek	956.8	956.8	0.0
13852.52	Bluestone Creek	955	955	0.0
13658.52	Bluestone Creek	953.8	953.8	0.0
13552.07	Bluestone Creek	952.9	952.9	0.0
13440.1	Bluestone Creek	951.9	951.9	0.0
1842.591	Tributary 3	974.2	974.2	0.0
1574.434	Tributary 3	967.9	967.9	0.0
1370.118	Tributary 3	961.2	961.2	0.0
1126.884	Tributary 3	955.8	955.8	0.0
1109.439	Tributary 3	Culvert		
1089.963	Tributary 3	953.4	953.4	0.0
13395.79	Bluestone Creek-Upper	951.4	951.4	0.0
13372.57	Bluestone Creek-Upper	Culvert		
13353.46	Bluestone Creek-Upper	950.8	950.8	0.0
13212.39	Bluestone Creek-Upper	949.9	949.9	0.0
13020.26	Bluestone Creek-Upper	948.5	948.5	0.0
12827.43	Bluestone Creek-Upper	946.8	946.8	0.0
12694.78	Bluestone Creek-Upper	945.5	945.5	0.0
12504.92	Bluestone Creek-Upper	943.2	943.2	0.0
12207.32	Bluestone Creek-Upper	942	942	0.0
12162.04	Bluestone Creek-Upper	941.3	941.3	0.0
12075.53	Bluestone Creek-Upper	940.6	940.6	0.0
11904.55	Bluestone Creek-Upper	939.6	939.6	0.0
11770.6	Bluestone Creek-Upper	939.1	939.1	0.0
11632.87	Bluestone Creek-Upper	938.4	938.4	0.0
11351.13	Bluestone Creek-Upper	936.8	936.8	0.0
11189.95	Bluestone Creek-Upper	935.9	935.9	0.0
10974.14	Bluestone Creek-Upper	935.7	935.7	0.0
10615.35	Bluestone Creek-Upper	933.9	933.9	0.0
10402.9	Bluestone Creek-Upper	933.3	933.3	0.0
10179.69	Bluestone Creek-Upper	933.2	933.2	0.0
10155.71	Bluestone Creek-Upper	Culvert		
10120.86	Bluestone Creek-Upper	931.3	931.3	0.0
10055.03	Bluestone Creek-Upper	930.9	931	+ 0.1



**OXF-157-159 WELL PAD  
FLOODPLAIN STUDY  
SUMMARY OF COMPUTED ELEVATIONS**

CROSS SECTION STATION	RIVER NAME	EXISTING CONDITIONS MODEL	TEMPORARY CONDITIONS BRIDGE MODEL	PROPOSED DIFFERENCE
1293.508	Tributary 2	938.3	938.3	0.0
1159.413	Tributary 2	934.8	934.8	0.0
1030.844	Tributary 2	931.2	931.2	0.0
9989.38	Bluestone Creek-Middle	930.3	931	+ 0.7
9878.981	Bluestone Creek-Middle	N/A	931	N/A
9855.351	Bluestone Creek-Middle		Bridge	
9831.906	Bluestone Creek-Middle	N/A	928.5	N/A
9559.249	Bluestone Creek-Middle	927.7	927.7	0.0
9443.656	Bluestone Creek-Middle	926.9	926.9	0.0
9322.807	Bluestone Creek-Middle	926.9	926.9	0.0
9266.019	Bluestone Creek-Middle	925.7	925.7	0.0
9003.47	Bluestone Creek-Middle	924.5	924.5	0.0
8906.253	Bluestone Creek-Middle	924.1	924.1	0.0
8843.186	Bluestone Creek-Middle	923.7	923.7	0.0
8712.623	Bluestone Creek-Middle	923.5	923.5	0.0
8542.514	Bluestone Creek-Middle	923.3	923.3	0.0
8379.502	Bluestone Creek-Middle	922.4	922.4	0.0
8109.907	Bluestone Creek-Middle	921.2	921.2	0.0
7770.441	Bluestone Creek-Middle	919.8	919.8	0.0
7438.793	Bluestone Creek-Middle	919.4	919.4	0.0
7150.429	Bluestone Creek-Middle	918.4	918.4	0.0
6893.619	Bluestone Creek-Middle	916.5	916.5	0.0
6579.154	Bluestone Creek-Middle	914.9	914.9	0.0
6481.438	Bluestone Creek-Middle	913.7	913.9	+ 0.2
6323.723	Bluestone Creek-Middle	N/A	913.4	N/A
6303.783	Bluestone Creek-Middle		Bridge	
6289.579	Bluestone Creek-Middle	N/A	912	N/A
6179.412	Bluestone Creek-Middle	911.9	911.9	0.0
6057.761	Bluestone Creek-Middle	911	911	0.0
5898.334	Bluestone Creek-Middle	910.3	910.3	0.0
5722.175	Bluestone Creek-Middle	909.1	909.1	0.0
5588.448	Bluestone Creek-Middle	907.6	907.6	0.0
5493.95	Bluestone Creek-Middle	907.4	907.4	0.0
5409.687	Bluestone Creek-Middle	N/A	907.5	N/A
5395.595	Bluestone Creek-Middle		Bridge	
5379.96	Bluestone Creek-Middle	N/A	907	N/A
5291.039	Bluestone Creek-Middle	905.8	905.8	0.0
5071.499	Bluestone Creek-Middle	903.7	903.7	0.0
4871.481	Bluestone Creek-Middle	901.3	901.3	0.0
4704.612	Bluestone Creek-Middle	901.1	901.4	+ 0.3

**OXF-157-159 WELL PAD  
FLOODPLAIN STUDY  
SUMMARY OF COMPUTED ELEVATIONS**

CROSS SECTION STATION	RIVER NAME	EXISTING CONDITIONS MODEL	TEMPORARY CONDITIONS BRIDGE MODEL	PROPOSED DIFFERENCE
1494.636	Tributary 1	910	910	0.0
1352.345	Tributary 1	908.1	908.1	0.0
1083.88	Tributary 1	901	901	0.0
4682.971	Bluestone Creek-Lower	900.3	900.7	+ 0.4
4657.419	Bluestone Creek-Lower		Bridge	
4626.456	Bluestone Creek-Lower	N/A	899.7	N/A
4559.288	Bluestone Creek-Lower	899	899	0.0
4258.834	Bluestone Creek-Lower	898.3	898.3	0.0
4054.239	Bluestone Creek-Lower	897	897	0.0
3934.57	Bluestone Creek-Lower	896	896	0.0
3797.323	Bluestone Creek-Lower	895.6	895.6	0.0
3679.344	Bluestone Creek-Lower	895.3	895.3	0.0
3568.22	Bluestone Creek-Lower	894.5	894.5	0.0
3438.299	Bluestone Creek-Lower	894	894	0.0
3282.877	Bluestone Creek-Lower	892.3	892.3	0.0
3129.654	Bluestone Creek-Lower	890.8	890.7	- 0.1
2951.927	Bluestone Creek-Lower	889.8	890.4	+ 0.6
2875.345	Bluestone Creek-Lower	N/A	890.1	N/A
2862.727	Bluestone Creek-Lower			Bridge
2846.103	Bluestone Creek-Lower	N/A	889.7	N/A
2773.556	Bluestone Creek-Lower	889.7	889.5	- 0.2
2690.443	Bluestone Creek-Lower	888.1	888.1	0.0
2515.269	Bluestone Creek-Lower	886.7	886.7	0.0
2420.23	Bluestone Creek-Lower	886.3	886.3	0.0
2319.762	Bluestone Creek-Lower	885.4	885.4	0.0
2130.34	Bluestone Creek-Lower	884.8	884.8	0.0
1966.255	Bluestone Creek-Lower	883.5	883.5	0.0
1908.167	Bluestone Creek-Lower	883.5	883.5	0.0
1819.717	Bluestone Creek-Lower	883.4	883.4	0.0
1647.228	Bluestone Creek-Lower	881.9	881.9	0.0
1512.215	Bluestone Creek-Lower	881.3	881.3	0.0
1387.656	Bluestone Creek-Lower	881.2	881.2	0.0
1246.924	Bluestone Creek-Lower	879.9	879.9	0.0
1109.636	Bluestone Creek-Lower	880.1	880.1	0.0
1029.896	Bluestone Creek-Lower	879.3	879.3	0.0



**OXF-157-159 WELL PAD  
FLOODPLAIN STUDY  
SUMMARY OF COMPUTED ELEVATIONS**

CROSS SECTION STATION	RIVER NAME	EXISTING CONDITIONS MODEL	Permanent Condition Low Water Ford	PROPOSED DIFFERENCE
14659.36	Bluestone Creek	964.6	964.6	0.0
14572.23	Bluestone Creek	963.8	963.8	0.0
14557.54	Bluestone Creek	Culvert		
14543.33	Bluestone Creek	962.5	962.5	0.0
14371.96	Bluestone Creek	960.1	960.1	0.0
14193.22	Bluestone Creek	958.6	958.6	0.0
14044.56	Bluestone Creek	956.8	956.8	0.0
13852.52	Bluestone Creek	955	955	0.0
13658.52	Bluestone Creek	953.8	953.8	0.0
13552.07	Bluestone Creek	952.9	952.9	0.0
13440.1	Bluestone Creek	951.9	951.9	0.0
1842.591	Tributary 3	974.2	974.2	0.0
1574.434	Tributary 3	967.9	967.9	0.0
1370.118	Tributary 3	961.2	961.2	0.0
1126.884	Tributary 3	955.8	955.8	0.0
1109.439	Tributary 3	Culvert		
1089.963	Tributary 3	953.4	953.4	0.0
13395.79	Bluestone Creek-Upper	951.4	951.4	0.0
13372.57	Bluestone Creek-Upper	Culvert		
13353.46	Bluestone Creek-Upper	950.8	950.8	0.0
13212.39	Bluestone Creek-Upper	949.9	949.9	0.0
13020.26	Bluestone Creek-Upper	948.5	948.5	0.0
12827.43	Bluestone Creek-Upper	946.8	946.8	0.0
12694.78	Bluestone Creek-Upper	945.5	945.5	0.0
12504.92	Bluestone Creek-Upper	943.2	943.2	0.0
12207.32	Bluestone Creek-Upper	942	942	0.0
12162.04	Bluestone Creek-Upper	941.3	941.3	0.0
12075.53	Bluestone Creek-Upper	940.6	940.6	0.0
11904.55	Bluestone Creek-Upper	939.6	939.6	0.0
11770.6	Bluestone Creek-Upper	939.1	939.1	0.0
11632.87	Bluestone Creek-Upper	938.4	938.4	0.0
11351.13	Bluestone Creek-Upper	936.8	936.8	0.0
11189.95	Bluestone Creek-Upper	935.9	935.9	0.0
10974.14	Bluestone Creek-Upper	935.7	935.7	0.0
10615.35	Bluestone Creek-Upper	933.9	933.9	0.0
10402.9	Bluestone Creek-Upper	933.3	933.3	0.0
10179.69	Bluestone Creek-Upper	933.2	933.2	0.0
10155.71	Bluestone Creek-Upper	Culvert		
10120.86	Bluestone Creek-Upper	931.3	931.3	0.0
10055.03	Bluestone Creek-Upper	930.9	930.9	0.0

**OXF-157-159 WELL PAD  
FLOODPLAIN STUDY  
SUMMARY OF COMPUTED ELEVATIONS**

CROSS SECTION STATION	RIVER NAME	EXISTING CONDITIONS MODEL	Permanent Condition Low Water Ford	PROPOSED DIFFERENCE
1293.508	Tributary 2	938.3	938.3	0.0
1159.413	Tributary 2	934.8	934.8	0.0
1030.844	Tributary 2	931.2	931.2	0.0
9989.38	Bluestone Creek-Middle	930.3	930.4	+ 0.1
9559.249	Bluestone Creek-Middle	927.7	927.7	0.0
9443.656	Bluestone Creek-Middle	926.9	926.9	0.0
9322.807	Bluestone Creek-Middle	926.9	926.9	0.0
9266.019	Bluestone Creek-Middle	925.7	925.7	0.0
9003.47	Bluestone Creek-Middle	924.5	924.5	0.0
8906.253	Bluestone Creek-Middle	924.1	924.1	0.0
8843.186	Bluestone Creek-Middle	923.7	923.7	0.0
8712.623	Bluestone Creek-Middle	923.5	923.5	0.0
8542.514	Bluestone Creek-Middle	923.3	923.3	0.0
8379.502	Bluestone Creek-Middle	922.4	922.4	0.0
8109.907	Bluestone Creek-Middle	921.2	921.2	0.0
7770.441	Bluestone Creek-Middle	919.8	919.8	0.0
7438.793	Bluestone Creek-Middle	919.4	919.4	0.0
7150.429	Bluestone Creek-Middle	918.4	918.4	0.0
6893.619	Bluestone Creek-Middle	916.5	916.5	0.0
6579.154	Bluestone Creek-Middle	914.9	914.9	0.0
6481.438	Bluestone Creek-Middle	913.7	913.7	0.0
6323.723	Bluestone Creek-Middle	N/A	912.2	N/A
6303.783	Bluestone Creek-Middle		Ford	
6289.579	Bluestone Creek-Middle	N/A	912.1	N/A
6179.412	Bluestone Creek-Middle	911.9	911.9	0.0
6057.761	Bluestone Creek-Middle	911	911	0.0
5898.334	Bluestone Creek-Middle	910.3	910.3	0.0
5722.175	Bluestone Creek-Middle	909.1	909.1	0.0
5588.448	Bluestone Creek-Middle	907.6	907.6	0.0
5493.95	Bluestone Creek-Middle	907.4	906.6	- 0.8
5409.687	Bluestone Creek-Middle	N/A	907	N/A
5395.595	Bluestone Creek-Middle		Ford	
5379.96	Bluestone Creek-Middle	N/A	907	N/A
5291.039	Bluestone Creek-Middle	905.8	905.8	0.0
5071.499	Bluestone Creek-Middle	903.7	903.7	0.0
4871.481	Bluestone Creek-Middle	901.3	901.3	0.0
4704.612	Bluestone Creek-Middle	901.1	901.1	0.0
1494.636	Tributary 1	910	910	0.0
1352.345	Tributary 1	908.1	908.1	0.0



**OXF-157-159 WELL PAD  
FLOODPLAIN STUDY  
SUMMARY OF COMPUTED ELEVATIONS**

CROSS SECTION STATION	RIVER NAME	EXISTING CONDITIONS MODEL	Permanent Condition Low Water Ford	PROPOSED DIFFERENCE
1083.88	Tributary 1	901	901	0.0
4682.971	Bluestone Creek-Lower	900.3	900.3	0.0
4657.419	Bluestone Creek-Lower		Ford	
4626.456	Bluestone Creek-Lower	N/A	899.7	N/A
4559.288	Bluestone Creek-Lower	899	899	0.0
4258.834	Bluestone Creek-Lower	898.3	898.3	0.0
4054.239	Bluestone Creek-Lower	897	897	0.0
3934.57	Bluestone Creek-Lower	896	896	0.0
3797.323	Bluestone Creek-Lower	895.6	895.6	0.0
3679.344	Bluestone Creek-Lower	895.3	895.3	0.0
3568.22	Bluestone Creek-Lower	894.5	894.5	0.0
3438.299	Bluestone Creek-Lower	894	894	0.0
3282.877	Bluestone Creek-Lower	892.3	892.3	0.0
3129.654	Bluestone Creek-Lower	890.8	890.8	0.0
2951.927	Bluestone Creek-Lower	889.8	889.8	0.0
2773.556	Bluestone Creek-Lower	889.7	889.7	0.0
2690.443	Bluestone Creek-Lower	888.1	888.1	0.0
2515.269	Bluestone Creek-Lower	886.7	886.7	0.0
2420.23	Bluestone Creek-Lower	886.3	886.3	0.0
2319.762	Bluestone Creek-Lower	885.4	885.4	0.0
2130.34	Bluestone Creek-Lower	884.8	884.8	0.0
1966.255	Bluestone Creek-Lower	883.5	883.5	0.0
1908.167	Bluestone Creek-Lower	883.5	883.5	0.0
1819.717	Bluestone Creek-Lower	883.4	883.4	0.0
1647.228	Bluestone Creek-Lower	881.9	881.9	0.0
1512.215	Bluestone Creek-Lower	881.3	881.3	0.0
1387.656	Bluestone Creek-Lower	881.2	881.2	0.0
1246.924	Bluestone Creek-Lower	879.9	879.9	0.0
1109.636	Bluestone Creek-Lower	880.1	880.1	0.0
1029.896	Bluestone Creek-Lower	879.3	879.3	0.0

**Supplement 3**

**HEC-RAS Analysis –Existing Conditions Summary**



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

X	X	XXXXXX	XXXX	XXXX	XX	XXXX
X	X	X	X X	X X	X X	X
X	X	X	X	X X	X X	X
XXXXXXXX	XXXX	X	XXX	XXXX	XXXXXX	XXXX
X	X	X	X	X X	X X	X
X	X	X	X X	X X	X X	X
X	X	XXXXXX	XXXX	X X	X X	XXXXXX

\*\*\*\*\*

PROJECT DATA

Project Title: OXF 157-159 Bridges  
Project File : OXF157-159Bridges.prj  
Run Date and Time: 11/6/2013 3:01:13 PM

Project in English units

\*\*\*\*\*

PLAN DATA

Plan Title: Existing Revised  
Plan File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage  
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.p10

Geometry Title: Existing Revised  
Geometry File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage  
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.g03

Flow Title : Existing Revised  
Flow File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage  
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.f09

Plan Summary Information:

Number of: Cross Sections	=	97	Multiple Openings	=	0
Culverts	=	4	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	=	20
Maximum difference tolerance	=	0.3

Flow tolerance factor = 0.001

Computation Options

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

\*\*\*\*\*

FLOW DATA

Flow Title: Existing Revised
Flow File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.f09

Flow Data (cfs)

Table with 4 columns: River, Reach, RS, PF 1. Rows include Bluestone Creek (Upper, Middle, Lower) and Trib 1, 2, 3.

Boundary Conditions

Table with 5 columns: River, Reach, Profile, Upstream, Downstream. Rows specify boundary conditions for Bluestone Creek.

\*\*\*\*\*

GEOMETRY DATA

Geometry Title: Existing Revised
Geometry File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.g03

Reach Connection Table



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```

*****
* River      Reach      * Upstream Boundary * Downstream Boundary *
*****
* Bluestone Creek Bluestone Creek *      3      *
* Bluestone Creek Upper      *      2      *
* Bluestone Creek Middle     *      1      *
* Bluestone Creek Lower      *      1      *
* Trib 1      Trib 1      *      1      *
* Trib 2      Trib 2      *      2      *
* Trib 3      Trib 3      *      3      *
*****
    
```

JUNCTION INFORMATION

Name: 1  
 Description:  
 Energy computation Method

Length across Junction		Tributary		Length	Angle
River	Reach	River	Reach		
Bluestone Creek	Middle	to Bluestone Creek	Lower	20.21	0
Trib 1	Trib 1	to Bluestone Creek	Lower	0	0

Name: 2  
 Description:  
 Energy computation Method

Length across Junction		Tributary		Length	Angle
River	Reach	River	Reach		
Bluestone Creek	Upper	to Bluestone Creek	Middle	63.02	0
Trib 2	Trib 2	to Bluestone Creek	Middle	0	0

Name: 3  
 Description:  
 Energy computation Method

Length across Junction		Tributary		Length	Angle
River	Reach	River	Reach		
Bluestone Creek	Bluestone Creek	to Bluestone Creek	Upper	42.49	0
Trib 3	Trib 3	to Bluestone Creek	Upper	0	0

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14659.36

INPUT  
 Description:

Station Elevation Data		num=	88							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
*****										

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0	979.98	4.21	979.33	10.06	978.32	11.51	978.07	11.89	978
12.03	977.98	13.39	977.69	18.12	976.7	21.11	976	24.01	975.35
29.82	974	32.12	973.48	38.3	972	44.91	971.17	54.84	970
63.61	969.6	88.74	968	111.55	967.08	116.96	966.92	138.27	966.34
148.64	966	150.51	966	155	965.8	166.6	965.4	172.86	965.15
177.28	964.95	187.15	964.54	200.02	964	205.8	964	206.01	963.99
213.75	963.68	217.56	962.24	218.05	961.88	219.92	960.57	220.2	960.33
221.05	960.3	223.73	960.17	226.3	960.42	227.52	961.31	228.49	962
231.18	963.83	231.72	964	236.6	964.52	239.8	964.92	247.61	964.99
251.36	965.15	252.23	965.18	253.23	965.32	253.93	964.97	255.2	964.8
257.08	964.54	259.05	965.7	259.47	966	261.2	967	262.9	968
264.97	969.34	266	970	267.65	970.98	269.44	972	270.97	972.93
272.53	974	274.95	975.59	275.51	976	278.91	976.63	284.65	977.32
290.56	978.05	290.98	978.09	295.97	978.58	296.01	978.57	296.89	978.54
297.25	978.51	297.4	978.51	298.28	978.28	298.98	978	299.52	977.73
300.26	978	300.4	978	301.33	978.4	305.97	980	309.03	980.74
314.88	982	320.93	983.62	322.06	984	322.82	984.25	328.11	986
328.61	986.17	334.23	988	340.27	990				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	213.75	.035	231.18	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	213.75	231.18		58.5	87.12	77.46	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 965.44	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.84	* wt. n-Val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 964.60	* Reach Len. (ft)	* 58.50	* 87.12	* 77.46
* Crit W.S. (ft)	* 964.60	* Flow Area (sq ft)	* 13.80	* 53.31	* 2.07
* E.G. Slope (ft/ft)	* 0.008444	* Area (sq ft)	* 13.80	* 53.31	* 2.07
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 33.54	* 408.00	* 2.26
* Top Width (ft)	* 52.06	* Top width (ft)	* 28.04	* 17.43	* 6.59
* Vel Total (ft/s)	* 6.42	* Avg. Vel. (ft/s)	* 2.43	* 7.65	* 1.09
* Max chl Dpth (ft)	* 4.43	* Hydr. Depth (ft)	* 0.49	* 3.06	* 0.31
* Conv. Total (cfs)	* 4829.5	* Conv. (cfs)	* 365.0	* 4439.9	* 24.6
* Length wtd. (ft)	* 82.94	* Wetted Per. (ft)	* 28.06	* 19.40	* 6.67
* Min Ch El (ft)	* 960.17	* Shear (lb/sq ft)	* 0.26	* 1.45	* 0.16
* Alpha	* 1.32	* Stream Power (lb/ft s)	* 340.27	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.74	* Cum Volume (acre-ft)	* 1.00	* 1.38	* 0.35
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 1.04	* 0.46	* 0.35

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: Divided flow computed for this cross-section.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water



surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14572.23

INPUT  
 Description:

Station Elevation Data		num= 93	
Sta	Elev	Sta	Elev
0	980	3.05	979.48
23.82	976	28.07	975.2
50.79	972	51.33	971.94
90.61	968.09	104.42	967.58
142.46	966.19	143.46	966.17
165.57	965.26	167.22	965.18
203.07	963.82	224.89	962.38
230.8	961.07	231.1	960.89
237.83	960	238.68	960.96
245.04	962.07	247.43	962.54
256.99	963.88	260.52	964
271.37	964.22	272.66	964.32
273.58	963.7	276.12	963.54
281.62	966	283.91	966.97
292.5	970.83	295.29	972
303.23	975.6	304.55	976
314.53	980	315.77	980.17
327.17	982	331.85	983.22
343.94	987.73	344.7	988

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.035	227.37	.035
		239.58	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 227.37 239.58 35.73 28.43 82.26 .1 .3

Blocked Obstructions		num= 1
Sta L	Sta R	Elev
272.66	350.12	964.32

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 964.62	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.78	* wt. n-val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 963.84	* Reach Len. (ft)	* 35.73	* 28.43	* 82.26

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* Crit W.S. (ft)	* 963.84	* Flow Area (sq ft)	* 20.01	* 36.64	* 23.33	*
* E.G. slope (ft/ft)	* 0.009567	* Area (sq ft)	* 20.01	* 36.64	* 23.33	*
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 72.30	* 303.03	* 68.47	*
* Top Width (ft)	* 54.08	* Top width (ft)	* 24.61	* 12.21	* 17.26	*
* Vel Total (ft/s)	* 5.55	* Avg. Vel. (ft/s)	* 3.61	* 8.27	* 2.94	*
* Max chl Dpth (ft)	* 3.84	* Hydr. Depth (ft)	* 0.81	* 3.00	* 1.35	*
* Conv. Total (cfs)	* 4537.3	* Conv. (cfs)	* 739.2	* 3098.1	* 700.0	*
* Length Wtd. (ft)	* 28.43	* Wetted Per. (ft)	* 24.67	* 13.03	* 17.49	*
* Min Ch El (ft)	* 960.00	* Shear (lb/sq ft)	* 0.48	* 1.68	* 0.80	*
* Alpha	* 1.63	* Stream Power (lb/ft s)	* 350.12	* 0.00	* 0.00	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 0.97	* 1.29	* 0.33	*
* C & E Loss (ft)	*	* Cum SA (acres)	* 1.01	* 0.43	* 0.33	*

Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.

CULVERT

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14557.54

INPUT

Description:

Distance from Upstream XS = 9.4  
 Deck/Roadway width = 10  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates

num=	2	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
*****		227.37	962.19	0	245.04	962.07	0				

Upstream Bridge Cross Section Data

Station Elevation Data		num=	93								
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	3.05	979.48	11.86	977.89	13.66	977.59	19.99	976.59		
23.82	976	28.07	975.2	35.99	973.98	37.25	973.76	50.16	972.08		
50.79	972	51.33	971.94	61.97	970.61	66.69	970.19	78.37	969.18		
90.61	968.09	104.42	967.58	113.31	967.22	120.75	966.88	121.99	966.83		
142.46	966.19	143.46	966.17	144.74	966.15	145.6	966.12	148.12	966.01		
165.57	965.26	167.22	965.18	175.77	964.8	177.81	964.75	199.56	964.05		
203.07	963.82	224.89	962.38	227.37	962.19	227.41	962.17	227.75	962		
230.8	961.07	231.1	960.89	231.34	960.8	231.85	960.81	237.82	960		
237.83	960	238.68	960.96	239.58	961.36	242.13	961.61	242.14	961.62		
245.04	962.07	247.43	962.54	248.06	962.61	251.16	962.86	253.9	963.04		
256.99	963.88	260.52	964	267.49	964	269.4	964.06	269.43	964.07		
271.37	964.22	272.66	964.32	272.99	964.1	273.09	964.03	273.13	964		
273.58	963.7	276.12	963.54	276.71	963.69	277.39	964	278.82	964.65		
281.62	966	283.91	966.97	286.11	968	289.1	969.27	290.74	970		
292.5	970.83	295.29	972	299.04	973.61	299.7	973.91	300	974		



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303.23	975.6	304.55	976	307.61	977.61	308.36	978	308.79	978.23
314.53	980	315.77	980.17	318.75	980.52	320.47	980.69	322.26	981.07
327.17	982	331.85	983.22	333.9	984	337.85	985.53	339.15	986
343.94	987.73	344.7	988	350.12	990				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 227.37 .035 239.58 .06

Bank Sta: Left Right Coeff Contr. Expan.  
 227.37 239.58 .1 .3

Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 272.66 350.12 964.32

Downstream Deck/Roadway Coordinates num= 2  
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 \*\*\*\*\*  
 207.08 962.06 0 241.24 962.02 0

Downstream Bridge Cross Section Data  
 Station Elevation Data num= 85  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 980 3.13 978.99 5.82 978 8.91 976.85 9.87 976.63  
 13.32 976 18.7 975.07 24.76 974 34.48 972.4 37.37 972  
 42.13 971.4 53.36 970 58.46 969.48 62.67 969.32 77.6 968.02  
 78 968 85.09 967.69 104.64 966.27 107.8 966.14 113.26 966  
 117.63 966 119.66 965.91 147.18 964.86 159.88 964.37 168.48 964.06  
 169.65 964 178.72 964 199.86 962.55 207.08 962.06 207.19 962.05  
 207.92 962 208.5 962 212.76 961.68 218.2 961.38 221.49 960.52  
 223.39 960 224.91 959.63 225.38 959.45 232.6 959.53 235.66 959.67  
 236.44 960 237.08 960.35 240.36 961.86 240.37 961.88 241.3 962.02  
 243.7 962.34 248.99 963.15 253.81 963.76 255.68 963.83 261.36 963.9  
 266.39 963.96 266.49 963.97 266.64 963.97 268.25 964.01 269.34 964.03  
 269.5 964 272.29 962.65 272.31 962.64 272.32 962.65 273.68 964  
 276.08 965.98 276.09 966 276.11 966.02 276.51 966.41 278.31 968  
 279.53 968.96 280.72 970 282.22 971.46 282.83 972 285.02 973.95  
 285.07 974 285.11 974.03 287.35 976 288.75 977.15 289.72 978  
 291.4 979.61 291.81 980 292.17 980.31 294.19 982 295.94 982.65  
 299.24 984 301.43 984.67 305.63 986 307.39 986.54 307.48 986.57

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 218.2 .035 240.36 .035

Bank Sta: Left Right Coeff Contr. Expan.  
 218.2 240.36 .1 .3

OXF157-159Bridges.rep

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 1.67  
 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  
 4.94 19.51 .024 .024 0 .9 1

Number of Barrels = 3  
 Upstream Elevation = 960.16  
 Centerline Stations

Sta. Sta. Sta.  
 234.6 236.3 238.3

Downstream Elevation = 959.43  
 Centerline Stations

Sta. Sta. Sta.  
 228.4 230.4 232.6

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1  
 \*\*\*\*\*  
 \* Q Culv Group (cfs) \* 41.85 \* Culv Full Len (ft) \* 19.51 \*  
 \* # Barrels \* 3 \* Culv Vel US (ft/s) \* 6.37 \*  
 \* Q Barrel (cfs) \* 13.95 \* Culv Vel DS (ft/s) \* 6.37 \*  
 \* E.G. US. (ft) \* 964.58 \* Culv Inv El Up (ft) \* 960.16 \*  
 \* W.S. US. (ft) \* 963.84 \* Culv Inv El Dn (ft) \* 959.43 \*  
 \* E.G. DS (ft) \* 963.35 \* Culv Frctn Ls (ft) \* 0.66 \*  
 \* W.S. DS (ft) \* 962.51 \* Culv Exit Loss (ft) \* 0.00 \*  
 \* Delta EG (ft) \* 1.23 \* Culv Entr Loss (ft) \* 0.57 \*  
 \* Delta WS (ft) \* 1.33 \* Q Weir (cfs) \* 401.95 \*  
 \* E.G. IC (ft) \* 964.55 \* Weir Sta Lft (ft) \* 182.98 \*  
 \* E.G. OC (ft) \* 964.58 \* Weir Sta Rgt (ft) \* 278.67 \*  
 \* Culvert Control \* Outlet \* Weir Submerg \* 0.08 \*  
 \* Culv WS Inlet (ft) \* 961.83 \* Weir Max Depth (ft) \* 2.51 \*  
 \* Culv WS Outlet (ft) \* 961.10 \* Weir Avg Depth (ft) \* 1.24 \*  
 \* Culv Nm] Depth (ft) \* \* Weir Flow Area (sq ft) \* 118.70 \*  
 \* Culv Crt Depth (ft) \* 1.40 \* Min El Weir Flow (ft) \* 962.08 \*  
 \*\*\*\*\*

Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.

CROSS SECTION



OXF157-159Bridges.rep

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14543.33

INPUT  
 Description:

Station Elevation Data		num= 85		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	3.13	978.99	5.82	978	8.91	976.85	9.87	976.63
13.32	976	18.7	975.07	24.76	974	34.48	972.4	37.37	972
42.13	971.4	53.36	970	58.46	969.48	62.67	969.32	77.6	968.02
78	968	85.09	967.69	104.64	966.27	107.8	966.14	113.26	966
117.63	966	119.66	965.91	147.18	964.86	159.88	964.37	168.48	964.06
169.65	964	178.72	964	199.86	962.55	207.08	962.06	207.19	962.05
207.92	962	208.5	962	212.76	961.68	218.2	961.38	221.49	960.52
223.39	960	224.91	959.63	225.38	959.45	232.6	959.53	235.66	959.67
236.44	960	237.08	960.35	240.36	961.86	240.37	961.88	241.3	962.02
243.7	962.34	248.99	963.15	253.81	963.76	255.68	963.83	261.36	963.9
266.39	963.96	266.49	963.97	266.64	963.97	268.25	964.01	269.34	964.03
269.5	964	272.29	962.65	272.31	962.64	272.32	962.65	273.68	964
276.08	965.98	276.09	966	276.11	966.02	276.51	966.41	278.31	968
279.53	968.96	280.72	970	282.22	971.46	282.83	972	285.02	973.95
285.07	974	285.11	974.03	287.35	976	288.75	977.15	289.72	978
291.4	979.61	291.81	980	292.17	980.31	294.19	982	295.94	982.65
299.24	984	301.43	984.67	305.63	986	307.39	986.54	307.48	986.57

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	218.2	.035	240.36	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	218.2	240.36		183.08	169.22	151.23	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 963.35	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.84	* wt. n-val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 962.51	* Reach Len. (ft)	* 183.08	* 169.22	* 151.23
* Crit W.S. (ft)	* 962.51	* Flow Area (sq ft)	* 10.39	* 53.81	* 1.42
* E.G. Slope (ft/ft)	* 0.010300	* Area (sq ft)	* 10.39	* 53.81	* 1.42
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 31.27	* 409.72	* 2.82
* Top Width (ft)	* 44.38	* Top Width (ft)	* 17.76	* 22.16	* 4.45
* Vel Total (ft/s)	* 6.76	* Avg. Vel. (ft/s)	* 3.01	* 7.61	* 1.99
* Max Chl Dpth (ft)	* 3.06	* Hydr. Depth (ft)	* 0.58	* 2.43	* 0.32
* Conv. Total (cfs)	* 4372.9	* Conv. (cfs)	* 308.1	* 4037.1	* 27.8
* Length wtd. (ft)	* 169.29	* Wetted Per. (ft)	* 17.80	* 22.91	* 4.51
* Min Ch El (ft)	* 959.45	* Shear (lb/sq ft)	* 0.38	* 1.51	* 0.20
* Alpha	* 1.18	* Stream Power (lb/ft s)	* 307.48	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.67	* Cum Volume (acre-ft)	* 0.97	* 1.21	* 0.33
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 0.99	* 0.42	* 0.31

OXF157-159Bridges.rep

\*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Bluestone Creek RS: 14371.96

INPUT

Description:

Station Elevation Data		num=		90							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	4.57	978	7.82	976.72	9.5	976	11.45	975.19		
14.28	974	17.54	972.62	18.97	972	22.82	970.54	24.67	970		
25.7	969.68	31.45	968	37.99	966.59	41.53	966	54.25	965.08		
74.28	964	96.81	963.17	119.43	962	153.31	960.92	154.77	960.88		
155.61	960.87	182.46	960.38	184.8	960.4	186.96	960.41	200.27	960.12		
201.82	960.13	206.41	960.14	207.51	960.14	223.38	960	230.86	960		
232.26	959.95	233.99	959.9	234.64	959.45	236.77	958	238.6	956.66		
239.74	956	239.85	955.98	240.21	955.75	241.92	955.82	245.81	956		
245.84	956	245.94	956.03	248.24	957.43	249.65	958	249.94	958.16		
250.14	958.24	251.34	958.5	260.99	960	267.46	960	271.67	960.51		
273.63	960.45	274.08	960.47	274.47	960.49	277.38	961.9	277.43	961.91		
277.7	961.91	284.83	962.07	289.89	962.17	290.13	962.09	290.37	962		
291.58	961.57	292.06	961.52	292.07	961.52	294.15	961.07	294.63	960.93		
295.94	961.92	296.04	962	298.32	963.73	298.65	964	299.04	964.29		
301.29	966	303.89	967.96	303.94	968	304	968.05	306.54	970		
307.79	970.93	309.11	972	310.68	972.78	311.33	973.17	312.38	974		
316.38	975.8	316.59	975.9	316.78	976	316.87	976.05	320.66	978		
322.99	979.23	324.41	980	325.88	980.53	330.82	982	338.37	984		

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	233.99	.035	250.14	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	233.99	250.14		183.56	178.06	171.27	.1 .3



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CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 961.13 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 1.02  * Wt. n-Val.      * 0.035  * 0.035  * 0.060  *
* W.S. Elev (ft)     * 960.11 * Reach Len. (ft) * 183.56 * 178.06 * 171.27 *
* Crit W.S. (ft)     * 959.81 * Flow Area (sq ft) * 2.04  * 51.02  * 11.17  *
* E.G. Slope (ft/ft) * 0.009495 * Area (sq ft)    * 2.04  * 51.02  * 11.17  *
* Q Total (cfs)      * 443.80 * Flow (cfs)      * 1.67  * 422.80 * 19.33  *
* Top Width (ft)     * 57.59 * Top Width (ft)  * 23.20 * 16.15  * 18.24  *
* Vel Total (ft/s)   * 6.91  * Avg. Vel. (ft/s) * 0.82  * 8.29  * 1.73  *
* Max Chl Dpth (ft) * 4.36  * Hydr. Depth (ft) * 0.09  * 3.16  * 0.61  *
* Conv. Total (cfs)  * 4554.6 * Conv. (cfs)     * 17.2  * 4339.1 * 198.4  *
* Length Wtd. (ft)  * 178.92 * Wetted Per. (ft) * 23.20 * 17.99 * 18.39  *
* Min Ch El (ft)    * 955.75 * Shear (lb/sq ft) * 0.05  * 1.68  * 0.36  *
* Alpha             * 1.37  * Stream Power (lb/ft s) * 338.37 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 1.71  * Cum Volume (acre-ft) * 0.95  * 1.01  * 0.30  *
* C & E Loss (ft)   * 0.08  * Cum SA (acres)   * 0.91  * 0.35  * 0.27  *
*****

```

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14193.22

INPUT

Description:

```

Station Elevation Data num= 76
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 980 6.95 978 8.59 977.51 14.05 976 18.9 974.63
21.16 974 24.63 973.22 30.54 972 39.73 970.11 40.29 970
41.01 969.85 47.1 968 49.93 967.14 54.9 966 55.4 965.9
68.5 964 80.78 963.35 87.43 962.91 90.6 962.78 93.54 962.6
95.37 962.45 105.01 962 108 962 119.05 961.82 119.58 961.82
170.51 961.53 174.83 961.51 176.18 961.51 204.07 960.94 204.59 960.93
235.6 960 268.28 958.19 269.3 958.13 269.55 958.12 271.67 958
272.88 957.94 298.42 956.47 300.15 956.1 300.85 956 301.49 955.85
302.07 955.53 303 955.59 308.33 955.42 309.41 955.97 309.46 956
309.75 956.14 311.76 958 313.6 959.61 315.11 960 317.74 960.39
330.27 961.54 337.68 961.48 343.32 961.45 343.4 961.44 345.03 961.39
346.7 961.11 347.39 960.82 347.62 960.79 348.71 960.6 349.28 961.19
350.05 962 350.94 962.89 352.02 964 353.24 965.42 353.82 966
355.41 967.7 355.71 968 357.65 970.03 360.54 972 362.24 973.58
362.79 974 363.37 974.55 365.01 976 365.96 976.91 367.09 978
369.25 980

```

Manning's n Values num= 3

Sta n Val      Sta n Val      Sta n Val  
 \*\*\*\*\*  
 0    .035 298.42    .035 309.75    .06

Bank Sta: Left    Right      Lengths: Left Channel    Right      Coeff Contr.    Expan.  
                  298.42 309.75                   191.71 148.15    175.74                   .1                   .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)            * 959.34 * Element                   * Left OB * Channel * Right OB *
* Vel Head (ft)            * 0.74 * Wt. n-Val.               * 0.035 * 0.035 * 0.060 *
* W.S. Elev (ft)            * 958.59 * Reach Len. (ft)         * 191.71 * 148.15 * 175.74 *
* Crit W.S. (ft)            * 958.59 * Flow Area (sq ft)       * 39.37 * 32.44 * 3.26 *
* E.G. Slope (ft/ft)       * 0.009609 * Area (sq ft)            * 39.37 * 32.44 * 3.26 *
* Q Total (cfs)             * 443.80 * Flow (cfs)               * 169.29 * 267.15 * 7.36 *
* Top Width (ft)            * 51.44 * Top width (ft)           * 37.42 * 11.33 * 2.69 *
* Vel Total (ft/s)          * 5.91 * Avg. Vel. (ft/s)        * 4.30 * 8.24 * 2.26 *
* Max Chl Dpth (ft)        * 3.17 * Hydr. Depth (ft)        * 1.05 * 2.86 * 1.21 *
* Conv. Total (cfs)         * 4527.4 * Conv. (cfs)             * 1727.0 * 2725.3 * 75.1 *
* Length wtd. (ft)         * 158.60 * Wetted Per. (ft)        * 37.48 * 11.65 * 3.64 *
* Min Ch El (ft)            * 955.42 * Shear (lb/sq ft)        * 0.63 * 1.67 * 0.54 *
* Alpha                     * 1.37 * Stream Power (lb/ft s) * 369.25 * 0.00 * 0.00 *
* Frctn Loss (ft)          * 1.62 * Cum Volume (acre-ft)    * 0.86 * 0.84 * 0.28 *
* C & E Loss (ft)          * 0.00 * Cum SA (acres)          * 0.78 * 0.29 * 0.23 *
*****
  
```

warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek      RS: 14044.56

INPUT  
 Description:

Station		Elevation Data		num= 97		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	5.84	978	8.26	977.24	11.92	976	14.67	975.3
19.55	974	25.61	972.5	27.57	972	34.85	970.19	35.59	970
43.36	968.1	43.74	968	45.43	967.66	54.19	966	62.33	964.6

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65.89	964	71.11	963.56	92.69	962	122.77	960.63	130.31	960.3
130.9	960.28	136.43	960	137.62	960	147.5	959.47	159.91	959.06
171.62	958.93	174.03	958.85	197.43	958.5	212.52	958.22	213.19	958.23
224.22	958.11	225.14	958.12	229.45	958.08	229.56	958.08	244.33	958.07
244.66	958.07	250.32	958	269.78	958	276.14	957.68	293.44	956.87
312	956	318.39	955.44	330.15	954.38	332.69	954.03	332.84	954
333.07	954	333.23	953.99	339.66	953.61	339.76	953.73	340	954
340.68	954.68	343.85	956	344.35	956.22	344.81	956.41	368.09	957.67
374.1	957.92	376	958	376.19	958.02	383.73	958.76	383.75	958.76
387.93	958.52	393.62	958.51	394.07	958.61	395.58	958.68	397.3	958.49
397.64	958.44	400.26	959.23	402.02	960	402.93	960.42	406.48	962
410.22	963.66	410.64	963.84	410.74	963.9	413.39	965.8	413.65	966
416.59	967.89	416.75	968	417.29	968.33	420.04	970	421.23	970.76
422.83	972	424.7	973.19	425.76	974	427.37	975.46	428.12	976
430.35	977.71	430.74	978	431.33	978.43	433.67	980	436.35	982
437.61	982.88	438.89	984	440.84	985.6	441.6	986	443	986.63
446.41	988	451.45	990						

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 318.39 .035 344.81 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 318.39 344.81 187.81 191.69 193.78 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 957.50	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.74	* wt. n-Val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 956.75	* Reach Len. (ft)	* 187.81	* 191.69	* 193.78
* Crit W.S. (ft)	* 956.75	* Flow Area (sq ft)	* 12.67	* 56.29	* 1.09
* E.G. Slope (ft/ft)	* 0.010927	* Area (sq ft)	* 12.67	* 56.29	* 1.09
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 38.34	* 404.59	* 0.88
* Top Width (ft)	* 55.26	* Top Width (ft)	* 22.48	* 26.42	* 6.36
* Vel Total (ft/s)	* 6.33	* Avg. vel. (ft/s)	* 3.03	* 7.19	* 0.80
* Max Chl Dpth (ft)	* 3.14	* Hydr. Depth (ft)	* 0.56	* 2.13	* 0.17
* Conv. Total (cfs)	* 4245.5	* Conv. (cfs)	* 366.8	* 3870.4	* 8.4
* Length wtd. (ft)	* 190.81	* Wetted Per. (ft)	* 22.52	* 27.31	* 6.37
* Min ch El (ft)	* 953.61	* Shear (lb/sq ft)	* 0.38	* 1.41	* 0.12
* Alpha	* 1.19	* Stream Power (lb/ft s)	* 451.45	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.96	* Cum Volume (acre-ft)	* 0.75	* 0.69	* 0.27
* C & E Loss (ft)	* 0.15	* Cum SA (acres)	* 0.65	* 0.23	* 0.21

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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



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This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Bluestone Creek RS: 13852.52

INPUT

Description:

Station Elevation Data		num= 78		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	30.62	968.08	31.99	968	33.37	967.9	35.79	967.71		
56.67	966.41	63.01	966	65.69	965.81	69.49	965.56	85.32	964.53		
90.62	964	107.61	962.8	125.37	962	139.15	961.18	143.88	961.02		
154.43	960.54	158.65	960.33	166.86	960	181.94	959.4	214.59	958		
249.49	956	258.37	955.38	275.98	954	289.95	954	297.04	953.9		
315.85	953.64	316.74	953.64	330.1	953.18	331.71	952.73	333.97	952		
336.19	951.36	337.43	950.96	343.64	951.6	343.67	951.6	343.74	951.64		
344.71	952	347.16	953.41	347.19	953.43	348.66	953.56	354.9	954		
355.38	954	367.24	954.87	376.14	956	380.3	956.54	383.14	956.91		
387.74	957.5	393.66	957.71	400.51	957.83	401.16	957.8	401.63	957.77		
403.08	957.56	404.37	957.37	404.72	957.67	405.16	958	406.48	959.72		
406.73	960	407.14	960.5	408.98	962	409.36	962.25	409.8	962.65		
410.36	963.1	411.54	964	413.03	965.34	413.75	966	414.56	966.62		
416.14	968	417.99	969.49	418.54	970	419.4	970.67	420.92	972		
422.78	973.5	423.34	974	423.86	974.42	425.81	976	427.23	977.24		
428.22	978	429.17	978.79	430.49	979.87						

Manning's n Values		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	330.1	.035	347.16	.06		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	330.1	347.16		350.42	192.57	163.42	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 955.21	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.23	* wt. n-val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 954.98	* Reach Len. (ft)	* 350.42	* 192.57	* 163.42
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 72.02	* 53.18	* 16.69

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* E.G. Slope (ft/ft)	*0.002898	* Area (sq ft)	* 72.02	* 53.18	* 16.69
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 173.30	* 251.41	* 19.09
* Top Width (ft)	* 104.62	* Top width (ft)	* 66.62	* 17.06	* 20.94
* Vel Total (ft/s)	* 3.13	* Avg. vel. (ft/s)	* 2.41	* 4.73	* 1.14
* Max chl Dpth (ft)	* 4.02	* Hydr. Depth (ft)	* 1.08	* 3.12	* 0.80
* Conv. Total (cfs)	* 8244.0	* Conv. (cfs)	* 3219.3	* 4670.2	* 354.6
* Length wtd. (ft)	* 240.64	* Wetted Per. (ft)	* 66.67	* 17.87	* 21.01
* Min Ch El (ft)	* 950.96	* Shear (lb/sq ft)	* 0.20	* 0.54	* 0.14
* Alpha	* 1.53	* Stream Power (lb/ft s)	* 430.49	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.94	* Cum Volume (acre-ft)	* 0.56	* 0.45	* 0.23
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 0.45	* 0.13	* 0.15

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 13658.52

INPUT  
 Description:

Station	Elevation	Data	num=	122	Sta	Elev	Sta	Elev	Sta	Elev
0	970	32.38	970	53.21	968.61	63.3	968	86.24	968	
126.18	966.33	133.83	966	139.43	966	186.99	964.8	197.68	964.16	
197.97	964.16	198.28	964.16	200.43	964	242.42	962.32	250.62	962	
255.33	961.67	255.39	961.67	265.89	961.84	267.03	961.85	268.89	961.57	
271.07	961.74	271.83	961.7	275.86	961.72	276.42	961.73	282.17	961.59	
283.89	961.56	286.87	961.48	296.55	960.97	302.4	960.62	304.38	960.5	
310.56	960	311.28	959.94	323.29	958.84	324.6	958.71	328.42	958.3	
333.65	957.82	334.04	957.77	340.05	956.92	341.21	956.83	346.28	957.28	
346.95	957.35	355.1	957.27	357.8	957.21	359.47	957.1	372.56	956.87	
373.87	956.84	400.61	956	416.64	955.63	420.92	955.6	422.93	955.56	
427.11	955.47	439.41	954.99	465.06	954	466.62	954	484.41	952.39	
487.98	952.1	488.59	952.08	489.24	952	494.97	951.52	495.83	951.44	
496.2	951.24	499.84	950.55	499.9	950.54	500.15	950.54	505.58	950.26	
505.78	950.26	506.01	950.26	506.88	950.98	507.06	951.18	510.16	951.36	
515.51	952	519.8	952	528.38	953.57	530.24	953.78	532.39	954	
539.68	954	540.23	954.1	540.26	954.1	540.84	954.12	543.47	954.12	
550.74	954.09	550.79	954.09	550.83	954.09	551.74	954	552.02	954	
552.95	953.9	553.03	953.89	553.12	953.85	553.15	953.85	558.68	952.61	
558.71	952.63	559.8	953.41	560.63	954	562.4	955.22	565.57	957.41	
566.03	957.72	566.21	957.82	567.72	958.42	570.28	959.45	571.51	960	
573.31	960.72	576.65	962	577.09	962.18	578.11	962.6	579.21	963.15	
580.44	964	580.77	964.22	583.44	966	584.19	966.54	586.26	968	
588.37	969.43	589.24	970	592.02	971.8	592.3	972	593.37	972.72	
595.12	974	596.36	974.9	597.79	976	598.17	976.38	599.94	978	
601.46	979.52	601.93	979.88							

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

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\*\*\*\*\*

0 .035 495.83 .035 507.06 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 495.83 507.06 100.46 106.4 102.7 .1 .3

Blocked Obstructions num= 1

Sta L Sta R Elev

\*\*\*\*\*

550.74 601.93 954.09

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*

* E.G. Elev (ft)	* 954.25	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.44	* Wt. n-Val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 953.81	* Reach Len. (ft)	* 100.46	* 106.40	* 102.70
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 32.76	* 35.88	* 36.15
* E.G. Slope (ft/ft)	* 0.005519	* Area (sq ft)	* 32.76	* 35.88	* 36.15
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 116.81	* 238.85	* 88.14
* Top width (ft)	* 61.88	* Top width (ft)	* 27.14	* 11.23	* 23.50
* Vel Total (ft/s)	* 4.23	* Avg. Vel. (ft/s)	* 3.57	* 6.66	* 2.44
* Max Chl Dpth (ft)	* 3.55	* Hydr. Depth (ft)	* 1.21	* 3.20	* 1.54
* Conv. Total (cfs)	* 5974.0	* Conv. (cfs)	* 1572.4	* 3215.1	* 1186.5
* Length wtd. (ft)	* 104.11	* Wetted Per. (ft)	* 27.25	* 11.70	* 23.70
* Min Ch El (ft)	* 950.26	* Shear (lb/sq ft)	* 0.41	* 1.06	* 0.53
* Alpha	* 1.58	* Stream Power (lb/ft s)	* 601.93	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.69	* Cum Volume (acre-ft)	* 0.14	* 0.25	* 0.13
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 0.08	* 0.07	* 0.07

\*\*\*\*\*

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 13552.07

INPUT

Description:

Station Elevation Data		num=	85							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	970	33.05	968	34.34	968	37.71	967.8	68.32	966	
105.54	966	106.18	965.99	106.35	965.99	108.85	965.91	111.32	965.81	
111.77	965.8	120.26	965.45	140.15	964.51	155.5	964	155.66	964	
168.78	963.41	184.62	962.59	185.01	962.57	194.87	962	210.96	960.67	
215.23	960.31	221.31	960	225.2	959.81	225.67	959.78	226.21	959.72	
226.4	959.69	237.78	958	243.61	957.69	269.35	956	305.01	955.02	
312.14	954.83	346.83	954	350.47	954	356.67	953.6	357.9	953.53	
358.02	953.52	360.06	953.41	377.25	952	387.59	952	387.98	951.98	
395.71	951.47	402.64	950.99	402.91	950.74	403.35	950	403.73	949.15	
403.98	948.65	405.39	948.59	408.97	948.34	410.04	949.91	410.13	950	
410.21	950.12	410.93	950.97	411.91	951.09	412.12	951.11	422.13	952	
428.02	952	433.41	952.62	439.14	953.14	447.36	953.11	452.66	952.98	



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453.22	952.98	453.97	953.14	456.53	952.05	456.65	952.03	456.67	952.03
457.31	952.33	457.48	952.4	457.88	952.58	458.49	952.82	461.8	954.39
464.21	955.14	467.22	956	472.93	957.64	474.11	958	475.37	958.38
480.55	960	483.2	961.17	486.12	962	487.87	963.22	488.86	964
490.86	965.33	491.66	966	494.15	967.89	494.29	968	497.08	970

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 402.64 .035 410.93 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 402.64 410.93 9.06 105.32 16.94 .1 .3  
 Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 447.36 497.08 953.11

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 953.54 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.63 \* Wt. n-val. \* 0.035 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 952.92 \* Reach Len. (ft) \* 9.06 \* 105.32 \* 16.94 \*  
 \* Crit W.S. (ft) \* 952.91 \* Flow Area (sq ft) \* 35.82 \* 32.19 \* 24.98 \*  
 \* E.G. slope (ft/ft) \* 0.008207 \* Area (sq ft) \* 35.82 \* 32.19 \* 24.98 \*  
 \* Q Total (cfs) \* 443.80 \* Flow (cfs) \* 135.72 \* 253.26 \* 54.81 \*  
 \* Top Width (ft) \* 70.58 \* Top width (ft) \* 36.55 \* 8.29 \* 25.74 \*  
 \* Vel Total (ft/s) \* 4.77 \* Avg. vel. (ft/s) \* 3.79 \* 7.87 \* 2.19 \*  
 \* Max chl Dpth (ft) \* 4.58 \* Hydr. Depth (ft) \* 0.98 \* 3.88 \* 0.97 \*  
 \* Conv. Total (cfs) \* 4898.9 \* Conv. (cfs) \* 1498.2 \* 2795.7 \* 605.1 \*  
 \* Length Wtd. (ft) \* 83.90 \* Wetted Per. (ft) \* 36.62 \* 11.00 \* 25.83 \*  
 \* Min Ch El (ft) \* 948.34 \* Shear (lb/sq ft) \* 0.50 \* 1.50 \* 0.50 \*  
 \* Alpha \* 1.77 \* Stream Power (lb/ft s) \* 497.08 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.81 \* Cum Volume (acre-ft) \* 0.06 \* 0.17 \* 0.06 \*  
 \* C & E Loss (ft) \* 0.02 \* Cum SA (acres) \* 0.00 \* 0.04 \* 0.01 \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 13440.10

INPUT

Description:

Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	12.72	969	27.53	968	31.27	968	41.62	967.09
57.8	966	58.08	965.97	58.2	965.96	64.34	965.51	89.31	964
94.23	963.89	97.31	963.68	98.31	963.61	99.29	963.57	126.21	962.65
138.26	962.25	141.48	962	156.55	961.63	157.25	961.61	162.24	961.41

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167.54	961.16	176.19	960.75	189.25	960.32	191.55	960.11	193.82	960.02
194.26	960	197.83	960	202.93	959.63	203.69	959.56	213.9	958.84
219.07	958.45	222.38	958.2	225.22	958	239.97	957.01	245.08	956.43
246.38	956.33	249.31	956.27	256.88	956.34	256.99	956.34	260.01	956.41
277.5	956	313.74	956	315.58	955.82	316.21	955.66	318.54	955.52
322.33	955.3	335.01	954.46	341.35	954	341.7	954	352.99	952.92
362.6	952	365.88	951.68	367.23	951.54	367.27	951.52	367.56	951.39
370	950	370.98	949.52	373.28	948.12	373.68	948.17	384.92	949.85
394.14	951.3	395.33	951.47	395.55	951.45	395.69	951.45	395.81	951.49
395.89	951.49	418.27	951.6	418.51	951.61	418.68	951.62	419.21	951.65
419.43	951.65	426.52	951.9	427.51	951.93	430.82	952	431.14	952.01
434.64	952.07	435.16	952	442.6	952	452.39	951.48	453.06	951.52
458.1	952	460.87	952	469.07	952.27	480.97	952.92	487.75	953.1
495.47	953.02	496.65	952.77	497.57	952.72	498.03	952.57	499.47	952.4
501.13	952.65	501.63	952.85	504.56	954	504.71	954.06	510.23	956
514.64	957.65	515.54	958	516.44	958.51	519.28	960	519.68	960.21
523.5	961.68	524.31	962	526.94	963	529.51	964	532.11	965.02
533.04	965.53	533.69	966	533.98	966.19	536.66	968	537.62	968.6
539.9	970								

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 367.23 .035 395.33 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 367.23 395.33 438.21 42.49 4.26 .1 .3  
 Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 434.64 539.9 952.07

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 952.71	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.80	* Wt. n-Val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 951.91	* Reach Len. (ft)	* 42.49	* 42.49	* 42.49
* Crit w.s. (ft)	* 951.91	* Flow Area (sq ft)	* 0.66	* 59.22	* 9.55
* E.G. Slope (ft/ft)	* 0.011495	* Area (sq ft)	* 0.66	* 59.22	* 9.55
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 0.95	* 431.37	* 11.47
* Top width (ft)	* 63.11	* Top width (ft)	* 3.66	* 28.10	* 31.36
* Vel Total (ft/s)	* 6.39	* Avg. Vel. (ft/s)	* 1.45	* 7.28	* 1.20
* Max Chl Dpth (ft)	* 3.79	* Hydr. Depth (ft)	* 0.18	* 2.11	* 0.30
* Conv. Total (cfs)	* 4139.3	* Conv. (cfs)	* 8.9	* 4023.4	* 107.0
* Length Wtd. (ft)	* 42.49	* Wetted Per. (ft)	* 3.68	* 29.26	* 31.37
* Min Ch El (ft)	* 948.12	* Shear (lb/sq ft)	* 0.13	* 1.45	* 0.22
* Alpha	* 1.26	* Stream Power (lb/ft s)	* 539.90	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.08	* Cum Volume (acre-ft)	* 0.06	* 0.06	* 0.05
* C & E Loss (ft)	* 0.22	* Cum SA (acres)	*	*	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth for the water surface and continued on with the calculations.  
 warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.  
 warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.  
 warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 13395.79

INPUT

Description:

Station Elevation Data num= 105

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	8.02	968	12.03	967.03	16.07	966	22.99	964.25
24.37	964	24.51	963.98	25.63	963.82	26.34	963.68	32.43	962.69
34.76	962.32	36.19	962	37.17	961.77	45	960	45.9	960
57.03	959.16	60.05	959.04	61.11	958.97	63.65	958.8	73.53	958
79.81	957.59	98.1	956.47	102.56	956.18	106.08	956	121.96	955.6
123.84	955.56	124.24	955.55	160.05	955.14	163.74	955.16	172.99	955.11
177.9	955.03	183.68	954.89	195.14	954.51	204.38	954.32	210.33	954
225.54	953.63	226.53	953.62	226.86	953.61	238.03	953.41	242.13	953.32
255.99	952	271.7	950.03	273.65	950	281.35	948.9	285.87	948.48
287.28	948.28	287.99	948.23	290.08	948	302.67	948	309.27	948.17
311.54	949.15	314.45	948	318.27	946.43	318.87	946	319.35	946
320.28	946.6	321.07	946.98	323.85	948	325.36	948.5	337.93	949.29
344.78	949.54	345.63	949.6	348.3	949.71	350	949.79	355.54	950
355.55	950	364.5	950.07	364.85	950.09	365.02	950.09	366.77	950.14
369.14	950.2	375.69	950.61	388.03	951.44	389.4	951.53	390.28	951.62
399.78	951.97	400.29	952	402.19	952.07	403.28	952.14	413.63	952.76
416.84	952.8	429.26	952.97	431.97	952.81	433.46	952.41	433.87	952.6
435.21	953.07	435.52	953.18	437.85	954	442.16	955.55	443.43	956
444.09	956.25	449.17	958	451.68	959.25	453.41	960	454.79	960.67
457.89	962	460.28	963.08	462.26	964	464.36	965.01	466.46	965.98
466.53	966	471.34	967.39	472.43	968	472.74	968.16	476.33	970

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	311.54	.035	325.36	.06

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



CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 951.46 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.07  * Wt. n-Val.      * 0.035  * 0.035  * 0.060  *
* W.S. Elev (ft)     * 951.39 * Reach Len. (ft) * 51.65  * 41.35  * 22.86  *
* Crit W.S. (ft)     * 949.60 * Flow Area (sq ft) * 121.09 * 53.75  * 90.92  *
* E.G. Slope (ft/ft) * 0.000771 * Area (sq ft)    * 121.09 * 53.75  * 90.92  *
* Q Total (cfs)      * 482.70 * Flow (cfs)      * 253.72 * 148.27 * 80.70  *
* Top Width (ft)     * 126.38 * Top Width (ft)  * 50.67  * 13.82  * 61.89  *
* Vel Total (ft/s)   * 1.82  * Avg. vel. (ft/s) * 2.10  * 2.76  * 0.89  *
* Max Chl Dpth (ft) * 5.39  * Hydr. Depth (ft) * 2.39  * 3.89  * 1.47  *
* Conv. Total (cfs)  * 17386.9 * Conv. (cfs)     * 9139.0 * 5340.9 * 2907.0 *
* Length wtd. (ft)   * 41.35  * Wetted Per. (ft) * 51.08  * 15.01  * 61.97  *
* Min Ch El (ft)    * 946.00 * Shear (lb/sq ft) * 0.11  * 0.17  * 0.07  *
* Alpha             * 1.45  * Stream Power (lb/ft s) * 476.33 * 0.00  * 0.00  *
* Frctn Loss (ft)   *        * Cum Volume (acre-ft) * 5.81  * 4.24  * 1.13  *
* C & E Loss (ft)   *        * Cum SA (acres)   * 6.24  * 1.21  * 1.02  *
*****

```

CULVERT

RIVER: Bluestone Creek  
 REACH: Upper RS: 13372.57

INPUT

Description:  
 Distance from Upstream XS = 16.8  
 Deck/Roadway width = 10  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates

num= 2

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
273.65	950	0	355.54	950	0				

Upstream Bridge Cross Section Data

Station Elevation Data		num= 105		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	8.02	968	12.03	967.03	16.07	966	22.99	964.25		
24.37	964	24.51	963.98	25.63	963.82	26.34	963.68	32.43	962.69		
34.76	962.32	36.19	962	37.17	961.77	45	960	45.9	960		
57.03	959.16	60.05	959.04	61.11	958.97	63.65	958.8	73.53	958		
79.81	957.59	98.1	956.47	102.56	956.18	106.08	956	121.96	955.6		
123.84	955.56	124.24	955.55	160.05	955.14	163.74	955.16	172.99	955.11		
177.9	955.03	183.68	954.89	195.14	954.51	204.38	954.32	210.33	954		
225.54	953.63	226.53	953.62	226.86	953.61	238.03	953.41	242.13	953.32		
255.99	952	271.7	950.03	273.65	950	281.35	948.9	285.87	948.48		
287.28	948.28	287.99	948.23	290.08	948	302.67	948	309.27	948.17		

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311.54	949.15	314.45	948	318.27	946.43	318.87	946	319.35	946
320.28	946.6	321.07	946.98	323.85	948	325.36	948.5	337.93	949.29
344.78	949.54	345.63	949.6	348.3	949.71	350	949.79	355.54	950
355.55	950	364.5	950.07	364.85	950.09	365.02	950.09	366.77	950.14
369.14	950.2	375.69	950.61	388.03	951.44	389.4	951.53	390.28	951.62
399.78	951.97	400.29	952	402.19	952.07	403.28	952.14	413.63	952.76
416.84	952.8	429.26	952.97	431.97	952.81	433.46	952.41	433.87	952.6
435.21	953.07	435.52	953.18	437.85	954	442.16	955.55	443.43	956
444.09	956.25	449.17	958	451.68	959.25	453.41	960	454.79	960.67
457.89	962	460.28	963.08	462.26	964	464.36	965.01	466.46	965.98
466.53	966	471.34	967.39	472.43	968	472.74	968.16	476.33	970

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	311.54	.035	325.36	.06

Bank Sta: Left Right Coeff Contr. Expan.

311.54	325.36	.1	.3
--------	--------	----	----

Downstream Deck/Roadway Coordinates num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
328.66	950	0	377.29	950	0

Downstream Bridge Cross Section Data Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970.01	.04	970	1.37	969.68	5.16	968.98	8.99	968
14.69	966.02	14.78	966	14.92	965.96	22.04	964	25.24	963.02
28.91	962	31.95	961.02	35	960	40.28	958.44	41.89	958
45.61	957.22	46.79	957.03	51.39	956.57	53.86	956.22	56.22	956
59.49	955.9	68.64	955.59	79.79	955.27	84.48	955.19	85.68	955.18
94.85	955.08	102.33	955.01	104.73	954.97	124.84	954.54	126.71	954.49
137.31	954.22	139.85	954.14	146.91	954	157.25	954	176.26	953.89
178.14	953.87	182.29	953.83	182.77	953.83	192	953.73	192.53	953.72
201.07	953.61	205.03	953.54	205.36	953.55	220.77	953.41	253.43	952.68
254.46	952.66	268.72	952.43	272.47	952.33	273.93	952.3	285.28	952.21
291.89	952	292.29	951.99	300.35	951.51	306.06	951.17	318.85	950.66
329.66	950	334.91	948.71	337.4	948.12	337.95	948	339.79	947.16
347.87	946.04	348.03	946.03	348.15	946	348.19	946	348.21	946
348.8	946	353.72	946.36	354.27	946.36	361.17	947.17	362.29	947.54
363.77	948	364.69	948.28	366.58	948.61	366.71	948.63	372.88	949.1
377.29	950	380.77	950.05	387.24	950.89	391.46	951.2	394.17	952
394.21	952	399.94	952.5	409.12	953.3	413.64	953.33	423.73	953.41
425.63	953.44	426.08	953.41	428.9	953.22	431.69	952.91	431.98	952.83
432.28	952.96	433.49	953.37	434.08	953.58	435.44	954	441.69	955.9
442.09	956	442.93	956.29	446.05	957.33	447.7	958	449.24	958.85
450.57	959.41	451.74	960	453.83	961.03	455.55	962	456.49	962.51
459.11	964	461.84	965.57	462.63	966	463.42	966.47	466.17	968

469.3 970

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 337.4 .035 366.71 .06

Bank Sta: Left Right Coeff Contr. Expan.  
 337.4 366.71 .1 .3

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 1.25  
 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
	13	20	.024	.024	0	.9	1

Number of Barrels = 4  
 Upstream Elevation = 947.92  
 Centerline Stations

Sta.	Sta.	Sta.	Sta.
315.3	316.7	318.1	319.6

Downstream Elevation = 947.4  
 Centerline Stations

Sta.	Sta.	Sta.	Sta.
341.6	343.3	344.7	346.2

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

```
*****
* Q Culv Group (cfs) * 17.36 * Culv Full Len (ft) * 20.00 *
* # Barrels * 4 * Culv Vel US (ft/s) * 3.54 *
* Q Barrel (cfs) * 4.34 * Culv Vel DS (ft/s) * 3.54 *
* E.G. US. (ft) * 951.46 * Culv Inv El Up (ft) * 947.92 *
* W.S. US. (ft) * 951.39 * Culv Inv El Dn (ft) * 947.40 *
* E.G. DS (ft) * 950.98 * Culv Frctn Ls (ft) * 0.31 *
* W.S. DS (ft) * 950.77 * Culv Exit Loss (ft) * 0.00 *
* Delta EG (ft) * 0.48 * Culv Entr Loss (ft) * 0.17 *
* Delta WS (ft) * 0.62 * Q Weir (cfs) * 465.34 *
* E.G. IC (ft) * 951.39 * Weir Sta Lft (ft) * 260.63 *
* E.G. OC (ft) * 951.46 * Weir Sta Rgt (ft) * 387.70 *
* Culvert Control * Outlet * Weir Submerg * 0.51 *
* Culv WS Inlet (ft) * 949.17 * Weir Max Depth (ft) * 1.42 *
```



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\* Culv WS Outlet (ft) \* 948.65 \* Weir Avg Depth (ft) \* 1.23 \*  
 \* Culv Nml Depth (ft) \* \* Weir Flow Area (sq ft) \* 156.36 \*  
 \* Culv crt Depth (ft) \* 0.84 \* Min El Weir Flow (ft) \* 950.01 \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 13353.46

INPUT  
 Description:

Station Elevation Data num= 111

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970.01	.04	970	1.37	969.68	5.16	968.98	8.99	968
14.69	966.02	14.78	966	14.92	965.96	22.04	964	25.24	963.02
28.91	962	31.95	961.02	35	960	40.28	958.44	41.89	958
45.61	957.22	46.79	957.03	51.39	956.57	53.86	956.22	56.22	956
59.49	955.9	68.64	955.59	79.79	955.27	84.48	955.19	85.68	955.18
94.85	955.08	102.33	955.01	104.73	954.97	124.84	954.54	126.71	954.49
137.31	954.22	139.85	954.14	146.91	954	157.25	954	176.26	953.89
178.14	953.87	182.29	953.83	182.77	953.83	192	953.73	192.53	953.72
201.07	953.61	205.03	953.54	205.36	953.55	220.77	953.41	253.43	952.68
254.46	952.66	268.72	952.43	272.47	952.33	273.93	952.3	285.28	952.21
291.89	952	292.29	951.99	300.35	951.51	306.06	951.17	318.85	950.66
329.66	950	334.91	948.71	337.4	948.12	337.95	948	339.79	947.16
347.87	946.04	348.03	946.03	348.15	946	348.19	946	348.21	946
348.8	946	353.72	946.36	354.27	946.36	361.17	947.17	362.29	947.54
363.77	948	364.69	948.28	366.58	948.61	366.71	948.63	372.88	949.1
377.29	950	380.77	950.05	387.24	950.89	391.46	951.2	394.17	952
394.21	952	399.94	952.5	409.12	953.3	413.64	953.33	423.73	953.41
425.63	953.44	426.08	953.41	428.9	953.22	431.69	952.91	431.98	952.83
432.28	952.96	433.49	953.37	434.08	953.58	435.44	954	441.69	955.9
442.09	956	442.93	956.29	446.05	957.33	447.7	958	449.24	958.85
450.57	959.41	451.74	960	453.83	961.03	455.55	962	456.49	962.51
459.11	964	461.84	965.57	462.63	966	463.42	966.47	466.17	968
469.3	970								

Manning's n values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	337.4	.035	366.71	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 337.4 366.71 13.98 104.53 171.51 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 950.98 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.21 \* wt. n-Val. \* 0.035 \* 0.035 \* 0.060 \*  
 \*\*\*\*\*

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* W.S. Elev (ft)	* 950.77	* Reach Len. (ft)	* 13.98	* 104.53	* 171.51	*
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 18.26	* 113.56	* 21.78	*
* E.G. Slope (ft/ft)	*0.001375	* Area (sq ft)	* 18.26	* 113.56	* 21.78	*
* Q Total (cfs)	* 482.70	* Flow (cfs)	* 25.68	* 435.70	* 21.32	*
* Top Width (ft)	* 70.31	* Top width (ft)	* 21.38	* 29.31	* 19.63	*
* Vel Total (ft/s)	* 3.14	* Avg. Vel. (ft/s)	* 1.41	* 3.84	* 0.98	*
* Max Chl Dpth (ft)	* 4.77	* Hydr. Depth (ft)	* 0.85	* 3.87	* 1.11	*
* Conv. Total (cfs)	* 13017.1	* Conv. (cfs)	* 692.4	* 11749.7	* 574.9	*
* Length Wtd. (ft)	* 88.45	* Wetted Per. (ft)	* 21.62	* 29.85	* 19.78	*
* Min Ch El (ft)	* 946.00	* Shear (lb/sq ft)	* 0.07	* 0.33	* 0.09	*
* Alpha	* 1.36	* Stream Power (lb/ft s)	* 469.30	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 0.26	* Cum Volume (acre-ft)	* 5.81	* 4.04	* 1.13	*
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	* 6.20	* 1.19	* 1.00	*

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 13212.39

INPUT

Description:

Station Elevation Data

num= 92

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	969.99	.1	969.96	5.1	968.88	8.08	968.21	8.72	968.05
8.84	968.03	8.96	968	9.1	967.95	14.71	966	15.25	965.81
20.38	964	24.97	962.39	26.31	962	27.27	961.68	32.88	960
37.16	958.79	38.68	958.34	39.81	958	46.67	956.06	46.86	956
47.3	955.94	47.37	955.93	57.5	954.61	58.94	954.53	75.6	954
94.43	953.6	101.41	953.54	111.97	953.53	113.68	953.51	116.37	953.47
123.82	953.34	129.95	953.23	136.65	953.12	144.3	952.98	160.82	952.67
170.11	952.49	172.74	952.43	180.28	952.34	196.95	952	241.21	952
280.43	950.03	280.95	950	283.69	949.81	303.56	948.41	312.35	948.03
314.77	948	315.29	947.98	316.76	947.88	319.39	946.28	320.4	946
320.51	945.68	321.07	945.36	321.26	945.37	321.48	945.46	322.75	946
323.8	946.51	327.34	948.14	334.12	949.35	336.06	950	341.29	951.06
345.85	952	346.16	952.05	347.38	952.19	356.63	952.23	360.36	952.18
360.95	952.17	361.46	952.09	361.96	952	364.46	951.63	364.85	951.58
365.08	951.64	366.19	952.06	369.36	953.6	370.09	954	373.19	955.55
374.25	956	375.34	956.52	377.47	957.48	377.59	957.85	377.64	958
378	958.89	378.53	960	379.17	961.23	379.56	962	379.91	962.73
380.48	964	381.52	965.92	381.55	966	381.7	966.3	382.5	968
383.02	969.08	383.37	970						

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 316.76 .035 327.34 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 316.76 327.34 85.56 185.64 187.85 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 950.67 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.77 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 949.90 \* Reach Len. (ft) \* 85.56 \* 185.64 \* 187.85 \*  
 \* Crit W.S. (ft) \* 949.90 \* Flow Area (sq ft) \* 38.80 \* 34.15 \* 8.24 \*  
 \* E.G. Slope (ft/ft) \* 0.009709 \* Area (sq ft) \* 38.80 \* 34.15 \* 8.24 \*  
 \* Q Total (cfs) \* 482.70 \* Flow (cfs) \* 176.03 \* 287.13 \* 19.54 \*  
 \* Top Width (ft) \* 53.28 \* Top width (ft) \* 34.30 \* 10.58 \* 8.41 \*  
 \* Vel Total (ft/s) \* 5.95 \* Avg. vel. (ft/s) \* 4.54 \* 8.41 \* 2.37 \*  
 \* Max Chl Dpth (ft) \* 4.54 \* Hydr. Depth (ft) \* 1.13 \* 3.23 \* 0.98 \*  
 \* Conv. Total (cfs) \* 4898.9 \* Conv. (cfs) \* 1786.5 \* 2914.1 \* 198.3 \*  
 \* Length Wtd. (ft) \* 154.62 \* Wetted Per. (ft) \* 34.36 \* 11.98 \* 8.60 \*  
 \* Min Ch El (ft) \* 945.36 \* Shear (lb/sq ft) \* 0.68 \* 1.73 \* 0.58 \*  
 \* Alpha \* 1.41 \* Stream Power (lb/ft s) \* 383.37 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.31 \* Cum Volume (acre-ft) \* 5.80 \* 3.86 \* 1.07 \*  
 \* C & E Loss (ft) \* 0.01 \* Cum SA (acres) \* 6.19 \* 1.14 \* 0.94 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 13020.26

INPUT

Description:

Station Elevation Data num= 84  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 969.99 2.25 969.68 11.85 968 17.01 966.18 17.64 966  
 21.39 964.74 23.65 964 25.96 963.2 28.84 962.24 29.55 962



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29.85	961.9	31.22	961.55	35.73	960	40.95	958.53	42.79	958
47.12	956.76	49.62	956	57.26	954.42	59.04	954	61.33	953.66
72.92	952	77.95	951.73	80.7	951.74	118.23	950.75	128.84	950.73
175.41	950.42	181.69	950.31	194.29	950.11	194.69	950.11	199.63	950
235.99	949.12	266.38	948.22	273.81	948	278.89	948	282.38	947.79
303.43	946.48	303.55	946.29	303.74	946	304.72	944.21	304.73	944.19
304.82	944.13	305.06	944	305.28	943.98	305.51	944	305.92	944
306.23	944.03	312.17	944.36	313.17	945.95	313.21	946	313.5	946.36
313.51	946.36	322.39	947.86	323.39	948	323.65	948.04	328.16	948.63
334.13	948.71	341.87	948.81	343.59	948.35	343.68	948.33	344.46	948.21
345.68	948.82	348.01	950	350.98	951.59	351.83	952	352.43	952.31
355.66	954	355.83	954.09	356.03	954.19	359.37	955.68	360.08	956
360.86	956.35	364.56	958	365.27	958.33	369.27	960	371.63	961.06
373.58	962	375.53	963.15	376.9	964	379.35	965.47	380.16	966
381.15	966.66	383.22	968	384.34	968.77	386.06	970		

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 303.43 .035 313.5 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 303.43 313.5 146.04 191.17 139.06 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 949.25	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.73	* wt. n-Val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 948.52	* Reach Len. (ft)	* 146.04	* 191.17	* 139.06
* Crit W.S. (ft)	* 948.52	* Flow Area (sq ft)	* 38.77	* 40.73	* 14.58
* E.G. Slope (ft/ft)	* 0.007458	* Area (sq ft)	* 38.77	* 40.73	* 14.58
* Q Total (cfs)	* 482.70	* Flow (cfs)	* 124.32	* 327.48	* 30.89
* Top Width (ft)	* 73.42	* Top Width (ft)	* 47.34	* 10.07	* 16.01
* Vel Total (ft/s)	* 5.13	* Avg. Vel. (ft/s)	* 3.21	* 8.04	* 2.12
* Max Chl Dpth (ft)	* 4.54	* Hydr. Depth (ft)	* 0.82	* 4.04	* 0.91
* Conv. Total (cfs)	* 5589.4	* Conv. (cfs)	* 1439.6	* 3792.1	* 357.7
* Length wtd. (ft)	* 174.70	* Wetted Per. (ft)	* 47.40	* 12.54	* 16.29
* Min Ch El (ft)	* 943.98	* Shear (lb/sq ft)	* 0.38	* 1.51	* 0.42
* Alpha	* 1.78	* Stream Power (lb/ft s)	* 386.06	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.38	* Cum Volume (acre-ft)	* 5.73	* 3.70	* 1.02
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 6.11	* 1.10	* 0.89

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: Divided flow computed for this cross-section.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12827.43

INPUT  
 Description:

Station	Elevation	Data	num=	85	Sta	Elev	Sta	Elev	Sta	Elev
0	969.98	2.4	969.16	5.72	968	8.19	967.19	11.53	966	
14.97	964.94	17.3	964.35	18.51	964	19.92	963.6	25.38	962	
25.99	961.83	29.89	960.66	32.11	960	38.07	958.26	38.89	958	
41.38	957.25	45.86	956	46.73	955.76	55.35	954	59.63	953.14	
64.22	952	82.05	950.16	83.23	950	88.18	950	120.87	949.28	
147.29	948.79	154.78	948.71	155.49	948.7	185.36	948	204.67	948	
276.65	946.87	284.42	946.81	287.1	946.79	288.13	946.78	303.19	946.6	
327.4	946	349.02	946	377.43	946	379.4	945.96	391.62	945.49	
393.01	944.89	394.97	944	396.67	943.22	397.46	942.44	400.14	942.61	
402.51	944	404.29	944.95	406.8	946	407.26	946.2	408.78	946.8	
410.25	946.94	413.26	947.17	419.51	947.28	424.42	947.42	431.41	947.02	
448.74	946.92	453.65	946.89	461.8	947.05	462.09	947.27	462.92	948	
463.54	948.56	465.25	950	467.39	951.81	467.63	952	467.95	952.29	
469.89	954	470.59	954.56	472.28	956	473.03	956.68	474.18	957.63	
474.55	958	474.6	958.05	476.61	959.84	476.68	959.86	476.99	960	
478.4	960.53	482.15	962	485.2	963.18	487.34	964	491.01	965.39	
492.59	966	498.27	967.91	498.53	967.99	498.57	968	498.6	968	

Manning's n	Values	num=	3
Sta	n Val	Sta	n Val
0	.035	391.62	.035
		408.78	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	391.62	408.78		60.19	131.9	273.42	.1
							.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 947.26	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.48	* wt. n-val.	* 0.035	* 0.035	*
* W.S. Elev (ft)	* 946.78	* Reach Len. (ft)	* 60.19	* 131.90	* 273.42
* Crit W.S. (ft)	* 946.78	* Flow Area (sq ft)	* 66.34	* 43.03	*
* E.G. slope (ft/ft)	* 0.008429	* Area (sq ft)	* 66.34	* 43.03	*
* Q Total (cfs)	* 482.70	* Flow (cfs)	* 192.37	* 290.33	*
* Top width (ft)	* 120.49	* Top width (ft)	* 103.39	* 17.11	*
* Vel Total (ft/s)	* 4.41	* Avg. Vel. (ft/s)	* 2.90	* 6.75	*
* Max chl Dpth (ft)	* 4.34	* Hydr. Depth (ft)	* 0.64	* 2.52	*

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```

* Conv. Total (cfs)      * 5257.5 * Conv. (cfs)          * 2095.3 * 3162.3 *
* Length Wtd. (ft)     * 110.75 * Wetted Per. (ft)    * 103.41 * 18.90 *
* Min Ch El (ft)       * 942.44 * Shear (lb/sq ft)    * 0.34 * 1.20 *
* Alpha                 * 1.58 * Stream Power (lb/ft s) * 498.60 * 0.00 * 0.00 *
* Frctn Loss (ft)      * 0.53 * Cum Volume (acre-ft) * 5.55 * 3.52 * 1.00 *
* C & E Loss (ft)      * 0.08 * Cum SA (acres)      * 5.85 * 1.04 * 0.86 *
*****

```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 12694.78

INPUT

Description:

Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	2.3	959.3	6.68	958	12.54	956.37	13.83	956
16.44	955.29	21.93	954	24.78	953.31	30.33	952	35.84	950.7
38.81	950	41.68	950	61.51	949.54	62.14	949.53	96.34	948.78
114.1	948	138.17	948	149.94	947.7	153.63	947.61	180.35	946.92
217.84	946	264.5	945.01	330.4	945.08	395.71	945.16	401.39	941.14
409.12	940.76	411.21	942	412.87	942.82	423.24	944	433.28	945.5
433.54	945.56	434.81	946	435.4	946.21	440.37	948	453.19	949.49
458.58	950	460.4	950	462.47	950.12	465.87	950.33	466.73	950.38
469	950.53	476.38	951.08	492.5	952	495.48	952	509.44	952.95
520.9	953.05	527.14	953.46	536.37	954	546.48	954.5	552.15	954.82
564.55	956	572.77	957.3	576.73	958	592.6	959.07	597.18	959.26
598.71	959.29	617.28	959.85	618.35	959.88	620.1	959.9	622.31	959.99

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	395.71	.035	433.28	.035



Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 395.71 433.28 138.33 186.83 225.35 .1 .3  
 Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 460 485 955

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 945.77 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.23 * Wt. n-Val. * 0.035 * 0.035 * 0.035 *
* W.S. Elev (ft) * 945.55 * Reach Len. (ft) * 138.33 * 186.83 * 225.35 *
* Crit W.S. (ft) * 944.58 * Flow Area (sq ft) * 68.16 * 93.32 * 0.01 *
* E.G. slope (ft/ft) * 0.003091 * Area (sq ft) * 68.16 * 93.32 * 0.01 *
* Q Total (cfs) * 482.70 * Flow (cfs) * 92.39 * 390.31 * 0.00 *
* Top width (ft) * 194.42 * Top width (ft) * 156.64 * 37.57 * 0.21 *
* Vel Total (ft/s) * 2.99 * Avg. Vel. (ft/s) * 1.36 * 4.18 * 0.20 *
* Max Chl Dpth (ft) * 4.79 * Hydr. Depth (ft) * 0.44 * 2.48 * 0.02 *
* Conv. Total (cfs) * 8682.2 * Conv. (cfs) * 1661.8 * 7020.4 * 0.0 *
* Length wtd. (ft) * 182.23 * Wetted Per. (ft) * 156.65 * 39.57 * 0.22 *
* Min Ch El (ft) * 940.76 * Shear (lb/sq ft) * 0.08 * 0.46 * 0.00 *
* Alpha * 1.62 * Stream Power (lb/ft s) * 622.31 * 0.00 * 0.00 *
* Frctn Loss (ft) * 1.07 * Cum Volume (acre-ft) * 5.46 * 3.31 * 1.00 *
* C & E Loss (ft) * 0.12 * Cum SA (acres) * 5.68 * 0.96 * 0.86 *
*****
    
```

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

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

This may indicate the need for additional cross sections.

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12504.92

INPUT

Description:

Station Elevation Data		num= 96									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	.06	969.97	4.25	968.1	4.48	968	4.72	967.9		
9.44	966.02	9.49	966	9.52	965.99	14.04	964	18.8	962.06		
23.59	960	27.88	958.14	28.19	958	28.47	957.9	30.06	957.28		
33.67	956	34.59	955.73	35.88	955.26	39.22	954	41.84	952.94		
44.16	952	44.42	951.88	52.39	950	62.32	948.69	73.46	948		
77.84	948	95.85	947.72	106.16	947.58	111.17	947.51	114.13	947.47		

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118.21	947.43	224.93	946	240.52	946	259.51	945.48	311.46	944
394.24	944	411.78	943.91	435.64	943.78	452.76	943.98	452.98	943.98
459.78	943.79	460.89	942.78	461.74	942	462.98	940.86	463.86	940.12
464.44	940.06	466.75	940.03	468.15	940	469.73	939.74	475.74	939.14
476.09	939.9	476.2	940	476.7	941.21	477.2	942	477.38	942.27
477.67	942.72	484.95	943.49	489.79	944	497.71	945.04	510.51	946
520.16	947.66	522.09	948	524.06	948.34	529.43	948.62	529.6	948.63
529.65	948.63	529.85	948.66	530.1	948.72	533.76	950.54	536.01	951.64
536.79	952	537.86	952.49	538.48	952.77	541.26	954	543.77	955.27
546.15	956.34	549.74	958	553.49	959.48	557.12	960.92	558.54	961.54
559.73	962	563.01	963.37	563.99	963.78	564.06	963.8	566.74	964.06
571.02	964.46	573.46	964.57	575.86	964.66	588.24	965.85	589.78	966
591.98	966.2	611.56	968	621.29	969.03	630.35	969.71	633.39	970
633.51	970.03								

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 459.78 .035 477.67 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 459.78 477.67 29.91 278.36 370.21 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 944.59	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.41	* Wt. n-Val.	* 0.035	* 0.060	*
* W.S. Elev (ft)	* 943.18	* Reach Len. (ft)	* 29.91	* 278.36	* 370.21
* Crit W.S. (ft)	* 943.18	* Flow Area (sq ft)	* 50.52	* 0.99	*
* E.G. Slope (ft/ft)	* 0.015247	* Area (sq ft)	* 50.52	* 0.99	*
* Q Total (cfs)	* 482.70	* Flow (cfs)	* 481.57	* 1.13	*
* Top width (ft)	* 21.54	* Top width (ft)	* 17.22	* 4.32	*
* Vel Total (ft/s)	* 9.37	* Avg. Vel. (ft/s)	* 9.53	* 1.14	*
* Max chl Dpth (ft)	* 4.04	* Hydr. Depth (ft)	* 2.93	* 0.23	*
* Conv. Total (cfs)	* 3909.2	* Conv. (cfs)	* 3900.0	* 9.1	*
* Length wtd. (ft)	* 210.75	* Wetted Per. (ft)	* 20.60	* 4.35	*
* Min ch El (ft)	* 939.14	* Shear (lb/sq ft)	* 2.33	* 0.22	*
* Alpha	* 1.03	* Stream Power (lb/ft s)	* 633.51	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.96	* Cum Volume (acre-ft)	* 5.35	* 3.00	* 1.00
* C & E Loss (ft)	* 0.39	* Cum SA (acres)	* 5.43	* 0.84	* 0.85

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.  
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12207.32

INPUT  
 Description:

Station Elevation Data num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	969.98	.21	969.89	3.66	968	7.09	966.31	7.69	966
11.42	964.07	11.55	964	15.27	962.07	15.4	962	17.59	960.73
18.97	960	20.53	959.47	23.14	958	23.62	957.82	28.89	956
34.81	954.05	34.95	954	40.44	952.12	40.79	952	41.26	951.84
46.52	950	51.47	949.67	74.93	948	76.64	948	96.98	947.62
133.49	946.93	185.5	946.09	187.51	946.06	191.55	946	208.7	945.66
215.54	945.54	231.36	945.28	233.54	945.24	240.79	945.14	281.83	944.37
298.18	944	305.4	943.07	313.46	942	315.5	942	343.41	941.44
354.34	941.25	384.57	940.6	385.76	940.32	386	940.29	387.17	940.22
388.67	940.16	395.65	939.95	397.33	939.92	398.67	939.91	399.86	939.91
400.17	939.91	400.52	939.95	400.82	940.02	400.9	940.03	402.53	940.71
412.99	940.81	443.45	941.08	452.56	941.15	456.61	941.29	457.47	940.59
458.05	940	459.44	938.99	475.51	938.75	476.34	940	482.79	942
490.61	943.31	494.36	944	495.39	944.5	498.6	946	499.96	946.65
502.77	948	505.83	949.41	507.16	950	508.6	950.66	511.43	952
513.53	953.03	515.53	954	519.64	955.96	519.74	956	519.84	956.05
523.12	957.35	524.77	958	526.16	958.56	529.52	960	533.85	961.69
534.63	962	535.29	962.3	538.47	964	539.94	965.18	541.31	966
543.01	966.95	544.68	968	545.42	968.43	546.5	969.3	550.65	970

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	456.61	.035	482.79	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 456.61 482.79 138.18 45.27 69.35 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 942.10	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.11	* wt. n-Val.	* 0.035	* 0.035	*
* W.S. Elev (ft)	* 941.99	* Reach Len. (ft)	* 138.18	* 45.27	* 69.35
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 136.17	* 63.99	*



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* E.G. slope (ft/ft)	*0.002164	* Area (sq ft)	* 136.17	* 63.99	*	*
* Q Total (cfs)	* 482.70	* Flow (cfs)	* 263.13	* 219.57	*	*
* Top Width (ft)	* 166.63	* Top width (ft)	* 140.49	* 26.14	*	*
* Vel Total (ft/s)	* 2.41	* Avg. vel. (ft/s)	* 1.93	* 3.43	*	*
* Max Chl Dpth (ft)	* 3.24	* Hydr. Depth (ft)	* 0.97	* 2.45	*	*
* Conv. Total (cfs)	* 10376.2	* Conv. (cfs)	* 5656.2	* 4720.0	*	*
* Length Wtd. (ft)	* 96.36	* Wetted Per. (ft)	* 140.70	* 27.94	*	*
* Min Ch El (ft)	* 938.75	* Shear (lb/sq ft)	* 0.13	* 0.31	*	*
* Alpha	* 1.27	* Stream Power (lb/ft s)	* 550.65	* 0.00	*	0.00
* Frctn Loss (ft)	* 0.38	* Cum Volume (acre-ft)	* 5.30	* 2.64	*	0.99
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 5.38	* 0.70	*	0.83

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12162.04

INPUT

Description:

Station Elevation Data num= 72

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	7.74	958	11.22	957.29	16.62	956	24.03	954.21
24.92	954	25.51	953.85	40.15	952	41.89	951.92	42.52	951.89
46.52	951.69	63.87	950.8	75.37	950.18	79.13	950	86.26	949.74
97.11	949.19	105.14	948.76	120.44	948	128.15	947.74	135.69	947.44
168.29	946	181.52	945.47	189.08	945.24	197.73	944.89	222.33	944
236.35	944	236.48	944	244.62	943.47	265.35	942.15	266.58	942.07
267.58	942	289.5	941.57	355.75	940.25	365.93	940.34	366.89	940.34
368.17	940.34	370.19	940.34	389.41	940.38	392.13	940.39	411.48	940.79
412.94	940.8	414.08	940.26	414.22	940	414.88	939.39	415.26	939.23
416.61	938.37	419.24	938.49	419.71	938.52	421.79	939.18	422	939.23
428.9	939.98	429.1	940	429.53	940.08	443.26	942	443.69	942.28
446.38	944	448.8	945.59	449.43	946	450.73	946.92	452.42	948
454.71	949.5	455.53	950	457.73	951.41	458.75	952	459.14	952.24
462.03	954	462.57	954.35	464.78	955.78	465.16	956	466.72	957.03
468.33	958	472.01	960						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	412.94	.035	429.1	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
412.94	429.1	102.49	86.36	91.08	.1	.3

OXF157-159Bridges.rep

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 941.70 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.36  * Wt. n-Val.      * 0.035  * 0.035  * 0.100  *
* W.S. Elev (ft)     * 941.34 * Reach Len. (ft) * 102.49 * 86.36  * 91.08  *
* Crit W.S. (ft)    * 941.31 * Flow Area (sq ft) * 80.90 * 33.15  * 6.19   *
* E.G. slope (ft/ft) * 0.009218 * Area (sq ft) * 80.90 * 33.15  * 6.19   *
* Q Total (cfs)      * 482.70 * Flow (cfs)      * 266.03 * 210.04 * 6.64   *
* Top width (ft)     * 137.21 * Top width (ft)  * 111.65 * 16.16  * 9.41   *
* Vel Total (ft/s)   * 4.01  * Avg. vel. (ft/s) * 3.29  * 6.34   * 1.07   *
* Max Chl Dpth (ft) * 2.97  * Hydr. Depth (ft) * 0.72  * 2.05   * 0.66   *
* Conv. Total (cfs)  * 5027.5 * Conv. (cfs)     * 2770.8 * 2187.6 * 69.1   *
* Length wtd. (ft)  * 94.36 * Wetted Per. (ft) * 111.66 * 17.11  * 9.50   *
* Min Ch El (ft)    * 938.37 * Shear (lb/sq ft) * 0.42  * 1.12   * 0.37   *
* Alpha              * 1.45  * Stream Power (lb/ft s) * 472.01 * 0.00   * 0.00   *
* Frctn Loss (ft)   * 0.72  * Cum Volume (acre-ft) * 4.96  * 2.59   * 0.99   *
* C & E Loss (ft)   * 0.01  * Cum SA (acres)   * 4.98  * 0.68   * 0.83   *
*****

```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper

RS: 12075.53

INPUT

Description:

Station Elevation Data		num=		102							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	29.07	958.02	29.28	958.01	29.37	958	36.25	958		
41.93	957.55	45.21	957.5	46.73	957.45	65.61	956	67.7	956		
81.81	954.95	95.66	954	101.56	953.61	117.97	952.43	120.61	952.24		
123.73	952	136.93	951.16	142.43	950.83	144.58	950.69	154.74	950		
157.16	950	175.09	949.24	190.41	948.13	197.55	948.02	198.05	948		
200.32	947.87	205.43	947.47	213.39	947.1	234.45	946	264.46	944.08		
265.5	944.04	266.42	944	270.74	944	281.68	942.04	282.09	942		
300.4	942	307.52	941.06	311.62	940.61	321.83	940	334.36	940.54		
346.89	940	388.94	939.79	440.26	940	456.9	940.65	462.86	937.01		
472.34	937.67	473.24	938.67	475.13	940	475.88	940.72	475.97	940.88		
477.39	941.35	479.23	942	484.86	943.97	484.97	944	485.17	944.07		
485.34	944.12	489.19	945.12	491.23	946	493.42	946.91	493.88	947.18		
496.1	948	497.56	948.81	499.54	949.53	500.62	950	503.25	951.94		
503.38	952	504.66	952.7	505.66	952.97	509.42	954	510.99	954.54		
514.5	955.74	514.68	955.82	515.11	956	516.52	956.69	518.63	957.78		
518.92	958	521.58	959.8	521.82	960	521.98	960.14	524.03	961.66		
524.48	962	525.3	962.65	527.18	964	528.6	964.88	529.78	964.77		
537.52	965.96	538.01	965.96	539.76	965.94	540.74	965.45	546.36	965.28		
553.5	964.98	553.7	964.9	555.1	964.59	555.99	964.5	556.92	965.26		
557.9	965.82	558.05	965.91	559.63	967.06	560.95	968	562.78	969.51		
563.4	970	563.47	970.06								

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 456.9 .035 475.88 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 456.9 475.88 204.78 165.56 176.18 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 940.97 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.33 \* Wt. n-Val. \* 0.035 \* 0.035 \* \* \*  
 \* W.S. Elev (ft) \* 940.64 \* Reach Len. (ft) \* 204.78 \* 165.56 \* 176.18 \*  
 \* Crit W.S. (ft) \* 940.62 \* Flow Area (sq ft) \* 87.31 \* 46.95 \* \*  
 \* E.G. Slope (ft/ft) \* 0.006381 \* Area (sq ft) \* 87.31 \* 46.95 \* \*  
 \* Q Total (cfs) \* 482.70 \* Flow (cfs) \* 210.84 \* 271.86 \* \*  
 \* Top Width (ft) \* 164.13 \* Top width (ft) \* 145.25 \* 18.88 \* \*  
 \* Vel Total (ft/s) \* 3.60 \* Avg. Vel. (ft/s) \* 2.41 \* 5.79 \* \*  
 \* Max Chl Dpth (ft) \* 3.63 \* Hydr. Depth (ft) \* 0.60 \* 2.49 \* \*  
 \* Conv. Total (cfs) \* 6042.6 \* Conv. (cfs) \* 2639.3 \* 3403.3 \* \*  
 \* Length Wtd. (ft) \* 187.12 \* Wetted Per. (ft) \* 145.31 \* 21.04 \* \*  
 \* Min Ch El (ft) \* 937.01 \* Shear (lb/sq ft) \* 0.24 \* 0.89 \* \*  
 \* Alpha \* 1.66 \* Stream Power (lb/ft s) \* 563.47 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.14 \* Cum Volume (acre-ft) \* 4.76 \* 2.51 \* 0.98 \*  
 \* C & E Loss (ft) \* 0.03 \* Cum SA (acres) \* 4.68 \* 0.65 \* 0.82 \*  
 \*\*\*\*\*

Warning: Divided flow computed for this cross-section.

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper

RS: 11904.55

INPUT  
 Description:

Station Elevation Data num= 83  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 960 2.14 959.57 9.31 958 11.95 957.61 19.02 956  
 19.61 956 22.47 955.39 30.39 954 44.44 952.06 44.97 952  
 49.05 952 66.6 950.06 66.74 950.05 67.06 950.01 67.17 950  
 67.22 949.99 72.01 949.15 78.41 948 78.62 947.96 89.47 946  
 89.79 945.94 92.19 945.53 100.5 944 102.3 943.67 111.59 942  
 120.54 940.39 121.43 940.29 121.84 940.28 122.71 940.25 122.85 940.23  
 124.03 940 169.17 939.27 179.12 939.11 186.55 938.98 199.46 938.75  
 202.83 938.7 203.67 938.69 207.06 938.64 210.94 938.58 213.81 938.54  
 221.06 938.43 270.9 938.53 273.4 938.55 283.93 938.63 306.68 938.9



OXF157-159Bridges.rep

326.88	939.14	334.13	939.08	339.23	939.31	340.31	938.2	340.51	938
341.46	936.95	341.61	936.8	351.71	936.77	353.46	936.84	353.93	936.78
354.09	936.85	354.81	938	355.4	939.34	355.52	939.56	357.42	939.65
360.44	940	362.43	940.29	364.1	940.58	372.19	942	376.58	943.87
376.89	944	381.59	945.96	381.68	946	381.85	946.07	387.42	948
388.28	948.3	388.47	948.37	393.04	950	395.58	951.46	396.84	952
397.94	952.75	399.93	954	401.35	954.92	403.03	956	405.07	957.47
405.92	958	407.44	958.9	408.91	959.88				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	339.23	.035	355.52	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	339.23	355.52		212.95	131.78	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 939.80	* Element	* Left OB	* Channel	* Right OB	*	*	*	*
* Vel Head (ft)	* 0.23	* Wt. n-Val.	* 0.035	* 0.035	* 0.000	*	*	*	*
* W.S. Elev (ft)	* 939.57	* Reach Len. (ft)	* 212.95	* 131.78	* 72.41	*	*	*	*
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 143.02	* 40.40	* 0.00	*	*	*	*
* E.G. Slope (ft/ft)	* 0.005835	* Area (sq ft)	* 143.02	* 40.40	* 0.00	*	*	*	*
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 385.49	* 216.41	* 0.00	*	*	*	*
* Top width (ft)	* 205.30	* Top width (ft)	* 188.75	* 16.29	* 0.26	*	*	*	*
* Vel Total (ft/s)	* 3.28	* Avg. Vel. (ft/s)	* 2.70	* 5.36	* 0.04	*	*	*	*
* Max Chl Dpth (ft)	* 2.80	* Hydr. Depth (ft)	* 0.76	* 2.48	* 0.01	*	*	*	*
* Conv. Total (cfs)	* 7879.6	* Conv. (cfs)	* 5046.5	* 2833.1	* 0.0	*	*	*	*
* Length wtd. (ft)	* 187.77	* Wetted Per. (ft)	* 188.77	* 19.03	* 0.26	*	*	*	*
* Min Ch El (ft)	* 936.77	* Shear (lb/sq ft)	* 0.28	* 0.77	*	*	*	*	*
* Alpha	* 1.39	* Stream Power (lb/ft s)	* 408.91	* 0.00	* 0.00	*	*	*	*
* Frctn Loss (ft)	* 0.58	* Cum Volume (acre-ft)	* 4.22	* 2.34	* 0.98	*	*	*	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 3.89	* 0.58	* 0.82	*	*	*	*

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 11770.60

INPUT

Description:

Station	Elevation	Data	num=	93							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	959.97	3.39	958.76	5.44	958	10.37	956.25	10.84	956.07		

OXF157-159Bridges.rep

11.06	956	11.31	955.94	11.72	955.84	12.94	955.49	17.73	954
22.4	952.32	23.43	952	27.05	950.68	28.96	950	31.92	948.97
34.63	948	35.15	947.81	40.07	946	40.57	945.82	41.22	945.6
45.63	944	49.18	942.72	51.13	942	55.54	940.47	57.34	940
75.12	938.5	81.19	938	106.77	937.41	128.7	938	141.15	938.12
171.62	938.18	210.62	938	235.66	937.68	258.34	938	272.87	938.28
273	938.15	273.28	938	274.03	937.19	275.22	936	275.9	935.06
276.25	934.71	277.33	934.78	280.57	934.9	280.85	935.04	282.64	936
284.11	936.93	285.06	937.34	285.75	937.45	289.39	938	301.46	939.8
302.78	940	303.94	940.16	319.47	942	320	942.07	320.3	942.11
320.31	942.11	321.61	942.3	326	944	328.22	944.85	331.49	946
334.64	947.13	341.12	949.52	342.44	950	344.29	950.66	348.45	952
352.07	953.31	355.49	954	358.4	954.86	362.46	956	364.72	956.95
368.47	958	383.23	958	386.17	957.05	387.42	956.47	388.06	956.28
389.09	956	389.14	955.98	389.37	955.92	389.81	955.96	393.59	955.94
396.98	956	399.04	956.04	399.21	956.03	399.23	956.04	399.24	956.04
401.62	956.77	401.63	956.77	401.78	956.72	404.26	956.23	404.38	956.31
406.82	957.68	407.27	958.02	410.26	960.03				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	272.87	.035	285.06	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	272.87	285.06		66.99	132.69	134.32	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 939.19	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.10	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 939.09	* Reach Len. (ft)	* 66.99	* 132.69	* 134.32
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 227.19	* 40.12	* 10.14
* E.G. Slope (ft/ft)	*0.001890	* Area (sq ft)	* 227.19	* 40.12	* 10.14
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 449.27	* 146.71	* 5.93
* Top Width (ft)	* 228.60	* Top width (ft)	* 204.76	* 12.19	* 11.65
* Vel Total (ft/s)	* 2.17	* Avg. vel. (ft/s)	* 1.98	* 3.66	* 0.58
* Max Chl Dpth (ft)	* 4.38	* Hydr. Depth (ft)	* 1.11	* 3.29	* 0.87
* Conv. Total (cfs)	* 13846.1	* Conv. (cfs)	* 10335.0	* 3374.8	* 136.3
* Length wtd. (ft)	* 96.22	* wetted Per. (ft)	* 204.83	* 14.39	* 11.78
* Min Ch El (ft)	* 934.71	* Shear (lb/sq ft)	* 0.13	* 0.33	* 0.10
* Alpha	* 1.31	* Stream Power (lb/ft s)	* 410.26	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.28	* Cum Volume (acre-ft)	* 3.32	* 2.22	* 0.97
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 2.93	* 0.54	* 0.81

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper

RS: 11632.87

INPUT  
 Description:

Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	3.26	958.93	6.12	958	9.54	957.53	10.66	957.31
14.77	956	21.02	954.53	23.58	954	32.2	952.02	32.35	951.98
39.73	950	42.38	949.32	47.66	948	52.6	946.76	55.61	946
62.93	944.13	63.44	944	64.5	943.72	69.14	942.38	70.43	942
75.91	941.26	78.88	940	93.6	939.03	109.52	938	131.39	938
210.03	937.57	240.41	937.41	243	937.31	243.16	937.07	243.96	936
244.79	934.65	245.78	934	246.03	933.83	246.2	933.83	246.58	933.86
247.37	934	247.8	934	248.38	934.18	256.29	934.82	257.84	935.84
258.08	936	258.3	936.14	259.41	937.6	268.24	938	283.83	939.04
287.82	939.25	292.58	939.5	295.29	939.61	295.81	939.64	300.44	940
311.72	941.28	317.13	942	329.19	943.58	332.34	944	333.59	944.16
347.29	945.77	347.37	945.78	347.4	945.79	347.69	946	349.52	946.95
350.86	948	351.69	948.66	353.47	950	354.52	950.78	355.37	951.44
359.06	951.82	360.88	952	361.65	952.08	361.71	952.08	363.24	952.12
372.06	952.3	372.93	952.35	373.7	952.33	373.79	952.33	373.84	952.32
376.37	951.97	376.49	951.95	376.54	951.97	376.68	952	377.81	952.63
380.85	954.33	381.67	954.78	381.69	954.8	381.75	954.84	383.23	956
383.85	956.5	385.88	958	387.01	958.72	388.94	959.89		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	243	.035	259.41	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	243	259.41		286.13	220.98	202.96	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 938.87	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.43	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 938.44	* Reach Len. (ft)	* 286.13	* 220.98	* 202.96
* Crit W.S. (ft)	* 938.44	* Flow Area (sq ft)	* 93.83	* 58.84	* 7.05
* E.G. Slope (ft/ft)	* 0.005172	* Area (sq ft)	* 93.83	* 58.84	* 7.05
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 219.16	* 378.26	* 4.48
* Top Width (ft)	* 172.02	* Top Width (ft)	* 140.23	* 16.41	* 15.38
* Vel Total (ft/s)	* 3.77	* Avg. vel. (ft/s)	* 2.34	* 6.43	* 0.63
* Max Chl Dpth (ft)	* 4.61	* Hydr. Depth (ft)	* 0.67	* 3.59	* 0.46
* Conv. Total (cfs)	* 8369.1	* Conv. (cfs)	* 3047.3	* 5259.5	* 62.3
* Length wtd. (ft)	* 248.26	* Wetted Per. (ft)	* 140.25	* 19.26	* 15.40
* Min ch El (ft)	* 933.83	* Shear (lb/sq ft)	* 0.22	* 0.99	* 0.15
* Alpha	* 1.97	* Stream Power (lb/ft s)	* 388.94	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	* 3.07	* 2.07	* 0.94



\* C & E Loss (ft) \* 0.01 \* Cum SA (acres) \* 2.66 \* 0.49 \* 0.76 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 11351.13

INPUT

Description:

Station Elevation Data

num= 104

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	8.69	958	12.73	957.24	16.21	956.63	19.81	956
24.99	954.96	31.77	954	33.45	953.6	36.16	952.9	37.93	952.4
39.69	952	46.26	950.46	48.09	950	55.41	948.21	56.25	948
61.54	946.27	62.07	946	64.18	944.84	65.9	944	68.58	942.6
69.8	942	70.2	941.91	80.88	940.56	83.09	940.28	85.34	940
90.77	939.25	99.86	938	100.58	937.89	110.49	936	159.57	936
196.96	935.86	198.63	935.88	219.49	935.97	227.82	935.95	235	935.96
242.46	935.94	245.11	935.93	265.79	935.95	299.93	935.98	299.97	935.93
301.62	934	301.96	933.65	302.06	933.52	302.08	933.52	311.76	933.12
311.79	933.2	314.29	935.14	314.49	935.31	315.82	935.55	316.68	935.74
321.25	937.05	323.4	937.62	324.82	938	331.09	939.72	332.17	940
333.57	940.38	339.6	942	346.3	943.86	346.79	944	347.02	944.08
348.35	944.33	351.47	944.91	351.53	944.93	356.15	946	358.67	946.58
364.61	948	369.76	949.48	372.16	950	373	950.27	373.13	950.29
373.48	950.3	375.58	950.31	376.01	950.34	380.52	950.23	385.22	950.44
386.2	950.47	387.36	950.55	388.19	950.65	389.93	950.65	399.61	950.3
399.82	950.28	401.71	950.06	401.94	950.01	401.96	950	402.2	949.93
404.05	949.55	404.45	949.48	404.56	949.58	405.23	950	405.74	950.54
406.04	950.9	407.22	951.92	407.32	952	407.35	952.02	408.67	953.23
408.78	953.3	410.1	954	413.27	955.85	413.54	956	413.84	956.18
417.29	958	418.56	958.43	423.98	959.29	428.7	959.98		

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	299.93	.035	314.29	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 299.93 314.29 158.28 141.28 210.48 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 937.20 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.41 * Wt. n-Val. * 0.060 * 0.035 * 0.100 *
* W.S. Elev (ft) * 936.79 * Reach Len. (ft) * 158.28 * 141.28 * 210.48 *
* Crit W.S. (ft) * 936.79 * Flow Area (sq ft) * 159.57 * 44.71 * 5.04 *
* E.G. Slope (ft/ft) * 0.006855 * Area (sq ft) * 159.57 * 44.71 * 5.04 *
* Q Total (cfs) * 601.90 * Flow (cfs) * 287.58 * 308.99 * 5.33 *
* Top Width (ft) * 214.01 * Top width (ft) * 193.59 * 14.36 * 6.06 *
* Vel Total (ft/s) * 2.88 * Avg. Vel. (ft/s) * 1.80 * 6.91 * 1.06 *
* Max chl Dpth (ft) * 3.67 * Hydr. Depth (ft) * 0.82 * 3.11 * 0.83 *
* Conv. Total (cfs) * 7269.8 * Conv. (cfs) * 3473.4 * 3732.0 * 64.4 *
* Length wtd. (ft) * 152.71 * Wetted Per. (ft) * 193.66 * 16.21 * 6.31 *
* Min Ch El (ft) * 933.12 * Shear (lb/sq ft) * 0.35 * 1.18 * 0.34 *
* Alpha * 3.15 * Stream Power (lb/ft s) * 428.70 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.53 * Cum Volume (acre-ft) * 2.24 * 1.80 * 0.92 *
* C & E Loss (ft) * 0.10 * Cum SA (acres) * 1.57 * 0.41 * 0.71 *
*****
    
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 11189.95

INPUT

Description:

Station Elevation Data num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	949.99	1.6	949.56	8.15	948	13.4	946.56	14.9	946.14
15.46	946	22.5	944.11	22.9	944	26.68	942.99	29.86	942.16
30.47	942	30.99	941.87	38.05	940	44.66	938.3	47.34	938

OXF157-159Bridges.rep

59.53	936.64	61.72	936.46	65.02	936	67.37	936	81.56	934.73
89.53	934.14	90.77	934.09	93.56	934.08	97.91	934.12	103.27	934.02
129.26	934.03	134.7	934.06	143.11	934.05	146.21	934.04	149.97	934
151.38	933.98	154.39	934	182.46	934	198.26	934.26	222.23	934.45
236.94	934.63	264.31	934.96	269.77	934.99	269.99	934.65	271.72	932.86
272.02	932.58	272.11	932.45	273.32	932.28	274.87	932.04	275.36	932
275.72	932	275.92	932.09	278.61	932.67	279.21	933.31	280.03	933.82
280.05	933.84	280.45	933.92	283.23	934.5	283.81	934.63	289.66	936
295.2	937.3	300.27	938.53	306.24	940	312.92	941.88	313.26	941.98
313.31	942	313.33	942.01	313.37	942.03	317.66	944	320.94	945.62
321.79	946	322.58	946.36	326.25	948	328.3	948.96	330.59	950.24
330.8	950.36	331.17	950.33	338.76	950.65	344.51	950.72	350.13	950.9
352.54	950.85	352.73	950.83	355.75	950.01	355.77	950	356.2	949.91
356.5	949.9	356.55	949.9	357.28	950.01	357.87	950.25	361.03	951.68
361.62	951.91	362.01	952	363.81	952.69	367.01	954	371.17	955.65
372.07	956	372.89	956.31	377.18	958	382.11	959.96	382.16	959.98

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .06 269.77 .035 280.03 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 269.77 280.03 65.71 199.34 191.45 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 935.97	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.07	* Wt. n-Val.	* 0.060	* 0.035	* 0.100
* W.S. Elev (ft)	* 935.89	* Reach Len. (ft)	* 65.71	* 199.34	* 191.45
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 311.93	* 32.41	* 9.70
* E.G. Slope (ft/ft)	* 0.002088	* Area (sq ft)	* 311.93	* 32.41	* 9.70
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 472.71	* 122.48	* 6.72
* Top width (ft)	* 220.63	* Top width (ft)	* 201.20	* 10.26	* 9.17
* Vel Total (ft/s)	* 1.70	* Avg. vel. (ft/s)	* 1.52	* 3.78	* 0.69
* Max Chl Dpth (ft)	* 3.89	* Hydr. Depth (ft)	* 1.55	* 3.16	* 1.06
* Conv. Total (cfs)	* 13172.5	* Conv. (cfs)	* 10345.1	* 2680.4	* 147.0
* Length wtd. (ft)	* 114.62	* Wetted Per. (ft)	* 201.28	* 11.92	* 9.41
* Min Ch El (ft)	* 932.00	* Shear (lb/sq ft)	* 0.20	* 0.35	* 0.13
* Alpha	* 1.63	* Stream Power (lb/ft s)	* 382.16	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.15	* Cum Volume (acre-ft)	* 1.38	* 1.68	* 0.88
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 0.85	* 0.37	* 0.68

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 10974.14

INPUT

Description:

Station Elevation Data		num= 100		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950.05	.25	950	3.51	949.3	8.79	948.25	9.99	948		
10.53	947.89	13.9	947.11	17.85	946	25.1	944.07	25.34	944		
25.83	943.86	32.12	942	36.48	940.98	40.06	940	46.05	938.56		
48.4	938	52.71	936.98	56.78	936	61.04	934.88	62.48	934.63		
65.55	934	66.62	934	70.28	933.92	128.37	933.37	134.04	933.26		
147.26	933.75	153.2	933.9	155.49	933.96	163.84	933.72	167.89	933.84		
177.32	933.25	180.12	932.05	180.19	932	180.31	931.84	181.14	930.28		
181.96	930.1	182.54	930	188.88	930	191.45	929.91	191.5	930.04		
191.91	930.76	191.97	930.91	192.37	932	192.46	933.02	192.66	933.64		
196	933.57	201.38	933.63	209.25	934	219.98	934	224.45	934.69		
226.67	935.04	230.8	935.61	232.56	936	234.23	936.17	239.67	936.39		
245.58	936.73	266.43	938	271.42	938.51	275.93	938.84	282.18	939.36		
288.93	940	291.42	940.41	303.12	942	305.11	943.34	306.16	944		
306.69	944.33	309.12	946	309.65	946.31	312.06	948	312.69	948.37		
314.72	949.67	315.17	950	315.26	950.04	315.51	950.31	316.28	950.39		
317.29	950.33	318.02	950.29	319.69	950.24	321.98	950.17	330	950.13		
330.36	950.12	330.7	950.11	330.85	950.08	332.05	949.87	332.77	949.72		
334.01	949.45	334.03	949.45	334.29	949.66	336.11	950.7	338.34	951.8		
338.72	952	339.62	952.5	342.66	954	346.35	955.75	346.84	956		
347.3	956.2	350.07	957.27	351.68	958	355.93	959.86	356.27	959.99		

Manning's n Values

Sta		n Val		num= 3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	177.32	.035	192.66	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	177.32	192.66		205.41	261.21	240.88	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 935.81	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.08	* Wt. n-Val.	* 0.060	* 0.035	* 0.060
* W.S. Elev (ft)	* 935.73	* Reach Len. (ft)	* 205.41	* 261.21	* 240.88
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 239.54	* 77.49	* 62.05
* E.G. Slope (ft/ft)	* 0.000924	* Area (sq ft)	* 239.54	* 77.49	* 62.05
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 286.31	* 251.73	* 63.86
* Top Width (ft)	* 173.54	* Top width (ft)	* 119.52	* 15.34	* 38.69
* Vel Total (ft/s)	* 1.59	* Avg. vel. (ft/s)	* 1.20	* 3.25	* 1.03
* Max chl Dpth (ft)	* 5.82	* Hydr. Depth (ft)	* 2.00	* 5.05	* 1.60
* Conv. Total (cfs)	* 19798.9	* Conv. (cfs)	* 9417.9	* 8280.4	* 2100.6
* Length Wtd. (ft)	* 242.94	* Wetted Per. (ft)	* 119.75	* 19.40	* 38.83
* Min ch El (ft)	* 929.91	* Shear (lb/sq ft)	* 0.12	* 0.23	* 0.09
* Alpha	* 2.06	* Stream Power (lb/ft s)	* 356.27	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.56	* Cum Volume (acre-ft)	* 0.96	* 1.43	* 0.72



\* C & E Loss (ft) \* 0.12 \* Cum SA (acres) \* 0.61 \* 0.32 \* 0.57 \*  
 \*\*\*\*\*

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper RS: 10615.35

INPUT

Description:

Station Elevation Data num= 80

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950.07	.23	950	4.39	948.66	6.24	948.1	6.54	948
6.93	947.86	12.37	946	12.77	945.86	18.27	944	19.53	943.56
22.08	942.72	23.81	942.23	24.56	942	25.83	941.56	30.73	940
45.25	940	53.93	938.94	57	938.25	58.13	938	62.01	937.21
67.82	936	74.83	934.57	77.59	934	80.19	933.47	87.06	932.33
87.09	932.32	87.57	932	89.72	930.44	90.33	930	92.18	928.65
92.27	928.51	92.29	928.53	92.3	928.48	92.41	928.47	92.5	928.47
93.94	928.71	94.09	928.73	94.45	928.98	94.49	929	94.66	929.25
96.53	930.72	97.28	931.15	97.66	931.33	97.85	931.42	97.95	931.43
98.47	931.46	103.32	932	109.19	932.65	109.51	932.66	121.31	933.59
132.54	934	133.01	934	136.9	934	139.46	934.04	146.56	934.09
149.6	934.07	151.88	934.01	217.27	935.34	218.13	935.34	253.19	936
270.87	936	279.41	936.88	290.14	938	291.27	938.1	314.2	940
323.67	941.2	330.09	941.69	333.34	942	333.49	942	338.41	942.82
341.29	943.3	345.56	944	345.8	944	353.14	945.47	356.47	946
364.43	947.54	366.78	948	367.4	948.12	379.99	950	380.02	950.01

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	87.06	.035	97.66	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 87.06 97.66 165.46 196.08 242.91 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 935.14	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.27	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 933.87	* Reach Len. (ft)	* 165.46	* 196.08	* 242.91
* Crit W.S. (ft)	* 933.87	* Flow Area (sq ft)	* 7.06	* 40.57	* 31.71
* E.G. Slope (ft/ft)	* 0.012785	* Area (sq ft)	* 7.06	* 40.57	* 31.71

OXF157-159Bridges.rep

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* Q Total (cfs)          * 601.90 * Flow (cfs)          * 28.92 * 420.00 * 152.98 *
* Top Width (ft)        * 50.78 * Top Width (ft)      * 8.84 * 10.60 * 31.34 *
* Vel Total (ft/s)      * 7.59 * Avg. Vel. (ft/s)   * 4.09 * 10.35 * 4.82 *
* Max Chl Dpth (ft)     * 5.40 * Hydr. Depth (ft)   * 0.80 * 3.83 * 1.01 *
* Conv. Total (cfs)     * 5323.1 * Conv. (cfs)        * 255.8 * 3714.4 * 1352.9 *
* Length wtd. (ft)      * 195.82 * Wetted Per. (ft)   * 8.97 * 12.81 * 31.47 *
* Min Ch El (ft)        * 928.47 * Shear (lb/sq ft)   * 0.63 * 2.53 * 0.80 *
* Alpha                  * 1.42 * Stream Power (lb/ft s) * 380.02 * 0.00 * 0.00 *
* Frctn Loss (ft)       * 1.19 * Cum Volume (acre-ft) * 0.38 * 1.07 * 0.46 *
* C & E Loss (ft)       * 0.28 * Cum SA (acres)     * 0.31 * 0.24 * 0.38 *
*****

```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 10402.90

INPUT

Description:

```

Station Elevation Data      num=      98
Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev
*****
0      949.98      4.75      949.07      9.99      948      12.35      947.16      13.4      946.71
15.19      946      16.9      945.32      20.16      944      22.21      943.19      25.98      942
27.3      941.58      33.58      940      41.79      938      48.68      936.32      50.12      936
52.93      935.42      59.48      934      66.15      933.44      69.83      933.02      78.61      932
81.03      932      107.82      931.32      108.61      931.3      113.64      931.2      113.78      930.95
114.87      930      115.19      929.31      115.46      929.17      117.12      928      125.15      928
125.65      928.15      125.93      928.39      126.93      929.7      127.14      930      128.2      931.45
128.47      931.79      128.48      931.79      128.85      931.9      130.37      932.31      132.68      933.01
133.56      933.28      139.51      934      163.9      934      177.25      934.27      198.2      934.69
234.32      935.4      256.93      935.77      261.59      935.82      268.68      935.89      276.66      936
278.04      936      295.82      937.17      300.68      937.56      305.09      938      320.66      939.68
324.3      940      330.46      940.55      340.25      941.36      347.45      942      355.87      942.74

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OXF157-159Bridges.rep

360.6	943.16	370.55	944	371.63	944.09	382.42	944.63	403.27	945.55
406.61	945.77	406.88	945.79	407.7	945.82	410.75	946	414.76	946.39
431.53	948	437.56	948.59	440.88	949.27	442.55	949.54	443.39	949.69
449.98	950	452.83	950.14	453.61	950.21	458.16	950.6	460.13	950.82
469.57	952	479.29	953.24	482.87	953.97	482.96	953.98	483.07	954
484.93	954.28	494.49	955.7	496.35	956	497.23	956.08	497.98	956.22
500.36	956.54	507.37	957.51	509.34	957.74	511.66	958	525.32	958.8
526.25	958.85	533.6	959.6	537.12	959.97				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	113.64	.035	139.51	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	113.64	139.51		195.34	212.37	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 933.66	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.34	* Wt. n-Val.	* 0.035	* 0.035	*
* W.S. Elev (ft)	* 933.32	* Reach Len. (ft)	* 195.34	* 212.37	* 143.13
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 66.99	* 72.53	*
* E.G. Slope (ft/ft)	* 0.003525	* Area (sq ft)	* 66.99	* 72.53	*
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 215.41	* 386.49	*
* Top Width (ft)	* 66.62	* Top width (ft)	* 46.40	* 20.22	*
* Vel Total (ft/s)	* 4.31	* Avg. Vel. (ft/s)	* 3.22	* 5.33	*
* Max Chl Dpth (ft)	* 5.32	* Hydr. Depth (ft)	* 1.44	* 3.59	*
* Conv. Total (cfs)	* 10137.9	* Conv. (cfs)	* 3628.1	* 6509.8	*
* Length wtd. (ft)	* 188.99	* Wetted Per. (ft)	* 46.49	* 23.60	*
* Min Ch El (ft)	* 928.00	* Shear (lb/sq ft)	* 0.32	* 0.68	*
* Alpha	* 1.18	* Stream Power (lb/ft s)	* 537.12	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.32	* Cum Volume (acre-ft)	* 0.24	* 0.82	* 0.38
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 0.20	* 0.17	* 0.29

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 10179.69

INPUT

Description:

Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	7.02	948	7.65	947.79	12.75	946	16.04	944.89

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18.45	944	18.83	943.86	21.31	943.03	24.14	942	24.95	941.72
30	940	30.34	939.88	30.41	939.86	35.66	938	36.55	937.7
41.32	936	43.87	935.16	47.2	934	52.51	933.3	63.17	932
70.31	931.07	73.42	930.68	73.8	930.3	74.91	929.23	75.38	928.56
81.38	928.17	83.78	928.19	84.51	928.78	87.28	930	88.71	930.67
89.62	931.15	100.19	930.83	109.2	930.7	131.77	931.45	139.29	931.7
143.11	931.76	154.22	931.96	156.23	931.97	158.62	931.98	164.24	931.98
166.29	932	205.48	932	211.15	932.07	211.99	932.07	218.22	932.55
222.7	932.85	230.07	933.41	238.55	934	245.91	934.6	253.87	934.91
258.79	935.16	261.36	935.28	263.95	935.43	276.63	936	285.33	936
295.58	936.42	308.18	936.84	318.94	937.07	346.1	937.98	347.82	938.05
350.52	938.17	355.55	938.45	380.49	940	385.34	940.26	406.85	941.41
417.23	942	442.02	943.97	442.54	944	454.48	944.96	464.56	946
474.51	946.87	485.59	948	486.82	948.12	506.82	950		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	73.42	.035	89.62	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.	
	73.42	89.62		111.2	58.47	28.87	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 933.26	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.09	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 933.17	* Reach Len. (ft)	* 111.20	* 58.47	* 28.87
* Crit W.S. (ft)	* 932.32	* Flow Area (sq ft)	* 24.42	* 67.62	* 199.78
* E.G. Slope (ft/ft)	* 0.000999	* Area (sq ft)	* 24.42	* 67.62	* 199.78
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 37.45	* 220.24	* 344.21
* Top width (ft)	* 173.34	* Top width (ft)	* 19.84	* 16.20	* 137.29
* Vel Total (ft/s)	* 2.06	* Avg. vel. (ft/s)	* 1.53	* 3.26	* 1.72
* Max ch1 Dpth (ft)	* 5.00	* Hydr. Depth (ft)	* 1.23	* 4.17	* 1.46
* Conv. Total (cfs)	* 19039.8	* Conv. (cfs)	* 1184.7	* 6966.7	* 10888.3
* Length wtd. (ft)	* 58.47	* Wetted Per. (ft)	* 20.00	* 17.88	* 137.36
* Min ch El (ft)	* 928.17	* Shear (lb/sq ft)	* 0.08	* 0.24	* 0.09
* Alpha	* 1.35	* Stream Power (lb/ft s)	* 506.82	* 0.00	* 0.00
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 0.04	* 0.48	* 0.05
* C & E Loss (ft)	*	* Cum SA (acres)	* 0.05	* 0.08	* 0.07

CULVERT

RIVER: Bluestone Creek  
 REACH: Upper RS: 10155.71

INPUT  
 Description:  
 Distance from Upstream XS = 14.5  
 Deck/Roadway width = 17



Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates

num= 2  
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 \*\*\*\*\*  
 63.17 932 0 155.61 932 0

Upstream Bridge Cross Section Data

Station Elevation Data num= 74  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 950 7.02 948 7.65 947.79 12.75 946 16.04 944.89  
 18.45 944 18.83 943.86 21.31 943.03 24.14 942 24.95 941.72  
 30 940 30.34 939.88 30.41 939.86 35.66 938 36.55 937.7  
 41.32 936 43.87 935.16 47.2 934 52.51 933.3 63.17 932  
 70.31 931.07 73.42 930.68 73.8 930.3 74.91 929.23 75.38 928.56  
 81.38 928.17 83.78 928.19 84.51 928.78 87.28 930 88.71 930.67  
 89.62 931.15 100.19 930.83 109.2 930.7 131.77 931.45 139.29 931.7  
 143.11 931.76 154.22 931.96 156.23 931.97 158.62 931.98 164.24 931.98  
 166.29 932 205.48 932 211.15 932.07 211.99 932.07 218.22 932.55  
 222.7 932.85 230.07 933.41 238.55 934 245.91 934.6 253.87 934.91  
 258.79 935.16 261.36 935.28 263.95 935.43 276.63 936 285.33 936  
 295.58 936.42 308.18 936.84 318.94 937.07 346.1 937.98 347.82 938.05  
 350.52 938.17 355.55 938.45 380.49 940 385.34 940.26 406.85 941.41  
 417.23 942 442.02 943.97 442.54 944 454.48 944.96 464.56 946  
 474.51 946.87 485.59 948 486.82 948.12 506.82 950

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 73.42 .035 89.62 .035

Bank Sta: Left Right Coeff Contr. Expan.  
 73.42 89.62 .1 .3

Downstream Deck/Roadway Coordinates

num= 2  
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 \*\*\*\*\*  
 76.48 932 0 191.31 932

Downstream Bridge Cross Section Data

Station Elevation Data num= 94  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 949.98 .99 949.69 3.05 948.99 5.8 948 7.27 947.54  
 14.25 945.18 17.77 944 20.76 943.12 25.92 942 32.18 940.67  
 41.53 938.63 44.67 938 50.24 936.88 54.17 936.09 54.63 936  
 55.48 935.83 64.84 934 70.21 933.14 76.48 932 85.69 930.67  
 90.55 930 91.37 930 95.59 929.44 96.66 929.56 98.88 929.36  
 99.87 928.89 100.02 928.83 100.45 928.82 111.15 928.34 112.41 928.5  
 113.52 928.63 115.72 928.63 118.68 928.83 126.56 929.92 127 930

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128.72	930.19	128.95	930.24	129.4	930.24	139.65	930.26	145.17	930.51
145.53	930.52	154.16	930.43	160.26	930.69	161.88	930.74	167.53	930.9
180.55	931.6	185.13	931.66	186.41	931.78	191.31	932	196.93	932
200.87	931.76	221.57	931.83	225.16	932	227.58	932	233.04	932.16
255.77	932.65	256.55	932.66	263.77	933.02	274.11	933.29	279.11	934
282.89	934	297.09	935.18	310.65	935.92	315.18	936	322.12	936
325.63	936.14	340.23	936.23	341.92	936.25	343.41	936.28	350.49	936.52
360.44	937.28	367.48	937.74	371.77	938	382.05	938	390.77	938.58
414.08	939.62	416.45	939.72	431.9	940.53	452.2	941.54	453.87	941.68
457.84	942	470.95	943.01	480.09	943.75	483.03	944	485.82	944.22
488.38	944.37	510.98	945.88	512.74	946	523.97	946.96	536.1	948
542.07	948.51	543.76	948.68	545.85	948.86	558.19	950.01		

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 90.55 .035 129.4 .035

Bank Sta: Left Right Coeff Contr. Expan.  
 90.55 129.4 .1 .3

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 2  
 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  
 4 39 .024 .024 0 .9 1  
 Upstream Elevation = 928.61  
 Centerline Station = 79.2  
 Downstream Elevation = 928.54  
 Centerline Station = 103.08

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1  
 \*\*\*\*\*  
 \* Q Culv Group (cfs) \* 18.77 \* Culv Full Len (ft) \* 39.00 \*  
 \* # Barrels \* 1 \* Culv Vel US (ft/s) \* 5.97 \*  
 \* Q Barrel (cfs) \* 18.77 \* Culv Vel DS (ft/s) \* 5.97 \*  
 \* E.G. US. (ft) \* 933.26 \* Culv Inv El Up (ft) \* 928.61 \*  
 \* W.S. US. (ft) \* 933.17 \* Culv Inv El Dn (ft) \* 928.54 \*  
 \* E.G. DS (ft) \* 931.75 \* Culv Frctn Ls (ft) \* 0.92 \*  
 \* W.S. DS (ft) \* 931.29 \* Culv Exit Loss (ft) \* 0.10 \*

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* Delta EG (ft)          * 1.51 * Culv Entr Loss (ft) * 0.50 *
* Delta WS (ft)         * 1.88 * Q Weir (cfs)         * 583.90 *
* E.G. IC (ft)          * 933.25 * Weir Sta Lft (ft)   * 52.81 *
* E.G. OC (ft)          * 933.26 * Weir Sta Rgt (ft)   * 228.14 *
* Culvert Control       * Outlet * Weir Submerg        * 0.00 *
* Culv WS Inlet (ft)    * 930.61 * Weir Max Depth (ft) * 1.30 *
* Culv WS Outlet (ft)   * 930.54 * Weir Avg Depth (ft) * 1.16 *
* Culv Nml Depth (ft)   * * * Weir Flow Area (sq ft) * 204.05 *
* Culv Crt Depth (ft)   * 1.56 * Min El Weir Flow (ft) * 931.98 *
*****
```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 10120.86

INPUT  
 Description:

Station Elevation Data num= 94

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	949.98	.99	949.69	3.05	948.99	5.8	948	7.27	947.54
14.25	945.18	17.77	944	20.76	943.12	25.92	942	32.18	940.67
41.53	938.63	44.67	938	50.24	936.88	54.17	936.09	54.63	936
55.48	935.83	64.84	934	70.21	933.14	76.48	932	85.69	930.67
90.55	930	91.37	930	95.59	929.44	96.66	929.56	98.88	929.36
99.87	928.89	100.02	928.83	100.45	928.82	111.15	928.34	112.41	928.5
113.52	928.63	115.72	928.63	118.68	928.83	126.56	929.92	127	930
128.72	930.19	128.95	930.24	129.4	930.24	139.65	930.26	145.17	930.51
145.53	930.52	154.16	930.43	160.26	930.69	161.88	930.74	167.53	930.9
180.55	931.6	185.13	931.66	186.41	931.78	191.31	932	196.93	932
200.87	931.76	221.57	931.83	225.16	932	227.58	932	233.04	932.16
255.77	932.65	256.55	932.66	263.77	933.02	274.11	933.29	279.11	934
282.89	934	297.09	935.18	310.65	935.92	315.18	936	322.12	936
325.63	936.14	340.23	936.23	341.92	936.25	343.41	936.28	350.49	936.52
360.44	937.28	367.48	937.74	371.77	938	382.05	938	390.77	938.58
414.08	939.62	416.45	939.72	431.9	940.53	452.2	941.54	453.87	941.68
457.84	942	470.95	943.01	480.09	943.75	483.03	944	485.82	944.22
488.38	944.37	510.98	945.88	512.74	946	523.97	946.96	536.1	948
542.07	948.51	543.76	948.68	545.85	948.86	558.19	950.01		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	90.55	.035	129.4	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 90.55 129.4 24.44 64.93 4.53 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*

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* E.G. Elev (ft)	* 931.75	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.46	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 931.29	* Reach Len. (ft)	* 24.44	* 64.93	* 4.53
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 6.01	* 84.93	* 32.63
* E.G. Slope (ft/ft)	* 0.006719	* Area (sq ft)	* 6.01	* 84.93	* 32.63
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 15.68	* 495.23	* 90.99
* Top Width (ft)	* 93.51	* Top Width (ft)	* 9.19	* 38.85	* 45.47
* Vel Total (ft/s)	* 4.87	* Avg. vel. (ft/s)	* 2.61	* 5.83	* 2.79
* Max Chl Dpth (ft)	* 2.95	* Hydr. Depth (ft)	* 0.65	* 2.19	* 0.72
* Conv. Total (cfs)	* 7342.9	* Conv. (cfs)	* 191.3	* 6041.6	* 1110.1
* Length wtd. (ft)	* 51.81	* Wetted Per. (ft)	* 9.28	* 39.15	* 45.50
* Min Ch El (ft)	* 928.34	* Shear (lb/sq ft)	* 0.27	* 0.91	* 0.30
* Alpha	* 1.24	* Stream Power (lb/ft s)	* 558.19	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.31	* Cum Volume (acre-ft)	* 0.04	* 0.25	* 0.05
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.02	* 0.04	* 0.00

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 10055.03

INPUT

Description:

Station Elevation Data		num= 83	
Sta	Elev	Sta	Elev
0	948	5.36	946.09
12.65	944	14.95	943.34
32.7	938.74	35.61	938
52.86	934	65.23	932.13
78	930.52	84.21	930.7
101.25	930	105.17	929.78
118.79	927.94	118.84	927.85
131.9	927.79	134.05	928.33
140.8	929.2	148.83	930
152.14	930	183.83	930.86
236.55	932	261.82	932
312.13	934	313.48	934
380.2	936	405.69	937.92
430.86	938.85	447.39	940
486.01	942	494.93	942.66
531.24	945.31	532.15	945.36
573.55	948.26	582.3	949.12

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.035	117.92	.035
		136.16	.035

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



.117.92 136:16 378.38 63.02 3.7 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 931.43 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.52  * Wt. n-Val.      * 0.035  * 0.035  * 0.035  *
* W.S. Elev (ft)     * 930.91 * Reach Len. (ft) * 63.02  * 63.02  * 63.02  *
* Crit W.S. (ft)     * 930.85 * Flow Area (sq ft) * 34.75  * 60.89  * 37.59  *
* E.G. Slope (ft/ft) * 0.005474 * Area (sq ft)    * 34.75  * 60.89  * 37.59  *
* Q Total (cfs)      * 601.90 * Flow (cfs)      * 92.06  * 411.53 * 98.31  *
* Top Width (ft)     * 112.44 * Top width (ft)  * 44.79  * 18.24  * 49.41  *
* Vel Total (ft/s)   * 4.52  * Avg. Vel. (ft/s) * 2.65  * 6.76  * 2.62  *
* Max Chl Dpth (ft) * 3.93  * Hydr. Depth (ft) * 0.78  * 3.34  * 0.76  *
* Conv. Total (cfs)  * 8135.5 * Conv. (cfs)     * 1244.3 * 5562.4 * 1328.8 *
* Length Wtd. (ft)  * 63.02 * Wetted Per. (ft) * 44.86  * 19.29  * 49.48  *
* Min Ch El (ft)    * 926.98 * Shear (lb/sq ft) * 0.26  * 1.08  * 0.26  *
* Alpha             * 1.64  * Stream Power (lb/ft s) * 592.99 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 0.59  * Cum Volume (acre-ft) * 0.03  * 0.14  * 0.04  *
* C & E Loss (ft)   * 0.02  * Cum SA (acres)   *        *        *        *
*****
    
```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 9989.380

INPUT  
 Description:

Station Elevation Data		num= 118		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	6.78	948.23	7.68	948	12.44	946.77	15.96	946
19.13	945.41	26.98	944	34.58	942.62	38.01	942	47.87	940.48
50.44	940	51.37	939.82	61.13	938	69.54	936.99	79.48	936
90.28	934.88	97.08	934.59	102.68	934.35	108.18	934	114.32	933.52
117.71	933.3	122.23	933.03	149.35	932	156.09	932	163.89	931.38
174.5	930.9	190.54	930.99	191.64	930.96	195.98	930.92	201.84	930.74
206.74	930.71	222.7	930.61	245.44	930	272.47	930	275.63	930.1
275.69	930	276.36	928.6	276.72	928	277.33	926.66	277.37	926.59
277.79	926.51	280.69	926	283.89	926	284.17	926.05	286.59	926.49
289.13	927.66	290.94	927.93	291.31	927.98	293.28	928.05	295.53	928.23
297.27	928.35	300.41	928.54	304.16	928.42	307.66	928.66	309.14	928.69
312.58	928.73	313.27	928.82	315.76	929.32	316.87	929.39	320.05	930
320.12	930.01	320.55	929.86	340.59	929.99	340.75	930	340.79	930
340.85	930	354.42	930	374.53	930	385.2	929.94	385.46	929.95
408.61	929.97	410.15	929.92	412.39	930	418.73	930.31	433.24	930.38
438.58	930.78	442.61	931.09	455.61	931.69	456.38	931.76	458.09	932
460.76	932	461.29	932.02	461.39	932.02	461.45	932.02	482.89	934
492.29	934	495.58	934.3	498.35	934.64	513.4	936	528.03	936
538.96	936.62	540.05	936.64	541	936.68	542.09	936.69	544.24	936.68
554.1	937.02	567.8	938	580.99	939.15	590.94	940	612.75	941.43

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616.44	941.64	620.65	941.87	623.48	942	624.95	942	630.69	942.37
654.37	944	682.42	945.98	682.81	946	683.06	946.02	683.12	946.03
683.3	946.04	686.85	946.3	689.58	946.47	706.49	947.51	713.64	948
725.84	948.97	730.86	949.43	738.37	950				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	206.74	.035	354.42	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	206.74	354.42		243.92	311.18	322.32	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 930.82	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.47	* Wt. n-Val.	* 0.035	* 0.060	*
* W.S. Elev (ft)	* 930.35	* Reach Len. (ft)	* 243.92	* 311.18	* 322.32
* Crit W.S. (ft)	* 930.35	* Flow Area (sq ft)	* 129.94	* 23.05	*
* E.G. Slope (ft/ft)	* 0.016550	* Area (sq ft)	* 129.94	* 23.05	*
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 729.36	* 34.24	*
* Top Width (ft)	* 194.35	* Top width (ft)	* 121.99	* 72.37	*
* Vel Total (ft/s)	* 4.99	* Avg. Vel. (ft/s)	* 5.61	* 1.49	*
* Max Chl Dpth (ft)	* 4.35	* Hydr. Depth (ft)	* 1.07	* 0.32	*
* Conv. Total (cfs)	* 5935.6	* Conv. (cfs)	* 5669.4	* 266.1	*
* Length wtd. (ft)	* 302.04	* Wetted Per. (ft)	* 124.72	* 72.38	*
* Min Ch El (ft)	* 926.00	* Shear (lb/sq ft)	* 1.08	* 0.33	*
* Alpha	* 1.21	* Stream Power (lb/ft s)	* 738.37	* 0.00	* 0.00
* Frctn Loss (ft)	* 2.44	* Cum Volume (acre-ft)	* 8.10	* 7.14	* 4.97
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 6.46	* 2.28	* 5.43

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle

RS: 9559.249

INPUT

Description:

Station Elevation Data		num= 97		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	6.5	949.21	14.8	948	25.88	946.28	28.22	946		
30.95	945.56	33.89	945.07	41.12	944	43.72	943.6	55.79	942		
65.88	940.44	69.07	940	75.17	939.16	83.35	938	89.63	937.13		
92.44	936.79	93.97	936.54	96.92	936	103.97	934.92	109.98	934		
111.51	933.76	122.74	932	139.9	930.98	143.92	930.71	157.27	930		
158.2	930	163.18	929.83	170.63	929.52	176.59	929.28	203.7	928		
218.28	928	238.44	927.52	238.98	927.51	241.46	927.49	242.08	927.49		
254	927.32	267.36	927.3	269.93	927.35	278.42	927.39	283.01	927.46		
296.59	927.39	304.78	927.39	309.38	927.41	310.75	927.41	311.24	927.41		
312.58	927.41	316.06	927.34	318.72	927.37	320.4	927.34	322.96	927.36		
355.93	926.89	396.93	926.29	398.44	926.27	403.58	926.19	406.77	926.19		
406.83	926.09	407	926	407.94	924.21	408.12	923.89	408.27	923.69		
408.28	923.69	413.07	923.36	418.12	923.03	418.58	923.27	418.93	923.48		
420.16	923.98	420.18	924	420.2	924.03	421.52	924.69	436.31	926		
449.91	927.02	468.93	927.91	470.78	928	472.99	928.18	476.74	930		
478.04	930.63	480.87	932	482.09	932.59	485.05	934	486.2	934.6		
489.71	935.73	490.51	936	495.97	937.99	496	938	496.06	938.03		
496.13	938.04	502.74	939.21	507.61	940	516.5	941.42	519.96	942		
528.21	943.34	532.23	944	535.88	944.63	543.57	946	554.66	948		
556.84	948.4	564.97	950								

Manning's n Values

Sta n Val		num= 3		Sta n Val	
0	.035	406.77	.035	421.52	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	406.77	421.52		20.59	105.55	110.93	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 928.15	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.43	* wt. n-Val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 927.72	* Reach Len. (ft)	* 20.59	* 105.55	* 110.93
* Crit W.S. (ft)	* 927.72	* Flow Area (sq ft)	* 109.21	* 60.14	* 56.68
* E.G. Slope (ft/ft)	* 0.004765	* Area (sq ft)	* 109.21	* 60.14	* 56.68
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 232.31	* 415.51	* 115.78
* Top width (ft)	* 234.63	* Top width (ft)	* 176.60	* 14.75	* 43.28
* Vel Total (ft/s)	* 3.38	* Avg. vel. (ft/s)	* 2.13	* 6.91	* 2.04
* Max Chl Dpth (ft)	* 4.69	* Hydr. Depth (ft)	* 0.62	* 4.08	* 1.31
* Conv. Total (cfs)	* 11061.8	* Conv. (cfs)	* 3365.4	* 6019.2	* 1677.3
* Length wtd. (ft)	* 71.23	* Wetted Per. (ft)	* 176.61	* 16.61	* 43.39
* Min ch El (ft)	* 923.03	* Shear (lb/sq ft)	* 0.18	* 1.08	* 0.39
* Alpha	* 2.45	* Stream Power (lb/ft s)	* 564.97	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.27	* Cum Volume (acre-ft)	* 7.79	* 6.46	* 4.68
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 5.96	* 1.79	* 5.00

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\*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 9443.656

INPUT

Description:

Station Elevation Data

num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	9.42	949.2	13.68	949.06	22.03	948	23.64	948
36.19	946.21	37.43	946	37.7	945.94	49.78	944	51.74	943.62
56.79	942.62	60	942	63.03	941.39	70.06	940	76.42	938.77
80.23	938	83.91	937.26	91.51	936	101.53	934.31	103.35	934
104.43	933.82	107.18	933.45	118.38	932	133.24	931.12	150.69	930
184.84	928.74	203.94	928	211.18	927.33	214.92	927.13	236.02	926
250.9	925.39	274.3	925.56	292.5	926	295.2	926.06	314.99	926.06
340.53	926	342.39	925.93	363.18	925.08	363.37	924.92	364.26	924
364.29	924	365.42	922.91	365.43	922.9	365.46	922.86	366.4	922.89
366.63	922.91	380.44	924	381.13	924.16	382.1	924.15	382.12	924.17
382.9	925.03	383.93	926	383.94	926.01	398.08	926	426	926.42
439.72	926	445.48	926	447.38	928	448.15	928.45	450.82	930
451.47	930.36	454.14	932	454.84	932.4	457.62	933.98	457.65	934
457.94	934.19	460.71	936	460.9	936.1	463.56	938	467.83	939.62
468.69	940	470.48	940.71	473.58	942	476.5	943.1	478.82	944
483.26	945.76	483.89	946	484.96	946.45	488.7	948	492.64	948.96
495.25	950								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	363.18	.035	383.93	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	363.18	383.93		30.34	114.86	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*

* E.G. Elev (ft)	* 927.16	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.22	* wt. n-Val.	* 0.035	* 0.035	* 0.100



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* W.S. Elev (ft)      * 926.94 * Reach Len. (ft)    * 30.34 * 114.86 * 56.64 *
* Crit W.S. (ft)     *      * Flow Area (sq ft)  * 157.56 * 67.76 * 49.73 *
* E.G. Slope (ft/ft) * 0.003104 * Area (sq ft)      * 157.56 * 67.76 * 49.73 *
* Q Total (cfs)      * 763.60 * Flow (cfs)        * 394.16 * 334.22 * 35.22 *
* Top Width (ft)     * 227.99 * Top Width (ft)    * 144.79 * 20.75 * 62.45 *
* Vel Total (ft/s)   * 2.78 * Avg. Vel. (ft/s)  * 2.50 * 4.93 * 0.71 *
* Max Chl Dpth (ft) * 4.08 * Hydr. Depth (ft)  * 1.09 * 3.27 * 0.80 *
* Conv. Total (cfs)  * 13705.3 * Conv. (cfs)       * 7074.5 * 5998.7 * 632.1 *
* Length wtd. (ft)  * 77.41 * Wetted Per. (ft)  * 144.86 * 22.50 * 62.87 *
* Min Ch El (ft)    * 922.86 * Shear (lb/sq ft)  * 0.21 * 0.58 * 0.15 *
* Alpha             * 1.80 * Stream Power (lb/ft s) * 495.25 * 0.00 * 0.00 *
* Frctn Loss (ft)   * 0.14 * Cum Volume (acre-ft) * 7.73 * 6.30 * 4.54 *
* C & E Loss (ft)   * 0.02 * Cum SA (acres)    * 5.89 * 1.75 * 4.87 *
*****

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 9322.807

INPUT

Description:

Station Elevation Data

num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	7.9	948	11.64	947.11	17.81	946.58	25.16	946
33.26	944.66	37.57	944	44.54	942.84	50.6	942	54.42	941.51
55.76	941.3	56.25	941.19	61.72	940.41	63.05	940.19	64.11	940
66.09	939.59	75.08	938	75.31	938	85.85	936.6	90.37	936
91.41	935.87	107.67	934	110.02	933.72	124.66	932	138.91	931.12
150.94	930	168.9	929.36	182.99	929.07	217.18	928	224.14	927.19
225.41	927.18	236.93	926.73	238.25	926.66	245.34	926	248.86	926
280.73	925.57	301.42	925.29	315.41	925.14	316.42	924.79	317.04	924.39
317.5	924.03	317.54	924	319.17	922.5	319.97	922	326.91	921.73
332.46	921.52	335.76	921.44	338.49	921.28	338.92	921.9	340.13	923.5
340.28	923.71	342.76	923.61	360.65	923.1	370.45	923.93	371.05	924
371.21	924	371.29	924	403.15	925.77	403.45	925.79	405.9	925.96
407.61	926	408.21	926.16	414.2	928	416.35	928.68	420.64	930
426.69	931.84	426.94	932	427.08	932.09	429.92	934	431.63	935.02
433.14	936	434.72	937.03	436.09	938	438.21	939.59	438.53	939.81
438.79	940	439.08	940.2	439.67	940.6	441.71	942	443.29	943.14
444.01	943.67	444.43	944	445.03	944.41	446.74	945.72	447.16	946
448.27	946.82	449.8	947.89	449.94	948	450.02	948.06	452.79	950

Manning's n values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
*****		*****		*****	

0 .035 315.41 .035 340.28 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 315.41 340.28 111.46 51.15 47.84 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

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*****
* E.G. Elev (ft) * 927.00 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.15 * Wt. n-Val. * 0.035 * 0.035 * 0.100 *
* W.S. Elev (ft) * 926.85 * Reach Len. (ft) * 111.46 * 51.15 * 47.84 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 93.57 * 118.35 * 173.84 *
* E.G. Slope (ft/ft) *0.001154 * Area (sq ft) * 93.57 * 118.35 * 173.84 *
* Q Total (cfs) * 763.60 * Flow (cfs) * 147.77 * 455.51 * 160.32 *
* Top Width (ft) * 176.71 * Top width (ft) * 81.65 * 24.87 * 70.19 *
* Vel Total (ft/s) * 1.98 * Avg. vel. (ft/s) * 1.58 * 3.85 * 0.92 *
* Max Chl Dpth (ft) * 5.57 * Hydr. Depth (ft) * 1.15 * 4.76 * 2.48 *
* Conv. Total (cfs) * 22474.4 * Conv. (cfs) * 4349.2 * 13406.8 * 4718.4 *
* Length wtd. (ft) * 57.21 * Wetted Per. (ft) * 81.69 * 27.15 * 70.42 *
* Min Ch El (ft) * 921.28 * Shear (lb/sq ft) * 0.08 * 0.31 * 0.18 *
* Alpha * 2.42 * Stream Power (lb/ft s) * 452.79 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.15 * Cum Volume (acre-ft) * 7.64 * 6.06 * 4.40 *
* C & E Loss (ft) * 0.09 * Cum SA (acres) * 5.81 * 1.69 * 4.78 *
*****
    
```

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle

RS: 9266.019

INPUT

Description:

Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	5.85	958.49	7.59	958	14.2	956.24	15.08	956
22.2	954.1	22.59	954	23.37	953.83	31.46	952	39.97	950.18
40.8	950	41.55	949.84	46.07	948.82	49.6	948	52.03	947.44
57.65	946	60.77	945.15	64.95	944	71.43	942.27	72.41	942
73.15	941.87	80.54	940	88.93	938.02	89	938	89.07	937.98
89.83	937.8	97.28	936	103.59	934.47	105.66	934	112.59	933.03
118.67	932	122.18	931.78	122.82	931.76	123.97	931.73	124.43	931.71
128.31	931.52	148.38	930.62	164.16	930.31	170.99	930	174.47	929.89
179.69	929.7	185.99	929.59	199.65	929.15	206.54	929.01	211.15	928.92
234.74	928.32	244.3	928	249.75	928	252.28	927.87	300.08	926
322.02	926	343.87	925.87	348.04	925.86	353.31	925.84	354.41	925.83

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359.99	925.84	365.96	925.79	374.02	925.72	388.44	925.09	392.14	925.1
394.8	924.76	397.19	924.27	398.04	924.17	399.58	924	404.99	923.41
406.68	923.3	407.05	922.98	409.08	922	409.17	921.94	409.18	921.93
409.42	921.93	410.45	921.88	421.24	921.33	421.57	922	421.6	922.06
422.79	924.47	422.82	924.53	423.39	924.5	424.51	924.57	426.3	924.61
426.87	924.63	428.38	924.67	469.04	925.82	475.23	926	476.61	926.63
479.59	928	481.78	929.01	483.99	930	486.57	931.22	488.01	932
491.21	933.97	491.25	934	491.7	934.31	494.19	936	496.36	937.66
496.82	938	498.42	938.96	499.89	940	501.53	941.13	502.68	942
504.3	943.1	505.42	943.89	505.58	944	508.1	945.84	508.33	946
511.92	947.99	511.92	948	511.93	948.01	515.43	950		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	392.14	.035	422.79	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	392.14	422.79		19.4	235.37	285.83	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 926.76	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.02	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 925.74	* Reach Len. (ft)	* 19.40	* 235.37	* 285.83
* Crit W.S. (ft)	* 925.74	* Flow Area (sq ft)	* 7.33	* 85.91	* 26.86
* E.G. Slope (ft/ft)	* 0.010847	* Area (sq ft)	* 7.33	* 85.91	* 26.86
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 16.10	* 717.43	* 30.07
* Top width (ft)	* 95.15	* Top width (ft)	* 20.92	* 30.65	* 43.57
* Vel Total (ft/s)	* 6.36	* Avg. Vel. (ft/s)	* 2.20	* 8.35	* 1.12
* Max Chl Dpth (ft)	* 4.41	* Hydr. Depth (ft)	* 0.35	* 2.80	* 0.62
* Conv. Total (cfs)	* 7331.7	* Conv. (cfs)	* 154.6	* 6888.3	* 288.8
* Length Wtd. (ft)	* 177.07	* Wetted Per. (ft)	* 20.94	* 33.10	* 43.63
* Min Ch El (ft)	* 921.33	* Shear (lb/sq ft)	* 0.24	* 1.76	* 0.42
* Alpha	* 1.62	* Stream Power (lb/ft s)	* 515.43	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.60	* Cum Volume (acre-ft)	* 7.52	* 5.94	* 4.29
* C & E Loss (ft)	* 0.18	* Cum SA (acres)	* 5.68	* 1.66	* 4.72

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 9003.470

INPUT  
 Description:

Station Elevation Data		num= 95		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	6.15	958.34	7.4	958	8.55	957.67	14.61	956
16.54	955.46	21.78	954	28.56	952.15	29.08	952	30	951.71
35.24	950	40.03	948.77	43.57	948	44.69	947.75	47.3	947.19
53.18	946	57.13	945.19	62.98	944	65.85	943.28	69.78	942
75.12	940.36	77.89	939.37	81.74	938	83.87	937.27	87.45	936
92.18	934.33	93.28	934	95.4	933.4	98.41	932.51	100.31	932
107.12	930.29	108.33	930	111.33	929.79	124.47	929.19	150.31	928
162.33	927.31	167.22	927.22	182.56	926	183.29	926	206.7	924.02
206.87	924	210.21	924	287.67	923.39	288.83	923.38	307.05	923.27
327.91	923.23	329.31	922.93	329.48	922.89	329.96	922.27	330.12	922
332.94	920.67	334.1	920.45	336.2	921.07	337.6	921.41	338.95	921.49
339.73	921.53	339.84	921.54	341.8	921.95	342.66	922.14	350.23	923.93
358.7	925.87	359.21	926	359.25	926	359.43	926.04	360.41	926.18
361.49	926.73	363.5	927	363.79	927.05	364.79	927.3	367.44	928
371.24	929.02	373.54	929.63	374.91	930	376.77	930.5	382.17	932
385.61	933.13	387.14	934	389.87	935.58	390.58	936	393.04	937.42
394.79	938	396.08	938.43	400.75	940	404.45	941.23	406.81	942
408.16	942.43	412.87	944	414.75	944.55	415.61	944.8	416.74	945.07
418.95	946	420.22	946.49	424.13	948	425.93	948.69	429.35	950

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	327.91	.035	350.23	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	327.91	350.23		59.54	96.43	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 924.92	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.41	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 924.51	* Reach Len. (ft)	* 59.54	* 96.43	* 71.30
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 115.85	* 55.13	* 0.74
* E.G. Slope (ft/ft)	* 0.007603	* Area (sq ft)	* 115.85	* 55.13	* 0.74
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 403.25	* 359.93	* 0.41
* Top width (ft)	* 151.90	* Top width (ft)	* 127.03	* 22.32	* 2.54
* Vel Total (ft/s)	* 4.45	* Avg. Vel. (ft/s)	* 3.48	* 6.53	* 0.56
* Max chl Dpth (ft)	* 4.06	* Hydr. Depth (ft)	* 0.91	* 2.47	* 0.29
* Conv. Total (cfs)	* 8757.4	* Conv. (cfs)	* 4624.7	* 4127.9	* 4.8



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* Length Wtd. (ft)      * 74.42 * Wetted Per. (ft)      * 127.06 * 23.54 * 2.61 *
* Min Ch El (ft)      * 920.45 * Shear (lb/sq ft)      * 0.43 * 1.11 * 0.13 *
* Alpha                * 1.34 * Stream Power (lb/ft s) * 429.35 * 0.00 * 0.00 *
* Frctn Loss (ft)     * 0.47 * Cum Volume (acre-ft)  * 7.49 * 5.56 * 4.20 *
* C & E Loss (ft)     * 0.04 * Cum SA (acres)        * 5.64 * 1.51 * 4.57 *
*****

```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8906.253

INPUT  
 Description:

Station Elevation Data		num= 94		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	6.61	958	10.17	956.91	13.21	956	19.69	954		
19.7	954	29.67	952	34.64	950.95	40.87	950	49.14	948.51		
52.04	948	53.52	947.71	58.39	946.76	60.42	946.35	62.05	946		
63.76	945.64	71.39	944	79.47	942.29	80.81	942	81.92	941.71		
88.79	940	89.59	939.76	95.56	938	97.22	937.52	102.61	936		
107.34	934.8	110.63	934	115.38	932.94	117.23	932.51	119.18	932		
123.86	930.79	126.87	930	134.56	928.15	135.14	928	150.82	926.26		
153.19	926	153.36	925.97	153.55	925.94	160.26	924.87	165.42	924		
178.5	924	217.3	923.2	271.94	922.69	298.77	922.44	299.61	922.44		
311.14	922.54	311.16	922.31	311.28	922	311.28	920.72	311.65	920.37		
311.74	920	311.84	919.8	311.98	919.77	312.18	919.73	312.52	919.75		
312.79	919.78	314.05	919.84	315.84	919.8	316.35	920	317.06	920.3		
319.49	921.3	321.29	921.81	321.94	921.85	327.01	922	336.16	922		
338.01	923.04	339.62	924	340.68	924.36	349.46	926	353	927.26		
354.34	927.7	355.24	928	358.77	929.23	361.15	930	363.74	930.87		
366.7	932	369.46	933.33	370.87	934	375.22	935.95	375.33	936		
375.6	936.13	379.33	938	380.1	938.35	383.39	940	384.22	940.4		
387.29	942	388.66	942.28	392.47	944	395.71	945.04	398.78	946		
404.01	947.68	405.06	948	407	948.59	412.03	950				

Manning's n Values		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	311.14	.035	321.29	.1		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	311.14	321.29		95.99	63.07	70.55	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 924.42 * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.29  * wt. n-val.            * 0.035 * 0.035 * 0.100 *
* W.S. Elev (ft)     * 924.13 * Reach Len. (ft)       * 95.99 * 63.07 * 70.55 *
* Crit W.S. (ft)     *        * Flow Area (sq ft)     * 148.90 * 37.37 * 36.09 *
*****

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* E.G. Slope (ft/ft)	*0.005342	* Area (sq ft)	* 148.90	* 37.37	* 36.09
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 467.05	* 237.00	* 59.56
* Top Width (ft)	* 175.32	* Top Width (ft)	* 146.47	* 10.15	* 18.70
* Vel Total (ft/s)	* 3.43	* Avg. Vel. (ft/s)	* 3.14	* 6.34	* 1.65
* Max Chl Dpth (ft)	* 4.40	* Hydr. Depth (ft)	* 1.02	* 3.68	* 1.93
* Conv. Total (cfs)	* 10448.0	* Conv. (cfs)	* 6390.4	* 3242.7	* 814.9
* Length Wtd. (ft)	* 83.95	* Wetted Per. (ft)	* 146.49	* 12.79	* 19.26
* Min Ch El (ft)	* 919.73	* Shear (lb/sq ft)	* 0.34	* 0.97	* 0.62
* Alpha	* 1.59	* Stream Power (lb/ft s)	* 412.03	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.41	* Cum Volume (acre-ft)	* 7.31	* 5.46	* 4.17
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 5.46	* 1.48	* 4.55

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8843.186

INPUT  
 Description:

Station Elevation Data num= 88

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	3.8	949.23	9.69	948	11.38	947.62	18.83	946
25.3	944.48	27.41	944	33.34	942.59	35.89	942	39.92	941.07
44.58	940	47.35	939.33	52.42	938	57.21	936.72	59.59	936
60.72	935.67	66.33	934	66.79	933.86	73.81	932	79.88	930.39
81.48	930	86.49	928.72	89.61	928	90.62	927.77	98.5	926
109.9	925.11	128.5	924	128.7	924	197.13	922.4	202.18	922.29
211.57	922	229.36	922	243.55	922	246.14	922.01	263.96	922.07
263.97	922.03	264.02	922	264.14	921.67	264.67	920	264.72	919.95
265.1	919.53	265.28	919.47	265.37	919.39	266.79	919.52	269.36	919.63
269.61	919.37	271.23	919.61	272.08	920	274.31	921.23	274.32	921.23
283.46	921.78	287.45	922	293.84	923.51	295.06	923.77	296.23	924
300.2	924.7	302.18	925.08	302.85	925.21	304.39	926	307.66	927.89
308.11	928	311.37	929.74	311.85	930	312.45	930.34	315.65	932
318.25	933.45	319.32	934	319.62	934.17	322.77	936	323.38	936.36
324.5	936.94	326.17	938	327.31	938.72	329.3	940	330.4	940.67
332.57	942	335.05	943.17	335.41	943.17	339.74	943.03	346.3	943.66
346.84	943.73	347.85	943.84	348.41	944	348.97	944.22	353.75	946
356.68	947.16	358.94	948	364.07	950				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	263.96	.035	274.31	.1

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
263.96	274.31	78.94	118.84	128.57	.1	.3	

CROSS SECTION OUTPUT Profile #PF 1

OXF157-159Bridges.rep

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*****
* E.G. Elev (ft)      * 924.01 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.28  * Wt. n-Val.      * 0.035  * 0.035  * 0.100  *
* W.S. Elev (ft)     * 923.73 * Reach Len. (ft) * 78.94  * 118.84 * 128.57 *
* Crit W.S. (ft)     *       * Flow Area (sq ft) * 149.62 * 39.67  * 34.05  *
* E.G. Slope (ft/ft) * 0.004389 * Area (sq ft)    * 149.62 * 39.67  * 34.05  *
* Q Total (cfs)      * 763.60 * Flow (cfs)      * 477.64 * 239.38 * 46.58  *
* Top Width (ft)     * 154.63 * Top Width (ft)  * 123.71 * 10.35  * 20.56  *
* Vel Total (ft/s)   * 3.42  * Avg. Vel. (ft/s) * 3.19  * 6.03  * 1.37  *
* Max Chl Dpth (ft)  * 4.36  * Hydr. Depth (ft) * 1.21  * 3.83  * 1.66  *
* Conv. Total (cfs)  * 11525.6 * Conv. (cfs)     * 7209.4 * 3613.1 * 703.0  *
* Length Wtd. (ft)  * 103.50 * Wetted Per. (ft) * 123.74 * 12.63  * 20.78  *
* Min Ch El (ft)    * 919.37 * Shear (lb/sq ft) * 0.33  * 0.86  * 0.45  *
* Alpha             * 1.53  * Stream Power (lb/ft s) * 364.07 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 0.28  * Cum Volume (acre-ft) * 6.98  * 5.40  * 4.11  *
* C & E Loss (ft)   * 0.01  * Cum SA (acres)   * 5.16  * 1.46  * 4.52  *
*****

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle

RS: 8712.623

INPUT

Description:

Station Elevation Data		num= 79		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	9.85	948	14.24	947	18.37	946	22.09	945.07
26.34	944	29.65	943.09	33.32	942	37.38	940.85	40.02	940
42.24	939.27	46.19	938	48.98	937.12	52.54	936	55.87	934.97
58.94	934	64.89	932.06	65.09	932	65.25	931.95	71.91	930
77.03	928.73	80.07	928	86.32	926.94	91.75	926	105.6	925.45
108.02	925.39	149.01	924	159.02	924	162.97	923.65	170.08	923.55
183.95	922.99	184.61	922.98	214.4	922	229.09	922	237.23	922
244.86	920.77	249.7	920	257.02	918.83	258.23	918.56	261.74	918.51
261.89	918.52	262	918.51	272.22	918.4	272.38	918.68	273.2	920.15
273.28	920.26	273.44	920.07	274.06	920.4	276.69	922	278.85	922.94
279.81	923.57	280.72	924	282.33	924.76	286.44	926	290.65	928
293.9	929.42	295.07	930	298.47	931.59	299.29	932	300.91	932.75
304.2	933.62	305.64	934	309.99	935.15	313.25	936	323.21	936.98
331.46	938	334.47	938.54	342.42	940	344.45	940.52	350.22	942
351.64	942.37	352.97	942.71	356.5	943.65	357.82	944	358.86	944.32
364.96	946	367.36	946.9	370.22	948	375.55	950		

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

OXF157-159Bridges.rep

\*\*\*\*\*  
 0 .035 237.23 .035 276.69 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 237.23 276.69 179.1 165.74 140.27 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 923.72 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.25 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.100 \*  
 \* W.S. Elev (ft) \* 923.47 \* Reach Len. (ft) \* 179.10 \* 165.74 \* 140.27 \*  
 \* Crit W.S. (ft) \* \* \* Flow Area (sq ft) \* 65.69 \* 148.90 \* 2.36 \*  
 \* E.G. Slope (ft/ft) \* 0.001869 \* Area (sq ft) \* 65.69 \* 148.90 \* 2.36 \*  
 \* Q Total (cfs) \* 763.60 \* Flow (cfs) \* 121.30 \* 641.09 \* 1.21 \*  
 \* Top width (ft) \* 107.50 \* Top width (ft) \* 65.08 \* 39.46 \* 2.96 \*  
 \* Vel Total (ft/s) \* 3.52 \* Avg. Vel. (ft/s) \* 1.85 \* 4.31 \* 0.51 \*  
 \* Max Chl Dpth (ft) \* 5.07 \* Hydr. Depth (ft) \* 1.01 \* 3.77 \* 0.80 \*  
 \* Conv. Total (cfs) \* 17662.4 \* Conv. (cfs) \* 2805.7 \* 14828.7 \* 28.0 \*  
 \* Length wtd. (ft) \* 171.05 \* Wetted Per. (ft) \* 65.10 \* 41.44 \* 3.32 \*  
 \* Min Ch El (ft) \* 918.40 \* Shear (lb/sq ft) \* 0.12 \* 0.42 \* 0.08 \*  
 \* Alpha \* 1.30 \* Stream Power (lb/ft s) \* 375.55 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.27 \* Cum Volume (acre-ft) \* 6.78 \* 5.14 \* 4.06 \*  
 \* C & E Loss (ft) \* 0.04 \* Cum SA (acres) \* 4.99 \* 1.39 \* 4.48 \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8542.514

INPUT

Description:

Station Elevation Data num= 52  

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	15.6	928	20.7	927.39	33.6	926	39.69	925.33
42.53	925.1	51.88	924.16	53.32	924	54.75	923.85	56.09	923.74
66.89	922.65	73.01	922	96.1	920.8	127.27	921.08	161.78	921.96
188.75	921.47	189.21	920.81	189.79	920	190.62	918.96	191.62	918.22
195.91	918.11	197.2	918.08	197.64	918.33	200.72	920	201.63	920.64
201.8	920.78	213.92	921.89	214.12	922	214.68	922.27	219.08	924
220.07	924.36	223.63	925.7	224.41	926	228.92	927.76	229.8	928
230.63	928.23	236.77	930	238.66	930.54	243.97	932	245.45	932.41
250.42	933.53	252.52	934	262.73	935.17	267.43	935.7	268.87	935.85
271.24	936	283.7	936	287.85	936.53	289.75	936.63	293.22	938
296.52	939.3	298.17	939.95						

Manning's n Values num= 3  

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	188.75	.035	201.8	.1



Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 188.75 201.8 234.69 160.81 130.54 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 923.40 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.12 * Wt. n-Val. * 0.035 * 0.035 * 0.100 *
* W.S. Elev (ft) * 923.28 * Reach Len. (ft) * 234.69 * 160.81 * 130.54 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 227.47 * 57.20 * 25.82 *
* E.G. Slope (ft/ft) * 0.001383 * Area (sq ft) * 227.47 * 57.20 * 25.82 *
* Q Total (cfs) * 763.60 * Flow (cfs) * 526.24 * 217.56 * 19.81 *
* Top width (ft) * 156.64 * Top width (ft) * 128.13 * 13.05 * 15.46 *
* Vel Total (ft/s) * 2.46 * Avg. Vel. (ft/s) * 2.31 * 3.80 * 0.77 *
* Max chl Dpth (ft) * 5.20 * Hydr. Depth (ft) * 1.78 * 4.38 * 1.67 *
* Conv. Total (cfs) * 20534.0 * Conv. (cfs) * 14151.0 * 5850.3 * 532.7 *
* Length wtd. (ft) * 202.01 * wetted Per. (ft) * 128.25 * 15.30 * 15.79 *
* Min Ch El (ft) * 918.08 * Shear (lb/sq ft) * 0.15 * 0.32 * 0.14 *
* Alpha * 1.29 * Stream Power (lb/ft s) * 298.17 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.50 * Cum Volume (acre-ft) * 6.18 * 4.75 * 4.01 *
* C & E Loss (ft) * 0.03 * Cum SA (acres) * 4.59 * 1.29 * 4.45 *
*****
    
```

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8379.502

INPUT

Description:

```

Station Elevation Data num= 65
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 929.99 1.37 929.86 2 929.81 6.43 929.38 11.59 928.86
20.74 928 27.84 927.51 51.79 926 70.04 925.39 82.11 925.12
103.62 924.48 131.5 924 132.66 924 137.78 923.92 138.07 923.91
149.17 923.7 153.48 923.6 175.63 923.07 205.41 922.39 218.41 922
231.41 921.91 245.45 921.79 308.74 921.33 315.6 921.29 316.52 921.28
345.72 920.83 346.18 920.2 346.32 920 346.61 919.66 347.98 918
348.05 917.92 348.63 917.1 354.42 917.74 354.6 917.75 354.68 917.78
355.09 918 355.7 918.23 356.96 918.96 358.64 920 359.67 920.56
360.55 921.1 360.93 921.33 384.61 921.96 385.87 922 386.22 922.16
390.19 924 390.38 924.09 392.19 924.95 393.22 925.44 394.35 926
394.81 926.28 398.16 928 399.11 928.54 401.53 930 403.65 931.22
405.03 932 407.32 933.35 408.52 934 410.94 935.72 411.41 936
411.95 936.44 414.22 938 416.48 939.57 417.07 939.89 417.22 939.97
    
```

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 345.72 .035 360.93 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 345.72 360.93 54.15 191.61 366.55 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 922.87 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.45 \* Wt. n-val. \* 0.035 \* 0.035 \* 0.100 \*  
 \* W.S. Elev (ft) \* 922.42 \* Reach Len. (ft) \* 54.15 \* 191.61 \* 366.55 \*  
 \* Crit W.S. (ft) \* 922.40 \* Flow Area (sq ft) \* 120.31 \* 58.54 \* 19.17 \*  
 \* E.G. Slope (ft/ft) \* 0.005537 \* Area (sq ft) \* 120.31 \* 58.54 \* 19.17 \*  
 \* Q Total (cfs) \* 763.60 \* Flow (cfs) \* 340.71 \* 405.58 \* 17.31 \*  
 \* Top Width (ft) \* 182.80 \* Top Width (ft) \* 141.74 \* 15.21 \* 25.86 \*  
 \* Vel Total (ft/s) \* 3.86 \* Avg. Vel. (ft/s) \* 2.83 \* 6.93 \* 0.90 \*  
 \* Max Chl Dpth (ft) \* 5.32 \* Hydr. Depth (ft) \* 0.85 \* 3.85 \* 0.74 \*  
 \* Conv. Total (cfs) \* 10261.7 \* Conv. (cfs) \* 4578.6 \* 5450.4 \* 232.6 \*  
 \* Length Wtd. (ft) \* 202.83 \* Wetted Per. (ft) \* 141.75 \* 18.02 \* 25.96 \*  
 \* Min Ch El (ft) \* 917.10 \* Shear (lb/sq ft) \* 0.29 \* 1.12 \* 0.26 \*  
 \* Alpha \* 1.96 \* Stream Power (lb/ft s) \* 417.22 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.29 \* Cum Volume (acre-ft) \* 5.24 \* 4.54 \* 3.94 \*  
 \* C & E Loss (ft) \* 0.02 \* Cum SA (acres) \* 3.86 \* 1.24 \* 4.39 \*  
 \*\*\*\*\*

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8109.907

INPUT

Description:

Station Elevation Data num= 75  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 930 7.95 929.2 19.72 928 44.1 926.29 48.51 926  
 91.2 924.68 111.71 924 112.56 924 119.49 923.75 141.98 923.18  
 142.75 923.18 231.99 922 304.72 922 321.57 922 343.78 920.19  
 345.75 920 351.71 920 358.84 920.37 361.48 920.5 362.42 920.47  
 362.48 920.57 363.64 918.05 363.67 918 364.19 916.86 364.2 916.84  
 365.79 916.84 368.97 916.84 369.05 916.84 369.09 916.88 370.67 918  
 373.15 919.36 373.7 919.76 373.84 919.85 373.87 919.85 377.03 920  
 381.99 920.23 383.39 920.32 389.05 920.56 390.33 920.61 406.68 920.77  
 412.66 920.95 417.17 920.69 420.19 920.62 431.69 920.52 475.33 920.15  
 490.51 920 514.63 920 515.65 920.1 517.3 920.19 524.52 920.68

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528.33	920.91	530.66	921.05	542.57	921.56	545	922	553.73	923.63
555.76	924	556.91	924.22	558.4	924.49	567.11	926	574.43	927.04
582.06	928	588.4	929.17	593.95	930	609.47	930	612.68	931.24
614.68	932	618.91	933.62	619.92	934	622.18	934.87	625.73	936
626.68	936.33	630.69	938	631.42	938.38	632.59	938.98	634.84	939.95

Manning's n Values num= 4  
 Sta n Val Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 362.48 .035 373.87 .035 542.57 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 362.48 373.87 237.06 210.48 130.06 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 921.56 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.37 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.035 \*  
 \* W.S. Elev (ft) \* 921.19 \* Reach Len. (ft) \* 237.06 \* 210.48 \* 130.06 \*  
 \* Crit W.S. (ft) \* 921.19 \* Flow Area (sq ft) \* 25.20 \* 38.81 \* 129.44 \*  
 \* E.G. Slope (ft/ft) \* 0.007440 \* Area (sq ft) \* 25.20 \* 38.81 \* 129.44 \*  
 \* Q Total (cfs) \* 763.60 \* Flow (cfs) \* 80.24 \* 271.99 \* 411.37 \*  
 \* Top Width (ft) \* 202.36 \* Top width (ft) \* 30.95 \* 11.39 \* 160.02 \*  
 \* Vel Total (ft/s) \* 3.95 \* Avg. Vel. (ft/s) \* 3.18 \* 7.01 \* 3.18 \*  
 \* Max chl Dpth (ft) \* 4.35 \* Hydr. Depth (ft) \* 0.81 \* 3.41 \* 0.81 \*  
 \* Conv. Total (cfs) \* 8853.0 \* Conv. (cfs) \* 930.3 \* 3153.4 \* 4769.3 \*  
 \* Length Wtd. (ft) \* 163.18 \* Wetted Per. (ft) \* 31.07 \* 14.66 \* 160.09 \*  
 \* Min ch El (ft) \* 916.84 \* Shear (lb/sq ft) \* 0.38 \* 1.23 \* 0.38 \*  
 \* Alpha \* 1.54 \* Stream Power (lb/ft s) \* 634.84 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.20 \* Cum Volume (acre-ft) \* 5.15 \* 4.32 \* 3.32 \*  
 \* C & E Loss (ft) \* 0.02 \* Cum SA (acres) \* 3.76 \* 1.18 \* 3.61 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle

RS: 7770.441

INPUT

Description:

Station Elevation Data		num= 98		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	940	9.71	938.57	13.6	938	15.77	937.74	23.51	936.71		
29.11	936	35.65	935.3	47.86	934	51.79	933.68	56.81	933.28		
73.67	932	93.25	930.9	101.17	930.52	106.76	930.2	107.16	930.19		
112.82	930	136.4	929.24	142.92	929.12	154.49	928.83	166.92	928.46		
184.67	928.11	188.89	928	189.47	928	192.94	927.91	195.37	927.82		
203.38	927.54	212.63	927.18	219.51	926.91	248.3	926	259.1	925.67		
259.96	925.64	268.71	925.33	315.38	924	316.23	923.97	316.34	923.97		
316.93	923.95	317.19	923.94	322.63	923.75	334.49	923.28	338.7	923.1		
369.55	922	378.44	920.53	381.36	920	384.59	919.42	385.67	919.25		
385.87	918.77	386.48	918	387.67	916.49	388.06	916.02	388.08	916.01		
388.45	915.97	390.36	916	393.11	916	394.44	916.18	394.62	916.44		
396.23	917.79	396.5	917.99	396.51	918	398.09	919.2	456.78	919.62		
471.53	919.53	515.67	918.28	521.85	918	535.46	919.52	561.54	918.51		
592.86	918.71	618.57	920	633.45	920	646.56	920.3	648.41	920.3		
654.78	920.28	655.28	920.28	663.87	920.19	666.05	920.2	670.79	920.25		
680.82	920.78	684.5	920.95	687.89	921.16	694.13	921.48	701.54	922		
702.39	922	706.35	923.93	706.67	924.09	710.75	926	714.38	927.7		
715.02	928	715.39	928.17	718.83	930	719.77	930.52	722.23	932		
722.73	932.28	724.96	933.56	725.79	934	725.84	934.03	729.55	936		
733.14	937.9	733.34	938	737.04	939.96						

Manning's n Values		num= 4		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	385.67	.035	398.09	.035	680.82	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	385.67	398.09		60.47	240.54	355.76	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 920.16	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.32	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 919.84	* Reach Len. (ft)	* 60.47	* 240.54	* 355.76
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 1.04	* 37.47	* 168.28
* E.G. Slope (ft/ft)	* 0.007284	* Area (sq ft)	* 1.04	* 37.47	* 168.28
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 1.68	* 247.95	* 513.97
* Top Width (ft)	* 233.12	* Top width (ft)	* 3.42	* 12.42	* 217.28
* Vel Total (ft/s)	* 3.69	* Avg. vel. (ft/s)	* 1.62	* 6.62	* 3.05
* Max chl Dpth (ft)	* 3.87	* Hydr. Depth (ft)	* 0.30	* 3.02	* 0.77
* Conv. Total (cfs)	* 8947.2	* Conv. (cfs)	* 19.6	* 2905.3	* 6022.3
* Length wtd. (ft)	* 214.75	* wetted Per. (ft)	* 3.47	* 15.18	* 217.44
* Min ch El (ft)	* 915.97	* Shear (lb/sq ft)	* 0.14	* 1.12	* 0.35
* Alpha	* 1.50	* Stream Power (lb/ft s)	* 737.04	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.63	* Cum Volume (acre-ft)	* 5.08	* 4.14	* 2.87
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	* 3.66	* 1.13	* 3.05



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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle

RS: 7438.793

INPUT

Description:

Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	940	16.63	938	19.14	937.72	23.78	937.2	34.3	936
44.11	935.29	59.53	934	75.52	933.33	82.58	933.09	98.14	932.45
108.23	932.2	108.84	932.18	114.29	932	117.12	932	129.37	931.72
132.62	931.61	141.96	931.33	146.53	931.18	182.86	930	197.1	929.6
199.67	929.53	204.14	929.39	208.43	929.25	245.62	928.06	247.4	928
274.27	927.1	285.61	926.7	301.46	926.14	306.33	926	313.9	925.46
320.25	925.08	326.1	924.7	340.91	924	359	922.93	363.42	922.72
376.3	922	376.73	921.92	376.84	921.89	381.08	920.82	382.67	920
384.2	919.07	384.63	918.93	386.33	918	386.98	917.7	396.37	917.35
424.77	917.6	455.06	917.55	486.41	917.42	507.09	918	521.66	918.38
522.05	918.39	522.07	918.25	522.37	918	523.33	916.72	523.95	916.07
523.98	916	524.53	915.22	525.22	915.21	530.56	915.16	531.05	915.43
532.83	916.66	534.65	917.53	540.1	918	540.31	918.02	542.15	918.04
555.68	918.76	561.02	918.95	565.18	919.14	582.07	919.69	582.6	919.72
587.3	919.91	590.17	920	609.32	920.85	623.01	921.46	626.73	921.6
629.18	921.66	639.8	922	650.79	922.3	654.85	922.38	659.76	922.39
666.4	922.52	671.68	922.64	712.7	923.9	715.7	924	732.96	924
748.88	924.61	757.11	925.2	757.74	925.23	759.18	925.39	761.01	925.59
763.68	926	765.89	926.34	776.89	928	791.76	929.74	793.92	930
799.74	930.98	802.44	931.48	805.4	932	807.19	932.38	814.76	934
825.1	935.78	826.63	936	827.55	936.36	829.14	937.27	830.57	938
832.31	939	834.49	939.97	834.55	940	834.69	939.98		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	522.05	.035	534.65	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 522.05 534.65 435.42 145.52 25.67 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 919.47	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.10	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 919.36	* Reach Len. (ft)	* 435.42	* 145.52	* 25.67
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 238.19	* 43.51	* 29.24

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* E.G. Slope (ft/ft)	*0.001559	* Area (sq ft)	* 238.19	* 43.51	* 29.24
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 572.51	* 149.48	* 41.61
* Top Width (ft)	* 188.28	* Top width (ft)	* 138.33	* 12.60	* 37.35
* Vel Total (ft/s)	* 2.46	* Avg. Vel. (ft/s)	* 2.40	* 3.44	* 1.42
* Max Chl Dpth (ft)	* 4.20	* Hydr. Depth (ft)	* 1.72	* 3.45	* 0.78
* Conv. Total (cfs)	* 19336.8	* Conv. (cfs)	* 14497.8	* 3785.3	* 1053.7
* Length wtd. (ft)	* 260.11	* Wetted Per. (ft)	* 138.76	* 14.83	* 37.40
* Min Ch El (ft)	* 915.16	* Shear (lb/sq ft)	* 0.17	* 0.29	* 0.08
* Alpha	* 1.12	* Stream Power (lb/ft s)	* 834.69	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.67	* Cum Volume (acre-ft)	* 4.92	* 3.92	* 2.07
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 3.57	* 1.06	* 2.01

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 7150.429

INPUT

Description:

Station Elevation Data		num= 77		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	940	1.43	939.31	4.02	938	6.22	936.97	8.31	936
11.04	934.79	12.69	934	14.35	933.2	18.22	932	19.69	931.46
22.43	930	24.92	928.71	26.26	928	27.78	927.21	32.8	926
38.16	925.16	45.94	924	49.34	922.8	51.37	922	52.83	921.41
56.39	920	59.71	918.68	60.85	918.53	65.8	918	66.62	918
67.96	917.93	70	917.86	70.24	917.85	110.28	916.16	113.59	916.02
114.02	916	114.22	915.99	114.39	915.97	114.4	915.96	115.45	915.12
116.07	914.42	116.24	914.24	116.51	914.24	126.06	914.6	129.8	914.74
130.94	915.99	130.96	916	131.75	917.53	134.95	917.66	158.58	918
182.07	918.33	203.14	918	230.5	917.53	281.5	917.51	305.6	918
322.5	918.5	333.42	919.26	338.97	919.43	345.58	920	367.04	921.32
377.22	922	382.54	922.18	403.49	922.59	410.44	922.67	434.16	923.26
447.57	923.43	458.92	924	466.41	925.64	468.06	926	469.38	926.29
478.61	928	483	928.81	489.41	930	493.34	930.71	499.95	932
504.19	932.81	511.15	934	518.93	935.28	522.09	936	527.42	937.19
531.06	938	540.27	940						

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	113.59	.035	131.75	.035

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
113.59	131.75	253.96	243.08	108.87	.1	.3	

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 918.77 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.40  * Wt. n-Val.      * 0.060  * 0.035  * 0.035  *
* W.S. Elev (ft)     * 918.37 * Reach Len. (ft) * 253.96 * 243.08 * 108.87 *
* Crit W.S. (ft)     * 918.37 * Flow Area (sq ft) * 64.94 * 65.28 * 101.98 *
* E.G. slope (ft/ft) * 0.004994 * Area (sq ft)    * 64.94 * 65.28 * 101.98 *
* Q Total (cfs)      * 763.60 * Flow (cfs)      * 132.93 * 426.06 * 204.61 *
* Top width (ft)     * 255.89 * Top width (ft)  * 51.27 * 18.16 * 186.46 *
* Vel Total (ft/s)   * 3.29  * Avg. Vel. (ft/s) * 2.05 * 6.53 * 2.01 *
* Max Chl Dpth (ft) * 4.13  * Hydr. Depth (ft) * 1.27 * 3.59 * 0.55 *
* Conv. Total (cfs)  * 10805.0 * Conv. (cfs)     * 1881.0 * 6028.8 * 2895.3 *
* Length wtd. (ft)  * 195.20 * Wetted Per. (ft) * 51.34 * 20.35 * 186.48 *
* Min Ch El (ft)    * 914.24 * Shear (lb/sq ft) * 0.39 * 1.00 * 0.17 *
* Alpha             * 2.36  * Stream Power (lb/ft s) * 540.27 * 0.00 * 0.00 *
* Frctn Loss (ft)   * 1.17  * Cum Volume (acre-ft) * 3.40 * 3.73 * 2.03 *
* C & E Loss (ft)   * 0.00  * Cum SA (acres)   * 2.62 * 1.01 * 1.94 *
*****
    
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 6893.619

INPUT

Description:

```

Station Elevation Data      num=      97
  Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev
*****
  0         940       .63    939.87   9.41     938    12.99   937.14   17.91    936
 20.37    935.42    26.13    934     27.78    933.6   30.03   933.05   33.04    932.2
 34.28    931.84    40.09    930     40.82    929.59   43.84    928     45.33    927.25
 47.62     926     50.25    925.61   59.48    924.26   59.94    924.25   61.68    924
 61.79    923.95    65.65    922     65.82    921.91   66.02    921.82   69.61    920
 70.09    919.75    73.76    918     77.08    916.27   77.83    915.83   78.32    915.46
 78.37    915.44    78.69    915.29   79.16    915.16   81.46    914.3    81.96    914.11
 82.11     914     83.8    913.28   83.84    913.26   84.09    913.26   95.28    913.18
 97.26    913.16    97.44    913.3    98.13     914    99.65    915.5   100.08    916
    
```

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100.09	916.21	103.23	916	108.05	915.57	141.24	916	147.363	916.03
149.52	916	170.28	915.43	220.71	915.66	245.16	916	256.9	916.87
272.3	918	275.45	918.35	289.44	920	303.62	921.66	306.58	922
320.13	923.58	323.84	924	332.93	925.7	334.13	925.91	334.61	926
341.03	927.74	341.98	928	342.57	928.16	347.76	929.6	349.24	930
350.19	930.26	356.83	932	364.7	933.97	364.94	934	377.68	935.85
378.87	936	388.73	936.78	393.45	936.47	395.28	936.16	395.37	936.12
395.5	936.03	395.53	936.02	396.1	935.97	396.43	935.95	398.54	935.91
405.71	935.73	405.75	935.73	406.4	935.66	408.89	935.38	409.35	935.68
410.22	936.14	413.07	937.55	416.22	939.12	416.24	939.12	417.99	939.77
418.65	940	418.77	940.04						

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .06 77.08 .035 100.09 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 77.08 100.09 109.73 264.07 195.16 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 916.94	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.44	* Wt. n-Val.	* 0.060	* 0.035	* 0.035
* W.S. Elev (ft)	* 916.51	* Reach Len. (ft)	* 109.73	* 264.07	* 195.16
* Crit W.S. (ft)	* 916.51	* Flow Area (sq ft)	* 0.05	* 62.11	* 115.87
* E.G. Slope (ft/ft)	* 0.007307	* Area (sq ft)	* 0.05	* 62.11	* 115.87
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 0.03	* 412.61	* 350.96
* Top Width (ft)	* 175.36	* Top width (ft)	* 0.45	* 23.01	* 151.90
* Vel Total (ft/s)	* 4.29	* Avg. Vel. (ft/s)	* 0.47	* 6.64	* 3.03
* Max chl Dpth (ft)	* 3.35	* Hydr. Depth (ft)	* 0.12	* 2.70	* 0.76
* Conv. Total (cfs)	* 8932.9	* Conv. (cfs)	* 0.3	* 4826.9	* 4105.7
* Length wtd. (ft)	* 221.10	* Wetted Per. (ft)	* 0.51	* 25.07	* 151.96
* Min ch El (ft)	* 913.16	* Shear (lb/sq ft)	* 0.05	* 1.13	* 0.35
* Alpha	* 1.53	* Stream Power (lb/ft s)	* 418.77	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	* 3.21	* 3.38	* 1.76
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.47	* 0.89	* 1.52

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION



RIVER: Bluestone Creek  
 REACH: Middle RS: 6579.154

INPUT

Description:

Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	940.02	.06	940	5.43	938.33	6.49	938	7.82	937.59
9.98	936.87	12.85	936	15.15	935.26	19.28	934	24.51	932.39
26.48	932	33.16	930.63	35.95	930	41.36	928.77	44.91	928
50.75	926.68	54.1	926	61.48	924.41	63.44	924	67.81	923.23
74.83	922	85.2	920.68	89.31	920	92.03	919.7	99.86	918
108.56	916.32	111.03	916	120.18	915.34	121.45	915.25	124.67	915.08
125.63	915.04	143.77	914.2	145.78	914.18	153.28	914.17	154.3	914
170.48	914	175.12	914.07	178.78	914	179.5	914	187.84	914
196.89	913.99	199.42	913.99	211.43	913.71	213.31	913.69	214.23	913.67
223.82	913.36	224	913.28	226.75	912	227.03	911.87	229.01	910.95
230.34	910.97	240.31	910.57	240.32	910.58	240.84	911.5	241.04	912
241.93	913.85	241.94	913.9	248.99	914	249.09	914	262.21	914
268.01	914.23	269.61	914.28	270.41	914.3	271.49	914.33	275.32	914.47
276.64	914.53	277.25	914.56	303.38	916	309.91	917.22	314.26	918
315.84	918.36	319.68	919.08	323.93	920	324.86	920.22	332	922
336.07	922.99	342.14	924.5	342.25	924.52	342.27	924.52	342.43	924.52
344.95	924.54	352.42	924.65	352.51	924.65	352.57	924.64	353.09	924.6
354.47	924.34	354.7	924.29	355.16	924.22	356.1	924	357.49	923.65
357.69	923.63	357.7	923.63	357.87	923.64	358.64	924.24	360.5	925.5
361.05	925.92	361.53	926.39	363.07	927.8	363.41	928	363.81	928.11
367.54	930	369.07	930.42	374.67	932	378.16	933.01	381.86	934
387.36	935.49	388.93	936	389.8	936.28	395.37	938	401.81	940

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	223.82	.035	241.93	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 223.82 241.93 97.68 95.13 91.27 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 915.39	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.51	* Wt. n-val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 914.87	* Reach Len. (ft)	* 97.68	* 95.13	* 91.27
* Crit W.S. (ft)	* 914.87	* Flow Area (sq ft)	* 80.10	* 64.61	* 27.91
* E.G. Slope (ft/ft)	* 0.006048	* Area (sq ft)	* 80.10	* 64.61	* 27.91
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 236.66	* 455.70	* 71.25
* Top Width (ft)	* 153.70	* Top width (ft)	* 94.59	* 18.11	* 41.00
* Vel Total (ft/s)	* 4.42	* Avg. Vel. (ft/s)	* 2.95	* 7.05	* 2.55
* Max Chl Dpth (ft)	* 4.30	* Hydr. Depth (ft)	* 0.85	* 3.57	* 0.68

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* Conv. Total (cfs)      * 9818.7 * Conv. (cfs)          * 3043.0 * 5859.5 * 916.1 *
* Length wtd. (ft)     * 95.66 * Wetted Per. (ft)    * 94.63 * 20.69 * 41.06 *
* Min Ch El (ft)       * 910.57 * Shear (lb/sq ft)    * 0.32 * 1.18 * 0.26 *
* Alpha                * 1.69 * Stream Power (lb/ft s) * 401.81 * 0.00 * 0.00 *
* Frctn Loss (ft)      * 0.69 * Cum Volume (acre-ft) * 3.11 * 2.99 * 1.43 *
* C & E Loss (ft)      * 0.00 * Cum SA (acres)      * 2.35 * 0.77 * 1.09 *
*****

```

warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 6481.438

INPUT

Description:

Station Elevation Data		num= 85									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	.35	929.96	.41	929.95	.61	929.91	1.02	929.72		
1.89	929.31	4.76	928	5	927.9	9.63	926	12.3	925.4		
15.61	924	18.56	923.45	24.55	922	28.55	920.85	31.48	920		
34.57	919.09	37.91	918	58.58	916.25	61.52	916	69.42	915.67		
111.84	914	140.07	912.86	143.41	912.75	165.44	912.38	179.04	912.18		
179.22	912.18	182.55	912.22	183.12	912.21	207.49	912.64	207.61	912.42		
207.83	912	208.27	911.12	208.84	910	208.86	909.96	208.97	909.95		
209.04	909.95	210.26	909.96	212.74	910	214.24	910	214.55	910.02		
217.56	910.23	219.96	911.8	220.65	912	221.21	912.16	221.72	912.3		
238.67	912.73	239.95	912.76	248.15	912.99	284.56	914	286.43	914		
299.14	914.56	299.25	914.56	299.3	914.57	299.63	914.58	308.83	915.26		
310.26	915.37	310.29	915.37	310.33	915.37	311.18	915.27	311.6	915.22		
311.71	915.2	312.17	915.12	314.42	914.72	315.01	914.58	315.07	914.59		
315.14	914.6	315.77	914.93	316.77	915.52	317.16	915.75	317.21	915.78		
318.37	916.71	319.29	917.42	321.35	918.98	322.57	920	324.99	921.72		
325.98	921.87	326.3	922	327.59	922.32	331.31	924	335.39	925.87		
335.66	926	340.01	927.82	340.4	928	341.02	928.29	344.66	930		

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
*****		*****		*****	

0 .035 207.49 .035 221.72 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 207.49 221.72 292.96 277.15 210.78 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 914.23 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.51 * Wt. n-Val. * 0.035 * 0.035 * 0.035 *
* W.S. Elev (ft) * 913.72 * Reach Len. (ft) * 292.96 * 277.15 * 210.78 *
* Crit W.S. (ft) * 913.72 * Flow Area (sq ft) * 94.65 * 44.77 * 38.00 *
* E.G. slope (ft/ft) * 0.008637 * Area (sq ft) * 94.65 * 44.77 * 38.00 *
* Q Total (cfs) * 855.60 * Flow (cfs) * 390.12 * 344.80 * 120.68 *
* Top width (ft) * 155.45 * Top width (ft) * 88.62 * 14.23 * 52.60 *
* Vel Total (ft/s) * 4.82 * Avg. Vel. (ft/s) * 4.12 * 7.70 * 3.18 *
* Max Chl Dpth (ft) * 3.77 * Hydr. Depth (ft) * 1.07 * 3.15 * 0.72 *
* Conv. Total (cfs) * 9206.2 * Conv. (cfs) * 4197.7 * 3710.0 * 1298.5 *
* Length Wtd. (ft) * 278.74 * Wetted Per. (ft) * 88.65 * 16.42 * 52.62 *
* Min Ch El (ft) * 909.95 * Shear (lb/sq ft) * 0.58 * 1.47 * 0.39 *
* Alpha * 1.42 * Stream Power (lb/ft s) * 344.66 * 0.00 * 0.00 *
* Frctn Loss (ft) * 1.37 * Cum Volume (acre-ft) * 2.91 * 2.87 * 1.36 *
* C & E Loss (ft) * 0.06 * Cum SA (acres) * 2.14 * 0.73 * 0.99 *
*****
    
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

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

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 6179.412

INPUT

Description:

Station	Elevation	Data	num=	80	Sta	Elev	Sta	Elev	Sta	Elev
0	930	8.88	928	12.35	927.22	17.73	926	20.28	925.44	
23.58	924.67	23.82	924.61	23.9	924.58	25.3	924	27.3	923.16	

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30.09	922	32.33	921.04	34.75	920	38.38	918.49	40.34	917.68
40.83	917.49	40.96	917.42	41.91	916.91	42.32	916.62	42.38	916.61
42.4	916.61	42.59	916.72	43.73	917.42	43.76	917.43	43.94	917.48
44.6	917.75	44.65	917.75	44.79	917.75	47.14	917.74	57.78	917.67
58.32	917.68	58.34	917.68	60.31	917.49	60.94	917.43	60.97	917.43
62.77	916.87	67.67	916	70.76	915.48	78.89	914	85.43	912.88
90.57	912	108.94	911.38	118.83	911.12	141.25	910.41	153.13	910
156.13	910	167.3	909.85	171.02	909.73	178.21	909.49	179.13	909.47
187.07	908.78	193.08	908.55	193.12	908.55	193.19	908.11	193.38	908
194.36	907.7	194.84	907.57	194.88	907.5	199.31	907.31	202.22	907
203.35	907.3	204.73	908	206.5	908.91	206.88	909.12	209.4	909.46
209.79	909.5	215.96	910	219.41	910.28	228.03	911	239.97	912
241.45	912.26	245.51	912.69	256.67	914	259	914.44	260.59	914.81
265.03	916	268.28	916.83	274.05	918	281.01	919.43	285.04	920

Manning's n values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	193.08	.035	206.88	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	193.08	206.88		87.02	117.95		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 912.17	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.31	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 911.86	* Reach Len. (ft)	* 87.02	* 117.95	* 167.42
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 147.85	* 58.90	* 41.29
* E.G. Slope (ft/ft)	* 0.003150	* Area (sq ft)	* 147.85	* 58.90	* 41.29
* Q Total (cfs)	* 855.60	* Flow (cfs)	* 462.06	* 352.33	* 41.21
* Top Width (ft)	* 143.59	* Top width (ft)	* 98.37	* 13.80	* 31.42
* Vel Total (ft/s)	* 3.45	* Avg. vel. (ft/s)	* 3.13	* 5.98	* 1.00
* Max Chl Dpth (ft)	* 4.86	* Hydr. Depth (ft)	* 1.50	* 4.27	* 1.31
* Conv. Total (cfs)	* 15244.6	* Conv. (cfs)	* 8232.7	* 6277.7	* 734.3
* Length Wtd. (ft)	* 107.45	* Wetted Per. (ft)	* 98.44	* 14.81	* 31.54
* Min Ch El (ft)	* 907.00	* Shear (lb/sq ft)	* 0.30	* 0.78	* 0.26
* Alpha	* 1.69	* Stream Power (lb/ft s)	* 285.04	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.50	* Cum Volume (acre-ft)	* 2.10	* 2.54	* 1.17
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 1.51	* 0.64	* 0.78

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle

RS: 6057.761



INPUT  
Description:

Station Elevation Data		num= 72		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	4.5	929.18	10.56	928.02	10.82	927.95	12.82	927.13
15.59	926	18.6	924.76	20.41	924	24.3	922.45	25.1	922.09
25.18	922.06	25.63	921.77	27.49	920.15	27.51	920.15	27.74	920.24
28.6	920.55	28.66	920.54	29.19	920.4	38.07	920.88	39.99	920.93
42.89	920.61	43.23	920.6	43.77	920.4	44.81	920	46.03	919.5
49.99	918	55.17	916.03	55.34	915.96	55.76	915.81	60.39	914.21
61	914	65.83	912.37	66.88	912	80.17	910.38	81.59	910
111.1	910	135.84	909.62	150.99	909.39	152.18	909.38	152.92	908.51
153.44	908	153.72	907.6	154.58	906.63	161.44	906.51	161.65	906.52
161.71	906.58	164.13	907.84	164.88	908.23	164.99	908.24	181.89	909.37
190.82	909.97	191.69	910	191.83	910.1	194.46	912	195.42	912.66
197.28	914	198.66	914.96	200.15	916	201.62	917.02	203.04	918
204.33	918.89	205.91	920	207.22	920.89	208.98	922	211.36	923.24
212.96	924	216.28	925.7	217.16	926	217.75	926.2	223.08	928
225.16	928.7	230.24	929.99						

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	152.18	.035	164.99	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	152.18	164.99		141.72	156.04	142.63	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 911.64	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.65	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 910.99	* Reach Len. (ft)	* 141.72	* 156.04	* 142.63
* Crit W.S. (ft)	* 910.99	* Flow Area (sq ft)	* 85.30	* 50.33	* 50.20
* E.G. Slope (ft/ft)	* 0.007526	* Area (sq ft)	* 85.30	* 50.33	* 50.20
* Q Total (cfs)	* 855.60	* Flow (cfs)	* 336.10	* 424.99	* 94.51
* Top Width (ft)	* 117.87	* Top width (ft)	* 77.00	* 12.81	* 28.07
* Vel Total (ft/s)	* 4.60	* Avg. Vel. (ft/s)	* 3.94	* 8.44	* 1.88
* Max Chl Dpth (ft)	* 4.48	* Hydr. Depth (ft)	* 1.11	* 3.93	* 1.79
* Conv. Total (cfs)	* 9862.4	* Conv. (cfs)	* 3874.2	* 4898.8	* 1089.4
* Length Wtd. (ft)	* 148.20	* Wetted Per. (ft)	* 77.09	* 14.50	* 28.45
* Min Ch El (ft)	* 906.51	* Shear (lb/sq ft)	* 0.52	* 1.63	* 0.83
* Alpha	* 1.98	* Stream Power (lb/ft s)	* 230.24	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.63	* Cum Volume (acre-ft)	* 1.87	* 2.40	* 1.00
* C & E Loss (ft)	* 0.12	* Cum SA (acres)	* 1.34	* 0.61	* 0.67

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.  
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than

1.4.

This may indicate the need for additional cross sections.

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

need for additional cross sections.

warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 5898.334

INPUT

Description:

Station Elevation Data

num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	.06	929.99	4.41	928.14	4.71	928	6.51	927.22
9.28	926	13.19	924.33	13.91	924.02	13.94	924	13.98	923.98
16.4	922.91	17.24	922.03	17.27	922	17.32	921.96	17.43	921.83
18.02	921.95	18.15	921.99	18.96	922.16	18.97	922.16	19.41	922.14
19.49	922.15	20.68	922.15	33.42	922.23	34.17	922.23	34.18	922.23
34.33	922.22	35.91	922	39.68	921.47	45.97	920.47	46.03	920.46
46.48	920.33	47.81	919.83	52.47	918.16	52.91	918	52.98	917.98
58.25	916	58.59	915.87	64.02	914	65.46	913.5	69.75	912
73.12	910.8	75.35	910	76.13	910	113.99	908.58	129.63	908
148.93	908	158.14	908	162.61	907.98	166.9	907.94	167.03	907.88
168.45	907.34	170.7	906.45	171.48	906.1	171.89	906.09	176.56	906
178.35	905.89	178.4	905.89	178.52	906.02	178.78	906.32	184.56	907.77
184.97	907.9	188.65	909.84	188.97	910	189.53	910.3	192.8	912
193.29	912.27	196.2	913.63	197.01	914	197.24	914.09	198.57	914.65
201.8	916	204.34	917.2	206.05	918	208.55	919.11	210.95	919.71
212.06	920	212.84	920.2	220.11	922	224.99	923.25	228.06	924
232.84	925.42	235.06	926	240.78	927.75	241.6	928	248.22	930

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	166.9	.035	184.97	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	166.9	184.97		150.38	175.2	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 910.60	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.26	* wt. n-Val.	* 0.035	* 0.035	* 0.100

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```

* W.S. Elev (ft)      * 910.34 * Reach Len. (ft)    * 150.38 * 175.20 * 214.49 *
* Crit W.S. (ft)     *      * * Flow Area (sq ft) * 159.72 * 66.69 * 5.65 *
* E.G. Slope (ft/ft) * 0.002715 * Area (sq ft)      * 159.72 * 66.69 * 5.65 *
* Q Total (cfs)      * 855.60 * Flow (cfs)        * 508.14 * 342.86 * 4.60 *
* Top Width (ft)     * 115.21 * Top Width (ft)    * 92.50 * 18.07 * 4.64 *
* Vel Total (ft/s)   * 3.69 * Avg. Vel. (ft/s)  * 3.18 * 5.14 * 0.81 *
* Max Chl Dpth (ft) * 4.45 * Hydr. Depth (ft)  * 1.73 * 3.69 * 1.22 *
* Conv. Total (cfs)  * 16421.3 * Conv. (cfs)       * 9752.5 * 6580.4 * 88.4 *
* Length Wtd. (ft)  * 166.93 * Wetted Per. (ft)  * 92.60 * 18.82 * 5.24 *
* Min Ch El (ft)    * 905.89 * Shear (lb/sq ft)  * 0.29 * 0.60 * 0.18 *
* Alpha              * 1.22 * Stream Power (lb/ft s) * 248.22 * 0.00 * 0.00 *
* Frctn Loss (ft)   * 0.70 * Cum Volume (acre-ft) * 1.47 * 2.19 * 0.90 *
* C & E Loss (ft)   * 0.05 * Cum SA (acres)    * 1.06 * 0.55 * 0.62 *
*****

```

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 5722.175

INPUT  
 Description:

Station Elevation Data		num= 82		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	12.15	928	17.6	927.09	24.16	926	24.42	925.96		
28.37	925.29	30.85	924.1	31.03	924	32.96	923.08	37.43	922.01		
37.45	922.01	37.47	922	41.22	920	41.3	919.97	43.28	918.79		
43.47	918.67	44.27	918.11	45.25	917.42	46.5	917.68	46.79	917.72		
46.88	917.74	47.34	917.77	47.57	917.79	47.98	917.77	48.07	917.78		
53.86	918	56.76	918.09	59.67	918.16	60.36	918.16	60.43	918.16		
61.8	918	61.98	918	63.84	917.81	66.98	917.58	67	917.58		
67.97	917.13	70.44	916	72.19	915.2	74.87	914	78.51	912.34		
80.13	911.64	83.91	910	86.01	910	126.88	908.85	133.69	908.68		
157.43	908	163.87	908	169.8	907.7	187.43	906.82	187.56	906.82		
188.64	906.77	188.68	906.74	189.15	906.47	189.82	906	192.1	904.7		
192.24	904.61	192.25	904.61	192.28	904.61	198.7	904.46	199.65	904.94		
201.87	905.82	201.91	905.84	202.06	905.85	203.87	905.95	204.99	906		
208.9	906.22	215.57	906.89	221.25	907.51	223.79	907.79	225.77	908		
226.24	908.23	228.37	909.16	230.31	910	232.68	910.98	235.01	912		
239.07	913.9	239.27	914	239.44	914.08	244.79	916	247.92	917.15		
250.26	918	257.27	920								

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	188.64	.035	201.87	.1		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 188.64 201.87 128.15 130.09 113.52 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft) * 909.85 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.76 * Wt. n-Val. * 0.035 * 0.035 * 0.100 *
* W.S. Elev (ft) * 909.10 * Reach Len. (ft) * 128.15 * 130.09 * 113.52 *
* Crit W.S. (ft) * 909.10 * Flow Area (sq ft) * 70.85 * 54.23 * 56.65 *
* E.G. slope (ft/ft) * 0.007242 * Area (sq ft) * 70.85 * 54.23 * 56.65 *
* Q Total (cfs) * 855.60 * Flow (cfs) * 256.74 * 480.55 * 118.31 *
* Top width (ft) * 110.08 * Top width (ft) * 70.49 * 13.23 * 26.35 *
* Vel Total (ft/s) * 4.71 * Avg. Vel. (ft/s) * 3.62 * 8.86 * 2.09 *
* Max chl Dpth (ft) * 4.64 * Hydr. Depth (ft) * 1.01 * 4.10 * 2.15 *
* Conv. Total (cfs) * 10054.2 * Conv. (cfs) * 3017.0 * 5647.0 * 1390.3 *
* Length wtd. (ft) * 128.33 * Wetted Per. (ft) * 70.54 * 14.12 * 26.70 *
* Min Ch El (ft) * 904.46 * Shear (lb/sq ft) * 0.45 * 1.74 * 0.96 *
* Alpha * 2.19 * Stream Power (lb/ft s) * 257.27 * 0.00 * 0.00 *
* Frctn Loss (ft) * 1.04 * Cum Volume (acre-ft) * 1.07 * 1.94 * 0.75 *
* C & E Loss (ft) * 0.02 * Cum SA (acres) * 0.78 * 0.49 * 0.54 *
*****
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 5588.448

INPUT

Description:

```
Station Elevation Data num= 93
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 919.97 9.97 918.11 10.57 918 10.68 917.98 20.7 916
31.9 914.01 31.95 914 32.67 914 35.67 912.9 35.94 912.73
36.72 912.23 37.74 911.58 38.06 911.4 38.71 911.01 38.75 911
39.48 911.14 40.59 911.3 40.87 911.34 41.17 911.36 41.53 911.38
42 911.37 42.05 911.37 42.07 911.37 42.56 911.33 45.98 911.03
48.99 910.78 50.38 910.78 55.17 910.81 55.26 910.81 55.3 910.81
```

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55.91	910.77	56.13	910.9	56.43	910.87	56.84	911.17	57	911.18
57.06	911.18	57.42	911.17	57.72	911.16	62.55	910.83	67.1	910.53
68.61	910.55	84.21	910	117.64	910	131.69	908.56	136.31	908
142.34	907.54	146.77	907.22	160.08	906	166.09	905.9	168.39	905.87
182.31	905.44	184	904.54	184.7	904	185.43	903.63	185.6	903.47
193.71	903.52	194.45	903.52	194.61	903.52	194.8	903.69	196.3	904.13
197.49	904.46	197.66	904.52	197.69	904.53	197.7	904.54	200.59	905.84
200.84	905.99	200.92	906	200.96	906.03	203.35	908	204.59	909.17
205.56	910	206.42	910.81	207.65	912	208.84	913.25	209.59	914
211.63	915.97	211.65	916	211.7	916.04	215.49	918	215.67	918.1
218.62	919.66	219.3	920	220.77	920.74	222.1	920.94	225.87	922
226.83	922.85	228.31	924	233.49	925.98	233.52	926	233.6	926.02
237.98	927.24	241.22	928	247.9	930				

Manning's n values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 182.31 .035 200.59 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 182.31 200.59 6.34 82.42 137.81 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 908.57	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.00	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 907.57	* Reach Len. (ft)	* 6.34	* 82.42	* 137.81
* Crit W.S. (ft)	* 907.57	* Flow Area (sq ft)	* 54.02	* 64.51	* 2.05
* E.G. Slope (ft/ft)	* 0.009191	* Area (sq ft)	* 54.02	* 64.51	* 2.05
* Q Total (cfs)	* 855.60	* Flow (cfs)	* 266.49	* 586.77	* 2.34
* Top width (ft)	* 60.93	* Top width (ft)	* 40.40	* 18.28	* 2.24
* Vel Total (ft/s)	* 7.10	* Avg. vel. (ft/s)	* 4.93	* 9.10	* 1.14
* Max Chl Dpth (ft)	* 4.10	* Hydr. Depth (ft)	* 1.34	* 3.53	* 0.91
* Conv. Total (cfs)	* 8924.5	* Conv. (cfs)	* 2779.7	* 6120.4	* 24.4
* Length Wtd. (ft)	* 70.11	* Wetted Per. (ft)	* 40.48	* 19.31	* 2.85
* Min Ch El (ft)	* 903.47	* Shear (lb/sq ft)	* 0.77	* 1.92	* 0.41
* Alpha	* 1.28	* Stream Power (lb/ft s)	* 247.90	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.34	* Cum Volume (acre-ft)	* 0.89	* 1.77	* 0.67
* C & E Loss (ft)	* 0.15	* Cum SA (acres)	* 0.62	* 0.44	* 0.50

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.



CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 5493.950

INPUT  
 Description:

Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	9.49	918.37	11.73	918	20.78	916.43	23.92	916
37.96	914.33	40.59	914	41.17	913.82	46.83	912	50.46	910.89
53.21	910	58.87	908.16	59	908.11	59.27	907.98	60.09	907.56
62.18	906.46	62.29	906.47	64.84	906.92	64.86	906.92	66.46	907.04
66.87	907.08	66.88	907.08	69.8	906.97	78.97	906.91	81.24	906.89
81.55	906.89	82.46	906.89	82.57	906.91	82.63	906.92	83.6	907.56
83.9	907.76	84.11	907.77	84.37	907.76	90.94	907.5	108.56	907.53
121.88	907.79	123.56	907.82	124.18	907.83	125.34	907.81	130.84	907.49
133.17	907.3	134.06	907.19	143.77	906.03	144.52	905.92	144.75	905.85
145.56	905.44	148.31	904	150.76	902.84	177.58	902.84	177.93	903.81
178.08	904	178.63	904.89	179.9	906	180.29	906.36	181.5	907.58
182.44	908	183.34	908.39	185.77	910	187.37	911.06	188.77	912
191.1	913.02	191.27	913.1	192.75	913.15	193.08	913.18	196.13	913.25
201.35	913.5	203.48	914	206.31	914.64	212.25	916	215.76	916.48
221.29	918	222.05	918.31	222.67	918.52	224.05	918.81	229.45	920
232.81	920.78	235.86	921.46	236.62	921.6	237.43	921.7	238.45	922
245.15	922	249.34	922.59	260.51	924	272.91	924	285.23	926

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	143.77	.035	179.9	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 143.77 179.9 151.97 198.62 272.82 .1 .3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	124.18	907.83

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 907.90	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.50	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 907.40	* Reach Len. (ft)	* 151.97	* 198.62	* 272.82
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 7.85	* 148.26	* 1.01
* E.G. Slope (ft/ft)	* 0.003030	* Area (sq ft)	* 7.85	* 148.26	* 1.01
* Q Total (cfs)	* 865.00	* Flow (cfs)	* 13.91	* 850.56	* 0.52
* Top Width (ft)	* 49.36	* Top Width (ft)	* 11.81	* 36.13	* 1.42
* Vel Total (ft/s)	* 5.51	* Avg. Vel. (ft/s)	* 1.77	* 5.74	* 0.52

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* Max Chl Dpth (ft)      * 4.56 * Hydr. Depth (ft)      * 0.66 * 4.10 * 0.71 *
* Conv. Total (cfs)     * 15713.1 * Conv. (cfs)         * 252.8 * 15450.8 * 9.5 *
* Length Wtd. (ft)     * 211.94 * Wetted Per. (ft)   * 11.89 * 38.55 * 1.99 *
* Min Ch El (ft)       * 902.84 * Shear (lb/sq ft)   * 0.12 * 0.73 * 0.10 *
* Alpha                 * 1.07 * Stream Power (lb/ft s) * 285.23 * 0.00 * 0.00 *
* Frctn Loss (ft)      * 1.07 * Cum Volume (acre-ft) * 0.88 * 1.57 * 0.67 *
* C & E Loss (ft)      * 0.05 * Cum SA (acres)     * 0.61 * 0.39 * 0.50 *
*****

```

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

This may indicate the need for additional cross sections.

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 5291.039

INPUT  
 Description:

Station Elevation Data		num= 82		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	8.82	927.33	13.47	926	15.58	925.37	20.07	924
23.56	922.92	26.52	922	29.93	920.97	32.98	920	36.72	918.86
39.71	918	44.38	916.68	46.9	916	50.23	915.03	53.91	914
55.43	913.55	56.03	913.37	60.48	912	64.01	910.98	67.49	910
71.69	908.81	74.32	908	76.93	907.23	79.67	906	80.44	905.69
82.39	905.1	83.1	904.14	83.64	903.63	84.78	902.21	85.91	902.06
86.8	902.01	86.86	902	91.4	902	92.16	901.97	97.1	901.85
97.14	901.88	97.31	902	97.51	902.16	98.35	902.62	108.24	903.37
111.01	903.6	116.97	904	119.26	904	124.72	904.14	132.29	904.33
190.11	906	203.24	906	204.47	906.18	210.19	907.08	218.24	907.27
224.81	907.25	231.41	907.28	231.96	907.25	232.54	907.24	233.62	907.31
235.81	907.56	236.52	907.72	237.47	908	240.12	908.68	243.69	909.08
247.1	909.4	253.72	910	261.89	910.75	275.64	912	285.25	913.35
288.02	914	290.68	914.72	295.35	916	301.76	917.82	302.38	918
305.04	918.75	309.62	920	310.02	920.11	316.91	922	317.92	922.28
324.25	924	327.85	924.98	331.58	926	337.2	927.52	339.02	928
346.3	929.96	346.44	930						

Manning's n values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	83.64	.035	98.35	.06

Bank Sta: Left 83.64 Right 98.35 Lengths: Left Channel 221.48 Right 200.96 Coeff Contr. .1 Expan. .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)          * 906.79 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)          * 0.97  * Wt. n-Val.      * 0.060  * 0.035  * 0.060  *
* W.S. Elev (ft)         * 905.82 * Reach Len. (ft) * 221.48 * 200.96 * 67.86  *
* Crit W.S. (ft)         * 905.82 * Flow Area (sq ft) * 2.73  * 55.02  * 110.20 *
* E.G. Slope (ft/ft)     * 0.009910 * Area (sq ft)    * 2.73  * 55.02  * 110.20 *
* Q Total (cfs)          * 865.00 * Flow (cfs)      * 4.96  * 538.13 * 321.90 *
* Top Width (ft)         * 103.59 * Top width (ft)  * 3.51  * 14.71  * 85.37  *
* Vel Total (ft/s)       * 5.15  * Avg. Vel. (ft/s) * 1.82  * 9.78   * 2.92   *
* Max Chl Dpth (ft)     * 3.97  * Hydr. Depth (ft) * 0.78  * 3.74   * 1.29   *
* Conv. Total (cfs)      * 8689.3 * Conv. (cfs)     * 49.9  * 5405.8 * 3233.6 *
* Length Wtd. (ft)      * 178.05 * Wetted Per. (ft) * 4.31  * 15.63  * 85.44  *
* Min Ch El (ft)        * 901.85 * Shear (lb/sq ft) * 0.39  * 2.18   * 0.80   *
* Alpha                  * 2.36  * Stream Power (lb/ft s) * 346.44 * 0.00   * 0.00   *
* Frctn Loss (ft)       * 1.75  * Cum Volume (acre-ft) * 0.86  * 1.10   * 0.32   *
* C & E Loss (ft)       * 0.03  * Cum SA (acres)   * 0.59  * 0.27   * 0.23   *
*****
    
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 5071.499

INPUT

Description:

Station	Elevation	Data	num=	96	Sta	Elev	Sta	Elev	Sta	Elev
0	928	7.24	926	12.79	924.51	14.65	924	19.89	922.6	
22.02	922	22.68	921.82	29.64	920	35.52	918.09	36.11	918	
38.46	916.9	40.86	916	45.98	914.02	46.02	914	46.37	913.87	
51.36	912	54.51	910.82	56.76	910	59.93	908.75	61.46	908.18	
61.94	908	62.33	907.86	67.25	906	70.79	904.71	72.66	904	
76.36	902.58	76.86	902.39	79.73	902.44	87.4	902.49	98.15	902.55	
120.15	902.03	124	902.03	132.07	902.09	162.54	902.28	162.88	902	
163.21	901.74	165.24	900	165.88	899.46	173.45	899.36	173.49	899.36	
173.5	899.36	173.56	899.39	175.21	900	175.74	900.18	180.99	902	

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183.34	902.53	183.37	902.54	183.42	902.69	183.45	902.67	183.8	902.69
187.71	902.94	202.09	904	203.46	904.22	205.42	904.54	214.36	906
219.18	907.21	221.54	908	222.48	908.31	225.28	909.27	228.91	909.72
230.44	909.73	230.56	909.66	230.6	909.65	230.65	909.65	234.66	909.6
238.58	909.55	239.52	909.6	239.57	909.61	239.92	909.65	241.08	910
242.62	910.45	242.87	910.48	243.05	910.47	244.3	910.08	244.51	910.1
251	912	253.58	912.77	253.72	912.81	254.25	912.9	260.33	914
265.61	914.97	271.33	916	276.37	916.92	282.45	918	295.83	919.65
298.25	920	301.81	920.42	304.18	920.73	311.42	922	316.52	922.83
323.9	924	332.34	925.32	336.58	926	345.99	927.67	347.61	928
356.94	930								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	162.54	.035	183.42	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	162.54	183.42		160.74	187.46	109.68	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 904.62	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.87	* Wt. n-Val.	* 0.100	* 0.035	* 0.060
* W.S. Elev (ft)	* 903.75	* Reach Len. (ft)	* 160.74	* 187.46	* 109.68
* Crit W.S. (ft)	* 903.75	* Flow Area (sq ft)	* 128.97	* 69.00	* 8.44
* E.G. Slope (ft/ft)	* 0.009743	* Area (sq ft)	* 128.97	* 69.00	* 8.44
* Q Total (cfs)	* 865.00	* Flow (cfs)	* 241.35	* 609.74	* 13.90
* Top Width (ft)	* 125.31	* Top width (ft)	* 89.22	* 20.88	* 15.21
* Vel Total (ft/s)	* 4.19	* Avg. Vel. (ft/s)	* 1.87	* 8.84	* 1.65
* Max Chl Dpth (ft)	* 4.39	* Hydr. Depth (ft)	* 1.45	* 3.30	* 0.55
* Conv. Total (cfs)	* 8763.5	* Conv. (cfs)	* 2445.2	* 6177.4	* 140.9
* Length wtd. (ft)	* 180.19	* Wetted Per. (ft)	* 89.47	* 22.53	* 15.26
* Min Ch El (ft)	* 899.36	* Shear (lb/sq ft)	* 0.88	* 1.86	* 0.34
* Alpha	* 3.19	* Stream Power (lb/ft s)	* 356.94	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.68	* Cum Volume (acre-ft)	* 0.53	* 0.82	* 0.23
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 0.35	* 0.19	* 0.15

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

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RIVER: Bluestone Creek  
 REACH: Middle

RS: 4871.481

INPUT

Description:

Station Elevation Data num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	5.38	918.05	5.52	918	5.65	917.95	6.96	917.66
14.19	916	14.84	915.84	16.08	915.49	21.68	914	27	912.5
28.76	912	29.54	911.78	35.84	910	36.65	909.77	42.81	908
44.16	907.61	49.71	906	50.94	905.74	56.53	904	60.94	904
69.34	902.62	70.81	902.36	72.03	902.12	74.17	902.15	75.16	902
91.05	900.95	96.24	900.59	104.87	900	116.51	900	121.21	900.24
121.94	900.27	122.18	900.26	122.62	900	123.59	899.18	125.37	898
127.08	896.91	127.24	896.83	127.26	896.82	128.12	896.82	133.39	896.92
138.5	897.09	139.63	897.09	139.85	897.26	140.85	898	143.15	898.84
144.54	899.3	148.46	899.69	151.33	900	155.81	900.45	157.29	900.57
162.61	901.04	164.17	901.17	173.26	902	181.15	903.92	181.64	904
181.77	904.05	182.09	904.15	186.95	905.39	189.36	906	193.81	907.46
195.35	908	196.48	908.53	197.15	908.71	199.51	908.7	206.49	909.63
207.01	909.69	209.35	910	215.49	910.78	218.92	911.32	225.82	912
227.55	912.18	233.28	912.44	234.11	912.29	239.41	911.51	241.29	911.32
241.45	911.31	241.76	911.33	247.07	911.81	249.24	912	251.43	912
261.01	913.15	267.15	914	276.91	915.4	281.09	916	284.91	916
292.8	916.41	305.43	917.28	306.45	917.32	313.58	917.91	315.05	918.09
315.71	918.19	318.09	918.6	318.65	918.7	318.97	918.85	319.74	918.8
319.9	918.81	322.9	919.16	331.86	920				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	121.94	.035	144.54	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	121.94	144.54		69.08	159.41	62.66	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 902.51	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.17	* Wt. n-Val.	* 0.100	* 0.035	* 0.060
* W.S. Elev (ft)	* 901.33	* Reach Len. (ft)	* 69.08	* 159.41	* 62.66
* Crit W.S. (ft)	* 901.33	* Flow Area (sq ft)	* 35.06	* 83.61	* 21.01
* E.G. Slope (ft/ft)	* 0.008976	* Area (sq ft)	* 35.06	* 83.61	* 21.01
* Q Total (cfs)	* 865.00	* Flow (cfs)	* 47.82	* 768.70	* 48.48
* Top Width (ft)	* 80.75	* Top width (ft)	* 36.71	* 22.60	* 21.43
* Vel Total (ft/s)	* 6.19	* Avg. Vel. (ft/s)	* 1.36	* 9.19	* 2.31
* Max chl Dpth (ft)	* 4.51	* Hydr. Depth (ft)	* 0.95	* 3.70	* 0.98
* Conv. Total (cfs)	* 9129.9	* Conv. (cfs)	* 504.7	* 8113.5	* 511.7
* Length wtd. (ft)	* 137.91	* Wetted Per. (ft)	* 36.76	* 24.19	* 21.53



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```
* Min Ch El (ft)      * 896.82 * Shear (lb/sq ft)   * 0.53 * 1.94 * 0.55 *
* Alpha              * 1.97 * Stream Power (lb/ft s) * 331.86 * 0.00 * 0.00 *
* Frctn Loss (ft)    * 0.32 * Cum Volume (acre-ft)  * 0.23 * 0.49 * 0.19 *
* C & E Loss (ft)    * 0.31 * Cum SA (acres)        * 0.12 * 0.10 * 0.10 *
*****
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 4704.612

INPUT

Description:

Station Elevation Data

num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	6.12	918	11.82	916.1	12.05	916.02	12.11	916
12.18	915.98	12.67	915.81	17.89	914	18.59	913.76	23.43	912
26.69	910.83	28.98	910	31.63	909.1	34.77	908	39.93	906.25
42.28	905.44	46.09	904	50.34	902.55	79.78	902	83.92	902
85.5	901.94	85.63	901.93	87.7	901.86	126.62	900	127.08	899.98
163.96	899.13	184.07	898.84	184.77	898.84	186.1	898.85	196.14	898.95
216.37	898.45	216.84	898.06	216.92	898	217.06	897.9	220.4	895.93
220.52	895.93	222.96	895.93	228.08	895.82	232.21	896	234.43	896
241.37	895.98	241.97	896	242.38	896	245.38	896.67	245.66	896.72
245.67	896.73	245.72	896.86	246.47	898	246.78	898.58	247.3	899.21
248.11	899.35	248.78	899.38	254.05	899.58	262.24	899.88	266.41	900
274.19	900	274.71	899.98	275.65	899.93	278.21	899.77	284.41	898.85
285.95	898.45	287.03	898.14	287.46	898.1	287.48	898.1	290.84	898.18
293.87	898.23	297.03	898.3	297.08	898.31	297.13	898.36	297.17	898.34
298	898.65	298.31	898.75	314.91	899.8	317.49	900	332.5	900
351.13	900.28	351.64	900.28	354.96	900.44	355.72	900.49	357.73	900.61
369.61	901.34	384.31	901.84	385.5	901.85	385.91	901.85	389.33	902
391.17	902.11	395.29	902.22	396.91	902.4	402.22	903.04	409.88	904

417.49 905.7 418.44 905.84 419.24 906 420.08 906.21 427.14 908  
 432.77 909.39 435.08 910 439.61 911.14 443.09 912

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 216.37 .035 247.3 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 216.37 247.3 434.52 20.21 9.46 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 901.29 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.15 \* Wt. n-Val. \* 0.100 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 901.14 \* Reach Len. (ft) \* 20.21 \* 20.21 \* 20.21 \*  
 \* Crit W.S. (ft) \* \* Flow Area (sq ft) \* 192.44 \* 151.16 \* 169.82 \*  
 \* E.G. Slope (ft/ft) \* 0.001023 \* Area (sq ft) \* 192.44 \* 151.16 \* 169.82 \*  
 \* Q Total (cfs) \* 865.00 \* Flow (cfs) \* 129.92 \* 565.00 \* 170.08 \*  
 \* Top Width (ft) \* 263.59 \* Top width (ft) \* 113.61 \* 30.93 \* 119.06 \*  
 \* Vel Total (ft/s) \* 1.68 \* Avg. Vel. (ft/s) \* 0.68 \* 3.74 \* 1.00 \*  
 \* Max Chl Dpth (ft) \* 5.32 \* Hydr. Depth (ft) \* 1.69 \* 4.89 \* 1.43 \*  
 \* Conv. Total (cfs) \* 27046.7 \* Conv. (cfs) \* 4062.2 \* 17666.3 \* 5318.1 \*  
 \* Length wtd. (ft) \* 20.21 \* Wetted Per. (ft) \* 113.65 \* 33.10 \* 119.42 \*  
 \* Min Ch El (ft) \* 895.82 \* Shear (lb/sq ft) \* 0.11 \* 0.29 \* 0.09 \*  
 \* Alpha \* 3.31 \* Stream Power (lb/ft s) \* 443.09 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.05 \* Cum Volume (acre-ft) \* 0.04 \* 0.06 \* 0.06 \*  
 \* C & E Loss (ft) \* 0.07 \* Cum SA (acres) \* \* \* \*  
 \*\*\*\*\*

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

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower RS: 4682.971

INPUT

Description:

Station Elevation Data num= 82  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 920 9.22 919.66 22.51 919.17 53.59 918.21 59.01 918.14  
 66.49 918 71.31 917.9 80.09 917.67 92.38 917.46 109.04 917.19  
 114.13 917.03 114.23 917.02 115.56 916.96 131.81 916.19 135.66 916  
 136.23 915.97 136.46 915.97 136.57 915.97 169.06 914.22 177.76 914  
 215.95 914 221.22 912.92 231.97 912.39 233.6 912.25 234.03 912.2  
 237.36 912 250.48 910.82 258.7 910 261.37 909.19 262.26 908.92  
 264.33 908.46 267.07 908 270.57 907.39 273.05 906.83 276.19 906  
 281.78 904.64 284.26 904 287.24 903.23 291.8 902 295.03 901.07

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296.56	900.68	296.66	900.64	297.85	900	298.67	899.51	301.33	898
303.53	896.58	303.92	896.41	305.07	896.25	307.47	895.75	315.99	895.75
318.38	896.44	320.75	896.6	327.55	900	333.66	901.15	343.69	901
351.37	898.44	354.79	897.73	364.69	897.93	365.67	898.34	385.26	899.45
418.85	899.45	427.33	900	437.81	900.66	445.51	900.94	453.48	901.08
456.11	901.08	458.98	901.21	470.76	902	471.32	902	475.53	902.58
476.66	902.76	487.83	904	487.89	904.01	497.58	906	504.19	907.69
505.3	908	509.99	909.28	511.93	910	512.44	910.19	517.29	912
520.43	913.17	522.73	914						

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 297.85 .035 327.55 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 297.85 327.55 17.09 123.67 27.31 .1 .3  
 Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 343.69 522.73 899.45

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 901.17	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.86	* Wt. n-val.	* 0.100	* 0.035	* 0.060
* W.S. Elev (ft)	* 900.31	* Reach Len. (ft)	* 17.09	* 123.67	* 27.31
* Crit W.S. (ft)	* 900.31	* Flow Area (sq ft)	* 0.09	* 99.10	* 67.38
* E.G. Slope (ft/ft)	* 0.007717	* Area (sq ft)	* 0.09	* 99.10	* 67.38
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 0.03	* 790.97	* 123.40
* Top Width (ft)	* 118.31	* Top Width (ft)	* 0.57	* 29.70	* 88.04
* Vel Total (ft/s)	* 5.49	* Avg. Vel. (ft/s)	* 0.34	* 7.98	* 1.83
* Max Chl Dpth (ft)	* 4.56	* Hydr. Depth (ft)	* 0.15	* 3.34	* 0.77
* Conv. Total (cfs)	* 10408.8	* Conv. (cfs)	* 0.3	* 9003.8	* 1404.7
* Length wtd. (ft)	* 84.70	* Wetted Per. (ft)	* 0.65	* 31.66	* 88.24
* Min Ch El (ft)	* 895.75	* Shear (lb/sq ft)	* 0.06	* 1.51	* 0.37
* Alpha	* 1.84	* Stream Power (lb/ft s)	* 522.73	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.48	* Cum Volume (acre-ft)	* 3.72	* 7.87	* 4.62
* C & E Loss (ft)	* 0.17	* Cum SA (acres)	* 2.20	* 1.76	* 2.55

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: Divided flow computed for this cross-section.

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

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower

RS: 4559.288

INPUT  
 Description:

Station Elevation Data num= 108

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	64.35	918	100.99	916.65	104.22	916.55	115.22	916.19
120.33	916	143.04	914.83	149.21	914.29	150.91	914.05	151.34	914
152.1	913.89	152.45	913.84	152.55	913.83	152.88	913.8	164.46	912.66
171.03	912.24	173.83	912	181.24	911.35	181.57	911.33	181.79	911.32
184.27	911.38	188.28	911.53	192.62	911.57	198.13	911.6	202.76	911.39
206.19	911.18	214.5	910.81	221.03	910.41	230.41	910	232.75	909.87
235.67	909.64	242.98	908.88	247.63	908.36	250.82	908	261.99	906.58
266.54	906	268.26	905.78	280.4	904.64	285.57	904.15	287.07	904
294.17	903.28	294.32	903.26	294.33	903.26	294.34	903.26	294.37	903.25
294.38	903.25	298.64	902	305.23	900.14	305.82	900	305.97	899.96
310.59	898.89	314.92	898.97	325.06	899.49	329.32	899.76	330.59	899.81
331.29	899.8	339.39	899.47	340.56	899.42	358.16	898.68	372.95	898
374.45	897.93	381.56	897.59	386.91	896.15	387.89	896	389.37	895.78
389.59	895.75	389.62	895.75	389.96	895.74	398.29	895.42	398.44	895.41
398.45	895.43	398.55	895.63	398.97	896	399.1	896.1	399.42	896.33
400.94	897.55	403.11	897.5	412.05	897.55	413.56	897.54	421.19	897.35
424.22	897.34	432.24	897.65	435.33	897.6	441.6	897.19	447.14	897.13
452.67	897.08	459.34	897.21	475.11	896.79	477.93	896.97	482.04	897.2
484.93	898	491.22	899.83	491.87	900	492.45	900.15	499.95	902
502.87	902.77	506.53	904	510.13	905.29	512.09	906	513.59	906.57
517.42	908	519.55	908.82	522.69	910	524.94	910.83	528.08	912
529.98	912.77	533.3	914	538.72	916				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	381.56	.035	400.94	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 381.56 400.94 20.28 144.92 262.06 .1 .3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	329.32	899.76

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*

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* E.G. Elev (ft)	* 899.29	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.30	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 898.99	* Reach Len. (ft)	* 20.28	* 144.92	* 262.06
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 21.10	* 55.78	* 145.34
* E.G. Slope (ft/ft)	* 0.004288	* Area (sq ft)	* 21.10	* 55.78	* 145.34
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 45.53	* 303.00	* 565.87
* Top Width (ft)	* 137.60	* Top width (ft)	* 30.82	* 19.38	* 87.40
* Vel Total (ft/s)	* 4.12	* Avg. Vel. (ft/s)	* 2.16	* 5.43	* 3.89
* Max Chl Dpth (ft)	* 3.58	* Hydr. Depth (ft)	* 0.68	* 2.88	* 1.66
* Conv. Total (cfs)	* 13963.5	* Conv. (cfs)	* 695.2	* 4627.1	* 8641.2
* Length Wtd. (ft)	* 163.36	* Wetted Per. (ft)	* 30.85	* 20.42	* 87.69
* Min Ch El (ft)	* 895.41	* Shear (lb/sq ft)	* 0.18	* 0.73	* 0.44
* Alpha	* 1.15	* Stream Power (lb/ft s)	* 538.72	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.60	* Cum Volume (acre-ft)	* 3.71	* 7.65	* 4.56
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.19	* 1.69	* 2.49

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower

RS: 4258.834

INPUT

Description:

Station Elevation Data

num= 98

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	44.91	918.39	58.07	918	76.38	917.28	111.69	916
117.03	916	132.44	914.79	136.26	914.48	141.38	914	143.17	913.63
147.63	912.72	148.91	912.43	151.02	912	159.23	910.18	160.19	910
161.8	909.69	169.8	908	176.95	906.3	178.71	906	190.33	904
191.11	903.83	201.6	902	202.78	901.82	214.24	900	214.66	899.94
215.66	899.78	216.92	899.12	220.33	898.42	221.8	898	223.13	897.62
223.57	897.53	223.77	897.56	224.36	897.63	226.72	897.85	226.79	897.85
227.18	897.86	234.97	898	236.3	898	239.31	898.06	245.85	898.2
248.13	898.07	249.49	898	250.5	898	259.83	897.72	260.27	897.71
276.78	897.54	276.99	897.54	281.84	897.47	284.23	897.46	287.06	897.47
300.35	896.94	302.59	896.77	306.79	896.59	307.57	896.55	307.7	896.55
310.14	896.49	312.03	896.48	312.52	896.45	329.02	896.49	330.17	896.45
332.69	896.28	332.72	896.28	332.74	896.28	333.18	896	333.43	895.47
333.63	895.38	334.55	894.21	334.67	894.21	337.29	894	340.82	894
343.98	893.86	347.4	893.67	347.97	893.62	356.14	893.17	356.31	893.32
357.06	894	357.64	894.78	360.58	897.43	362.16	898.68	362.21	898.71
362.24	898.73	362.73	898.97	370.08	902	371.3	902.49	375.03	904
378.1	905.18	380.37	906	384.94	907.74	385.62	908	390.7	909.9
390.96	910	397.71	912	399.17	912.4	404.67	914	407.08	914.73
411.46	916	414.31	916.9	415.64	917.01				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
*****		*****		*****	



0 .035 329.02 .035 360.58 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 329.02 360.58 15.43 180.39 150.97 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 898.68 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.40 * Wt. n-Val. * 0.035 * 0.035 * 0.100 *
* W.S. Elev (ft) * 898.29 * Reach Len. (ft) * 15.43 * 180.39 * 150.97 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 97.00 * 123.84 * 0.46 *
* E.G. slope (ft/ft) *0.003189 * Area (sq ft) * 97.00 * 123.84 * 0.46 *
* Q Total (cfs) * 914.40 * Flow (cfs) * 215.96 * 698.25 * 0.19 *
* Top Width (ft) * 140.87 * Top Width (ft) * 108.23 * 31.56 * 1.08 *
* Vel Total (ft/s) * 4.13 * Avg. Vel. (ft/s) * 2.23 * 5.64 * 0.41 *
* Max chl Dpth (ft) * 5.12 * Hydr. Depth (ft) * 0.90 * 3.92 * 0.43 *
* Conv. Total (cfs) * 16192.9 * Conv. (cfs) * 3824.3 * 12365.2 * 3.3 *
* Length wtd. (ft) * 156.68 * Wetted Per. (ft) * 108.38 * 34.33 * 1.38 *
* Min Ch El (ft) * 893.17 * Shear (lb/sq ft) * 0.18 * 0.72 * 0.07 *
* Alpha * 1.49 * Stream Power (lb/ft s) * 415.64 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.77 * Cum Volume (acre-ft) * 3.69 * 7.35 * 4.12 *
* C & E Loss (ft) * 0.05 * Cum SA (acres) * 2.16 * 1.61 * 2.22 *
*****
    
```

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 4054.239

INPUT

Description:

Station Elevation Data		num=		84	
Sta	Elev	Sta	Elev	Sta	Elev
0	920	.91	919.97	1.33	919.96
47.79	918	49.49	918	60.25	917.17
92.08	914.78	95.42	914.44	100.98	914
118.27	911.98	129.78	910	133.83	909.22
147.77	906	150.29	905.37	154.89	904
163.42	901.65	167.9	900.1	168.23	900
172.43	899.16	173.37	898.09	173.48	898
175.08	896.55	177.58	896.93	178.34	897.07
192.29	897.99	192.41	898	192.51	898.01
197.42	898	198.69	896.34	198.99	896
200.67	894.03	200.72	894	200.75	893.97
204.75	892.04	205.09	892	207.15	892
215.45	893.9	215.58	894	216.7	894.75
					216.75
					895.24
					251.3
					895.96

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280.14	895.55	300.45	894.88	320.61	896	324.34	897.74	324.85	898
325.58	898.33	329.21	900	332.69	901.61	333.58	902	334	902.2
336.17	903.15	336.93	903.53	337.87	904	338.87	904.36	342.86	906
344.62	906.52	349.59	908	352.14	908.78	356.1	910		

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 197.05 .035 216.75 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 197.05 216.75 224.35 114.06 104.56 .1 .3  
 Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 0 197.05 898.53

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 897.86 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.88 \* Wt. n-Val. \* \* 0.035 \* 0.100 \*  
 \* W.S. Elev (ft) \* 896.99 \* Reach Len. (ft) \* 224.35 \* 114.06 \* 104.56 \*  
 \* Crit W.S. (ft) \* 896.99 \* Flow Area (sq ft) \* \* 73.60 \* 151.47 \*  
 \* E.G. Slope (ft/ft) \* 0.008511 \* Area (sq ft) \* \* 73.60 \* 151.47 \*  
 \* Q Total (cfs) \* 914.40 \* Flow (cfs) \* \* 651.39 \* 263.01 \*  
 \* Top Width (ft) \* 124.53 \* Top Width (ft) \* \* 18.55 \* 105.97 \*  
 \* Vel Total (ft/s) \* 4.06 \* Avg. Vel. (ft/s) \* \* 8.85 \* 1.74 \*  
 \* Max Chl Dpth (ft) \* 4.99 \* Hydr. Depth (ft) \* \* 3.97 \* 1.43 \*  
 \* Conv. Total (cfs) \* 9911.8 \* Conv. (cfs) \* \* 7060.9 \* 2850.9 \*  
 \* Length Wtd. (ft) \* 111.32 \* Wetted Per. (ft) \* \* 21.67 \* 106.24 \*  
 \* Min Ch El (ft) \* 892.00 \* Shear (lb/sq ft) \* \* 1.80 \* 0.76 \*  
 \* Alpha \* 3.43 \* Stream Power (lb/ft s) \* 356.10 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.00 \* Cum Volume (acre-ft) \* 3.67 \* 6.94 \* 3.85 \*  
 \* C & E Loss (ft) \* 0.01 \* Cum SA (acres) \* 2.14 \* 1.50 \* 2.04 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 3934.570

INPUT

Description:

Station Elevation Data		num= 78		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	7.4	918	8.75	917.63	14.18	916	17.7	914.95
20.85	914	27.03	912.09	27.43	912	28.15	911.82	35.71	910
36.44	909.81	41.66	908	43.33	907.29	46.37	906	49.14	904.82
51.01	904	52.95	903.17	55.71	902	60.46	900.01	60.49	900
66.92	898	68.08	897.65	75.56	896.41	76.23	896.21	77.07	896.33
81.92	897.29	82.78	897.31	83.34	897.3	95.75	897.03	96.58	897.04
96.59	897.04	97.84	896.97	102.52	896.85	103.03	896.33	103.35	896
105.15	894.12	105.28	894	105.42	893.85	107.47	892.34	107.49	892.34
116.39	892	120.34	891.78	121.35	891.76	121.7	891.98	121.72	892
121.83	892.17	124.65	894	125.79	894.56	142.86	895.29	147.07	895.48
150.66	895.53	166.39	895.38	168.67	895.15	171.33	895.23	174.72	895.27
176.02	895.09	182.46	894.32	182.99	894.28	183.93	894.19	186.22	894
231.86	894	235.51	895.61	236.43	896	240.77	897.91	240.99	898
245.34	899.85	245.73	900	245.85	900.05	248.47	901.14	250.26	901.85
250.59	902	256.43	903.44	258.41	904	268.48	905.99	268.54	906
268.57	906.01	279.91	908	297.63	910				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	102.52	.035	125.79	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	102.52	125.79		111.8 133.81	33.19	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 896.84	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.85	* Wt. n-Val.	* *	* 0.035	* 0.100
* W.S. Elev (ft)	* 896.00	* Reach Len. (ft)	* 111.80	* 133.81	* 33.19
* Crit W.S. (ft)	* 896.00	* Flow Area (sq ft)	* *	* 74.90	* 149.34
* E.G. Slope (ft/ft)	* 0.009534	* Area (sq ft)	* *	* 74.90	* 149.34
* Q Total (cfs)	* 914.40	* Flow (cfs)	* *	* 650.58	* 263.82
* Top Width (ft)	* 133.07	* Top width (ft)	* *	* 22.44	* 110.63
* Vel Total (ft/s)	* 4.08	* Avg. Vel. (ft/s)	* *	* 8.69	* 1.77
* Max Chl Dpth (ft)	* 4.24	* Hydr. Depth (ft)	* *	* 3.34	* 1.35
* Conv. Total (cfs)	* 9364.7	* Conv. (cfs)	* *	* 6662.8	* 2701.9
* Length wtd. (ft)	* 93.49	* Wetted Per. (ft)	* *	* 24.69	* 111.15
* Min Ch El (ft)	* 891.76	* Shear (lb/sq ft)	* *	* 1.81	* 0.80
* Alpha	* 3.28	* Stream Power (lb/ft s)	* 297.63	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.32	* Cum Volume (acre-ft)	* 3.67	* 6.74	* 3.49
* C & E Loss (ft)	* 0.19	* Cum SA (acres)	* 2.14	* 1.45	* 1.78

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical

depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 3797.323

INPUT

Description:

Station Elevation Data

num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	7.71	918	12.86	916.64	15.31	916	18.69	914.98
21.42	914	23.92	913.3	29.27	912	35.07	910.58	36.27	910.23
36.67	910.09	37.37	909.65	39.78	908.08	40.17	908	40.26	907.99
40.3	908	41.46	908.31	41.74	908.35	41.75	908.35	42.15	908.36
43.67	908.38	52.69	908.51	52.73	908.5	56.65	908	56.68	908
56.96	907.96	57.05	907.89	59.43	906	61.96	904.02	61.98	904
62.16	903.85	64.27	902	65.06	901.32	66.56	900	68.26	898.65
68.99	898	70.2	896.83	71.17	896	72.66	894.5	73.28	894
73.81	893.66	73.84	893.65	73.85	893.65	74.04	893.66	75.43	893.8
76.13	893.86	76.77	893.73	77.13	893.63	82.34	892.55	82.69	892.48
84.91	893.39	86.57	893.81	89.23	893.93	90.96	894	99.91	894
99.93	893.96	100.26	893.55	101.3	892	101.96	891.2	102.39	890.6
102.56	890.58	102.62	890.58	102.65	890.57	102.66	890.56	114.28	890.71
114.57	890.7	117.54	891.94	117.64	892.03	118.64	892.14	118.77	892.15
119.83	892.18	137.23	892.86	164.72	893.94	166.29	894	174.51	894
178.03	894.62	179.07	894.76	183.39	896.78	185.93	898	186.07	898.06
186.56	898.28	189.81	899.61	190.9	900	193.23	900.55	201.13	902
202	902	204.31	902.32	206.94	902.58	214.8	903.37	218.22	904
225.57	905.37	230.3	906	232.72	906.25	250.41	908	274.46	910

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	99.91	.035	117.64	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	99.91	117.64		110.31	113.41	135.84	.1	.3

OXF157-159Bridges.rep

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 895.85 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.21  * Wt. n-Val.      * 0.060  * 0.035  * 0.035  *
* W.S. Elev (ft)     * 895.64 * Reach Len. (ft) * 110.31 * 113.41 * 135.84 *
* Crit W.S. (ft)     *      * Flow Area (sq ft) * 54.74  * 82.46  * 146.06 *
* E.G. Slope (ft/ft) * 0.001741 * Area (sq ft)    * 54.74  * 82.46  * 146.06 *
* Q Total (cfs)      * 914.40 * Flow (cfs)      * 85.38  * 378.70 * 450.32 *
* Top Width (ft)     * 109.42 * Top width (ft)  * 28.38  * 17.73  * 63.31  *
* Vel Total (ft/s)   * 3.23  * Avg. Vel. (ft/s) * 1.56  * 4.59  * 3.08  *
* Max Chl Dpth (ft) * 5.08  * Hydr. Depth (ft) * 1.93  * 4.65  * 2.31  *
* Conv. Total (cfs)  * 21915.8 * Conv. (cfs)     * 2046.3 * 9076.5 * 10793.1 *
* Length Wtd. (ft)  * 118.49 * Wetted Per. (ft) * 29.52  * 19.75  * 63.61  *
* Min Ch El (ft)    * 890.56 * Shear (lb/sq ft) * 0.20  * 0.45  * 0.25  *
* Alpha             * 1.31  * Stream Power (lb/ft s) * 274.46 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 0.23  * Cum Volume (acre-ft) * 3.60  * 6.50  * 3.38  *
* C & E Loss (ft)   * 0.01  * Cum SA (acres)   * 2.10  * 1.39  * 1.71  *
*****

```

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 3679.344

INPUT

Description:

```

Station Elevation Data num= 86
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 920 5.03 918 9.15 916.32 9.89 916 10.4 915.8
15.02 914 18.14 912.71 19.95 912 27.19 909.14 28.54 908.6
29.4 908.72 33.48 909.46 33.49 909.46 36.83 909.43 37.88 909.42
40.97 909.44 40.99 909.44 43.66 909.32 44.26 909.29 45.58 909.2
45.72 909.18 45.81 909.15 46.28 908.85 47.42 908 48.61 907.25
50.45 906 53.35 904.03 53.4 904 56.66 902 57.83 901.27
59.85 900 61.27 899.07 63.05 898 65.03 896.76 66.09 896
66.61 895.7 68.77 894.44 69.03 894.41 72.17 894 76.19 893.47
76.6 893.46 83.62 892.54 85.68 892.63 86.96 892.39 87.28 892.38
87.45 892.38 101.05 893.07 121.9 893.22 127.66 893.26 130.6 892.28
131.49 892 133.66 891.27 139.17 890.11 139.69 890.05 140.04 890
149.06 890 152.35 890.26 154.2 890.43 155.22 891.76 155.42 892
155.63 892.2 156.5 893.66 156.98 893.71 158.35 893.85 160.46 894
166.62 894.48 170.66 894.89 181.56 896 184.14 896.48 191.23 898
197.13 899.68 198.21 900 199.35 900.32 204.29 902 208.51 902.96
212.33 904 221.63 905.77 222.81 906 227.86 906.97 231 907.55
233.33 908 233.6 908.05 234.13 908.14 241.32 909.64 242.93 909.92
243.8 910

```

Manning's n Values

num= 3

```

Sta n Val sta n Val Sta n Val
*****

```



0 .06 127.66 .035 156.5 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 127.66 156.5 90.48 111.12 141.6 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 895.62 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.30 * Wt. n-Val. * 0.060 * 0.035 * 0.100 *
* W.S. Elev (ft) * 895.32 * Reach Len. (ft) * 90.48 * 111.12 * 141.60 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 130.90 * 130.33 * 15.90 *
* E.G. slope (ft/ft) * 0.002082 * Area (sq ft) * 130.90 * 130.33 * 15.90 *
* Q Total (cfs) * 914.40 * Flow (cfs) * 246.67 * 657.95 * 9.77 *
* Top width (ft) * 107.58 * Top Width (ft) * 60.39 * 28.84 * 18.35 *
* Vel Total (ft/s) * 3.30 * Avg. Vel. (ft/s) * 1.88 * 5.05 * 0.61 *
* Max chl Dpth (ft) * 5.32 * Hydr. Depth (ft) * 2.17 * 4.52 * 0.87 *
* Conv. Total (cfs) * 20037.9 * Conv. (cfs) * 5405.5 * 14418.2 * 214.2 *
* Length wtd. (ft) * 111.13 * Wetted Per. (ft) * 60.80 * 30.99 * 18.43 *
* Min Ch El (ft) * 890.00 * Shear (lb/sq ft) * 0.28 * 0.55 * 0.11 *
* Alpha * 1.77 * Stream Power (lb/ft s) * 243.80 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.36 * Cum Volume (acre-ft) * 3.36 * 6.22 * 3.13 *
* C & E Loss (ft) * 0.05 * Cum SA (acres) * 1.99 * 1.33 * 1.59 *
*****
    
```

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 3568.220

INPUT

Description:

```

Station Elevation Data num= 74
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 910 3.04 908 5.88 906.17 6.13 906 6.15 905.99
6.21 905.95 6.38 905.84 8.35 904.53 8.82 904.2 8.87 904.17
8.94 904.18 9.91 904.32 11.3 904.49 12.46 904.68 13.07 904.61
14.97 904.39 15.01 904.38 15.07 904.38 22.89 903.92 22.93 903.92
23.21 903.93 25.03 903.94 25.29 903.94 33.95 904.02 34.35 904.02
36.03 903.97 38.62 902.02 38.63 902 38.9 901.8 41.38 900
42.01 899.51 44.29 898 45.11 897.45 47.26 896 48.64 895.12
50.32 894 51.25 893.35 51.63 893.09 53.9 892.71 57.21 892.16
58.22 892 59.62 891.79 62.87 891.46 65.93 890.81 67.99 890
69.28 889.4 70.79 889.26 74.47 889.18 76.96 889.19 77.18 889.54
78.55 890.71 79.66 891.4 93.83 891.58 104.42 891.72 108.05 892
109.92 892 125.74 893.73 128.13 894 142.95 895.6 144.52 895.76
147.17 896 153.48 897.16 157 898 162.83 899.38 165.33 900
    
```

167.02 900.42 173.69 902 179.27 903.57 180.67 904 182.35 904.52  
 187.1 906 192.78 907.83 193.31 908 199.65 910

Manning's n Values num= 3  
 Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .06 62.87 .035 79.66 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 62.87 79.66 84.06 127.97 121.99 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 895.21 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.75 \* Wt. n-Val. \* 0.060 \* 0.035 \* 0.100 \*  
 \* W.S. Elev (ft) \* 894.46 \* Reach Len. (ft) \* 84.06 \* 127.97 \* 121.99 \*  
 \* Crit W.S. (ft) \* \* \* Flow Area (sq ft) \* 26.80 \* 75.66 \* 113.48 \*  
 \* E.G. Slope (ft/ft) \* 0.005604 \* Area (sq ft) \* 26.80 \* 75.66 \* 113.48 \*  
 \* Q Total (cfs) \* 914.40 \* Flow (cfs) \* 77.42 \* 626.93 \* 210.05 \*  
 \* Top width (ft) \* 82.75 \* Top width (ft) \* 13.24 \* 16.79 \* 52.73 \*  
 \* Vel Total (ft/s) \* 4.23 \* Avg. Vel. (ft/s) \* 2.89 \* 8.29 \* 1.85 \*  
 \* Max chl Dpth (ft) \* 5.28 \* Hydr. Depth (ft) \* 2.02 \* 4.51 \* 2.15 \*  
 \* Conv. Total (cfs) \* 12214.6 \* Conv. (cfs) \* 1034.2 \* 8374.5 \* 2805.9 \*  
 \* Length Wtd. (ft) \* 119.69 \* Wetted Per. (ft) \* 13.79 \* 17.97 \* 52.87 \*  
 \* Min Ch El (ft) \* 889.18 \* Shear (lb/sq ft) \* 0.68 \* 1.47 \* 0.75 \*  
 \* Alpha \* 2.71 \* Stream Power (lb/ft s) \* 199.65 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.59 \* Cum Volume (acre-ft) \* 3.20 \* 5.96 \* 2.92 \*  
 \* C & E Loss (ft) \* 0.05 \* Cum SA (acres) \* 1.91 \* 1.27 \* 1.47 \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 3438.299

INPUT

Description:

Station Elevation Data num= 89  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 920 7 918 8.77 917.5 13.97 916 17.61 915.1  
 21.61 914 28.86 912.31 30.16 912 36.84 910.38 38.42 910  
 46.44 908.12 46.92 908 48.28 907.68 52.95 906.58 55.13 906  
 55.3 905.95 58.55 905.12 58.59 905.09 59.96 904 62.63 902.24  
 62.93 902 63.19 901.78 65.64 900 66.29 899.54 68.33 898  
 70.47 896.58 70.94 896.21 72.61 895.03 72.62 895.02 74.94 895.76  
 76.47 896.23 76.54 896.23 77.08 896.22 77.61 896.21 79.62 896.25  
 79.72 896.25 86.95 896.11 87.57 896.09 88.27 896.08 89.84 896.08  
 90.37 896.06 91.91 896.16 95.3 896.49 96.55 896.11 96.78 896  
 101.12 894.65 103.13 894 103.68 893.87 105.18 893.4 141.78 892.44  
 149.76 892.17 155.05 892 156.57 892 166.51 891.96 177.29 891.92

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178.99	891.91	180.36	891.37	187.51	888.64	187.6	888.58	187.7	888.56
187.79	888.55	187.82	888.55	192.76	888.21	193.05	888.22	193.62	888.5
194.72	889	196.89	890	200.32	891.58	201.2	892	205.23	893.86
205.58	894.16	205.7	894.21	209.4	896	209.81	896.21	213.5	898
214.47	898.45	215.49	898.95	217.63	900	221.32	901.8	221.73	902
223.5	902.85	225.96	903.74	226.64	904	227.33	904.25	231.9	906
237.38	907.73	238.22	908	239.71	908.48	244.87	910		

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .06 178.99 .035 201.2 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 178.99 201.2 128.72 150.25 115.25 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 894.57	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.58	* Wt. n-Val.	* 0.060	* 0.035	* 0.035
* W.S. Elev (ft)	* 893.99	* Reach Len. (ft)	* 128.72	* 150.25	* 115.25
* Crit W.S. (ft)	* 893.60	* Flow Area (sq ft)	* 111.98	* 94.44	* 4.29
* E.G. Slope (ft/ft)	* 0.004360	* Area (sq ft)	* 111.98	* 94.44	* 4.29
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 237.27	* 665.73	* 11.40
* Top Width (ft)	* 102.22	* Top Width (ft)	* 75.82	* 22.21	* 4.18
* Vel Total (ft/s)	* 4.34	* Avg. Vel. (ft/s)	* 2.12	* 7.05	* 2.66
* Max Chl Dpth (ft)	* 5.78	* Hydr. Depth (ft)	* 1.48	* 4.25	* 1.02
* Conv. Total (cfs)	* 13848.1	* Conv. (cfs)	* 3593.4	* 10082.1	* 172.7
* Length wtd. (ft)	* 146.61	* Wetted Per. (ft)	* 75.93	* 23.68	* 4.64
* Min Ch El (ft)	* 888.21	* Shear (lb/sq ft)	* 0.40	* 1.09	* 0.25
* Alpha	* 1.99	* Stream Power (lb/ft s)	* 244.87	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.91	* Cum Volume (acre-ft)	* 3.07	* 5.71	* 2.75
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 1.83	* 1.21	* 1.39

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 3282.877

INPUT

Description:

Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****

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0	910	4.37	908.5	5.75	908	6.31	907.81	11.97	906
16.07	904.54	17.7	904	19.81	903.26	23.62	902	26.06	901.11
29.43	900	31.4	899.31	35.21	898	35.57	897.93	43.31	896
46.31	895.49	48.43	895.13	48.66	895.1	48.73	895.07	48.83	895.03
52.47	893.64	53.25	893.57	54.66	893.81	55.36	894.04	56.72	894.51
59.32	894.69	66.65	894.76	69.14	894.74	69.58	894.82	71.26	895.01
86.76	894.24	91.81	894	127.63	892.86	141.05	892.33	144.37	892.2
149.62	892	152.84	891.8	157.55	891.51	157.83	891.11	158.65	890
159.49	888.77	160.25	888	160.32	887.85	160.34	887.83	167.31	887.94
170.19	887.97	170.87	888	173.27	888.1	173.41	888.1	173.56	888.14
178.77	889.38	180.85	890	182.32	890.38	183.56	890.74	189.69	891.12
198.43	891.65	205.03	892	214.64	893.93	215.04	894	217.75	895.8
218.04	896	220.84	897.86	221.04	898	221.25	898.14	223.89	900
225.25	900.92	226.98	902	227.68	902.44	230.45	904	232.54	904.97
234.77	906	238.21	907.66	238.96	908	243.2	910		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	157.55	.035	183.56	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	157.55	183.56		131.38	138.39	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 893.59	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.29	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 892.30	* Reach Len. (ft)	* 131.38	* 138.39	* 148.67
* Crit W.S. (ft)	* 892.30	* Flow Area (sq ft)	* 5.53	* 94.34	* 19.80
* E.G. slope (ft/ft)	* 0.009580	* Area (sq ft)	* 5.53	* 94.34	* 19.80
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 11.42	* 876.95	* 26.02
* Top width (ft)	* 64.76	* Top width (ft)	* 15.78	* 26.01	* 22.97
* Vel Total (ft/s)	* 7.64	* Avg. Vel. (ft/s)	* 2.06	* 9.30	* 1.31
* Max chl Dpth (ft)	* 4.47	* Hydr. Depth (ft)	* 0.35	* 3.63	* 0.86
* Conv. Total (cfs)	* 9342.4	* Conv. (cfs)	* 116.7	* 8959.8	* 265.9
* Length wtd. (ft)	* 138.49	* Wetted Per. (ft)	* 15.80	* 28.20	* 23.04
* Min Ch El (ft)	* 887.83	* Shear (lb/sq ft)	* 0.21	* 2.00	* 0.51
* Alpha	* 1.42	* Stream Power (lb/ft s)	* 243.20	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.16	* Cum Volume (acre-ft)	* 2.89	* 5.39	* 2.72
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 1.69	* 1.13	* 1.35

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 3129.654

INPUT  
 Description:

Station Elevation Data		num= 74		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	8.57	908	14.45	906.66	17.22	906	25.46	904.05
25.7	904	25.92	903.96	28.5	903.52	35.6	902	38.6	901.43
46.03	900	47.73	899.68	54.17	898.43	55.85	898	56.7	897.78
63.57	896	67.36	895.05	71.48	894	76.42	892.73	77.39	892.47
78.66	892.15	80.42	891.74	85.24	890.69	92.28	890.66	94.46	890.63
94.47	890.63	95.65	890.83	97.65	890.9	98.64	890.9	107.86	891.19
109.72	891.31	119.23	892	124.68	892.4	128.93	892.69	139.1	892.94
144.81	893.18	155.08	893.45	156.96	893.46	178.83	893.05	183.17	892.94
185.79	892.9	185.98	892.89	194.86	892.4	195.22	892.17	195.41	892
197.77	890.47	198.53	890	200.07	888	201	886.61	225	886.61
226.81	888.84	228.08	890	228.93	890.81	230.23	892	231.22	892.85
232.47	894	234.48	895.57	235	896	236.24	897.08	236.96	897.71
237.3	898	239.49	899.89	239.61	900	239.79	900.16	240.99	901.2
241.87	902	243.65	903.61	244.07	904	244.33	904.22	246.1	906
247.29	907.04	248.37	908	250.21	909.58	251.32	910		

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	194.86	.035	230.23	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 194.86 230.23 41.42 177.15 191.92 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 891.78	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.98	* Wt. n-val.	* 0.060	* 0.035	*
* W.S. Elev (ft)	* 890.80	* Reach Len. (ft)	* 41.42	* 177.15	* 191.92
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 1.33	* 114.73	*
* E.G. Slope (ft/ft)	* 0.007349	* Area (sq ft)	* 1.33	* 114.73	*
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 0.70	* 913.70	*
* Top Width (ft)	* 42.39	* Top width (ft)	* 10.73	* 31.66	*
* Vel Total (ft/s)	* 7.88	* Avg. vel. (ft/s)	* 0.53	* 7.96	*
* Max Chl Dpth (ft)	* 4.19	* Hydr. Depth (ft)	* 0.12	* 3.62	*
* Conv. Total (cfs)	* 10666.7	* Conv. (cfs)	* 8.1	* 10658.5	*
* Length Wtd. (ft)	* 155.22	* Wetted Per. (ft)	* 10.76	* 35.45	*
* Min Ch El (ft)	* 886.61	* Shear (lb/sq ft)	* 0.06	* 1.48	*



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```
* Alpha * 1.02 * Stream Power (lb/ft s) * 251.32 * 0.00 * 0.00 *
* Frctn Loss (ft) * 1.15 * Cum Volume (acre-ft) * 2.88 * 5.05 * 2.69 *
* C & E Loss (ft) * 0.07 * Cum SA (acres) * 1.65 * 1.04 * 1.32 *
*****
```

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 2951.927

INPUT  
 Description:

Station Elevation Data num= 60

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	908.12	1.19	908	3.23	908	6.78	906.8	9.26	906
14.65	904.26	15.46	904	20.29	902.44	21.17	902	46.06	890.34
49.32	891.77	60.49	891.95	71.4	891.4	81.63	886.67	81.99	886.58
83.4	886.54	90.81	886.38	98.79	886.12	101.06	886.12	101.09	886.12
101.1	886.12	105.46	886.83	116.85	888	122.73	888.47	129.85	889.05
133.31	889.2	135.43	889	135.45	888.99	136.26	888	137.32	886.78
137.9	886	138.17	885.73	138.81	885.19	153.57	885.52	154.19	886
155.46	887.19	156.45	888	157.77	888.97	158.24	889.41	159.55	889.91
162.78	891.13	165.23	892	169.05	893.47	170.53	894	173.86	895.16
175.09	895.58	176.25	896	177.64	896.43	183.13	898	188.56	899.58
190.02	900	191.17	900.32	195.17	901.45	197.15	902	201.59	903.22
202.74	903.5	204.78	904	207.94	904.56	214.36	906	255.68	916

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	135.43	.035	157.77	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 135.43 157.77 200.61 168.64 176.27 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft) * 890.56 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.76 * wt. n-Val. * 0.100 * 0.035 * 0.100 *
* W.S. Elev (ft) * 889.80 * Reach Len. (ft) * 200.61 * 168.64 * 176.27 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 139.95 * 85.54 * 0.49 *
* E.G. Slope (ft/ft) * 0.007514 * Area (sq ft) * 139.95 * 85.54 * 0.49 *
* Q Total (cfs) * 1021.20 * Flow (cfs) * 312.06 * 708.88 * 0.27 *
* Top width (ft) * 84.40 * Top width (ft) * 60.57 * 22.34 * 1.49 *
* Vel Total (ft/s) * 4.52 * Avg. Vel. (ft/s) * 2.23 * 8.29 * 0.55 *
*****
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* Max Chl Dpth (ft)      * 4.61 * Hydr. Depth (ft)      * 2.31 * 3.83 * 0.33 *
* Conv. Total (cfs)     * 11780.5 * Conv. (cfs)          * 3599.9 * 8177.6 * 3.1 *
* Length Wtd. (ft)     * 175.27 * Wetted Per. (ft)    * 61.45 * 25.31 * 1.74 *
* Min Ch El (ft)       * 885.19 * Shear (lb/sq ft)    * 1.07 * 1.59 * 0.13 *
* Alpha                 * 2.41 * Stream Power (lb/ft s) * 255.68 * 0.00 * 0.00 *
* Frctn Loss (ft)      * 0.51 * Cum Volume (acre-ft) * 2.82 * 4.65 * 2.69 *
* C & E Loss (ft)      * 0.16 * Cum SA (acres)      * 1.62 * 0.93 * 1.31 *
*****
    
```

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 2773.556

INPUT

Description:

Station Elevation		Data		num= 91		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	4	908	4.48	907.77	8.06	906	9.5	905.28
12.21	904	15.94	902.15	16.25	902	17.11	901.56	19.32	900.6
20.71	900	23.17	898.85	25.11	898	25.22	897.96	28.87	896.36
29.33	896.15	29.36	896.13	29.5	896	29.67	895.82	31.56	894
32.23	893.28	33.63	892	34.36	891.29	35.47	890.54	36.27	890
38.33	888.36	38.82	888	40.75	886.63	41.65	886	42.36	885.47
42.46	885.39	44.53	883.92	44.55	883.92	55.28	883.97	56.85	883.94
59.19	883.92	59.38	884	61.44	885.34	62.51	886	62.59	886.06
63.53	886.67	63.59	886.68	67.7	886.75	83.72	887.08	108.82	887.61
114.4	887.88	116.96	887.99	117.2	888.02	118.35	888.13	118.7	888.09
120.41	888.05	122.41	888	132.03	887.71	132.28	887.71	132.47	887.72
133.6	887.83	134.39	888	134.41	888.01	136.58	888.43	147.1	889.99
147.25	890	151.47	890.44	161.43	891.34	167.16	892	168.77	892.19
175.61	892.74	184.55	893.47	191.29	894	197.1	894.44	214.17	896
225.81	897.12	234.71	898	237.32	898.26	240.34	898.55	245.76	899.11
254	900	257.03	900.33	260.59	900.71	267.68	901.29	269.97	901.48
274.29	902	274.87	902.05	275.61	902.1	288.68	903.12	294.64	903.52
296.09	903.61	296.82	903.66	298.27	903.79	300.53	904	318.38	905.66
322.01	906								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	40.75	.035	63.53	.035

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

40.75 63.53 88.56 82.82 18.59 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 889.90 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.24  * Wt. n-Val.      * 0.100  * 0.035  * 0.035  *
* W.S. Elev (ft)     * 889.66 * Reach Len. (ft) * 88.56  * 82.82  * 18.59  *
* Crit W.S. (ft)     *      * Flow Area (sq ft) * 6.30  * 119.32 * 167.92 *
* E.G. Slope (ft/ft) * 0.001516 * Area (sq ft)    * 6.30  * 119.32 * 167.92 *
* Q Total (cfs)      * 1021.20 * Flow (cfs)      * 4.22  * 567.52 * 449.47 *
* Top width (ft)     * 108.15 * Top width (ft)  * 4.05  * 22.78  * 81.32  *
* Vel Total (ft/s)   * 3.48  * Avg. Vel. (ft/s) * 0.67  * 4.76  * 2.68  *
* Max Chl Dpth (ft) * 5.74  * Hydr. Depth (ft) * 1.56  * 5.24  * 2.06  *
* Conv. Total (cfs)  * 26224.2 * Conv. (cfs)     * 108.3 * 14573.7 * 11542.2 *
* Length Wtd. (ft)  * 65.26  * Wetted Per. (ft) * 5.06  * 24.45 * 81.51 *
* Min Ch El (ft)    * 883.92 * Shear (lb/sq ft) * 0.12  * 0.46  * 0.20  *
* Alpha              * 1.30  * Stream Power (lb/ft s) * 322.01 * 0.00 * 0.00 *
* Frctn Loss (ft)   * 0.20  * Cum Volume (acre-ft) * 2.48 * 4.25 * 2.35 *
* C & E Loss (ft)   * 0.12  * Cum SA (acres)   * 1.47 * 0.84 * 1.14 *
*****
    
```

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 2690.443

INPUT  
 Description:

Station		Elevation Data		num= 94		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	7.23	907.07	9.64	906	12.9	904.66	15.2	904				
17.27	903.42	17.87	903.18	17.93	903.16	18.52	902.66	19.52	901.8				
19.72	901.63	21.59	900	22.47	899.26	24	898	24.89	897.21				
26.31	896	27.35	895.03	28.55	894	29.91	892.83	30.74	892				
31.41	891.45	33.29	890	35.18	888.26	35.52	888	35.84	887.72				
37.88	886	40.12	884.1	40.24	884	40.81	883.53	40.84	883.5				
42.71	883.5	56.6	883.34	56.73	883.57	57.01	884	57.57	884.92				
58.02	886	58.29	886.56	58.32	886.58	58.41	886.57	58.49	886.57				
58.52	886.56	58.57	886.56	69.58	886.77	77.51	887.56	79.69	887.95				
79.79	887.95	79.91	887.95	79.97	887.96	79.98	887.96	80.04	888				
80.1	888.03	80.24	888.04	82.17	888.19	99.08	889.56	99.56	889.6				
105.18	890	114.5	890	122.33	890.39	123.68	890.37	125.51	890.33				
127.03	890.14	128.16	889.81	129.89	889.24	132.14	889.2	141.54	888.95				
145	889.23	150.7	889.55	162.15	889.74	165.26	890	177.63	891.13				

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187.62	892	189.6	892.21	192.53	892.49	199.61	892.94	214.4	894
222.63	894.97	224.75	895.27	230.48	896.12	242.42	898	243.63	898.19
255.15	900	255.48	900.05	255.65	900.07	255.89	900.1	259.21	900.64
269.52	902	273.7	902.47	286.83	904	292.36	904.64	297.29	905.22
308.37	905.98	308.41	905.99	308.48	905.99	308.6	906		

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 37.88 .035 58.29 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 37.88 58.29 143.99 173.74 92.68 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 889.58	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.45	* Wt. n-Val.	* 0.100	* 0.035	* 0.035
* W.S. Elev (ft)	* 888.13	* Reach Len. (ft)	* 143.99	* 173.74	* 92.68
* Crit W.S. (ft)	* 888.13	* Flow Area (sq ft)	* 2.69	* 89.67	* 25.16
* E.G. Slope (ft/ft)	* 0.009431	* Area (sq ft)	* 2.69	* 89.67	* 25.16
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 3.38	* 908.36	* 109.47
* Top Width (ft)	* 46.04	* Top Width (ft)	* 2.53	* 20.41	* 23.10
* Vel Total (ft/s)	* 8.69	* Avg. Vel. (ft/s)	* 1.26	* 10.13	* 4.35
* Max Chl Dpth (ft)	* 4.79	* Hydr. Depth (ft)	* 1.06	* 4.39	* 1.09
* Conv. Total (cfs)	* 10515.7	* Conv. (cfs)	* 34.8	* 9353.7	* 1127.2
* Length Wtd. (ft)	* 168.30	* Wetted Per. (ft)	* 3.31	* 23.28	* 23.21
* Min Ch El (ft)	* 883.34	* Shear (lb/sq ft)	* 0.48	* 2.27	* 0.64
* Alpha	* 1.24	* Stream Power (lb/ft s)	* 308.60	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.30	* Cum Volume (acre-ft)	* 2.47	* 4.05	* 2.30
* C & E Loss (ft)	* 0.12	* Cum SA (acres)	* 1.46	* 0.80	* 1.12

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 2515.269

INPUT

Description:

Station Elevation Data		num= 85		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	7.06	908	11.47	906.79	14.7	906	20.49	904.53
20.84	904.43	27.19	902.78	30.1	902	31.92	901.53	37.75	900
41.22	898.37	42.08	898	45.84	896.17	46.19	896	47.68	895.27
49.99	894	50.43	893.75	53.57	892	54.47	891.48	57.12	890
58.34	889.31	60.69	888	62.18	887.15	68.07	886	71.85	885.28
75.35	884.61	77.1	884.27	87.55	884.1	87.98	883.82	89.91	882.68
90.2	882.5	91.58	881.57	91.7	881.47	92.28	881.25	99.15	881.3
104.87	881.69	107.35	881.59	107.45	881.74	107.7	882	109.16	883.43
109.6	884	111.33	885.7	111.64	886	112.38	886.9	113.08	886.88
131.72	886.8	140.18	886.76	144.29	886.84	144.83	886.71	147.47	886.33
147.55	886.32	147.68	886.31	149.36	886.28	150	886.27	155.8	886.17
157.03	886.18	157.46	886.19	157.51	886.2	157.79	886.27	161.85	887.31
164.61	888	166.38	888.47	168.76	888.95	173.79	889.7	177.59	890
183.28	890.64	194.83	892	201.18	892.85	205.5	894	209.56	895.07
213.12	896	222.94	897.97	223.09	898	228.37	899.21	231.44	900
233.83	900.39	243.65	902	248.88	902.83	256.26	904	264.49	905.1
271.17	906	284.46	907.78	285.98	908	286.8	908.12	299.36	910

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	87.55	.035	112.38	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	87.55	112.38		217.05	95.01	46.45	.1 .3

Blocked Obstructions num= 1		
Sta L	Sta R	Elev
144.29	299.36	886.84

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 887.74	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.07	* Wt. n-Val.	* 0.100	* 0.035	* *
* W.S. Elev (ft)	* 886.68	* Reach Len. (ft)	* 217.05	* 95.01	* 46.45
* Crit w.s. (ft)	* 885.92	* Flow Area (sq ft)	* 41.11	* 110.72	* *
* E.G. Slope (ft/ft)	* 0.006419	* Area (sq ft)	* 41.11	* 110.72	* *
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 71.73	* 949.47	* *
* Top width (ft)	* 47.59	* Top width (ft)	* 22.95	* 24.65	* *
* Vel Total (ft/s)	* 6.73	* Avg. Vel. (ft/s)	* 1.74	* 8.58	* *
* Max Chl Dpth (ft)	* 5.43	* Hydr. Depth (ft)	* 1.79	* 4.49	* *
* Conv. Total (cfs)	* 12745.6	* Conv. (cfs)	* 895.2	* 11850.4	* *
* Length Wtd. (ft)	* 118.00	* Wetted Per. (ft)	* 23.18	* 27.66	* *
* Min Ch El (ft)	* 881.25	* Shear (lb/sq ft)	* 0.71	* 1.60	* *
* Alpha	* 1.52	* Stream Power (lb/ft s)	* 299.36	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.67	* Cum Volume (acre-ft)	* 2.40	* 3.65	* 2.28
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 1.42	* 0.71	* 1.10



CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 2420.230

INPUT  
 Description:

Station Elevation Data		num= 76		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	6.78	898.19	7.43	898	7.69	897.93	14.61	896		
16.11	895.54	18.15	895.29	18.16	895.29	25.17	894	25.92	893.86		
35.82	892	38.47	891.48	41.89	891.3	43.02	891.21	46.41	890.81		
55.27	890	62.34	889.35	67.04	889.14	70.08	888.77	71.17	888.69		
85.13	888.1	87.25	887.97	91.86	887.62	96.72	887.47	103.59	887.02		
112.19	886	115.5	885.77	135.66	884.76	146.19	884.24	148.91	884.1		
149.37	884.08	150.87	884	152.68	884	159.92	883.04	162.94	883.02		
163.48	882.96	164.66	882.47	170.46	880.81	177.08	882.43	177.92	882.89		
178.66	883.08	181.26	883.17	183.38	884	183.39	884	185.51	884.4		
186.08	884.51	187.72	884.94	195.67	885.8	196.94	885.82	199.54	886		
201	886	205.22	886.39	217.76	887.56	221.55	888	228.1	889.97		
228.21	890	228.23	890.01	234.18	892	241.38	893.92	241.63	894		
242.18	894.14	248.31	896	249.89	896.48	254.87	898	259.66	899.02		
262.77	900	274.55	901.42	278.96	902	282.24	902.45	294.36	904		
304.13	905.06	312.57	906	322.44	907.08	330.78	908	341.39	909.31		
347.84	910										

Manning's n Values		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	162.94	.035	178.66	.035		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	162.94	178.66		144.52	97.6	53.98	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 886.94	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.64	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 886.30	* Reach Len. (ft)	* 144.52	* 97.60	* 53.98
* Crit W.S. (ft)	* 886.00	* Flow Area (sq ft)	* 86.05	* 69.57	* 32.13
* E.G. Slope (ft/ft)	* 0.005074	* Area (sq ft)	* 86.05	* 69.57	* 32.13
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 357.57	* 551.56	* 112.08
* Top Width (ft)	* 94.63	* Top Width (ft)	* 53.30	* 15.72	* 25.61
* Vel Total (ft/s)	* 5.44	* Avg. Vel. (ft/s)	* 4.16	* 7.93	* 3.49
* Max ch1 Dpth (ft)	* 5.49	* Hydr. Depth (ft)	* 1.61	* 4.43	* 1.25
* Conv. Total (cfs)	* 14336.4	* Conv. (cfs)	* 5019.8	* 7743.2	* 1573.4
* Length Wtd. (ft)	* 104.93	* Wetted Per. (ft)	* 53.43	* 16.39	* 25.94
* Min ch E1 (ft)	* 880.81	* Shear (lb/sq ft)	* 0.51	* 1.34	* 0.39
* Alpha	* 1.40	* Stream Power (lb/ft s)	* 347.84	* 0.00	* 0.00

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\* Frctn Loss (ft) \* 0.61 \* Cum Volume (acre-ft) \* 2.08 \* 3.46 \* 2.26 \*  
 \* C & E Loss (ft) \* 0.03 \* Cum SA (acres) \* 1.23 \* 0.67 \* 1.08 \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 2319.762

INPUT  
 Description:

Station Elevation Data		num= 79		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	5.56	908	9.72	906.56	11.26	906	15.56	904.36
16.47	904	16.72	903.9	20.77	902	21.67	901.54	24.85	900
27.95	898.55	29.6	898	36.72	896.22	37.81	895.88	43.72	894
48.89	892.36	50.03	892	51.97	891.38	57.28	890	61.53	888.89
74.36	888	83.71	887.49	86.45	887.33	99.49	886.49	103.36	886.23
106.95	886	121	885.4	133.84	884.89	146.15	884.28	148.29	884.17
148.54	884.16	151.75	884	157.82	883.7	165.14	883.33	165.25	883.33
166.93	882.54	167.8	882	169.81	881.1	171.05	880.36	173.1	880.39
181.14	880.74	183.94	880.76	184.09	880.76	184.12	880.77	184.61	881.21
185.1	882	186.07	883.3	186.49	884	186.59	884.1	186.61	884.13
195.87	884.07	200.81	884.36	207.24	884.57	217.44	885.79	219.21	886
223.87	887.45	225.89	888	228.71	888.86	232.47	890	236.4	891.25
238.77	892	241.44	892.83	244.71	894	245.76	894.36	247.45	894.92
251.29	896	254.61	896.84	259.13	898	266.53	899.9	267.32	900
269.15	900.24	282.5	902	293.71	903.53	298.21	904	318.37	905.77
320.48	906	324.58	906.5	337.05	908	356.46	910		

Manning's n Values		num= 4		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	61.53	.035	165.14	.035	186.59	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 165.14 186.59 134.94 150.07 126.66 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 886.31	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.90	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 885.40	* Reach Len. (ft)	* 134.94	* 150.07	* 126.66
* Crit w.s. (ft)	* 885.40	* Flow Area (sq ft)	* 43.67	* 91.25	* 26.87
* E.G. slope (ft/ft)	* 0.006756	* Area (sq ft)	* 43.67	* 91.25	* 26.87
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 151.06	* 778.24	* 91.90
* Top width (ft)	* 93.25	* Top width (ft)	* 44.19	* 21.45	* 27.61
* Vel Total (ft/s)	* 6.31	* Avg. Vel. (ft/s)	* 3.46	* 8.53	* 3.42
* Max chl Dpth (ft)	* 5.04	* Hydr. Depth (ft)	* 0.99	* 4.25	* 0.97
* Conv. Total (cfs)	* 12424.3	* Conv. (cfs)	* 1837.8	* 9468.3	* 1118.1

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```
* Length wtd. (ft)      * 145.02 * Wetted Per. (ft)      * 44.24 * 23.88 * 27.68 *
* Min Ch El (ft)      * 880.36 * Shear (lb/sq ft)     * 0.42 * 1.61 * 0.41 *
* Alpha                * 1.46  * Stream Power (lb/ft s) * 356.46 * 0.00 * 0.00 *
* Frctn Loss (ft)     * 0.56  * Cum Volume (acre-ft)  * 1.87 * 3.28 * 2.22 *
* C & E Loss (ft)     * 0.16  * Cum SA (acres)        * 1.07 * 0.62 * 1.05 *
*****
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 2130.340

INPUT

Description:

Station Elevation Data		num= 59		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	4.24	898	8.45	896.17	8.83	896	12.36	894.31		
13.06	894	15.34	892.93	17.51	892	18.83	891.4	21.78	890		
23.73	889.09	26.16	888	28.82	886.83	30.68	886	34.3	884.08		
34.44	884	46.93	884	64.55	883.35	66.26	883.33	83.85	882.83		
87.75	882.82	92.7	882.85	97.42	882.44	102.24	882.02	102.28	882		
102.47	882	103.93	881.54	108.79	880	108.8	880	110.72	879.17		
121.83	879.34	122.47	879.47	123.34	879.66	123.86	880	124.7	880.89		
125.46	881.67	128.94	881.96	129.47	882	139.26	882.8	139.78	882.84		
150.18	883.68	154.28	884	155.67	884.2	171.07	886	174.76	887.33		
176.62	888	179.69	889.07	182.27	890	187.27	891.74	188.04	892		
188.57	892.19	190.3	892.82	193.28	894	194.19	894.34	198.38	896		
202.82	897.67	203.62	898	204.93	898.28	211.79	900				

Manning's n Values		num= 4		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	34.3	.035	102.24	.035	125.46	.1

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Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 102.24 125.46 155.78 149.95 51.8 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft)      * 885.21 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.38  * Wt. n-Val.      * 0.035  * 0.035  * 0.100  *
* W.S. Elev (ft)     * 884.82 * Reach Len. (ft) * 155.78 * 149.95 * 51.80  *
* Crit W.S. (ft)     *      * Flow Area (sq ft) * 104.71 * 113.77 * 59.67  *
* E.G. Slope (ft/ft) * 0.002468 * Area (sq ft)    * 104.71 * 113.77 * 59.67  *
* Q Total (cfs)      * 1021.20 * Flow (cfs)      * 292.22 * 666.92 * 62.07  *
* Top Width (ft)     * 128.10 * Top Width (ft)  * 69.34  * 23.22  * 35.54  *
* Vel Total (ft/s)   * 3.67  * Avg. Vel. (ft/s) * 2.79  * 5.86  * 1.04  *
* Max Chl Dpth (ft) * 5.65  * Hydr. Depth (ft) * 1.51  * 4.90  * 1.68  *
* Conv. Total (cfs)  * 20554.4 * Conv. (cfs)     * 5881.6 * 13423.5 * 1249.2 *
* Length wtd. (ft)   * 137.17 * Wetted Per. (ft) * 69.60  * 24.55  * 35.68  *
* Min Ch El (ft)    * 879.17 * Shear (lb/sq ft) * 0.23  * 0.71  * 0.26  *
* Alpha             * 1.84  * Stream Power (lb/ft s) * 211.79 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 0.55  * Cum Volume (acre-ft) * 1.64  * 2.92  * 2.10  *
* C & E Loss (ft)   * 0.07  * Cum SA (acres)   * 0.89  * 0.55  * 0.96  *
*****
```

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 1966.255

INPUT

Description:

Station Elevation Data		num= 69	
Sta	Elev	Sta	Elev
0	900	5.23	898.17
10.42	895.66	13.86	894
22.42	890	22.94	889.75
30.62	886	34.59	884.14
35.66	883.6	37.04	882.73
43.41	878.48	43.71	878.29
51.47	878.2	52.64	878.27
57.33	881.17	57.56	881.3
92.59	882	125.94	883.3
148.98	884	149.2	884
173.13	886	177.73	887.75
183.05	889.85	183.44	890

194.39 894 200.37 895.88 200.85 896 209.78 897.95 210.04 898  
 210.89 898.12 212.9 898.4 223.91 899.32 225.35 900

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 38.14 .035 57.56 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 38.14 57.56 33.8 57.56 130.71 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 884.58 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 1.09 \* Wt. n-Val. \* 0.100 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 883.49 \* Reach Len. (ft) \* 33.80 \* 57.56 \* 130.71 \*  
 \* Crit W.S. (ft) \* 883.49 \* Flow Area (sq ft) \* 1.70 \* 85.11 \* 89.44 \*  
 \* E.G. Slope (ft/ft) \* 0.007780 \* Area (sq ft) \* 1.70 \* 85.11 \* 89.44 \*  
 \* Q Total (cfs) \* 1021.20 \* Flow (cfs) \* 1.62 \* 798.24 \* 221.34 \*  
 \* Top width (ft) \* 95.86 \* Top width (ft) \* 2.31 \* 19.42 \* 74.13 \*  
 \* Vel Total (ft/s) \* 5.79 \* Avg. Vel. (ft/s) \* 0.95 \* 9.38 \* 2.47 \*  
 \* Max chl Dpth (ft) \* 5.49 \* Hydr. Depth (ft) \* 0.74 \* 4.38 \* 1.21 \*  
 \* Conv. Total (cfs) \* 11577.9 \* Conv. (cfs) \* 18.4 \* 9050.0 \* 2509.4 \*  
 \* Length wtd. (ft) \* 72.84 \* Wetted Per. (ft) \* 2.75 \* 21.47 \* 74.17 \*  
 \* Min Ch El (ft) \* 878.00 \* Shear (lb/sq ft) \* 0.30 \* 1.93 \* 0.59 \*  
 \* Alpha \* 2.09 \* Stream Power (lb/ft s) \* 225.35 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.19 \* Cum Volume (acre-ft) \* 1.45 \* 2.58 \* 2.01 \*  
 \* C & E Loss (ft) \* 0.26 \* Cum SA (acres) \* 0.76 \* 0.47 \* 0.89 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 1908.167

INPUT

Description:



OXF157-159Bridges.rep

Station Elevation Data		num= 81		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	6.66	898	8.03	897.41	11.86	896	16.69	894.16
17.12	894	17.24	893.96	22.26	892	23.12	891.67	26.71	890.09
26.88	890.01	26.9	890.01	26.92	890	29.73	888.38	30.4	888
33.57	886.35	34.21	886	35.42	885.36	37.92	884	39.31	883.24
41.52	882	44.01	881.35	46.29	880.76	50.01	880	53.95	879.61
54.92	878.73	55.93	878.24	56.63	878.12	57.1	878	61.21	878
77.12	877.81	77.27	877.8	77.36	877.78	77.46	877.82	77.9	878
80.52	878.95	83.57	880	84.35	880.32	89.59	881.2	91.5	881.22
94.15	881.22	95.79	881.2	96.06	881.2	112.43	881.4	114.15	881.36
118.34	881.27	119.74	881.25	144.62	880.97	146.08	880.98	148.15	881.01
152.97	881.08	194.89	882	200.34	882	201.4	882.58	203.89	884
204.97	884.61	207.37	886	209.07	886.97	210.69	888	214.09	889.86
214.36	890	217.02	891.57	217.73	892	220.62	893.66	221.2	894
222.22	894.55	224.63	896	228.07	897.86	228.29	898	228.43	898.08
231.64	900	234.56	901.47	235.77	902	241.04	903.8	241.61	904
242.37	904.27	247.31	906	252.84	907.9	253.14	908	253.89	908.27
258.89	910								

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	53.95	.035	89.59	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	53.95	89.59		32.1	87.51	147.51	.1
							.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 883.77	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.22	* Wt. n-Val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 883.55	* Reach Len. (ft)	* 32.10	* 87.51	* 147.51
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 39.00	* 175.63	* 244.57
* E.G. Slope (ft/ft)	* 0.001302	* Area (sq ft)	* 39.00	* 175.63	* 244.57
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 38.10	* 764.88	* 218.22
* Top Width (ft)	* 164.35	* Top width (ft)	* 15.20	* 35.64	* 113.51
* Vel Total (ft/s)	* 2.22	* Avg. Vel. (ft/s)	* 0.98	* 4.36	* 0.89
* Max Chl Dpth (ft)	* 5.77	* Hydr. Depth (ft)	* 2.57	* 4.93	* 2.15
* Conv. Total (cfs)	* 28299.9	* Conv. (cfs)	* 1055.7	* 21196.7	* 6047.5
* Length Wtd. (ft)	* 94.87	* Wetted Per. (ft)	* 15.86	* 36.64	* 113.93
* Min Ch El (ft)	* 877.78	* Shear (lb/sq ft)	* 0.20	* 0.39	* 0.17
* Alpha	* 2.91	* Stream Power (lb/ft s)	* 258.89	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.12	* Cum Volume (acre-ft)	* 1.43	* 2.41	* 1.51
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 0.76	* 0.44	* 0.61

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 1819.717

INPUT

Description:

Station Elevation Data		num= 70		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	3.28	898.86	5.79	898	7.47	897.42	11.46	896		
15.35	894.44	16.75	894	17.93	893.63	22.92	892	26.61	890.88		
29.17	890	35.05	888.36	36.29	888	38.23	887.43	43.17	886		
47.53	884.74	49.95	884	50.68	883.76	50.98	883.66	54.2	882.79		
56.79	882	66.45	882	87.72	881.89	89.13	881.88	91.71	881.97		
93.19	881.92	96.73	881.7	102.39	881.33	103.96	881.22	111.98	880.66		
117.45	880.15	119.05	880	121.35	879.74	122.15	879.66	125.56	878.42		
126.41	878	127.09	877.64	128.26	877.31	148.11	877.31	148.72	877.89		
148.84	878	150.38	879.83	150.57	880	150.62	880.03	151.26	880.79		
153.89	880.71	161.76	880.36	169.9	880	194.12	880	196.25	881.53		
196.59	882	197.12	882.39	199.36	884	199.94	884.42	202.08	886		
202.95	886.61	204.89	888	206.62	889.18	207.73	890	210.57	891.97		
210.61	892	210.69	892.05	213.29	894	214.63	894.92	216.1	896		
218.26	897.56	218.82	898	219	898.12	219.13	898.23	221.6	900		

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	122.15	.035	151.26	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	122.15	151.26		135.34	155.41	187.82	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 883.65	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.25	* Wt. n-val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 883.40	* Reach Len. (ft)	* 135.34	* 155.41	* 187.82
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 127.67	* 164.60	* 145.37
* E.G. Slope (ft/ft)	* 0.001281	* Area (sq ft)	* 127.67	* 164.60	* 145.37
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 100.91	* 759.46	* 160.83
* Top Width (ft)	* 146.56	* Top width (ft)	* 70.19	* 29.11	* 47.26
* Vel Total (ft/s)	* 2.33	* Avg. vel. (ft/s)	* 0.79	* 4.61	* 1.11
* Max Chl Dpth (ft)	* 6.09	* Hydr. Depth (ft)	* 1.82	* 5.65	* 3.08
* Conv. Total (cfs)	* 28527.1	* Conv. (cfs)	* 2818.8	* 21215.5	* 4492.7
* Length wtd. (ft)	* 153.97	* Wetted Per. (ft)	* 70.48	* 31.11	* 48.46
* Min Ch El (ft)	* 877.31	* Shear (lb/sq ft)	* 0.14	* 0.42	* 0.24
* Alpha	* 2.95	* Stream Power (lb/ft s)	* 221.60	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.41	* Cum Volume (acre-ft)	* 1.37	* 2.07	* 0.85
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	* 0.73	* 0.37	* 0.34

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

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

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 1647.228

INPUT  
 Description:

Station Elevation Data		num= 67		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	5.62	898	5.64	897.99	6.01	897.86	11.02	896		
13.79	894.81	15.33	894.08	15.49	894	15.57	893.95	19.28	892		
19.79	891.74	23.17	890	23.49	889.83	26.85	888	28.44	887.18		
30.7	886	32.6	884.99	34.41	884	52.25	882.38	58.78	882		
63	882	69.97	881.71	70.39	881.7	74.85	881.57	117.71	880		
142.63	880	149.45	879.86	156.13	879.51	168.98	878.82	169.85	878.78		
170.32	878.75	170.34	878.74	171.41	878	172.53	876.88	172.73	876.72		
174.68	876.66	179.39	876.45	179.95	876.39	182.33	876.57	182.38	876.58		
183.21	877.91	183.27	878	183.52	878.58	184.43	880	184.56	880.3		
185.37	881.86	185.45	882	185.56	882.2	186.63	884	186.83	884.36		
187.79	886	188.06	886.48	189.01	888	189.6	889.12	190.21	890		
190.49	890.65	191.23	892	191.47	892.49	191.55	892.63	192.42	892.97		
195.03	894	197.53	894.93	198.32	895.24	200.28	896	204.32	897.5		
205.62	898	210.98	900								

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	170.32	.035	183.52	.1		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	170.32	183.52		90.87	130.82	89.72	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 883.14	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.21	* Wt. n-Val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 881.93	* Reach Len. (ft)	* 90.87	* 130.82	* 89.72
* Crit W.S. (ft)	* 881.93	* Flow Area (sq ft)	* 167.15	* 66.77	* 3.32
* E.G. Slope (ft/ft)	* 0.008552	* Area (sq ft)	* 167.15	* 66.77	* 3.32
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 311.92	* 705.15	* 4.13
* Top width (ft)	* 120.64	* Top width (ft)	* 105.55	* 13.20	* 1.89
* Vel Total (ft/s)	* 4.30	* Avg. Vel. (ft/s)	* 1.87	* 10.56	* 1.24
* Max Chl Dpth (ft)	* 5.54	* Hydr. Depth (ft)	* 1.58	* 5.06	* 1.76
* Conv. Total (cfs)	* 11042.5	* Conv. (cfs)	* 3372.9	* 7625.0	* 44.6
* Length wtd. (ft)	* 119.92	* Wetted Per. (ft)	* 105.61	* 15.14	* 3.85
* Min Ch El (ft)	* 876.39	* Shear (lb/sq ft)	* 0.84	* 2.36	* 0.46
* Alpha	* 4.21	* Stream Power (lb/ft s)	* 210.98	* 0.00	* 0.00

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\* Frctn Loss (ft) \* 0.52 \* Cum Volume (acre-ft) \* 0.91 \* 1.65 \* 0.53 \*  
 \* C & E Loss (ft) \* 0.23 \* Cum SA (acres) \* 0.45 \* 0.30 \* 0.23 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 1512.215

INPUT

Description:

Station Elevation Data		num= 70									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	4.06	898	4.96	897.58	7.92	896	10.21	894.86		
11.9	894	14.4	892.76	17.98	892	23.23	890.92	26.38	890		
27.28	890	29.42	889.53	32.27	888.87	35.54	888	35.81	887.92		
42.16	886	44.62	885.22	46.31	884.61	48.34	884	50.87	883.19		
54.4	882	55.84	881.82	57.99	881.66	76.45	880	88.83	880		
99.97	880	107.35	879.87	107.92	879.88	108.29	879.1	108.63	879.06		
108.74	878.8	108.82	878	109.1	877.43	109.85	876	112.59	875.15		
113.7	874.99	114.86	875.32	118.78	875.52	118.98	875.64	120.38	875.68		
120.97	875.7	123.59	876	131.62	876.57	131.89	876.64	132.17	877.22		
133.25	877.3	142.04	878	142.11	878	142.17	878	164.5	878.9		
181.21	880	183.49	881.16	185.2	882	187.6	883.19	189.15	884		
191.65	885.25	193.09	886	194.99	886.91	197.15	888	200.1	889.57		
200.94	890	204.32	891.7	204.93	892	208.51	893.79	208.93	894		
212.62	895.82	212.97	896	214.73	896.89	217.35	898	222.08	900		

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	107.92	.035	132.17	.1

Bank Sta: Left Right Lengths: Left Channel Right OXF157-159Bridges.rep Expan.  
 107.92 132.17 138.12 114.24 88.5 Coeff Contr. .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 881.78 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.45 * Wt. n-Val. * 0.100 * 0.035 * 0.100 *
* W.S. Elev (ft) * 881.33 * Reach Len. (ft) * 138.12 * 114.24 * 88.50 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 52.45 * 129.37 * 134.87 *
* E.G. Slope (ft/ft) * 0.002595 * Area (sq ft) * 52.45 * 129.37 * 134.87 *
* Q Total (cfs) * 1021.20 * Flow (cfs) * 43.10 * 785.57 * 192.53 *
* Top width (ft) * 122.24 * Top Width (ft) * 46.31 * 24.25 * 51.68 *
* Vel Total (ft/s) * 3.22 * Avg. Vel. (ft/s) * 0.82 * 6.07 * 1.43 *
* Max Chl Dpth (ft) * 6.34 * Hydr. Depth (ft) * 1.13 * 5.33 * 2.61 *
* Conv. Total (cfs) * 20045.8 * Conv. (cfs) * 846.0 * 15420.4 * 3779.4 *
* Length wtd. (ft) * 112.91 * Wetted Per. (ft) * 46.37 * 27.50 * 52.08 *
* Min Ch El (ft) * 874.99 * Shear (lb/sq ft) * 0.18 * 0.76 * 0.42 *
* Alpha * 2.77 * Stream Power (lb/ft s) * 222.08 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.22 * Cum Volume (acre-ft) * 0.68 * 1.36 * 0.38 *
* C & E Loss (ft) * 0.03 * Cum SA (acres) * 0.30 * 0.24 * 0.18 *
*****
  
```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 1387.656

INPUT

Description:

Station Elevation Data		num= 70		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	4.63	898.25	5.26	898	8.92	896.57	10.39	896
11.02	895.6	12.7	894	14.59	892.2	14.78	892	15.33	891.36
17.11	890	17.57	889.6	19.84	888	20.99	887.14	22.45	886
23.88	884.9	25.09	884	26.09	883.25	27.84	882	28.85	881.22
30.33	880	47.89	878.16	49.68	878	57.7	878	62.24	877.92
69.27	877.79	71.24	877.78	74.42	877.78	74.47	877.77	74.53	877.77
75.04	876.93	75.75	876	76.14	875.31	76.95	874.61	82.68	874.55
82.72	874.55	95.38	874.69	96.98	875.11	97.58	876	97.87	876.48
98.07	876.74	106.69	877.83	107.19	877.9	111.17	878	112.77	878
117.81	879.51	120.18	879.73	123.39	880	126.53	880	127.15	880.32
127.37	880.34	129.09	880.54	132.08	882	136.9	882	168.4	883.21
185.85	884	195.97	885.49	198.86	886	199.36	886.28	202.59	888
203.55	888.6	206	890	207.69	890.91	209.6	892	211.61	893.16
213.15	894	216.36	895.85	216.62	896	217.31	896.4	222.27	900

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	74.42	.035	98.07	.1



Bank Sta: Left 74.42 Right 98.07 Lengths: Left Channel 183.7 132.16 Right 32.28 Coeff Contr. .1 Expan. .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 881.53 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.35 * Wt. n-Val. * 0.100 * 0.035 * 0.100 *
* W.S. Elev (ft) * 881.18 * Reach Len. (ft) * 183.70 * 132.16 * 32.28 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 124.38 * 149.83 * 79.61 *
* E.G. Slope (ft/ft) *0.001534 * Area (sq ft) * 124.38 * 149.83 * 79.61 *
* Q Total (cfs) * 1021.20 * Flow (cfs) * 140.39 * 797.29 * 83.53 *
* Top Width (ft) * 101.51 * Top Width (ft) * 45.52 * 23.65 * 32.34 *
* Vel Total (ft/s) * 2.89 * Avg. vel. (ft/s) * 1.13 * 5.32 * 1.05 *
* Max Chl Dpth (ft) * 6.63 * Hydr. Depth (ft) * 2.73 * 6.34 * 2.46 *
* Conv. Total (cfs) * 26071.0 * Conv. (cfs) * 3584.0 * 20354.6 * 2132.5 *
* Length Wtd. (ft) * 130.35 * Wetted Per. (ft) * 46.05 * 26.17 * 32.89 *
* Min Ch El (ft) * 874.55 * Shear (lb/sq ft) * 0.26 * 0.55 * 0.23 *
* Alpha * 2.69 * Stream Power (lb/ft s) * 222.27 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.36 * Cum Volume (acre-ft) * 0.40 * 0.99 * 0.17 *
* C & E Loss (ft) * 0.09 * Cum SA (acres) * 0.15 * 0.18 * 0.09 *
*****
    
```

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower

RS: 1246.924

INPUT

Description:

Station	Elevation	Data	num=	71	Sta	Elev	Sta	Elev	Sta	Elev
0	900	.46	899.63	.97	899.22	1.04	899.28	1.16	898	
1.31	897.19	1.63	896	1.68	895.55	1.77	894.69	1.87	894	
2.01	893.2	2.24	892	2.43	891.22	2.77	890	2.97	888.88	
3.22	888	3.39	886.69	3.56	886	3.81	884.58	3.93	884	
4.16	882.47	4.27	882	4.58	880.38	4.65	880	4.72	879.59	
5	878	5.3	876.17	5.35	876	5.69	874.04	5.7	874	
5.71	873.91	9.41	873.67	11.57	873.55	14.56	873.99	14.6	874	
15.17	874.07	16.01	874.34	18.45	875.01	22.1	876	26.47	877.2	
27.68	877.49	27.7	877.5	30.68	877.93	31.18	878	35.41	878.63	
44.98	880	45.65	880	47.55	880.14	54.95	880.49	57.54	880.44	
59.91	880.43	102.71	882	123.84	882	140	882.91	140.8	883.02	
142.57	883.02	143.19	883.05	145.47	884	149.95	885.81	150.42	886	

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152.06	886.66	153.84	888	155.64	889.27	156.75	890	158.57	891.31
159.51	892	161.72	893.49	162.4	894	164.83	895.88	165	896
167.77	898								

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 5 .035 27.68 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 5 27.68 43.62 127.93 114.54 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft) * 881.08 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 1.21 * Wt. n-Val. * 0.100 * 0.035 * 0.100 *
* W.S. Elev (ft) * 879.87 * Reach Len. (ft) * 43.62 * 127.93 * 114.54 *
* Crit W.S. (ft) * 879.01 * Flow Area (sq ft) * 0.31 * 111.29 * 19.35 *
* E.G. Slope (ft/ft) * 0.006591 * Area (sq ft) * 0.31 * 111.29 * 19.35 *
* Q Total (cfs) * 1021.20 * Flow (cfs) * 0.11 * 995.19 * 25.90 *
* Top Width (ft) * 39.39 * Top Width (ft) * 0.33 * 22.68 * 16.38 *
* Vel Total (ft/s) * 7.80 * Avg. Vel. (ft/s) * 0.36 * 8.94 * 1.34 *
* Max Chl Dpth (ft) * 6.32 * Hydr. Depth (ft) * 0.94 * 4.91 * 1.18 *
* Conv. Total (cfs) * 12578.3 * Conv. (cfs) * 1.4 * 12258.0 * 319.0 *
* Length wtd. (ft) * 120.36 * Wetted Per. (ft) * 1.90 * 26.63 * 16.56 *
* Min Ch El (ft) * 873.55 * Shear (lb/sq ft) * 0.07 * 1.72 * 0.48 *
* Alpha * 1.28 * Stream Power (lb/ft s) * 167.77 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.37 * Cum Volume (acre-ft) * 0.14 * 0.60 * 0.13 *
* C & E Loss (ft) * 0.25 * Cum SA (acres) * 0.05 * 0.11 * 0.08 *
*****
```

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower

RS: 1109.636

INPUT

Description:

Station Elevation Data num= 91  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 900 7.99 898 12.11 896.99 14.98 896.29 15.03 896.27  
 16.24 895.94 18.02 895.4 18.05 895.39 18.1 895.36 19.43 894.63  
 20.13 894.27 20.36 894.21 21.06 894.1 21.82 894 27.98 893.2  
 29.82 893.02 31.32 892.97 36.62 892.73 36.95 892.72 39.12 892.49

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39.4	892.44	39.56	892.42	39.71	892.37	40.58	891.85	44.04	890.63
44.75	890	46.51	888.42	47.03	888	49.37	886	49.49	885.9
50.43	885.55	53.8	884.26	54.33	884	57.59	882.59	58.93	882
59.12	881.92	59.71	881.65	61.96	880.57	63.13	880	64.59	879.28
65.77	878.7	65.78	878.7	72.55	878.12	73.12	878.07	73.51	878
76.08	878	82.72	877.34	96.73	876.97	108.34	876.4	115.12	876.06
115.23	876	115.24	876	116.47	874.96	118.35	874.04	118.39	874.04
118.43	874.04	135.55	873.74	136.55	873.62	136.63	873.62	136.8	873.61
137.2	873.71	137.46	874	138.18	874.61	139.17	876	139.24	876.1
139.69	876.53	147.24	877.72	147.73	877.77	149.98	878	153.88	878.96
158.65	880	160.03	880.32	161.17	880.78	163.42	882	164.58	882.59
167.5	884	168.94	884.73	171.57	886	173.32	886.92	175.49	888
177.39	889.1	179.26	890	180.83	890.83	182.91	892	184.23	892.73
186.38	894	188	895.04	189.55	896	192.14	897.52	193.01	898
196.98	900								

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 115.12 .035 139.69 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 115.12 139.69 24.9 75.62 108.89 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 880.46	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.39	* wt. n-Val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 880.08	* Reach Len. (ft)	* 24.90	* 75.62	* 108.89
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 142.94	* 146.11	* 37.47
* E.G. Slope (ft/ft)	*0.001758	* Area (sq ft)	* 142.94	* 146.11	* 37.47
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 173.49	* 811.80	* 35.91
* Top Width (ft)	* 96.02	* Top width (ft)	* 52.15	* 24.57	* 19.30
* Vel Total (ft/s)	* 3.13	* Avg. Vel. (ft/s)	* 1.21	* 5.56	* 0.96
* Max Chl Dpth (ft)	* 6.47	* Hydr. Depth (ft)	* 2.74	* 5.95	* 1.94
* Conv. Total (cfs)	* 24356.1	* Conv. (cfs)	* 4137.8	* 19361.8	* 856.5
* Length wtd. (ft)	* 68.43	* Wetted Per. (ft)	* 52.56	* 26.50	* 19.64
* Min Ch El (ft)	* 873.61	* Shear (lb/sq ft)	* 0.30	* 0.61	* 0.21
* Alpha	* 2.54	* Stream Power (lb/ft s)	* 196.98	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.18	* Cum Volume (acre-ft)	* 0.07	* 0.22	* 0.06
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 0.03	* 0.04	* 0.03

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower

RS: 1029.896

INPUT

Description:

Station Elevation Data		num= 92		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	7.29	898	13.38	896.29	14.35	896	14.84	895.88
16.19	895.51	16.3	895.23	16.34	894	16.53	893.06	16.58	892.62
19.03	892.09	19.43	892	20.5	891.71	20.81	891.67	32.61	889.1
36.25	888.27	37.36	888	39.87	887.4	43.63	886.46	44.41	886.27
45.34	885.89	46.6	885.42	46.61	885.41	48.24	885.28	57.34	885.13
59.31	885.1	63.18	884.99	63.32	884.99	66.5	884.85	68.1	884.77
69.5	884.11	71.81	882.94	73.31	882.21	73.88	882	81.81	880.97
84.22	880.88	85.77	880.87	91.58	880.82	96.85	880	99.09	879.57
105.37	878	114.77	877.24	120.75	877.01	121.4	876.97	124.53	876.92
126.83	876.83	130	876.68	133.54	876.47	140.12	876.07	140.32	876.07
140.72	876.07	141.15	876.07	141.33	876.08	141.37	876.11	141.84	875.84
145.57	874	146.81	873.34	146.86	873.3	146.87	873.3	147.13	873.28
150.42	872.55	157.45	873.73	158.52	873.83	158.68	874	160.27	875.61
160.69	876	161.06	876.4	162.58	878	163.7	879.02	164.65	880
166.2	881.4	166.78	882	167.1	882.3	168.66	884	169.37	884.76
170.62	886	171.51	886.85	172.25	887.61	172.63	888	173.98	889.35
174.77	890	174.91	890.12	175.63	890.85	176.14	891.08	177.95	892
181.74	893.71	182.34	894	182.46	894.06	186.44	896	190.02	898
190.03	898	193.54	900						

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	141.37	.035	160.27	.1		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	141.37	160.27		1	1	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 880.23	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.90	* Wt. n-Val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 879.34	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 878.39	* Flow Area (sq ft)	* 89.87	* 105.74	* 6.87
* E.G. Slope (ft/ft)	* 0.004203	* Area (sq ft)	* 89.87	* 105.74	* 6.87
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 144.72	* 868.60	* 7.89
* Top Width (ft)	* 63.99	* Top width (ft)	* 41.35	* 18.90	* 3.74
* Vel Total (ft/s)	* 5.04	* Avg. vel. (ft/s)	* 1.61	* 8.21	* 1.15
* Max chl Dpth (ft)	* 6.79	* Hydr. Depth (ft)	* 2.17	* 5.59	* 1.84
* Conv. Total (cfs)	* 15751.3	* Conv. (cfs)	* 2232.1	* 13397.5	* 121.6
* Length wtd. (ft)	*	* Wetted Per. (ft)	* 41.59	* 20.51	* 5.28
* Min Ch El (ft)	* 872.55	* Shear (lb/sq ft)	* 0.57	* 1.35	* 0.34
* Alpha	* 2.27	* Stream Power (lb/ft s)	* 193.54	* 0.00	* 0.00
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*

\* C & E Loss (ft) \* \* Cum SA (acres) \* \* \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Trib 1  
 REACH: Trib 1 RS: 1494.636

INPUT  
 Description:

Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	15.95	928	20.13	927.28	25.47	926.34	26.17	926.15
26.4	926.1	27.13	926.02	27.39	926	43.3	924.94	45.42	924.77
53.91	924.35	62.06	924	71.7	924	79.1	923.52	96.59	922
96.73	921.96	101.41	920	111.87	918.35	114.12	918	114.62	917.71
115.54	917.35	119.67	916	123.52	914.71	126.42	914	132.68	912.45
134.98	912	135.64	911.88	135.72	911.87	137.14	911.78	140.39	911.8
144.88	911.81	145.55	911.81	146.78	911.88	147.48	912	157.45	912
158.05	911.87	163.08	910	163.87	909.72	164.15	909.62	166.55	908.17
166.75	908	167.1	907.78	167.17	907.72	167.74	907.67	172.91	906.96
173.22	907.58	173.49	908	173.99	908.62	174.47	910	196.54	912.02
232.54	920	280.78	930						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	163.08	.035	174.47	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 163.08 174.47 103.09 138.9 61.92 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 910.99	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.98	* Wt. n-Val.	* 0.000	* 0.035	* 0.000
* w.s. Elev (ft)	* 910.02	* Reach Len. (ft)	* 103.09	* 138.90	* 61.92
* Crit w.s. (ft)	* 910.02	* Flow Area (sq ft)	* 0.00	* 22.14	* 0.00
* E.G. Slope (ft/ft)	* 0.018884	* Area (sq ft)	* 0.00	* 22.14	* 0.00
* Q Total (cfs)	* 175.70	* Flow (cfs)	* 0.00	* 175.70	* 0.00
* Top width (ft)	* 11.61	* Top width (ft)	* 0.04	* 11.39	* 0.18
* Vel Total (ft/s)	* 7.94	* Avg. vel. (ft/s)	* 0.13	* 7.94	* 0.14
* Max Chl Dpth (ft)	* 3.06	* Hydr. Depth (ft)	* 0.01	* 1.94	* 0.01
* Conv. Total (cfs)	* 1278.6	* Conv. (cfs)	* 0.0	* 1278.6	* 0.0
* Length wtd. (ft)	* 125.42	* Wetted Per. (ft)	* 0.05	* 13.95	* 0.18
* Min Ch El (ft)	* 906.96	* Shear (lb/sq ft)	*	* 1.87	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	* 280.78	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.87	* Cum Volume (acre-ft)	* 0.00	* 0.19	* 0.07
* C & E Loss (ft)	* 0.18	* Cum SA (acres)	* 0.00	* 0.12	* 0.13



Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 1

REACH: Trib 1

RS: 1352.345

INPUT

Description:

Station Elevation Data		num= 66		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930.07	.26	930.04	.51	930	1.32	929.89	8.29	928.89		
14.32	928	19.16	927.54	30.08	926.36	31.67	926.17	33.3	926		
34.34	925.9	47.73	924.61	54.2	924	56.3	923.88	57.59	923.81		
88.84	922	101.43	920.92	102.13	920.86	102.61	920.8	106.2	920.6		
117.63	920	117.81	919.99	122.46	919.72	122.55	919.89	123.3	920		
124.15	920	125.63	919.88	126.31	919.79	141.39	918	151.12	917.25		
157.08	916.89	162.18	916.54	169.68	916	185.93	914.42	190.97	914		
191.68	913.86	193.38	913.52	200.99	912	201.2	912	211.09	910.26		
212.47	910	219.17	908.95	224.59	908	231.28	906.11	231.61	906.05		
231.65	906.04	231.78	905.93	232.27	905.51	234.19	905.5	234.81	905.62		
237.41	907.41	263.56	907.12	282.04	908	286.65	908	286.91	908.07		
294.68	910	299.45	911.23	302.52	912	310.2	913.92	310.44	914		
310.6	914.06	316.43	916	318.9	916.85	322.3	918	354.21	920		
399.33	930										

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	224.59	.035	237.41	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	224.59	237.41		147.16	222.54	129.92	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

\* E.G. Elev (ft) \* 908.44 \* Element \* Left OB \* Channel \* Right OB \*

OXF157-159Bridges.rep

* Vel Head (ft)	* 0.37	* Wt. n-val.	* 0.060	* 0.035	* 0.060	*
* W.S. Elev (ft)	* 908.07	* Reach Len. (ft)	* 147.16	* 222.54	* 129.92	*
* Crit W.S. (ft)	* 908.07	* Flow Area (sq ft)	* 0.02	* 19.52	* 30.99	*
* E.G. Slope (ft/ft)	* 0.012014	* Area (sq ft)	* 0.02	* 19.52	* 30.99	*
* Q Total (cfs)	* 175.70	* Flow (cfs)	* 0.00	* 114.18	* 61.51	*
* Top Width (ft)	* 62.75	* Top width (ft)	* 0.42	* 12.82	* 49.51	*
* Vel Total (ft/s)	* 3.48	* Avg. Vel. (ft/s)	* 0.30	* 5.85	* 1.99	*
* Max chl Dpth (ft)	* 2.57	* Hydr. Depth (ft)	* 0.04	* 1.52	* 0.63	*
* Conv. Total (cfs)	* 1603.0	* Conv. (cfs)	* 0.0	* 1041.7	* 561.2	*
* Length wtd. (ft)	* 205.20	* Wetted Per. (ft)	* 0.43	* 13.85	* 49.55	*
* Min Ch El (ft)	* 905.50	* Shear (lb/sq ft)	* 0.03	* 1.06	* 0.47	*
* Alpha	* 1.95	* Stream Power (lb/ft s)	* 399.33	* 0.00	* 0.00	*
* Frctn Loss (ft)	* 2.68	* Cum Volume (acre-ft)	* 0.00	* 0.12	* 0.05	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 0.00	* 0.08	* 0.09	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Trib 1  
 REACH: Trib 1 RS: 1083.880

INPUT

Description:

Station	Elevation	Data	num=	76	Sta	Elev	Sta	Elev	Sta	Elev
0	920	44.13	918.43	45.34	918.39	46.98	918.34	57.29	917.96	
66.46	917.92	80.97	917.33	81.51	917.32	83.4	917.33	86.95	917.29	
112.61	916	120.2	916	132.51	914.57	143.16	914	155.57	912.89	
161.95	912.27	162.68	912.19	164.29	912	180.16	910.34	183.14	910	
183.62	909.93	190.54	908	193.1	907.29	198.47	906	204.66	904.39	
205.66	904	205.84	904	207.25	903.86	221.11	902.77	230.86	902.13	
232.89	902	233.34	901.98	234.66	901.92	238.04	901.73	241.72	901.49	
244.78	901.19	246.01	901.14	256.41	901.41	258.24	900.98	262.76	900	
263.22	899.89	266.87	899.11	267.49	898.88	267.55	898.83	267.97	898.82	
275.19	898.93	275.88	899.71	276.17	900.13	276.44	900.62	278.38	900.53	
279.41	900.54	287.83	900.87	288.68	900.9	315.81	902	319.65	902	
323.28	902	337.1	902.73	350.54	903.23	369.17	904	372.26	905.01	
375.23	906	381.3	907.86	381.75	908	382.61	908.27	388.05	910	

OXF157-159Bridges.rep

388.86	910.26	389.69	910.52	393.66	911.83	394.18	912	395.5	912.43
403.48	914	404.87	914.21	416.95	916	417.75	916.12	430.76	918.03
443.96	920								

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .06 256.41 .035 276.44 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 256.41 276.44 516.84 78.3 187.93 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 901.58 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.61 * Wt. n-Val. * * 0.035 * 0.060 *
* W.S. Elev (ft) * 900.97 * Reach Len. (ft) * 0.00 * 0.00 *
* Crit W.S. (ft) * 900.97 * Flow Area (sq ft) * * 27.00 * 3.59 *
* E.G. slope (ft/ft) * 0.014263 * Area (sq ft) * * 27.00 * 3.59 *
* Q Total (cfs) * 175.70 * Flow (cfs) * * 171.41 * 4.29 *
* Top Width (ft) * 32.15 * Top width (ft) * * 18.16 * 13.99 *
* Vel Total (ft/s) * 5.74 * Avg. Vel. (ft/s) * * 6.35 * 1.19 *
* Max chl Dpth (ft) * 2.15 * Hydr. Depth (ft) * * 1.49 * 0.26 *
* Conv. Total (cfs) * 1471.2 * Conv. (cfs) * * 1435.3 * 35.9 *
* Length wtd. (ft) * 0.00 * Wetted Per. (ft) * * 19.28 * 14.00 *
* Min Ch El (ft) * 898.82 * Shear (lb/sq ft) * * 1.25 * 0.23 *
* Alpha * 1.19 * Stream Power (lb/ft s) * 443.96 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.00 * Cum Volume (acre-ft) * * * *
* C & E Loss (ft) * 0.03 * Cum SA (acres) * * * *
*****
  
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 2  
 REACH: Trib 2

RS: 1293.508

INPUT  
 Description:

Station Elevation Data num= 68  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 960 6.92 958 11.17 957.22 16.47 956.09 16.9 956

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17.06	955.97	28.07	954	34.79	952.48	36.86	952	42.25	950.75
45.35	950	49.67	949.22	54.37	948.32	56.43	948	59.81	947.38
60.81	947.21	67.14	946	73.98	944.19	74.69	944	76.35	943.57
76.69	943.45	81.66	942	82.68	942	87.59	941.4	97.87	940.09
108.08	939.12	117.15	938.26	119.68	938	122.4	937.75	123.11	937.7
131.08	936.69	133.07	936.46	133.37	936.42	133.57	936.41	138.05	936.85
143.16	937.04	151.89	937.22	160.8	937.45	162.89	937.51	177.41	937.97
184.86	938.67	188.18	938.95	189.84	939.14	190.24	939.27	192.38	940
195.61	941.08	198.24	942	200.07	942.62	201.12	942.59	208.36	942.85
208.86	942.87	210.15	942.63	212.83	942.15	213.01	942.11	213.21	942.21
220.91	946	224.58	947.76	225.54	948.24	229.35	950	232.44	951.57
233.44	952	235.43	952.59	240.17	954	241.17	954.21	247.19	956
248.37	956.24	255.48	958	263.61	960				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 131.08 .035 138.05 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 131.08 138.05 76.04 126.88 76.93 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 938.78	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.44	* Wt. n-val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 938.33	* Reach Len. (ft)	* 76.04	* 126.88	* 76.93
* Crit W.S. (ft)	* 938.33	* Flow Area (sq ft)	* 11.31	* 12.09	* 37.64
* E.G. slope (ft/ft)	* 0.013633	* Area (sq ft)	* 11.31	* 12.09	* 37.64
* Q Total (cfs)	* 303.00	* Flow (cfs)	* 46.83	* 86.18	* 169.99
* Top width (ft)	* 64.92	* Top width (ft)	* 14.71	* 6.97	* 43.24
* Vel Total (ft/s)	* 4.96	* Avg. Vel. (ft/s)	* 4.14	* 7.13	* 4.52
* Max Chl Dpth (ft)	* 1.92	* Hydr. Depth (ft)	* 0.77	* 1.73	* 0.87
* Conv. Total (cfs)	* 2595.1	* Conv. (cfs)	* 401.1	* 738.1	* 1455.9
* Length Wtd. (ft)	* 94.05	* Wetted Per. (ft)	* 14.81	* 7.01	* 43.27
* Min Ch El (ft)	* 936.41	* Shear (lb/sq ft)	* 0.65	* 1.47	* 0.74
* Alpha	* 1.16	* Stream Power (lb/ft s)	* 263.61	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.03	* Cum Volume (acre-ft)	* 0.09	* 0.08	* 0.06
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.12	* 0.04	* 0.07

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 2  
 REACH: Trib 2 RS: 1159.413

INPUT

Description:

Station Elevation Data		num= 105		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	6.65	958	10.82	957	15.24	956	17.08	955.33
20.5	954	23.7	952.78	25.76	952	29.85	950.38	30.51	950.11
30.77	950	31.21	949.82	35.43	948	39.11	946.47	40.38	946
42.21	945.29	46.26	944	53.16	942.04	53.33	942	53.41	941.98
65.75	940	69.76	939.37	73.05	938.88	80.28	938	81.51	937.85
82.62	937.73	91.12	936.59	95.48	936	97.49	935.89	98.47	935.77
98.8	935.89	99.19	936	100.9	936.79	103.82	937.66	104.11	937.66
106.98	937.67	110.63	937.08	115.17	937.53	115.82	937.6	115.85	937.61
116.02	937.67	116.25	937.67	119.44	937.51	122.06	936.6	124.49	936
124.83	935.91	126.37	935.52	129.8	935.45	130.01	935.45	134.79	935.31
184.34	934.3	194.41	934.09	194.89	934.08	198.88	934	213.13	934
221.76	933.47	226.62	932.98	228.42	932.27	228.87	932.22	229.53	932.23
231.22	932.37	233.97	932.66	237.73	933.86	238.17	934	239.79	934.52
242.86	936	243.61	936.42	245.86	937.56	251.91	937.95	252.94	938.02
253.26	938.03	253.47	938.03	253.9	938	254.46	938	261.43	937.52
261.45	937.51	261.68	937.5	263.42	937.41	264.59	937.72	265.39	938
266.3	938.3	270.1	939.55	271.25	939.88	271.6	940	271.98	940.11
277.9	942	279.69	942.55	284.82	944	288.89	945.15	291.92	946
293.54	946.44	296.18	946.91	299.1	948	301.91	948.95	305.01	950
306.79	950.62	310.34	952	312.48	952.72	315.83	954	318.57	954.98
320.92	955.53	322.41	956	325.37	956.92	328.76	958	335.19	960

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	226.62	.035	233.97	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	226.62	233.97		41.58	119.28	71.28	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 935.27	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.42	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 934.85	* Reach Len. (ft)	* 41.58	* 119.28	* 71.28
* Crit W.S. (ft)	* 934.85	* Flow Area (sq ft)	* 47.16	* 17.63	* 7.44
* E.G. Slope (ft/ft)	* 0.008935	* Area (sq ft)	* 47.16	* 17.63	* 7.44
* Q Total (cfs)	* 303.00	* Flow (cfs)	* 146.48	* 124.99	* 31.52
* Top width (ft)	* 83.05	* Top width (ft)	* 69.20	* 7.35	* 6.50
* Vel Total (ft/s)	* 4.19	* Avg. Vel. (ft/s)	* 3.11	* 7.09	* 4.23

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* Max Chl Dpth (ft)      * 2.63 * Hydr. Depth (ft)      * 0.68 * 2.40 * 1.14 *
* Conv. Total (cfs)     * 3205.5 * Conv. (cfs)          * 1549.7 * 1322.3 * 333.5 *
* Length Wtd. (ft)     * 73.88 * Wetted Per. (ft)    * 69.25 * 7.51 * 6.87 *
* Min Ch El (ft)       * 932.22 * Shear (lb/sq ft)   * 0.38 * 1.31 * 0.60 *
* Alpha                 * 1.55 * Stream Power (lb/ft s) * 335.19 * 0.00 * 0.00 *
* Frctn Loss (ft)      * 0.80 * Cum Volume (acre-ft) * 0.04 * 0.04 * 0.02 *
* C & E Loss (ft)      * 0.01 * Cum SA (acres)      * 0.05 * 0.02 * 0.03 *
*****

```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Trib 2  
 REACH: Trib 2                      RS: 1030.844

INPUT

Description:

Station Elevation Data		num= 86		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	.77	949.7	4.69	948	10.01	946.3	10.87	946		
12.24	945.59	19.11	944	20.32	943.72	27.09	942	36.87	940.69		
43.4	940	44.81	939.85	55.29	938.77	59.92	938.28	62.39	938		
62.88	937.96	63.9	937.89	66.83	937.63	85.74	936	94.69	935.33		
103.34	934.7	113.41	934	122.81	934	158.02	932.96	165.66	932.9		
171.97	932.76	174.56	932.7	179.24	932.57	180.02	932.54	198.58	932		
200.3	931.95	223.22	931.58	233.8	931.88	235.97	931.94	237.04	931.86		
247.93	931.05	262.23	930	265.81	929.74	271.79	929.55	273.11	929.52		
273.38	929.23	274.44	928.73	275.49	928.76	276.43	928.88	276.7	929.03		
277.45	929.54	281.45	929.77	285.33	930	285.43	930.01	286.29	930.07		
287.2	930.13	306.48	931.52	312.44	931.92	313.28	932	314.42	932.11		
315.51	932.21	317.32	932.35	317.47	932.36	320.2	932.45	326.81	932.59		
327.27	932.6	330.31	932.67	330.39	932.67	331.1	932.55	332.38	932.37		
332.64	932.33	333.27	932.49	339.31	934	346.64	935.84	347.25	936		
355.05	937.95	355.24	938	355.37	938.03	355.89	938.15	364.33	940		
367.31	940.66	370.78	941.39	373.55	942	376.93	942.81	382.38	944		
385.59	944.88	390.35	946	395.96	947.78	396.69	948	397.39	948.2		
403.1	950										

Manning's n values                      num= 3



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Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 273.11 .035 277.45 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 273.11 277.45 724.28 31.12 41.67 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 931.72 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.50 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.035 \*  
 \* W.S. Elev (ft) \* 931.22 \* Reach Len. (ft) \* 0.00 \* 0.00 \* 0.00 \*  
 \* Crit W.S. (ft) \* 931.22 \* Flow Area (sq ft) \* 26.63 \* 9.79 \* 21.85 \*  
 \* E.G. Slope (ft/ft) \* 0.013317 \* Area (sq ft) \* 26.63 \* 9.79 \* 21.85 \*  
 \* Q Total (cfs) \* 303.00 \* Flow (cfs) \* 127.58 \* 77.37 \* 98.04 \*  
 \* Top width (ft) \* 56.69 \* Top width (ft) \* 27.48 \* 4.34 \* 24.88 \*  
 \* Vel Total (ft/s) \* 5.20 \* Avg. Vel. (ft/s) \* 4.79 \* 7.90 \* 4.49 \*  
 \* Max Chl Dpth (ft) \* 2.49 \* Hydr. Depth (ft) \* 0.97 \* 2.26 \* 0.88 \*  
 \* Conv. Total (cfs) \* 2625.7 \* Conv. (cfs) \* 1105.6 \* 670.5 \* 849.6 \*  
 \* Length Wtd. (ft) \* 0.00 \* Wetted Per. (ft) \* 27.53 \* 4.78 \* 24.94 \*  
 \* Min Ch El (ft) \* 928.73 \* Shear (lb/sq ft) \* 0.80 \* 1.70 \* 0.73 \*  
 \* Alpha \* 1.19 \* Stream Power (lb/ft s) \* 403.10 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.00 \* Cum Volume (acre-ft) \* \* \* \*  
 \* C & E Loss (ft) \* 0.01 \* Cum SA (acres) \* \* \* \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 3  
 REACH: Trib 3

RS: 1842.591

INPUT  
 Description:

Station Elevation Data num= 81  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 1000 6.4 999.28 20.27 998 20.42 998 44.98 997.36  
 52.96 997.15 60.15 996.93 64.74 996.81 74.8 996.62 82.49 996.29  
 88.19 996 92.42 995.25 99.72 994 106.71 992.75 110.98 992  
 121.35 990 127.51 988.78 131.29 988 135.66 987.27 137.17 986.94  
 142.11 986 152.25 984.2 153.42 984 153.82 983.9 155.97 983.64  
 167.51 982 173.15 981.05 177.24 980 179.83 979.35 180.72 979.3

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182.8	979.21	189.91	979.03	205.77	978	206.05	978	207.36	977.92
207.76	977.89	223.86	976.82	243.23	976	248.81	975.84	256.19	975.49
257.03	975.45	270.58	975.11	278.56	974.91	280.77	974.66	286.86	974.22
287.94	974	291.06	973.47	291.14	973.42	291.54	973.07	292.08	972.37
292.27	972.34	292.53	972.29	293.2	972.37	293.92	972.5	306.91	973.1
307.39	973.1	308.53	972.74	311.83	972.59	311.86	972.61	312.46	973.01
313	973.06	314.5	973.26	318.97	974	322.06	974.54	323.99	974.92
330.34	976	334.36	976.65	341.86	978	350.17	979.44	351.08	979.59
353.42	980	354.85	980.31	360.68	982	365.18	983.32	367.59	983.72
368.88	984	371	984.46	377.87	986	384.9	987.4	387.97	988
397.92	990								

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 287.94 .035 318.97 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 287.94 318.97 232.84 249 40.66 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 974.76	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.59	* Wt. n-Val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 974.17	* Reach Len. (ft)	* 232.84	* 249.00	* 40.66
* Crit W.S. (ft)	* 974.17	* Flow Area (sq ft)	* 0.07	* 35.92	* 0.08
* E.G. Slope (ft/ft)	* 0.018019	* Area (sq ft)	* 0.07	* 35.92	* 0.08
* Q Total (cfs)	* 221.90	* Flow (cfs)	* 0.07	* 221.77	* 0.05
* Top width (ft)	* 32.82	* Top Width (ft)	* 0.83	* 31.03	* 0.96
* Vel Total (ft/s)	* 6.15	* Avg. Vel. (ft/s)	* 1.08	* 6.17	* 0.63
* Max Chl Dpth (ft)	* 1.88	* Hydr. Depth (ft)	* 0.08	* 1.16	* 0.08
* Conv. Total (cfs)	* 1653.1	* Conv. (cfs)	* 0.6	* 1652.1	* 0.4
* Length Wtd. (ft)	* 239.14	* Wetted Per. (ft)	* 0.84	* 31.86	* 0.98
* Min Ch El (ft)	* 972.29	* Shear (lb/sq ft)	* 0.09	* 1.27	* 0.09
* Alpha	* 1.01	* Stream Power (lb/ft s)	* 397.92	* 0.00	* 0.00
* Frctn Loss (ft)	* 3.40	* Cum Volume (acre-ft)	* 0.24	* 0.53	* 0.08
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.26	* 0.23	* 0.03

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 3  
 REACH: Trib 3

RS: 1574.434

INPUT  
 Description:

Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	990	10	988	15.71	987.15	19.89	986.59	23.54	986
25.41	985.57	32.23	984	36.68	982.82	39.63	982	42.32	981.26
47.1	980	49.68	979.16	53.9	978	56.77	976.83	58.83	976
63.08	974.23	63.71	974	67.16	972.75	69.22	972	73.69	970.74
74.68	970.49	75.24	970.4	77.74	970	82.68	969.7	95.02	968
102.03	968	117.68	966.58	117.78	966.58	118.1	966.54	118.17	966.36
118.51	966.01	118.52	966	118.54	965.99	119.41	964.47	126.22	966
126.42	966.04	127.48	966.59	137.35	968	139.81	968.28	155.28	970
163.75	970	163.78	970	202.11	971.68	206.2	971.8	211.52	972
256.73	972	266.44	973.46	272.28	973.45	273.54	973.48	279.85	973.6
286.83	974	315.66	974	340.26	975.28	341.26	975.3	342.57	975.33
355.08	976	358.38	976	368.38	976.86	382.99	978	391.58	979.77
392.53	980	393.63	980.26	400.41	982	406.71	983.46	408.96	984
410.89	984.37	417.72	986	421.38	986.59	427.73	988	442.56	990

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	117.68	.035	127.48	.035

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

117.68	127.48	206.74	191.29	82.26	.1	.3
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CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 968.56	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.70	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 967.85	* Reach Len. (ft)	* 206.74	* 191.29	* 82.26
* Crit w.s. (ft)	* 967.85	* Flow Area (sq ft)	* 8.93	* 23.37	* 5.58
* E.G. slope (ft/ft)	* 0.011533	* Area (sq ft)	* 8.93	* 23.37	* 5.58
* Q Total (cfs)	* 221.90	* Flow (cfs)	* 30.04	* 173.26	* 18.61
* Top width (ft)	* 32.67	* Top width (ft)	* 14.03	* 9.80	* 8.84
* Vel Total (ft/s)	* 5.86	* Avg. Vel. (ft/s)	* 3.36	* 7.41	* 3.33
* Max Chl Dpth (ft)	* 3.38	* Hydr. Depth (ft)	* 0.64	* 2.38	* 0.63
* Conv. Total (cfs)	* 2066.3	* Conv. (cfs)	* 279.7	* 1613.3	* 173.3
* Length wtd. (ft)	* 190.24	* Wetted Per. (ft)	* 14.09	* 11.27	* 8.93
* Min Ch El (ft)	* 964.47	* Shear (lb/sq ft)	* 0.46	* 1.49	* 0.45
* Alpha	* 1.32	* Stream Power (lb/ft s)	* 442.56	* 0.00	* 0.00
* Frctn Loss (ft)	* 2.45	* Cum Volume (acre-ft)	* 0.22	* 0.36	* 0.08
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 0.22	* 0.11	* 0.03

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 3  
REACH: Trib 3

RS: 1370.118

INPUT

Description:

Station Elevation Data		num= 58		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	6.3	978	8.38	977.64	13.94	976	17.71	975.16		
23.15	974	25.83	973.24	30.31	972	37.29	970.07	37.52	970		
38.72	969.66	44.36	968	52.77	966.36	54.46	966.03	54.63	966		
54.66	966	59.8	965.14	66.71	964	75.77	962.58	79.73	962		
88.98	960.2	89.65	960.07	89.95	960	98.13	959.7	98.24	959.57		
100.71	958.34	104.95	959.42	110.62	960.9	110.78	960.98	119.04	961.45		
132.13	962	137.13	962	148.73	962.58	157.81	963.03	170.75	964		
204.44	965.56	218.52	966	218.77	966	220.23	966.05	241.28	966.9		
267.46	967.92	268.94	968	274.65	968.18	306.35	968.78	311.04	968.88		
328.46	970	344.5	970	370.97	971.22	388.26	972	395.26	972.5		
401.3	972.91	416.44	974	422.1	974.37	437.35	975.25	449.91	976		
452.05	976.31	467.65	978	479.77	980						

Manning's n Values		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	98.13	.035	110.78	.035		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	98.13	110.78		227.21	215.79	21.44	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 961.82	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.64	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 961.18	* Reach Len. (ft)	* 227.21	* 215.79	* 21.44
* Crit w.s. (ft)	* 961.18	* Flow Area (sq ft)	* 14.36	* 21.21	* 0.34
* E.G. Slope (ft/ft)	* 0.014524	* Area (sq ft)	* 14.36	* 21.21	* 0.34
* Q Total (cfs)	* 221.90	* Flow (cfs)	* 73.70	* 147.83	* 0.38

* Top width (ft)	* 30.30	* Top width (ft)	* 14.18	* 12.65	* 3.48
* Vel Total (ft/s)	* 6.18	* Avg. Vel. (ft/s)	* 5.13	* 6.97	* 1.09
* Max Chl Dpth (ft)	* 2.84	* Hydr. Depth (ft)	* 1.01	* 1.68	* 0.10
* Conv. Total (cfs)	* 1841.3	* Conv. (cfs)	* 611.5	* 1226.6	* 3.1
* Length wtd. (ft)	* 188.26	* Wetted Per. (ft)	* 14.30	* 13.34	* 3.48
* Min Ch El (ft)	* 958.34	* Shear (lb/sq ft)	* 0.91	* 1.44	* 0.09
* Alpha	* 1.08	* Stream Power (lb/ft s)	* 479.77	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.40	* Cum Volume (acre-ft)	* 0.16	* 0.26	* 0.07
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 0.15	* 0.06	* 0.01

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

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

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Trib 3  
 REACH: Trib 3                      RS: 1126.884

INPUT

Description:

Station Elevation Data		num= 115		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	9.03	978.1	9.52	978	10.1	977.88	18.57	976		
23.53	974.92	27.67	974	30.94	973.26	36.86	972	41.73	970.97		
46.43	970	50.91	969.02	56.12	968	66.26	966.03	66.41	966		
66.48	965.99	66.71	965.94	68.56	965.69	70.27	965.75	71.33	965.71		
72.12	965.68	75.26	966	77.3	966	90.43	964.28	92.56	964		
92.72	963.98	92.87	963.96	100.81	963.21	104.88	962.51	107.18	962		
110.33	961.68	120.99	960.57	126.29	960	127.9	959.87	128.13	959.85		
138.1	958.98	156.3	958.07	157.07	958.02	157.15	958.01	157.32	958.01		
157.68	958	163.84	957.92	202.16	957.39	210.95	957.27	212.49	957.27		
213.32	957.27	222.3	957.1	224.62	957.03	246.62	956.03	248.38	956		
256.86	955.52	279.62	955.29	284.16	954.19	284.47	954.05	284.65	954		
287.2	952	291.87	953.51	292.71	954	292.85	954.16	293.42	954.37		
299.08	954.41	299.22	954.41	306.22	954.81	318.34	955.34	333.26	956		
348.54	956	351.7	956.16	352.19	956.16	352.37	956.17	357.02	956.45		
370.63	957.14	372.78	957.25	384.84	957.97	385.08	957.98	385.38	958		

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385.86	958	389.33	958.28	409.3	960	413.52	960	457.56	961.45
459.36	961.51	474.72	962	474.93	962	521.34	963.57	534.61	964
536.11	964.15	537.07	964.19	538.1	964.25	548.77	964.64	572.95	965.53
573.22	965.53	576.97	965.64	584.38	966	594.95	966	618.72	967.34
621.77	967.36	633.66	967.97	634.12	968	641.73	968.53	645.69	968.89
658.74	970	663.93	970.44	672.77	971.43	677.96	972	742.87	972
759.83	972.67	762.87	972.77	784.57	974	797.65	974.9	811.04	975.67
814.8	975.9	816.69	976	818.77	976.28	831.01	978	842.35	980

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 284.16 .035 293.42 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 284.16 293.42 54.31 34.66 9.68 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*

* E.G. Elev (ft)	* 956.08	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.27	* wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 955.81	* Reach Len. (ft)	* 54.31	* 34.66	* 9.68
* Crit W.S. (ft)	* 955.65	* Flow Area (sq ft)	* 14.82	* 25.13	* 28.04
* E.G. Slope (ft/ft)	* 0.004521	* Area (sq ft)	* 14.82	* 25.13	* 28.04
* Q Total (cfs)	* 221.90	* Flow (cfs)	* 25.03	* 128.59	* 68.29
* Top width (ft)	* 77.23	* Top width (ft)	* 32.42	* 9.26	* 35.54
* Vel Total (ft/s)	* 3.26	* Avg. Vel. (ft/s)	* 1.69	* 5.12	* 2.44
* Max chl Dpth (ft)	* 3.81	* Hydr. Depth (ft)	* 0.46	* 2.71	* 0.79
* Conv. Total (cfs)	* 3300.1	* Conv. (cfs)	* 372.2	* 1912.3	* 1015.6
* Length wtd. (ft)	* 34.66	* Wetted Per. (ft)	* 32.56	* 10.47	* 35.58
* Min Ch El (ft)	* 952.00	* Shear (lb/sq ft)	* 0.13	* 0.68	* 0.22
* Alpha	* 1.63	* Stream Power (lb/ft s)	* 842.35	* 0.00	* 0.00
* Frctn Loss (ft)	*	* Cum volume (acre-ft)	* 0.09	* 0.14	* 0.06
* C & E Loss (ft)	*	* Cum SA (acres)	* 0.03	* 0.01	* 0.01

\*\*\*\*\*

CULVERT

RIVER: Trib 3  
 REACH: Trib 3 RS: 1109.439

INPUT

Description:

Distance from Upstream XS = 11  
 Deck/Roadway Width = 10  
 Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 2

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
284.16	954.19	0	306.22	954.81	0				



Upstream Bridge Cross Section Data

Station Elevation Data num= 115									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	9.03	978.1	9.52	978	10.1	977.88	18.57	976
23.53	974.92	27.67	974	30.94	973.26	36.86	972	41.73	970.97
46.43	970	50.91	969.02	56.12	968	66.26	966.03	66.41	966
66.48	965.99	66.71	965.94	68.56	965.69	70.27	965.75	71.33	965.71
72.12	965.68	75.26	966	77.3	966	90.43	964.28	92.56	964
92.72	963.98	92.87	963.96	100.81	963.21	104.88	962.51	107.18	962
110.33	961.68	120.99	960.57	126.29	960	127.9	959.87	128.13	959.85
138.1	958.98	156.3	958.07	157.07	958.02	157.15	958.01	157.32	958.01
157.68	958	163.84	957.92	202.16	957.39	210.95	957.27	212.49	957.27
213.32	957.27	222.3	957.1	224.62	957.03	246.62	956.03	248.38	956
256.86	955.52	279.62	955.29	284.16	954.19	284.47	954.05	284.65	954
287.2	952	291.87	953.51	292.71	954	292.85	954.16	293.42	954.37
299.08	954.41	299.22	954.41	306.22	954.81	318.34	955.34	333.26	956
348.54	956	351.7	956.16	352.19	956.16	352.37	956.17	357.02	956.45
370.63	957.14	372.78	957.25	384.84	957.97	385.08	957.98	385.38	958
385.86	958	389.33	958.28	409.3	960	413.52	960	457.56	961.45
459.36	961.51	474.72	962	474.93	962	521.34	963.57	534.61	964
536.11	964.15	537.07	964.19	538.1	964.25	548.77	964.64	572.95	965.53
573.22	965.53	576.97	965.64	584.38	966	594.95	966	618.72	967.34
621.77	967.36	633.66	967.97	634.12	968	641.73	968.53	645.69	968.89
658.74	970	663.93	970.44	672.77	971.43	677.96	972	742.87	972
759.83	972.67	762.87	972.77	784.57	974	797.65	974.9	811.04	975.67
814.8	975.9	816.69	976	818.77	976.28	831.01	978	842.35	980

Manning's n Values

num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	284.16	.035	293.42	.035

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	284.16	293.42	.1		.3

Downstream Deck/Roadway Coordinates

num= 2					
Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
228.78	954.26	0	300.13	954.27	0

Downstream Bridge Cross Section Data

Station Elevation Data num= 114									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	7.75	968	14.33	966.27	15.77	966	18.18	965.58
27.24	964	28.93	963.74	34.28	963.02	36.34	962.71	37.55	962.38
37.58	962.38	39.35	962.55	40	962.65	44.1	962.3	52.15	961.38
59.99	960.73	66.63	960.17	67.26	960.12	68.38	960	85.41	958.71
96.78	958	98.95	957.89	110.89	957.26	145.41	956.82	165.27	956.8

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175.54	956.82	178.9	956.75	183.31	956.63	187.82	956.5	193.61	956.23
194.94	956.21	201.39	956.1	206.69	956	207.42	956	218.14	955.11
228.78	954.26	237.22	953.56	238.57	953.45	245.56	953.4	248.36	953.46
250.52	953.38	253.9	952.89	262.36	952.08	262.66	952	262.87	952
269.68	950.39	273.17	952	273.53	952.14	286.94	953.77	288.62	953.92
289.42	953.99	289.43	953.99	289.76	953.86	289.96	953.86	290.36	953.87
293.53	954	300.13	954.27	302.74	954.29	303.16	954.26	303.27	954.27
303.36	954.27	303.73	954.33	313.71	954.89	326.65	955.61	331.76	956
337.5	956.47	349.95	957.63	353.91	958	358.14	958	371.05	958.7
372.07	958.74	386.07	959.36	392.59	959.61	397.93	960	438.81	961.29
441.87	961.37	460.75	962	461.51	962	463.53	962.14	469.25	962.28
490.96	962.99	499.69	963.21	524.28	964	538.22	965.41	546.78	965.74
546.93	965.75	554.09	966	566.14	967.05	577.89	968	579.37	968.11
579.54	968.13	579.73	968.15	582.66	968.33	584.56	968.41	596.64	968.9
609.91	970	629.18	970	633.26	970.34	638.47	970.79	647.29	971.19
652.77	972	729.9	972	737.49	972.32	767.13	973.45	768.34	973.49
777.47	974	804.59	975.83	807.59	976	808.71	976	811.35	976.32
813.23	976.57	822.26	978	823.4	978.2	833.21	980		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	262.36	.035	273.53	.035

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	262.36	273.53	.1		.3

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	1.25							
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		
	6.7	21.4	.024	.024	0	.9	1		
Upstream	Elevation = 952.39								
	Centerline Station = 287.2								
Downstream	Elevation = 952.12								
	Centerline Station = 269.5								

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1  
 \*\*\*\*\*  
 \* Q culv Group (cfs) \* 8.54 \* Culv Full Len (ft) \* 21.40 \*

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* # Barrels * 1 * Culv Vel US (ft/s) * 6.96 *
* Q Barrel (cfs) * 8.54 * Culv Vel DS (ft/s) * 6.96 *
* E.G. US. (ft) * 956.08 * Culv Inv El Up (ft) * 952.39 *
* W.S. US. (ft) * 955.81 * Culv Inv El Dn (ft) * 952.12 *
* E.G. DS (ft) * 954.05 * Culv Frctn Ls (ft) * 1.27 *
* W.S. DS (ft) * 953.38 * Culv Exit Loss (ft) * 0.08 *
* Delta EG (ft) * 2.04 * Culv Entr Loss (ft) * 0.68 *
* Delta WS (ft) * 2.43 * Q weir (cfs) * 212.96 *
* E.G. IC (ft) * 956.08 * Weir Sta Lft (ft) * 245.45 *
* E.G. OC (ft) * 956.08 * Weir Sta Rgt (ft) * 350.18 *
* Culvert Control * Outlet * Weir Submerg * 0.00 *
* Culv WS Inlet (ft) * 953.64 * Weir Max Depth (ft) * 1.89 *
* Culv WS Outlet (ft) * 953.37 * Weir Avg Depth (ft) * 0.75 *
* Culv Nml Depth (ft) * * Weir Flow Area (sq ft) * 79.05 *
* Culv CRT Depth (ft) * 1.14 * Min El Weir Flow (ft) * 954.27 *
*****

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CROSS SECTION

RIVER: Trib 3  
 REACH: Trib 3 RS: 1089.963

INPUT  
 Description:

Station		Elevation Data		num= 114		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	7.75	968	14.33	966.27	15.77	966	18.18	965.58				
27.24	964	28.93	963.74	34.28	963.02	36.34	962.71	37.55	962.38				
37.58	962.38	39.35	962.55	40	962.65	44.1	962.3	52.15	961.38				
59.99	960.73	66.63	960.17	67.26	960.12	68.38	960	85.41	958.71				
96.78	958	98.95	957.89	110.89	957.26	145.41	956.82	165.27	956.8				
175.54	956.82	178.9	956.75	183.31	956.63	187.82	956.5	193.61	956.23				
194.94	956.21	201.39	956.1	206.69	956	207.42	956	218.14	955.11				
228.78	954.26	237.22	953.56	238.57	953.45	245.56	953.4	248.36	953.46				
250.52	953.38	253.9	952.89	262.36	952.08	262.66	952	262.87	952				
269.68	950.39	273.17	952	273.53	952.14	286.94	953.77	288.62	953.92				
289.42	953.99	289.43	953.99	289.76	953.86	289.96	953.86	290.36	953.87				
293.53	954	300.13	954.27	302.74	954.29	303.16	954.26	303.27	954.27				
303.36	954.27	303.73	954.33	313.71	954.89	326.65	955.61	331.76	956				
337.5	956.47	349.95	957.63	353.91	958	358.14	958	371.05	958.7				
372.07	958.74	386.07	959.36	392.59	959.61	397.93	960	438.81	961.29				
441.87	961.37	460.75	962	461.51	962	463.53	962.14	469.25	962.28				
490.96	962.99	499.69	963.21	524.28	964	538.22	965.41	546.78	965.74				
546.93	965.75	554.09	966	566.14	967.05	577.89	968	579.37	968.11				
579.54	968.13	579.73	968.15	582.66	968.33	584.56	968.41	596.64	968.9				
609.91	970	629.18	970	633.26	970.34	638.47	970.79	647.29	971.19				
652.77	972	729.9	972	737.49	972.32	767.13	973.45	768.34	973.49				
777.47	974	804.59	975.83	807.59	976	808.71	976	811.35	976.32				
813.23	976.57	822.26	978	823.4	978.2	833.21	980						

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 262.36 .035 273.53 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 262.36 273.53 482.6 81.36 254.05 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 954.05 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.67 \* Wt. n-val. \* 0.035 \* 0.035 \* 0.035 \*  
 \* W.S. Elev (ft) \* 953.38 \* Reach Len. (ft) \* 0.00 \* 0.00 \* 0.00 \*  
 \* Crit W.S. (ft) \* 953.38 \* Flow Area (sq ft) \* 8.39 \* 23.66 \* 6.32 \*  
 \* E.G. Slope (ft/ft) \* 0.011404 \* Area (sq ft) \* 8.39 \* 23.66 \* 6.32 \*  
 \* Q Total (cfs) \* 221.90 \* Flow (cfs) \* 30.12 \* 171.07 \* 20.71 \*  
 \* Top Width (ft) \* 33.20 \* Top Width (ft) \* 11.83 \* 11.17 \* 10.19 \*  
 \* Vel Total (ft/s) \* 5.78 \* Avg. vel. (ft/s) \* 3.59 \* 7.23 \* 3.28 \*  
 \* Max Chl Dpth (ft) \* 2.99 \* Hydr. Depth (ft) \* 0.71 \* 2.12 \* 0.62 \*  
 \* Conv. Total (cfs) \* 2077.9 \* Conv. (cfs) \* 282.0 \* 1601.9 \* 194.0 \*  
 \* Length Wtd. (ft) \* 0.00 \* Wetted Per. (ft) \* 11.91 \* 11.75 \* 10.27 \*  
 \* Min Ch El (ft) \* 950.39 \* Shear (lb/sq ft) \* 0.50 \* 1.43 \* 0.44 \*  
 \* Alpha \* 1.29 \* Stream Power (lb/ft s) \* 833.21 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.00 \* Cum Volume (acre-ft) \* \* \* \*  
 \* C & E Loss (ft) \* 0.18 \* Cum SA (acres) \* \* \* \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.  
 Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.  
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

**Supplement 4**

**HEC-RAS Analysis –Temporary Conditions Summary w/ Cross Sections**

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

```

X      X  XXXXXX   XXXX      XXXX      XX      XXXX
X      X  X       X   X      X   X      X  X      X
X      X  X       X   X      X   X      X  X      X
XXXXXXXX XXXX     X       XXX  XXXX     XXXXXX     XXXX
X      X  X       X   X      X   X      X   X      X
X      X  X       X   X      X   X      X   X      X
X      X  XXXXXX   XXXX     X   X      X   X      XXXXXX

```

\*\*\*\*\*

PROJECT DATA

Project Title: OXF 157-159 Bridges  
Project File : OXF157-159Bridges.prj  
Run Date and Time: 6/3/2014 8:02:37 AM

Project in English units

\*\*\*\*\*

PLAN DATA

Plan Title: Proposed Temp Bridge Revised  
Plan File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage  
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.p09

Geometry Title: Proposed Temp Bridge Revised  
Geometry File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage  
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.g02

Flow Title : Structures Revised  
Flow File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage  
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.f10

Plan Summary Information:

Number of:	Cross Sections = 106	Multiple Openings = 0
	Culverts = 4	Inline Structures = 0
	Bridges = 5	Lateral Structures = 0

Computational Information

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



Flow tolerance factor = 0.001

Computation Options

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

\*\*\*\*\*

FLOW DATA

Flow Title: Structures Revised
Flow File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.f10

Flow Data (cfs)

Table with 4 columns: River, Reach, RS, PF 1. Rows include Bluestone Creek Upper, Middle, Lower and Trib 1, 2, 3.

Boundary Conditions

Table with 4 columns: River, Reach, Profile, Upstream/Downstream. Rows include Bluestone Creek Upper and Lower with Normal S values.

\*\*\*\*\*

GEOMETRY DATA

Geometry Title: Proposed Temp Bridge Revised
Geometry File : x:\Navitus Jobfiles\SLS\7889-OXF 159\Engineering\Drainage
Comp\Floodplain\Report\Computations\HEC-RAS\Revised2\OXF157-159Bridges.g02

Reach Connection Table

OXF157-159Bridges.rep

```

*****
* River          Reach          * Upstream Boundary * Downstream Boundary *
*****
* Bluestone Creek Bluestone Creek *          3          *
* Bluestone Creek Upper          *          3          *
* Bluestone Creek Middle         *          2          *
* Bluestone Creek Lower         *          1          *
* Trib 1          Trib 1         *          1          *
* Trib 2          Trib 2         *          2          *
* Trib 3          Trib 3         *          3          *
*****
    
```

JUNCTION INFORMATION

Name: 1  
 Description:  
 Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length	Angle
Bluestone Creek	Middle	to Bluestone Creek	Lower	20.21	0
Trib 1	Trib 1	to Bluestone Creek	Lower	0	0

Name: 2  
 Description:  
 Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length	Angle
Bluestone Creek	Upper	to Bluestone Creek	Middle	63.02	0
Trib 2	Trib 2	to Bluestone Creek	Middle	0	0

Name: 3  
 Description:  
 Energy computation Method

Length across Junction River	Reach	Tributary River	Reach	Length	Angle
Bluestone Creek	Bluestone Creek	to Bluestone Creek	Upper	42.49	0
Trib 3	Trib 3	to Bluestone Creek	Upper	0	0

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14659.36

INPUT  
 Description:

Station Elevation Data num= 88  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*

OXF157-159Bridges.rep

0	979.98	4.21	979.33	10.06	978.32	11.51	978.07	11.89	978
12.03	977.98	13.39	977.69	18.12	976.7	21.11	976	24.01	975.35
29.82	974	32.12	973.48	38.3	972	44.91	971.17	54.84	970
63.61	969.6	88.74	968	111.55	967.08	116.96	966.92	138.27	966.34
148.64	966	150.51	966	155	965.8	166.6	965.4	172.86	965.15
177.28	964.95	187.15	964.54	200.02	964	205.8	964	206.01	963.99
213.75	963.68	217.56	962.24	218.05	961.88	219.92	960.57	220.2	960.33
221.05	960.3	223.73	960.17	226.3	960.42	227.52	961.31	228.49	962
231.18	963.83	231.72	964	236.6	964.52	239.8	964.92	247.61	964.99
251.36	965.15	252.23	965.18	253.23	965.32	253.93	964.97	255.2	964.8
257.08	964.54	259.05	965.7	259.47	966	261.2	967	262.9	968
264.97	969.34	266	970	267.65	970.98	269.44	972	270.97	972.93
272.53	974	274.95	975.59	275.51	976	278.91	976.63	284.65	977.32
290.56	978.05	290.98	978.09	295.97	978.58	296.01	978.57	296.89	978.54
297.25	978.51	297.4	978.51	298.28	978.28	298.98	978	299.52	977.73
300.26	978	300.4	978	301.33	978.4	305.97	980	309.03	980.74
314.88	982	320.93	983.62	322.06	984	322.82	984.25	328.11	986
328.61	986.17	334.23	988	340.27	990				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 213.75 .035 231.18 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 213.75 231.18 58.5 87.12 77.46 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 965.44	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.84	* Wt. n-val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 964.60	* Reach Len. (ft)	* 58.50	* 87.12	* 77.46
* Crit w.s. (ft)	* 964.60	* Flow Area (sq ft)	* 13.80	* 53.31	* 2.07
* E.G. Slope (ft/ft)	* 0.008444	* Area (sq ft)	* 13.80	* 53.31	* 2.07
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 33.54	* 408.00	* 2.26
* Top width (ft)	* 52.06	* Top width (ft)	* 28.04	* 17.43	* 6.59
* Vel Total (ft/s)	* 6.42	* Avg. vel. (ft/s)	* 2.43	* 7.65	* 1.09
* Max Chl Dpth (ft)	* 4.43	* Hydr. Depth (ft)	* 0.49	* 3.06	* 0.31
* Conv. Total (cfs)	* 4829.5	* Conv. (cfs)	* 365.0	* 4439.9	* 24.6
* Length Wtd. (ft)	* 82.94	* Wetted Per. (ft)	* 28.06	* 19.40	* 6.67
* Min Ch El (ft)	* 960.17	* Shear (lb/sq ft)	* 0.26	* 1.45	* 0.16
* Alpha	* 1.32	* Stream Power (lb/ft s)	* 340.27	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.74	* Cum Volume (acre-ft)	* 1.00	* 1.38	* 0.35
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 1.04	* 0.46	* 0.35

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: Divided flow computed for this cross-section.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14572.23

INPUT  
 Description:

Station Elevation Data num= 93											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	3.05	979.48	11.86	977.89	13.66	977.59	19.99	976.59		
23.82	976	28.07	975.2	35.99	973.98	37.25	973.76	50.16	972.08		
50.79	972	51.33	971.94	61.97	970.61	66.69	970.19	78.37	969.18		
90.61	968.09	104.42	967.58	113.31	967.22	120.75	966.88	121.99	966.83		
142.46	966.19	143.46	966.17	144.74	966.15	145.6	966.12	148.12	966.01		
165.57	965.26	167.22	965.18	175.77	964.8	177.81	964.75	199.56	964.05		
203.07	963.82	224.89	962.38	227.37	962.19	227.41	962.17	227.75	962		
230.8	961.07	231.1	960.89	231.34	960.8	231.85	960.81	237.82	960		
237.83	960	238.68	960.96	239.58	961.36	242.13	961.61	242.14	961.62		
245.04	962.07	247.43	962.54	248.06	962.61	251.16	962.86	253.9	963.04		
256.99	963.88	260.52	964	267.49	964	269.4	964.06	269.43	964.07		
271.37	964.22	272.66	964.32	272.99	964.1	273.09	964.03	273.13	964		
273.58	963.7	276.12	963.54	276.71	963.69	277.39	964	278.82	964.65		
281.62	966	283.91	966.97	286.11	968	289.1	969.27	290.74	970		
292.5	970.83	295.29	972	299.04	973.61	299.7	973.91	300	974		
303.23	975.6	304.55	976	307.61	977.61	308.36	978	308.79	978.23		
314.53	980	315.77	980.17	318.75	980.52	320.47	980.69	322.26	981.07		
327.17	982	331.85	983.22	333.9	984	337.85	985.53	339.15	986		
343.94	987.73	344.7	988	350.12	990						

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	227.37	.035	239.58	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 227.37 239.58 35.73 28.43 82.26 .1 .3

Blocked Obstructions num= 1		
Sta L	Sta R	Elev
272.66	350.12	964.32

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 964.62	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.78	* Wt. n-Val.	* 0.035	* 0.035	* 0.060
* w.s. Elev (ft)	* 963.84	* Reach Len. (ft)	* 35.73	* 28.43	* 82.26

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* Crit W.S. (ft)	* 963.84	* Flow Area (sq ft)	* 20.01	* 36.64	* 23.33
* E.G. Slope (ft/ft)	* 0.009567	* Area (sq ft)	* 20.01	* 36.64	* 23.33
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 72.30	* 303.03	* 68.47
* Top Width (ft)	* 54.08	* Top width (ft)	* 24.61	* 12.21	* 17.26
* Vel Total (ft/s)	* 5.55	* Avg. Vel. (ft/s)	* 3.61	* 8.27	* 2.94
* Max Chl Dpth (ft)	* 3.84	* Hydr. Depth (ft)	* 0.81	* 3.00	* 1.35
* Conv. Total (cfs)	* 4537.3	* Conv. (cfs)	* 739.2	* 3098.1	* 700.0
* Length Wtd. (ft)	* 28.43	* Wetted Per. (ft)	* 24.67	* 13.03	* 17.49
* Min Ch El (ft)	* 960.00	* Shear (lb/sq ft)	* 0.48	* 1.68	* 0.80
* Alpha	* 1.63	* Stream Power (lb/ft s)	* 350.12	* 0.00	* 0.00
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 0.97	* 1.29	* 0.33
* C & E Loss (ft)	*	* Cum SA (acres)	* 1.01	* 0.43	* 0.33

Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.

CULVERT

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14557.54

INPUT

Description:

Distance from Upstream XS = 9.4  
 Deck/Roadway width = 10  
 Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 2

Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

*****	227.37	962.19	0	245.04	962.07	0
-------	--------	--------	---	--------	--------	---

Upstream Bridge Cross Section Data

Station Elevation Data

num= 93

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	3.05	979.48	11.86	977.89	13.66	977.59	19.99	976.59
23.82	976	28.07	975.2	35.99	973.98	37.25	973.76	50.16	972.08
50.79	972	51.33	971.94	61.97	970.61	66.69	970.19	78.37	969.18
90.61	968.09	104.42	967.58	113.31	967.22	120.75	966.88	121.99	966.83
142.46	966.19	143.46	966.17	144.74	966.15	145.6	966.12	148.12	966.01
165.57	965.26	167.22	965.18	175.77	964.8	177.81	964.75	199.56	964.05
203.07	963.82	224.89	962.38	227.37	962.19	227.41	962.17	227.75	962
230.8	961.07	231.1	960.89	231.34	960.8	231.85	960.81	237.82	960
237.83	960	238.68	960.96	239.58	961.36	242.13	961.61	242.14	961.62
245.04	962.07	247.43	962.54	248.06	962.61	251.16	962.86	253.9	963.04
256.99	963.88	260.52	964	267.49	964	269.4	964.06	269.43	964.07
271.37	964.22	272.66	964.32	272.99	964.1	273.09	964.03	273.13	964
273.58	963.7	276.12	963.54	276.71	963.69	277.39	964	278.82	964.65
281.62	966	283.91	966.97	286.11	968	289.1	969.27	290.74	970
292.5	970.83	295.29	972	299.04	973.61	299.7	973.91	300	974

OXF157-159Bridges.rep

303.23	975.6	304.55	976	307.61	977.61	308.36	978	308.79	978.23
314.53	980	315.77	980.17	318.75	980.52	320.47	980.69	322.26	981.07
327.17	982	331.85	983.22	333.9	984	337.85	985.53	339.15	986
343.94	987.73	344.7	988	350.12	990				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	227.37	.035	239.58	.06

Bank Sta: Left Right Coeff Contr. Expan.

227.37	239.58	.1	.3
--------	--------	----	----

Blocked Obstructions num= 1

Sta L	Sta R	Elev
272.66	350.12	964.32

Downstream Deck/Roadway Coordinates num= 2

Sta Hi	Cord Lo	Cord	Sta Hi	Cord Lo	Cord
207.08	962.06	0	241.24	962.02	0

Downstream Bridge Cross Section Data Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	3.13	978.99	5.82	978	8.91	976.85	9.87	976.63
13.32	976	18.7	975.07	24.76	974	34.48	972.4	37.37	972
42.13	971.4	53.36	970	58.46	969.48	62.67	969.32	77.6	968.02
78	968	85.09	967.69	104.64	966.27	107.8	966.14	113.26	966
117.63	966	119.66	965.91	147.18	964.86	159.88	964.37	168.48	964.06
169.65	964	178.72	964	199.86	962.55	207.08	962.06	207.19	962.05
207.92	962	208.5	962	212.76	961.68	218.2	961.38	221.49	960.52
223.39	960	224.91	959.63	225.38	959.45	232.6	959.53	235.66	959.67
236.44	960	237.08	960.35	240.36	961.86	240.37	961.88	241.3	962.02
243.7	962.34	248.99	963.15	253.81	963.76	255.68	963.83	261.36	963.9
266.39	963.96	266.49	963.97	266.64	963.97	268.25	964.01	269.34	964.03
269.5	964	272.29	962.65	272.31	962.64	272.32	962.65	273.68	964
276.08	965.98	276.09	966	276.11	966.02	276.51	966.41	278.31	968
279.53	968.96	280.72	970	282.22	971.46	282.83	972	285.02	973.95
285.07	974	285.11	974.03	287.35	976	288.75	977.15	289.72	978
291.4	979.61	291.81	980	292.17	980.31	294.19	982	295.94	982.65
299.24	984	301.43	984.67	305.63	986	307.39	986.54	307.48	986.57

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	218.2	.035	240.36	.035

Bank Sta: Left Right Coeff Contr. Expan.

218.2	240.36	.1	.3
-------	--------	----	----



OXF157-159Bridges.rep

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 1.67  
 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  
 4.94 19.51 .024 .024 0 .9 1

Number of Barrels = 3  
 Upstream Elevation = 960.16  
 Centerline Stations  
 Sta. Sta. Sta.  
 234.6 236.3 238.3  
 Downstream Elevation = 959.43  
 Centerline Stations  
 Sta. Sta. Sta.  
 228.4 230.4 232.6

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1  
 \*\*\*\*\*  
 \* Q Culv Group (cfs) \* 41.85 \* Culv Full Len (ft) \* 19.51 \*  
 \* # Barrels \* 3 \* Culv Vel US (ft/s) \* 6.37 \*  
 \* Q Barrel (cfs) \* 13.95 \* Culv Vel DS (ft/s) \* 6.37 \*  
 \* E.G. US. (ft) \* 964.58 \* Culv Inv El Up (ft) \* 960.16 \*  
 \* W.S. US. (ft) \* 963.84 \* Culv Inv El Dn (ft) \* 959.43 \*  
 \* E.G. DS (ft) \* 963.35 \* Culv Frctn Ls (ft) \* 0.66 \*  
 \* W.S. DS (ft) \* 962.51 \* Culv Exit Loss (ft) \* 0.00 \*  
 \* Delta EG (ft) \* 1.23 \* Culv Entr Loss (ft) \* 0.57 \*  
 \* Delta WS (ft) \* 1.33 \* Q Weir (cfs) \* 401.95 \*  
 \* E.G. IC (ft) \* 964.55 \* Weir Sta Lft (ft) \* 182.98 \*  
 \* E.G. OC (ft) \* 964.58 \* Weir Sta Rgt (ft) \* 278.67 \*  
 \* Culvert Control \* Outlet \* Weir Submerg \* 0.08 \*  
 \* Culv WS Inlet (ft) \* 961.83 \* Weir Max Depth (ft) \* 2.51 \*  
 \* Culv WS Outlet (ft) \* 961.10 \* Weir Avg Depth (ft) \* 1.24 \*  
 \* Culv Nml Depth (ft) \* \* Weir Flow Area (sq ft) \* 118.70 \*  
 \* Culv Crt Depth (ft) \* 1.40 \* Min El weir Flow (ft) \* 962.08 \*  
 \*\*\*\*\*

Warning: During subcritical analysis, the water surface upstream of culvert went to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14543.33

INPUT  
 Description:

Station Elevation Data num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	3.13	978.99	5.82	978	8.91	976.85	9.87	976.63
13.32	976	18.7	975.07	24.76	974	34.48	972.4	37.37	972
42.13	971.4	53.36	970	58.46	969.48	62.67	969.32	77.6	968.02
78	968	85.09	967.69	104.64	966.27	107.8	966.14	113.26	966
117.63	966	119.66	965.91	147.18	964.86	159.88	964.37	168.48	964.06
169.65	964	178.72	964	199.86	962.55	207.08	962.06	207.19	962.05
207.92	962	208.5	962	212.76	961.68	218.2	961.38	221.49	960.52
223.39	960	224.91	959.63	225.38	959.45	232.6	959.53	235.66	959.67
236.44	960	237.08	960.35	240.36	961.86	240.37	961.88	241.3	962.02
243.7	962.34	248.99	963.15	253.81	963.76	255.68	963.83	261.36	963.9
266.39	963.96	266.49	963.97	266.64	963.97	268.25	964.01	269.34	964.03
269.5	964	272.29	962.65	272.31	962.64	272.32	962.65	273.68	964
276.08	965.98	276.09	966	276.11	966.02	276.51	966.41	278.31	968
279.53	968.96	280.72	970	282.22	971.46	282.83	972	285.02	973.95
285.07	974	285.11	974.03	287.35	976	288.75	977.15	289.72	978
291.4	979.61	291.81	980	292.17	980.31	294.19	982	295.94	982.65
299.24	984	301.43	984.67	305.63	986	307.39	986.54	307.48	986.57

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	218.2	.035	240.36	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 218.2 240.36 183.08 169.22 151.23 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 963.35	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.84	* Wt. n-val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 962.51	* Reach Len. (ft)	* 183.08	* 169.22	* 151.23
* Crit w.s. (ft)	* 962.51	* Flow Area (sq ft)	* 10.39	* 53.81	* 1.42
* E.G. slope (ft/ft)	* 0.010300	* Area (sq ft)	* 10.39	* 53.81	* 1.42
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 31.27	* 409.72	* 2.82
* Top width (ft)	* 44.38	* Top width (ft)	* 17.76	* 22.16	* 4.45
* Vel Total (ft/s)	* 6.76	* Avg. vel. (ft/s)	* 3.01	* 7.61	* 1.99
* Max chl dpth (ft)	* 3.06	* Hydr. Depth (ft)	* 0.58	* 2.43	* 0.32
* Conv. Total (cfs)	* 4372.9	* Conv. (cfs)	* 308.1	* 4037.1	* 27.8
* Length wtd. (ft)	* 169.29	* Wetted Per. (ft)	* 17.80	* 22.91	* 4.51
* Min Ch El (ft)	* 959.45	* Shear (lb/sq ft)	* 0.38	* 1.51	* 0.20
* Alpha	* 1.18	* Stream Power (lb/ft s)	* 307.48	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.67	* Cum Volume (acre-ft)	* 0.97	* 1.21	* 0.33
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 0.99	* 0.42	* 0.31

\*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Bluestone Creek RS: 14371.96

INPUT

Description:

Station Elevation Data		num=		90							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	4.57	978	7.82	976.72	9.5	976	11.45	975.19		
14.28	974	17.54	972.62	18.97	972	22.82	970.54	24.67	970		
25.7	969.68	31.45	968	37.99	966.59	41.53	966	54.25	965.08		
74.28	964	96.81	963.17	119.43	962	153.31	960.92	154.77	960.88		
155.61	960.87	182.46	960.38	184.8	960.4	186.96	960.41	200.27	960.12		
201.82	960.13	206.41	960.14	207.51	960.14	223.38	960	230.86	960		
232.26	959.95	233.99	959.9	234.64	959.45	236.77	958	238.6	956.66		
239.74	956	239.85	955.98	240.21	955.75	241.92	955.82	245.81	956		
245.84	956	245.94	956.03	248.24	957.43	249.65	958	249.94	958.16		
250.14	958.24	251.34	958.5	260.99	960	267.46	960	271.67	960.51		
273.63	960.45	274.08	960.47	274.47	960.49	277.38	961.9	277.43	961.91		
277.7	961.91	284.83	962.07	289.89	962.17	290.13	962.09	290.37	962		
291.58	961.57	292.06	961.52	292.07	961.52	294.15	961.07	294.63	960.93		
295.94	961.92	296.04	962	298.32	963.73	298.65	964	299.04	964.29		
301.29	966	303.89	967.96	303.94	968	304	968.05	306.54	970		
307.79	970.93	309.11	972	310.68	972.78	311.33	973.17	312.38	974		
316.38	975.8	316.59	975.9	316.78	976	316.87	976.05	320.66	978		
322.99	979.23	324.41	980	325.88	980.53	330.82	982	338.37	984		

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	233.99	.035	250.14	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	233.99	250.14		183.56	178.06	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 961.13 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 1.02  * Wt. n-Val.      * 0.035  * 0.035  * 0.060  *
* W.S. Elev (ft)     * 960.11 * Reach Len. (ft) * 183.56 * 178.06 * 171.27 *
* Crit w.s. (ft)     * 959.81 * Flow Area (sq ft) * 2.04  * 51.02  * 11.17  *
* E.G. Slope (ft/ft) * 0.009495 * Area (sq ft)    * 2.04  * 51.02  * 11.17  *
* Q Total (cfs)      * 443.80 * Flow (cfs)      * 1.67  * 422.80 * 19.33  *
* Top width (ft)     * 57.59 * Top width (ft)  * 23.20 * 16.15  * 18.24  *
* Vel Total (ft/s)   * 6.91  * Avg. vel. (ft/s) * 0.82  * 8.29  * 1.73  *
* Max Chl Dpth (ft) * 4.36  * Hydr. Depth (ft) * 0.09  * 3.16  * 0.61  *
* Conv. Total (cfs)  * 4554.6 * Conv. (cfs)     * 17.2  * 4339.1 * 198.4  *
* Length wtd. (ft)  * 178.92 * Wetted Per. (ft) * 23.20 * 17.99 * 18.39 *
* Min Ch El (ft)    * 955.75 * Shear (lb/sq ft) * 0.05  * 1.68  * 0.36  *
* Alpha              * 1.37  * Stream Power (lb/ft s) * 338.37 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 1.71  * Cum Volume (acre-ft) * 0.95  * 1.01  * 0.30  *
* C & E Loss (ft)   * 0.08  * Cum SA (acres)   * 0.91  * 0.35  * 0.27  *
*****
    
```

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14193.22

INPUT  
 Description:

Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	6.95	978	8.59	977.51	14.05	976	18.9	974.63
21.16	974	24.63	973.22	30.54	972	39.73	970.11	40.29	970
41.01	969.85	47.1	968	49.93	967.14	54.9	966	55.4	965.9
68.5	964	80.78	963.35	87.43	962.91	90.6	962.78	93.54	962.6
95.37	962.45	105.01	962	108	962	119.05	961.82	119.58	961.82
170.51	961.53	174.83	961.51	176.18	961.51	204.07	960.94	204.59	960.93
235.6	960	268.28	958.19	269.3	958.13	269.55	958.12	271.67	958
272.88	957.94	298.42	956.47	300.15	956.1	300.85	956	301.49	955.85
302.07	955.53	303	955.59	308.33	955.42	309.41	955.97	309.46	956
309.75	956.14	311.76	958	313.6	959.61	315.11	960	317.74	960.39
330.27	961.54	337.68	961.48	343.32	961.45	343.4	961.44	345.03	961.39
346.7	961.11	347.39	960.82	347.62	960.79	348.71	960.6	349.28	961.19
350.05	962	350.94	962.89	352.02	964	353.24	965.42	353.82	966
355.41	967.7	355.71	968	357.65	970.03	360.54	972	362.24	973.58
362.79	974	363.37	974.55	365.01	976	365.96	976.91	367.09	978
369.25	980								

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 298.42 .035 309.75 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 298.42 309.75 191.71 148.15 175.74 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 959.34 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.74 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 958.59 \* Reach Len. (ft) \* 191.71 \* 148.15 \* 175.74 \*  
 \* Crit W.S. (ft) \* 958.59 \* Flow Area (sq ft) \* 39.37 \* 32.44 \* 3.26 \*  
 \* E.G. Slope (ft/ft) \* 0.009609 \* Area (sq ft) \* 39.37 \* 32.44 \* 3.26 \*  
 \* Q Total (cfs) \* 443.80 \* Flow (cfs) \* 169.29 \* 267.15 \* 7.36 \*  
 \* Top Width (ft) \* 51.44 \* Top width (ft) \* 37.42 \* 11.33 \* 2.69 \*  
 \* Vel Total (ft/s) \* 5.91 \* Avg. vel. (ft/s) \* 4.30 \* 8.24 \* 2.26 \*  
 \* Max Chl Dpth (ft) \* 3.17 \* Hydr. Depth (ft) \* 1.05 \* 2.86 \* 1.21 \*  
 \* Conv. Total (cfs) \* 4527.4 \* Conv. (cfs) \* 1727.0 \* 2725.3 \* 75.1 \*  
 \* Length Wtd. (ft) \* 158.60 \* Wetted Per. (ft) \* 37.48 \* 11.65 \* 3.64 \*  
 \* Min Ch El (ft) \* 955.42 \* Shear (lb/sq ft) \* 0.63 \* 1.67 \* 0.54 \*  
 \* Alpha \* 1.37 \* Stream Power (lb/ft s) \* 369.25 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.62 \* Cum volume (acre-ft) \* 0.86 \* 0.84 \* 0.28 \*  
 \* C & E Loss (ft) \* 0.00 \* Cum SA (acres) \* 0.78 \* 0.29 \* 0.23 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 14044.56

INPUT

Description:

Station Elevation Data num= 97  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 980 5.84 978 8.26 977.24 11.92 976 14.67 975.3  
 19.55 974 25.61 972.5 27.57 972 34.85 970.19 35.59 970  
 43.36 968.1 43.74 968 45.43 967.66 54.19 966 62.33 964.6

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65.89	964	71.11	963.56	92.69	962	122.77	960.63	130.31	960.3
130.9	960.28	136.43	960	137.62	960	147.5	959.47	159.91	959.06
171.62	958.93	174.03	958.85	197.43	958.5	212.52	958.22	213.19	958.23
224.22	958.11	225.14	958.12	229.45	958.08	229.56	958.08	244.33	958.07
244.66	958.07	250.32	958	269.78	958	276.14	957.68	293.44	956.87
312	956	318.39	955.44	330.15	954.38	332.69	954.03	332.84	954
333.07	954	333.23	953.99	339.66	953.61	339.76	953.73	340	954
340.68	954.68	343.85	956	344.35	956.22	344.81	956.41	368.09	957.67
374.1	957.92	376	958	376.19	958.02	383.73	958.76	383.75	958.76
387.93	958.52	393.62	958.51	394.07	958.61	395.58	958.68	397.3	958.49
397.64	958.44	400.26	959.23	402.02	960	402.93	960.42	406.48	962
410.22	963.66	410.64	963.84	410.74	963.9	413.39	965.8	413.65	966
416.59	967.89	416.75	968	417.29	968.33	420.04	970	421.23	970.76
422.83	972	424.7	973.19	425.76	974	427.37	975.46	428.12	976
430.35	977.71	430.74	978	431.33	978.43	433.67	980	436.35	982
437.61	982.88	438.89	984	440.84	985.6	441.6	986	443	986.63
446.41	988	451.45	990						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	318.39	.035	344.81	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	318.39	344.81		187.81	191.69	193.78	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 957.50	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.74	* Wt. n-val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 956.75	* Reach Len. (ft)	* 187.81	* 191.69	* 193.78
* Crit w.s. (ft)	* 956.75	* Flow Area (sq ft)	* 12.67	* 56.29	* 1.09
* E.G. Slope (ft/ft)	* 0.010927	* Area (sq ft)	* 12.67	* 56.29	* 1.09
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 38.34	* 404.59	* 0.88
* Top Width (ft)	* 55.26	* Top width (ft)	* 22.48	* 26.42	* 6.36
* Vel Total (ft/s)	* 6.33	* Avg. vel. (ft/s)	* 3.03	* 7.19	* 0.80
* Max Chl Dpth (ft)	* 3.14	* Hydr. Depth (ft)	* 0.56	* 2.13	* 0.17
* Conv. Total (cfs)	* 4245.5	* Conv. (cfs)	* 366.8	* 3870.4	* 8.4
* Length wtd. (ft)	* 190.81	* Wetted Per. (ft)	* 22.52	* 27.31	* 6.37
* Min Ch El (ft)	* 953.61	* Shear (lb/sq ft)	* 0.38	* 1.41	* 0.12
* Alpha	* 1.19	* Stream Power (lb/ft s)	* 451.45	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.96	* Cum Volume (acre-ft)	* 0.75	* 0.69	* 0.27
* C & E Loss (ft)	* 0.15	* Cum SA (acres)	* 0.65	* 0.23	* 0.21

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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



This may indicate the need for additional cross sections.  
 warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.  
 warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 13852.52

INPUT

Description:

Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	30.62	968.08	31.99	968	33.37	967.9	35.79	967.71
56.67	966.41	63.01	966	65.69	965.81	69.49	965.56	85.32	964.53
90.62	964	107.61	962.8	125.37	962	139.15	961.18	143.88	961.02
154.43	960.54	158.65	960.33	166.86	960	181.94	959.4	214.59	958
249.49	956	258.37	955.38	275.98	954	289.95	954	297.04	953.9
315.85	953.64	316.74	953.64	330.1	953.18	331.71	952.73	333.97	952
336.19	951.36	337.43	950.96	343.64	951.6	343.67	951.6	343.74	951.64
344.71	952	347.16	953.41	347.19	953.43	348.66	953.56	354.9	954
355.38	954	367.24	954.87	376.14	956	380.3	956.54	383.14	956.91
387.74	957.5	393.66	957.71	400.51	957.83	401.16	957.8	401.63	957.77
403.08	957.56	404.37	957.37	404.72	957.67	405.16	958	406.48	959.72
406.73	960	407.14	960.5	408.98	962	409.36	962.25	409.8	962.65
410.36	963.1	411.54	964	413.03	965.34	413.75	966	414.56	966.62
416.14	968	417.99	969.49	418.54	970	419.4	970.67	420.92	972
422.78	973.5	423.34	974	423.86	974.42	425.81	976	427.23	977.24
428.22	978	429.17	978.79	430.49	979.87				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	330.1	.035	347.16	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	330.1	347.16		350.42	192.57	163.42	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 955.21	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.23	* Wt. n-val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 954.98	* Reach Len. (ft)	* 350.42	* 192.57	* 163.42
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 72.07	* 53.19	* 16.71

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* E.G. Slope (ft/ft)      *0.002894 * Area (sq ft)          * 72.07 * 53.19 * 16.71 *
* Q Total (cfs)          * 443.80 * Flow (cfs)           * 173.36 * 251.33 * 19.10 *
* Top Width (ft)        * 104.64 * Top width (ft)       * 66.63 * 17.06 * 20.95 *
* Vel Total (ft/s)      * 3.13 * Avg. vel. (ft/s)    * 2.41 * 4.73 * 1.14 *
* Max Chl Dpth (ft)    * 4.02 * Hydr. Depth (ft)    * 1.08 * 3.12 * 0.80 *
* Conv. Total (cfs)     * 8249.7 * Conv. (cfs)         * 3222.6 * 4672.0 * 355.1 *
* Length Wtd. (ft)     * 240.58 * Wetted Per. (ft)    * 66.68 * 17.87 * 21.02 *
* Min Ch El (ft)       * 950.96 * Shear (lb/sq ft)    * 0.20 * 0.54 * 0.14 *
* Alpha                 * 1.53 * Stream Power (lb/ft s) * 430.49 * 0.00 * 0.00 *
* Frctn Loss (ft)      * 0.94 * Cum Volume (acre-ft) * 0.56 * 0.45 * 0.23 *
* C & E Loss (ft)      * 0.02 * Cum SA (acres)      * 0.45 * 0.13 * 0.15 *
*****

```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 13658.52

INPUT  
 Description:

Station Elevation Data num= 108

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	7.18	966	27.28	964	53.6	962	79.9	960
111.22	958	115.26	960	135.36	970	150.67	970	226.56	970
231.61	967.53	238.5	969.4	252.3	969.64	265.57	969.01	282.5	962
304.38	960.5	310.56	960	311.28	959.94	323.29	958.84	324.6	958.71
328.42	958.3	333.65	957.82	334.04	957.77	340.05	956.92	341.21	956.83
346.28	957.28	346.95	957.35	355.1	957.27	357.8	957.21	359.47	957.1
372.56	956.87	373.87	956.84	400.61	956	416.64	955.63	420.92	955.6
422.93	955.56	427.11	955.47	439.41	954.99	465.06	954	466.62	954
484.41	952.39	487.98	952.1	488.59	952.08	489.24	952	494.97	951.52
495.83	951.44	496.2	951.24	499.84	950.55	499.9	950.54	500.15	950.54
505.58	950.26	505.78	950.26	506.01	950.26	506.88	950.98	507.06	951.18
510.16	951.36	515.51	952	519.8	952	528.38	953.57	530.24	953.78
532.39	954	539.68	954	540.23	954.1	540.26	954.1	540.84	954.12
543.47	954.12	550.74	954.09	550.79	954.09	550.83	954.09	551.74	954
552.02	954	552.95	953.9	553.03	953.89	553.12	953.85	553.15	953.85
558.68	952.61	558.71	952.63	559.8	953.41	560.63	954	562.4	955.22
565.57	957.41	566.03	957.72	566.21	957.82	567.72	958.42	570.28	959.45
571.51	960	573.31	960.72	576.65	962	577.09	962.18	578.11	962.6
579.21	963.15	580.44	964	580.77	964.22	583.44	966	584.19	966.54
586.26	968	588.37	969.43	589.24	970	592.02	971.8	592.3	972
593.37	972.72	595.12	974	596.36	974.9	597.79	976	598.17	976.38
599.94	978	601.46	979.52	601.93	979.88				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	495.83	.035	507.06	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 495.83 507.06 100.46 106.4 102.7 .1 .3

Blocked Obstructions num= 1

Sta L Sta R Elev  
 \*\*\*\*\*  
 550.74 601.93 954.09

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 954.25 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.45 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 953.80 \* Reach Len. (ft) \* 100.46 \* 106.40 \* 102.70 \*  
 \* Crit W.S. (ft) \* \* \* Flow Area (sq ft) \* 32.50 \* 35.77 \* 35.93 \*  
 \* E.G. Slope (ft/ft) \* 0.005597 \* Area (sq ft) \* 32.50 \* 35.77 \* 35.93 \*  
 \* Q Total (cfs) \* 443.80 \* Flow (cfs) \* 116.39 \* 239.33 \* 88.08 \*  
 \* Top Width (ft) \* 61.67 \* Top width (ft) \* 27.04 \* 11.23 \* 23.41 \*  
 \* Vel Total (ft/s) \* 4.26 \* Avg. vel. (ft/s) \* 3.58 \* 6.69 \* 2.45 \*  
 \* Max Chl Dpth (ft) \* 3.54 \* Hydr. Depth (ft) \* 1.20 \* 3.19 \* 1.53 \*  
 \* Conv. Total (cfs) \* 5931.9 \* Conv. (cfs) \* 1555.6 \* 3199.0 \* 1177.3 \*  
 \* Length Wtd. (ft) \* 104.11 \* Wetted Per. (ft) \* 27.14 \* 11.70 \* 23.61 \*  
 \* Min Ch El (ft) \* 950.26 \* Shear (lb/sq ft) \* 0.42 \* 1.07 \* 0.53 \*  
 \* Alpha \* 1.58 \* Stream Power (lb/ft s) \* 601.93 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.69 \* Cum Volume (acre-ft) \* 0.14 \* 0.25 \* 0.13 \*  
 \* C & E Loss (ft) \* 0.02 \* Cum SA (acres) \* 0.08 \* 0.07 \* 0.07 \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 13552.07

INPUT  
 Description:

Station Elevation Data num= 69  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 950 29.9 950 50.45 960 71.17 970 86.64 970  
 163.81 970 176.39 964 200.59 961.48 208.14 964.71 219.16 964.84  
 230.18 964.23 243.2 958 269.35 956 305.01 955.02 312.14 954.83  
 346.83 954 350.47 954 356.67 953.6 357.9 953.53 358.02 953.52  
 360.06 953.41 377.25 952 387.59 952 387.98 951.98 395.71 951.47  
 402.64 950.99 402.91 950.74 403.35 950 403.73 949.15 403.98 948.65  
 405.39 948.59 408.97 948.34 410.04 949.91 410.13 950 410.21 950.12  
 410.93 950.97 411.91 951.09 412.12 951.11 422.13 952 428.02 952  
 433.41 952.62 439.14 953.14 447.36 953.11 452.66 952.98 453.22 952.98  
 453.97 953.14 456.53 952.05 456.65 952.03 456.67 952.03 457.31 952.33  
 457.48 952.4 457.88 952.58 458.49 952.82 461.8 954.39 464.21 955.14  
 467.22 956 472.93 957.64 474.11 958 475.37 958.38 480.55 960  
 483.2 961.17 486.12 962 487.87 963.22 488.86 964 490.86 965.33  
 491.66 966 494.15 967.89 494.29 968 497.08 970

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 402.64 .035 410.93 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 402.64 410.93 9.06 105.32 16.94 .1 .3  
 Left Levee Station= 350.47 Elevation= 954  
 Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 447.36 497.08 953.11

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 953.54 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.61 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 952.93 \* Reach Len. (ft) \* 9.06 \* 105.32 \* 16.94 \*  
 \* Crit W.S. (ft) \* 952.93 \* Flow Area (sq ft) \* 36.34 \* 32.31 \* 25.35 \*  
 \* E.G. Slope (ft/ft) \* 0.008006 \* Area (sq ft) \* 36.34 \* 32.31 \* 25.35 \*  
 \* Q Total (cfs) \* 443.80 \* Flow (cfs) \* 136.88 \* 251.67 \* 55.25 \*  
 \* Top Width (ft) \* 70.91 \* Top Width (ft) \* 36.72 \* 8.29 \* 25.89 \*  
 \* Vel Total (ft/s) \* 4.72 \* Avg. Vel. (ft/s) \* 3.77 \* 7.79 \* 2.18 \*  
 \* Max Chl Dpth (ft) \* 4.59 \* Hydr. Depth (ft) \* 0.99 \* 3.90 \* 0.98 \*  
 \* Conv. Total (cfs) \* 4960.1 \* Conv. (cfs) \* 1529.9 \* 2812.8 \* 617.4 \*  
 \* Length Wtd. (ft) \* 83.60 \* Wetted Per. (ft) \* 36.80 \* 11.00 \* 25.99 \*  
 \* Min Ch El (ft) \* 948.34 \* Shear (lb/sq ft) \* 0.49 \* 1.47 \* 0.49 \*  
 \* Alpha \* 1.77 \* Stream Power (lb/ft s) \* 497.08 \* 350.47 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.78 \* Cum Volume (acre-ft) \* 0.06 \* 0.17 \* 0.06 \*  
 \* C & E Loss (ft) \* 0.02 \* Cum SA (acres) \* 0.00 \* 0.04 \* 0.01 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Bluestone Creek RS: 13440.10

INPUT

Description:  
 Station Elevation Data num= 85

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Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	6.16	950	49.43	960	83.03	970	100.38	970
125.15	970	159.43	962	194.5	960	225.2	958	234.2	957.4
242.7	960.83	254.19	960.93	265.51	960.21	270.54	958	277.5	956
313.74	956	315.58	955.82	316.21	955.66	318.54	955.52	322.33	955.3
335.01	954.46	341.35	954	341.7	954	352.99	952.92	362.6	952
365.88	951.68	367.23	951.54	367.27	951.52	367.56	951.39	370	950
370.98	949.52	373.28	948.12	373.68	948.17	384.92	949.85	394.14	951.3
395.33	951.47	395.55	951.45	395.69	951.45	395.81	951.49	395.89	951.49
418.27	951.6	418.51	951.61	418.68	951.62	419.21	951.65	419.43	951.65
426.52	951.9	427.51	951.93	430.82	952	431.14	952.01	434.64	952.07
435.16	952	442.6	952	452.39	951.48	453.06	951.52	458.1	952
460.87	952	469.07	952.27	480.97	952.92	487.75	953.1	495.47	953.02
496.65	952.77	497.57	952.72	498.03	952.57	499.47	952.4	501.13	952.65
501.63	952.85	504.56	954	504.71	954.06	510.23	956	514.64	957.65
515.54	958	516.44	958.51	519.28	960	519.68	960.21	523.5	961.68
524.31	962	526.94	963	529.51	964	532.11	965.02	533.04	965.53
533.69	966	533.98	966.19	536.66	968	537.62	968.6	539.9	970

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	367.23	.035	395.33	.06

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

367.23	395.33	438.21	42.49	4.26	.1	.3
--------	--------	--------	-------	------	----	----

Left Levee Station= 313.74 Elevation= 956

Blocked Obstructions num= 1

Sta L	Sta R	Elev
434.64	539.9	952.07

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 952.71	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.78	* Wt. n-Val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 951.93	* Reach Len. (ft)	* 42.49	* 42.49	* 42.49
* Crit W.S. (ft)	* 951.93	* Flow Area (sq ft)	* 0.75	* 59.91	* 10.33
* E.G. Slope (ft/ft)	* 0.010995	* Area (sq ft)	* 0.75	* 59.91	* 10.33
* Q Total (cfs)	* 443.80	* Flow (cfs)	* 1.11	* 430.11	* 12.58
* Top width (ft)	* 64.18	* Top Width (ft)	* 3.91	* 28.10	* 32.17
* Vel Total (ft/s)	* 6.25	* Avg. Vel. (ft/s)	* 1.48	* 7.18	* 1.22
* Max Chl Dpth (ft)	* 3.81	* Hydr. Depth (ft)	* 0.19	* 2.13	* 0.32
* Conv. Total (cfs)	* 4232.5	* Conv. (cfs)	* 10.6	* 4101.9	* 119.9
* Length Wtd. (ft)	* 42.49	* Wetted Per. (ft)	* 3.93	* 29.26	* 32.18
* Min Ch El (ft)	* 948.12	* Shear (lb/sq ft)	* 0.13	* 1.41	* 0.22
* Alpha	* 1.28	* Stream Power (lb/ft s)	* 539.90	* 313.74	* 0.00
* Frctn Loss (ft)	* 0.08	* Cum Volume (acre-ft)	* 0.06	* 0.06	* 0.05
* C & E Loss (ft)	* 0.21	* Cum SA (acres)	*	*	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

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

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 13395.79

INPUT

Description:

Station Elevation Data

num= 101

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970	8.02	968	12.03	967.03	16.07	966	22.99	964.25
24.37	964	24.51	963.98	25.63	963.82	26.34	963.68	32.43	962.69
34.76	962.32	36.19	962	37.17	961.77	45	960	45.9	960
57.03	959.16	60.05	959.04	61.11	958.97	63.65	958.8	73.53	958
79.81	957.59	98.1	956.47	102.56	956.18	106.08	956	121.96	955.6
123.84	955.56	124.24	955.55	160.05	955.14	163.74	955.16	172.99	955.11
177.9	955.03	183.68	954.89	195.14	954.51	208.38	954.32	218.43	954.11
228.49	953.89	255.99	952	271.7	950.03	273.65	950	281.35	948.9
285.87	948.48	287.28	948.28	287.99	948.23	290.08	948	302.67	948
309.27	948.17	311.54	949.15	314.45	948	318.27	946.43	318.87	946
319.35	946	320.28	946.6	321.07	946.98	323.85	948	325.36	948.5
337.93	949.29	344.78	949.54	345.63	949.6	348.3	949.71	350	949.79
355.54	950	355.55	950	364.5	950.07	364.85	950.09	365.02	950.09
366.77	950.14	369.14	950.2	375.69	950.61	388.03	951.44	389.4	951.53
390.28	951.62	399.78	951.97	400.29	952	402.19	952.07	403.28	952.14
413.63	952.76	416.84	952.8	429.26	952.97	431.97	952.81	433.46	952.41
433.87	952.6	435.21	953.07	435.52	953.18	437.85	954	442.16	955.55
443.43	956	444.09	956.25	449.17	958	451.68	959.25	453.41	960
454.79	960.67	457.89	962	460.28	963.08	462.26	964	464.36	965.01
466.46	965.98	466.53	966	471.34	967.39	472.43	968	472.74	968.16
476.33	970								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
*****					



0 .035 311.54 .035 325.36 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 311.54 325.36 51.65 41.35 22.86 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 951.46 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.07 * Wt. n-Val. * 0.035 * 0.035 * 0.060 *
* W.S. Elev (ft) * 951.39 * Reach Len. (ft) * 51.65 * 41.35 * 22.86 *
* Crit W.S. (ft) * 949.60 * Flow Area (sq ft) * 121.09 * 53.75 * 90.92 *
* E.G. Slope (ft/ft) * 0.000771 * Area (sq ft) * 121.09 * 53.75 * 90.92 *
* Q Total (cfs) * 482.70 * Flow (cfs) * 253.72 * 148.27 * 80.70 *
* Top Width (ft) * 126.38 * Top width (ft) * 50.67 * 13.82 * 61.89 *
* Vel Total (ft/s) * 1.82 * Avg. vel. (ft/s) * 2.10 * 2.76 * 0.89 *
* Max Chl Dpth (ft) * 5.39 * Hydr. Depth (ft) * 2.39 * 3.89 * 1.47 *
* Conv. Total (cfs) * 17386.9 * Conv. (cfs) * 9139.0 * 5340.9 * 2907.0 *
* Length Wtd. (ft) * 41.35 * Wetted Per. (ft) * 51.08 * 15.01 * 61.97 *
* Min Ch El (ft) * 946.00 * Shear (lb/sq ft) * 0.11 * 0.17 * 0.07 *
* Alpha * 1.45 * Stream Power (lb/ft s) * 476.33 * 0.00 * 0.00 *
* Frctn Loss (ft) * * Cum Volume (acre-ft) * 5.86 * 4.24 * 1.19 *
* C & E Loss (ft) * * Cum SA (acres) * 6.24 * 1.21 * 1.02 *
*****
    
```

CULVERT

RIVER: Bluestone Creek  
 REACH: Upper RS: 13372.57

INPUT

Description:  
 Distance from Upstream XS = 16.8  
 Deck/Roadway Width = 10  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates  
 num= 2  
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 \*\*\*\*\*  
 273.65 950 0 355.54 950 0

Upstream Bridge Cross Section Data

```

Station Elevation Data num= 101
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 970 8.02 968 12.03 967.03 16.07 966 22.99 964.25
24.37 964 24.51 963.98 25.63 963.82 26.34 963.68 32.43 962.69
34.76 962.32 36.19 962 37.17 961.77 45 960 45.9 960
57.03 959.16 60.05 959.04 61.11 958.97 63.65 958.8 73.53 958
79.81 957.59 98.1 956.47 102.56 956.18 106.08 956 121.96 955.6
123.84 955.56 124.24 955.55 160.05 955.14 163.74 955.16 172.99 955.11
177.9 955.03 183.68 954.89 195.14 954.51 208.38 954.32 218.43 954.11
    
```

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228.49	953.89	255.99	952	271.7	950.03	273.65	950	281.35	948.9
285.87	948.48	287.28	948.28	287.99	948.23	290.08	948	302.67	948
309.27	948.17	311.54	949.15	314.45	948	318.27	946.43	318.87	946
319.35	946	320.28	946.6	321.07	946.98	323.85	948	325.36	948.5
337.93	949.29	344.78	949.54	345.63	949.6	348.3	949.71	350	949.79
355.54	950	355.55	950	364.5	950.07	364.85	950.09	365.02	950.09
366.77	950.14	369.14	950.2	375.69	950.61	388.03	951.44	389.4	951.53
390.28	951.62	399.78	951.97	400.29	952	402.19	952.07	403.28	952.14
413.63	952.76	416.84	952.8	429.26	952.97	431.97	952.81	433.46	952.41
433.87	952.6	435.21	953.07	435.52	953.18	437.85	954	442.16	955.55
443.43	956	444.09	956.25	449.17	958	451.68	959.25	453.41	960
454.79	960.67	457.89	962	460.28	963.08	462.26	964	464.36	965.01
466.46	965.98	466.53	966	471.34	967.39	472.43	968	472.74	968.16
476.33	970								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	311.54	.035	325.36	.06

Bank Sta: Left Right Coeff Contr. Expan.

311.54	325.36	.1	.3
--------	--------	----	----

Downstream Deck/Roadway Coordinates num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
328.66	950	0	377.29	950	0

Downstream Bridge Cross Section Data Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970.01	.04	970	1.37	969.68	5.16	968.98	8.99	968
14.69	966.02	14.78	966	14.92	965.96	22.04	964	25.24	963.02
28.91	962	31.95	961.02	35	960	40.28	958.44	41.89	958
45.61	957.22	46.79	957.03	51.39	956.57	53.86	956.22	56.22	956
59.49	955.9	68.64	955.59	79.79	955.27	84.48	955.19	85.68	955.18
94.85	955.08	102.33	955.01	104.73	954.97	124.84	954.54	126.71	954.49
137.31	954.22	139.85	954.14	146.91	954	157.25	954	176.26	953.89
178.14	953.87	182.29	953.83	182.77	953.83	192	953.73	192.53	953.72
201.07	953.61	205.03	953.54	205.36	953.55	221.63	953.63	231.85	953.42
241.86	953.21	253.43	952.68	254.46	952.66	268.72	952.43	272.47	952.33
273.93	952.3	285.28	952.21	291.89	952	292.29	951.99	300.35	951.51
306.06	951.17	318.85	950.66	329.66	950	334.91	948.71	337.4	948.12
337.95	948	339.79	947.16	347.87	946.04	348.03	946.03	348.15	946
348.19	946	348.21	946	348.8	946	353.72	946.36	354.27	946.36
361.17	947.17	362.29	947.54	363.77	948	364.69	948.28	366.58	948.61
366.71	948.63	372.88	949.1	377.29	950	380.77	950.05	387.24	950.89
391.46	951.2	394.17	952	394.21	952	399.94	952.5	409.12	953.3
413.64	953.33	423.73	953.41	425.63	953.44	426.08	953.41	428.9	953.22
431.69	952.91	431.98	952.83	432.28	952.96	433.49	953.37	434.08	953.58

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435.44	954	441.69	955.9	442.09	956	442.93	956.29	446.05	957.33
447.7	958	449.24	958.85	450.57	959.41	451.74	960	453.83	961.03
455.55	962	456.49	962.51	459.11	964	461.84	965.57	462.63	966
463.42	966.47	466.17	968	469.3	970				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 337.4 .035 366.71 .06

Bank Sta: Left Right Coeff Contr. Expan.  
 337.4 366.71 .1 .3

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 1.25  
 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
	13	20	.024	.024	0	.9	1

Number of Barrels = 4

Upstream Elevation = 947.92

Centerline Stations  
 Sta. Sta. Sta.  
 315.3 316.7 318.1 319.6

Downstream Elevation = 947.4

Centerline Stations  
 Sta. Sta. Sta. Sta.  
 341.6 343.3 344.7 346.2

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

\*\*\*\*\*  
 \* Q Culv Group (cfs) \* 17.36 \* Culv Full Len (ft) \* 20.00 \*  
 \* # Barrels \* 4 \* Culv Vel US (ft/s) \* 3.54 \*  
 \* Q Barrel (cfs) \* 4.34 \* Culv Vel DS (ft/s) \* 3.54 \*  
 \* E.G. US. (ft) \* 951.46 \* Culv Inv El Up (ft) \* 947.92 \*  
 \* W.S. US. (ft) \* 951.39 \* Culv Inv El Dn (ft) \* 947.40 \*  
 \* E.G. DS (ft) \* 950.98 \* Culv Frctn Ls (ft) \* 0.31 \*  
 \* W.S. DS (ft) \* 950.77 \* Culv Exit Loss (ft) \* 0.00 \*  
 \* Delta EG (ft) \* 0.48 \* Culv Entr Loss (ft) \* 0.17 \*  
 \* Delta WS (ft) \* 0.62 \* Q Weir (cfs) \* 465.34 \*  
 \* E.G. IC (ft) \* 951.39 \* Weir Sta Lft (ft) \* 260.63 \*

OXF157-159Bridges.rep

```
* E.G. OC (ft)          * 951.46 * Weir Sta Rgt (ft)    * 387.70 *
* Culvert Control      * Outlet * Weir Submerg       * 0.51 *
* Culv WS Inlet (ft)   * 949.17 * Weir Max Depth (ft) * 1.42 *
* Culv WS Outlet (ft)  * 948.65 * Weir Avg Depth (ft) * 1.23 *
* Culv Nm1 Depth (ft)  *        * Weir Flow Area (sq ft) * 156.36 *
* Culv Crt Depth (ft)  * 0.84  * Min El Weir Flow (ft) * 950.01 *
*****
```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 13353.46

INPUT  
 Description:

Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	970.01	.04	970	1.37	969.68	5.16	968.98	8.99	968
14.69	966.02	14.78	966	14.92	965.96	22.04	964	25.24	963.02
28.91	962	31.95	961.02	35	960	40.28	958.44	41.89	958
45.61	957.22	46.79	957.03	51.39	956.57	53.86	956.22	56.22	956
59.49	955.9	68.64	955.59	79.79	955.27	84.48	955.19	85.68	955.18
94.85	955.08	102.33	955.01	104.73	954.97	124.84	954.54	126.71	954.49
137.31	954.22	139.85	954.14	146.91	954	157.25	954	176.26	953.89
178.14	953.87	182.29	953.83	182.77	953.83	192	953.73	192.53	953.72
201.07	953.61	205.03	953.54	205.36	953.55	221.63	953.63	231.85	953.42
241.86	953.21	253.43	952.68	254.46	952.66	268.72	952.43	272.47	952.33
273.93	952.3	285.28	952.21	291.89	952	292.29	951.99	300.35	951.51
306.06	951.17	318.85	950.66	329.66	950	334.91	948.71	337.4	948.12
337.95	948	339.79	947.16	347.87	946.04	348.03	946.03	348.15	946
348.19	946	348.21	946	348.8	946	353.72	946.36	354.27	946.36
361.17	947.17	362.29	947.54	363.77	948	364.69	948.28	366.58	948.61
366.71	948.63	372.88	949.1	377.29	950	380.77	950.05	387.24	950.89
391.46	951.2	394.17	952	394.21	952	399.94	952.5	409.12	953.3
413.64	953.33	423.73	953.41	425.63	953.44	426.08	953.41	428.9	953.22
431.69	952.91	431.98	952.83	432.28	952.96	433.49	953.37	434.08	953.58
435.44	954	441.69	955.9	442.09	956	442.93	956.29	446.05	957.33
447.7	958	449.24	958.85	450.57	959.41	451.74	960	453.83	961.03
455.55	962	456.49	962.51	459.11	964	461.84	965.57	462.63	966
463.42	966.47	466.17	968	469.3	970				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	337.4	.035	366.71	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 337.4 366.71 13.98 104.53 171.51 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

OXF157-159Bridges.rep

```

*****
* E.G. Elev (ft)      * 950.98 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.21  * Wt. n-Val.      * 0.035  * 0.035  * 0.060  *
* W.S. Elev (ft)     * 950.77 * Reach Len. (ft) * 13.98  * 104.53 * 171.51 *
* Crit W.S. (ft)     *        * Flow Area (sq ft) * 18.26  * 113.56 * 21.78  *
* E.G. Slope (ft/ft) * 0.001375 * Area (sq ft)    * 18.26  * 113.56 * 21.78  *
* Q Total (cfs)      * 482.70 * Flow (cfs)      * 25.68  * 435.70 * 21.32  *
* Top Width (ft)     * 70.31 * Top width (ft)  * 21.38  * 29.31  * 19.63  *
* Vel Total (ft/s)   * 3.14  * Avg. Vel. (ft/s) * 1.41  * 3.84  * 0.98  *
* Max Chl Dpth (ft) * 4.77  * Hydr. Depth (ft) * 0.85  * 3.87  * 1.11  *
* Conv. Total (cfs)  * 13017.1 * Conv. (cfs)     * 692.4  * 11749.7 * 574.9  *
* Length Wtd. (ft)  * 88.45 * Wetted Per. (ft) * 21.62  * 29.85  * 19.78  *
* Min Ch El (ft)    * 946.00 * Shear (lb/sq ft) * 0.07  * 0.33  * 0.09  *
* Alpha              * 1.36  * Stream Power (lb/ft s) * 469.30 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 0.26  * Cum Volume (acre-ft) * 5.86  * 4.04  * 1.19  *
* C & E Loss (ft)   * 0.06  * Cum SA (acres)   * 6.20  * 1.19  * 1.00  *
*****

```

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper

RS: 13212.39

INPUT

Description:

```

Station Elevation Data      num=      95
Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev
*****
0      969.99      .1      969.96      5.1      968.88      8.08      968.21      8.72      968.05
8.84      968.03      8.96      968          9.1      967.95      14.71      966          15.25      965.81
20.38      964          24.97      962.39      26.31      962          27.27      961.68      32.88      960
37.16      958.79      38.68      958.34      39.81      958          46.67      956.06      46.86      956
47.3      955.94      47.37      955.93      57.5      954.61      58.94      954.53      75.6      954
94.43      953.6      101.41      953.54      111.97      953.53      113.68      953.51      116.37      953.47
123.82      953.34      129.95      953.23      136.65      953.12      144.3      952.98      160.82      952.67
170.11      952.49      172.74      952.43      180.28      952.34      196.95      952          217.67      952
221.39      952.35      231.52      952.19      241.21      952          280.43      950.03      280.95      950
283.69      949.81      303.56      948.41      312.35      948.03      314.77      948          315.29      947.98
316.76      947.88      319.39      946.28      320.4      946          320.51      945.68      321.07      945.36
321.26      945.37      321.48      945.46      322.75      946          323.8      946.51      327.34      948.14
334.12      949.35      336.06      950          341.29      951.06      345.85      952          346.16      952.05
347.38      952.19      356.63      952.23      360.36      952.18      360.95      952.17      361.46      952.09
361.96      952          364.46      951.63      364.85      951.58      365.08      951.64      366.19      952.06
369.36      953.6      370.09      954          373.19      955.55      374.25      956          375.34      956.52
377.47      957.48      377.59      957.85      377.64      958          378          958.89      378.53      960

```

379.17 961.23 379.56 962 379.91 962.73 380.48 964 381.52 965.92  
 381.55 966 381.7 966.3 382.5 968 383.02 969.08 383.37 970

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 316.76 .035 327.34 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 316.76 327.34 85.56 185.64 187.85 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 950.67 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.77 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 949.90 \* Reach Len. (ft) \* 85.56 \* 185.64 \* 187.85 \*  
 \* Crit W.S. (ft) \* 949.90 \* Flow Area (sq ft) \* 38.80 \* 34.15 \* 8.24 \*  
 \* E.G. Slope (ft/ft) \* 0.009709 \* Area (sq ft) \* 38.80 \* 34.15 \* 8.24 \*  
 \* Q Total (cfs) \* 482.70 \* Flow (cfs) \* 176.03 \* 287.13 \* 19.54 \*  
 \* Top Width (ft) \* 53.28 \* Top Width (ft) \* 34.30 \* 10.58 \* 8.41 \*  
 \* Vel Total (ft/s) \* 5.95 \* Avg. vel. (ft/s) \* 4.54 \* 8.41 \* 2.37 \*  
 \* Max Chl Dpth (ft) \* 4.54 \* Hydr. Depth (ft) \* 1.13 \* 3.23 \* 0.98 \*  
 \* Conv. Total (cfs) \* 4898.9 \* Conv. (cfs) \* 1786.5 \* 2914.1 \* 198.3 \*  
 \* Length Wtd. (ft) \* 154.62 \* Wetted Per. (ft) \* 34.36 \* 11.98 \* 8.60 \*  
 \* Min Ch El (ft) \* 945.36 \* Shear (lb/sq ft) \* 0.68 \* 1.73 \* 0.58 \*  
 \* Alpha \* 1.41 \* Stream Power (lb/ft s) \* 383.37 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.31 \* Cum Volume (acre-ft) \* 5.85 \* 3.86 \* 1.14 \*  
 \* C & E Loss (ft) \* 0.01 \* Cum SA (acres) \* 6.19 \* 1.14 \* 0.94 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.  
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 13020.26

INPUT  
 Description:  
 Station Elevation Data num= 84  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev



OXF157-159Bridges.rep

```

*****
0 969.99 2.25 969.68 11.85 968 17.01 966.18 17.64 966
21.39 964.74 23.65 964 25.96 963.2 28.84 962.24 29.55 962
29.85 961.9 31.22 961.55 35.73 960 40.95 958.53 42.79 958
47.12 956.76 49.62 956 57.26 954.42 59.04 954 61.33 953.66
72.92 952 77.95 951.73 80.7 951.74 118.23 950.75 128.84 950.73
175.41 950.42 181.69 950.31 194.29 950.11 194.69 950.11 199.63 950
235.99 949.12 266.38 948.22 273.81 948 278.89 948 282.38 947.79
303.43 946.48 303.55 946.29 303.74 946 304.72 944.21 304.73 944.19
304.82 944.13 305.06 944 305.28 943.98 305.51 944 305.92 944
306.23 944.03 312.17 944.36 313.17 945.95 313.21 946 313.5 946.36
313.51 946.36 322.39 947.86 323.39 948 323.65 948.04 328.16 948.63
334.13 948.71 341.87 948.81 343.59 948.35 343.68 948.33 344.46 948.21
345.68 948.82 348.01 950 350.98 951.59 351.83 952 352.43 952.31
355.66 954 355.83 954.09 356.03 954.19 359.37 955.68 360.08 956
360.86 956.35 364.56 958 365.27 958.33 369.27 960 371.63 961.06
373.58 962 375.53 963.15 376.9 964 379.35 965.47 380.16 966
381.15 966.66 383.22 968 384.34 968.77 386.06 970

```

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	303.43	.035	313.5	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	303.43	313.5		146.04	191.17		.1	.3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 949.25 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.73 * Wt. n-Val. * 0.035 * 0.035 * 0.060 *
* W.S. Elev (ft) * 948.52 * Reach Len. (ft) * 146.04 * 191.17 * 139.06 *
* Crit W.S. (ft) * 948.52 * Flow Area (sq ft) * 38.77 * 40.73 * 14.58 *
* E.G. Slope (ft/ft) * 0.007458 * Area (sq ft) * 38.77 * 40.73 * 14.58 *
* Q Total (cfs) * 482.70 * Flow (cfs) * 124.32 * 327.48 * 30.89 *
* Top width (ft) * 73.42 * Top width (ft) * 47.34 * 10.07 * 16.01 *
* Vel Total (ft/s) * 5.13 * Avg. Vel. (ft/s) * 3.21 * 8.04 * 2.12 *
* Max Chl Dpth (ft) * 4.54 * Hydr. Depth (ft) * 0.82 * 4.04 * 0.91 *
* Conv. Total (cfs) * 5589.4 * Conv. (cfs) * 1439.6 * 3792.1 * 357.7 *
* Length Wtd. (ft) * 174.70 * Wetted Per. (ft) * 47.40 * 12.54 * 16.29 *
* Min Ch El (ft) * 943.98 * Shear (lb/sq ft) * 0.38 * 1.51 * 0.42 *
* Alpha * 1.78 * Stream Power (lb/ft s) * 386.06 * 0.00 * 0.00 *
* Frctn Loss (ft) * 1.38 * Cum Volume (acre-ft) * 5.78 * 3.71 * 1.09 *
* C & E Loss (ft) * 0.07 * Cum SA (acres) * 6.11 * 1.10 * 0.89 *
*****

```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: Divided flow computed for this cross-section.

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

need for additional cross sections.  
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12827.43

INPUT  
 Description:

Station Elevation Data		num= 85		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	969.98	2.4	969.16	5.72	968	8.19	967.19	11.53	966		
14.97	964.94	17.3	964.35	18.51	964	19.92	963.6	25.38	962		
25.99	961.83	29.89	960.66	32.11	960	38.07	958.26	38.89	958		
41.38	957.25	45.86	956	46.73	955.76	55.35	954	59.63	953.14		
64.22	952	82.05	950.16	83.23	950	88.18	950	120.87	949.28		
147.29	948.79	154.78	948.71	155.49	948.7	185.36	948	204.67	948		
276.65	946.87	284.42	946.81	287.1	946.79	288.13	946.78	303.19	946.6		
327.4	946	349.02	946	377.43	946	379.4	945.96	391.62	945.49		
393.01	944.89	394.97	944	396.67	943.22	397.46	942.44	400.14	942.61		
402.51	944	404.29	944.95	406.8	946	407.26	946.2	408.78	946.8		
410.25	946.94	413.26	947.17	419.51	947.28	424.42	947.42	431.41	947.02		
448.74	946.92	453.65	946.89	461.8	947.05	462.09	947.27	462.92	948		
463.54	948.56	465.25	950	467.39	951.81	467.63	952	467.95	952.29		
469.89	954	470.59	954.56	472.28	956	473.03	956.68	474.18	957.63		
474.55	958	474.6	958.05	476.61	959.84	476.68	959.86	476.99	960		
478.4	960.53	482.15	962	485.2	963.18	487.34	964	491.01	965.39		
492.59	966	498.27	967.91	498.53	967.99	498.57	968	498.6	968		

Manning's n values		num= 3		Sta n val	
Sta	n Val	Sta	n Val	Sta	n val
0	.035	391.62	.035	408.78	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff	Contr.	Expan.
	391.62	408.78		60.19	131.9	273.42	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 947.26	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.48	* Wt. n-Val.	* 0.035	* 0.035	*
* W.S. Elev (ft)	* 946.78	* Reach Len. (ft)	* 60.19	* 131.90	* 273.42
* Crit W.S. (ft)	* 946.78	* Flow Area (sq ft)	* 66.34	* 43.03	*
* E.G. Slope (ft/ft)	* 0.008429	* Area (sq ft)	* 66.34	* 43.03	*
* Q Total (cfs)	* 482.70	* Flow (cfs)	* 192.37	* 290.33	*

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* Top Width (ft)	* 120.49	* Top width (ft)	* 103.39	* 17.11	*	*
* Vel Total (ft/s)	* 4.41	* Avg. Vel. (ft/s)	* 2.90	* 6.75	*	*
* Max Chl Dpth (ft)	* 4.34	* Hydr. Depth (ft)	* 0.64	* 2.52	*	*
* Conv. Total (cfs)	* 5257.5	* Conv. (cfs)	* 2095.3	* 3162.3	*	*
* Length Wtd. (ft)	* 110.75	* Wetted Per. (ft)	* 103.41	* 18.90	*	*
* Min Ch El (ft)	* 942.44	* Shear (lb/sq ft)	* 0.34	* 1.20	*	*
* Alpha	* 1.58	* Stream Power (lb/ft s)	* 498.60	* 0.00	*	0.00 *
* Frctn Loss (ft)	* 0.53	* Cum Volume (acre-ft)	* 5.60	* 3.52	*	1.06 *
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 5.85	* 1.04	*	0.86 *

\*\*\*\*\*

warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

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

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

warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12694.78

INPUT

Description:

Station Elevation Data		num= 60									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	2.3	959.3	6.68	958	12.54	956.37	13.83	956		
16.44	955.29	21.93	954	24.78	953.31	30.33	952	35.84	950.7		
38.81	950	41.68	950	61.51	949.54	62.14	949.53	96.34	948.78		
114.1	948	138.17	948	149.94	947.7	153.63	947.61	180.35	946.92		
217.84	946	264.5	945.01	330.4	945.08	395.71	945.16	401.39	941.14		
409.12	940.76	411.21	942	412.87	942.82	423.24	944	433.28	945.5		
433.54	945.56	434.81	946	435.4	946.21	440.37	948	453.19	949.49		
458.58	950	460.4	950	462.47	950.12	465.87	950.33	466.73	950.38		
469	950.53	476.38	951.08	492.5	952	495.48	952	509.44	952.95		
520.9	953.05	527.14	953.46	536.37	954	546.48	954.5	552.15	954.82		
564.55	956	572.77	957.3	576.73	958	592.6	959.07	597.18	959.26		
598.71	959.29	617.28	959.85	618.35	959.88	620.1	959.9	622.31	959.99		

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

\*\*\*\*\*  
 0 .035 395.71 .035 433.28 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 395.71 433.28 138.33 186.83 225.35 .1 .3  
 Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 460 485 955

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 945.77 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.23 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.035 \*  
 \* W.S. Elev (ft) \* 945.55 \* Reach Len. (ft) \* 138.33 \* 186.83 \* 225.35 \*  
 \* Crit W.S. (ft) \* 944.58 \* Flow Area (sq ft) \* 68.16 \* 93.32 \* 0.01 \*  
 \* E.G. Slope (ft/ft) \* 0.003091 \* Area (sq ft) \* 68.16 \* 93.32 \* 0.01 \*  
 \* Q Total (cfs) \* 482.70 \* Flow (cfs) \* 92.39 \* 390.31 \* 0.00 \*  
 \* Top Width (ft) \* 194.42 \* Top width (ft) \* 156.64 \* 37.57 \* 0.21 \*  
 \* Vel Total (ft/s) \* 2.99 \* Avg. vel. (ft/s) \* 1.36 \* 4.18 \* 0.20 \*  
 \* Max Chl Dpth (ft) \* 4.79 \* Hydr. Depth (ft) \* 0.44 \* 2.48 \* 0.02 \*  
 \* Conv. Total (cfs) \* 8682.2 \* Conv. (cfs) \* 1661.8 \* 7020.4 \* 0.0 \*  
 \* Length wtd. (ft) \* 182.23 \* Wetted Per. (ft) \* 156.65 \* 39.57 \* 0.22 \*  
 \* Min Ch El (ft) \* 940.76 \* Shear (lb/sq ft) \* 0.08 \* 0.46 \* 0.00 \*  
 \* Alpha \* 1.62 \* Stream Power (lb/ft s) \* 622.31 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.07 \* Cum Volume (acre-ft) \* 5.51 \* 3.32 \* 1.06 \*  
 \* C & E Loss (ft) \* 0.12 \* Cum SA (acres) \* 5.67 \* 0.96 \* 0.86 \*  
 \*\*\*\*\*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.  
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  
 This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12504.92

INPUT

Description:

Station Elevation Data num= 96  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 970 .06 969.97 4.25 968.1 4.48 968 4.72 967.9  
 9.44 966.02 9.49 966 9.52 965.99 14.04 964 18.8 962.06  
 23.59 960 27.88 958.14 28.19 958 28.47 957.9 30.06 957.28

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33.67	956	34.59	955.73	35.88	955.26	39.22	954	41.84	952.94
44.16	952	44.42	951.88	52.39	950	62.32	948.69	73.46	948
77.84	948	95.85	947.72	106.16	947.58	111.17	947.51	114.13	947.47
118.21	947.43	224.93	946	240.52	946	259.51	945.48	311.46	944
394.24	944	411.78	943.91	435.64	943.78	452.76	943.98	452.98	943.98
459.78	943.79	460.89	942.78	461.74	942	462.98	940.86	463.86	940.12
464.44	940.06	466.75	940.03	468.15	940	469.73	939.74	475.74	939.14
476.09	939.9	476.2	940	476.7	941.21	477.2	942	477.38	942.27
477.67	942.72	484.95	943.49	489.79	944	497.71	945.04	510.51	946
520.16	947.66	522.09	948	524.06	948.34	529.43	948.62	529.6	948.63
529.65	948.63	529.85	948.66	530.1	948.72	533.76	950.54	536.01	951.64
536.79	952	537.86	952.49	538.48	952.77	541.26	954	543.77	955.27
546.15	956.34	549.74	958	553.49	959.48	557.12	960.92	558.54	961.54
559.73	962	563.01	963.37	563.99	963.78	564.06	963.8	566.74	964.06
571.02	964.46	573.46	964.57	575.86	964.66	588.24	965.85	589.78	966
591.98	966.2	611.56	968	621.29	969.03	630.35	969.71	633.39	970
633.51	970.03								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	459.78	.035	477.67	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	459.78	477.67		29.91	278.36	370.21	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 944.59	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.41	* Wt. n-Val.	* 0.035	* 0.060	*
* W.S. Elev (ft)	* 943.18	* Reach Len. (ft)	* 29.91	* 278.36	* 370.21
* Crit W.S. (ft)	* 943.18	* Flow Area (sq ft)	*	* 50.52	* 0.99
* E.G. Slope (ft/ft)	* 0.015247	* Area (sq ft)	*	* 50.52	* 0.99
* Q Total (cfs)	* 482.70	* Flow (cfs)	*	* 481.57	* 1.13
* Top Width (ft)	* 21.54	* Top width (ft)	*	* 17.22	* 4.32
* Vel Total (ft/s)	* 9.37	* Avg. Vel. (ft/s)	*	* 9.53	* 1.14
* Max Chl Dpth (ft)	* 4.04	* Hydr. Depth (ft)	*	* 2.93	* 0.23
* Conv. Total (cfs)	* 3909.2	* Conv. (cfs)	*	* 3900.0	* 9.1
* Length Wtd. (ft)	* 210.75	* Wetted Per. (ft)	*	* 20.60	* 4.35
* Min Ch El (ft)	* 939.14	* Shear (lb/sq ft)	*	* 2.33	* 0.22
* Alpha	* 1.03	* Stream Power (lb/ft s)	* 633.51	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.96	* Cum Volume (acre-ft)	* 5.40	* 3.01	* 1.06
* C & E Loss (ft)	* 0.39	* Cum SA (acres)	* 5.43	* 0.84	* 0.85

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.  
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12207.32

INPUT  
 Description:

Station Elevation Data num= 95

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	969.98	.21	969.89	3.66	968	7.09	966.31	7.69	966
11.42	964.07	11.55	964	15.27	962.07	15.4	962	17.59	960.73
18.97	960	20.53	959.47	23.14	958	23.62	957.82	28.89	956
34.81	954.05	34.95	954	40.44	952.12	40.79	952	41.26	951.84
46.52	950	51.47	949.67	74.93	948	76.64	948	96.98	947.62
133.49	946.93	185.5	946.09	187.51	946.06	191.55	946	208.7	945.66
215.54	945.54	231.36	945.28	233.54	945.24	240.79	945.14	281.83	944.37
298.18	944	305.4	943.07	313.46	942	315.5	942	343.41	941.44
354.34	941.25	384.57	940.6	385.76	940.32	386	940.29	387.17	940.22
388.67	940.16	395.65	939.95	397.33	939.92	398.67	939.91	399.86	939.91
400.17	939.91	400.52	939.95	400.82	940.02	400.9	940.03	402.53	940.71
412.99	940.81	443.45	941.08	452.56	941.15	456.61	941.29	457.47	940.59
458.05	940	459.44	938.99	475.51	938.75	476.34	940	482.79	942
490.61	943.31	494.36	944	495.39	944.5	498.6	946	499.96	946.65
502.77	948	505.83	949.41	507.16	950	508.6	950.66	511.43	952
513.53	953.03	515.53	954	519.64	955.96	519.74	956	519.84	956.05
523.12	957.35	524.77	958	526.16	958.56	529.52	960	533.85	961.69
534.63	962	535.29	962.3	538.47	964	539.94	965.18	541.31	966
543.01	966.95	544.68	968	545.42	968.43	546.5	969.3	550.65	970

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	456.61	.035	482.79	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	456.61	482.79		138.18	45.27	69.35	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

\* E.G. Elev (ft) \* 942.10 \* Element \* Left OB \* Channel \* Right OB \*



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* Vel Head (ft)	* 0.11	* Wt. n-Val.	* 0.035	* 0.035	* *	* *
* W.S. Elev (ft)	* 941.99	* Reach Len. (ft)	* 138.18	* 45.27	* 69.35	* *
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 136.17	* 63.99	* *	* *
* E.G. Slope (ft/ft)	*0.002164	* Area (sq ft)	* 136.17	* 63.99	* *	* *
* Q Total (cfs)	* 482.70	* Flow (cfs)	* 263.13	* 219.57	* *	* *
* Top Width (ft)	* 166.63	* Top Width (ft)	* 140.49	* 26.14	* *	* *
* Vel Total (ft/s)	* 2.41	* Avg. vel. (ft/s)	* 1.93	* 3.43	* *	* *
* Max Chl Dpth (ft)	* 3.24	* Hydr. Depth (ft)	* 0.97	* 2.45	* *	* *
* Conv. Total (cfs)	* 10376.2	* Conv. (cfs)	* 5656.2	* 4720.0	* *	* *
* Length Wtd. (ft)	* 96.36	* Wetted Per. (ft)	* 140.70	* 27.94	* *	* *
* Min Ch El (ft)	* 938.75	* Shear (lb/sq ft)	* 0.13	* 0.31	* *	* *
* Alpha	* 1.27	* Stream Power (lb/ft s)	* 550.65	* 0.00	* 0.00	* *
* Frctn Loss (ft)	* 0.38	* Cum Volume (acre-ft)	* 5.35	* 2.64	* 1.06	* *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 5.38	* 0.70	* 0.83	* *

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12162.04

INPUT

Description:

Station Elevation Data		num= 55	
Sta	Elev	Sta	Elev
0	995	66.4	994
189.08	945.24	197.73	944.89
244.62	943.47	265.35	942.15
355.75	940.25	365.93	940.34
389.41	940.38	392.13	940.39
414.22	940	414.88	939.39
419.71	938.52	421.79	939.18
429.53	940.08	443.26	942
449.43	946	450.73	946.92
457.73	951.41	458.75	952
464.78	955.78	465.16	956

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.035	412.94	.035
		429.1	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	412.94	429.1		102.49	86.36	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

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*****
* E.G. Elev (ft)      * 941.70 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.36  * Wt. n-Val.      * 0.035  * 0.035  * 0.100  *
* W.S. Elev (ft)     * 941.34 * Reach Len. (ft) * 102.49 * 86.36  * 91.08  *
* Crit W.S. (ft)     * 941.31 * Flow Area (sq ft) * 80.90  * 33.15  * 6.19   *
* E.G. Slope (ft/ft) * 0.009218 * Area (sq ft)    * 80.90  * 33.15  * 6.19   *
* Q Total (cfs)      * 482.70 * Flow (cfs)      * 266.03 * 210.04 * 6.64   *
* Top width (ft)     * 137.21 * Top width (ft)  * 111.65 * 16.16  * 9.41   *
* Vel Total (ft/s)   * 4.01  * Avg. Vel. (ft/s) * 3.29   * 6.34   * 1.07   *
* Max Chl Dpth (ft) * 2.97  * Hydr. Depth (ft) * 0.72   * 2.05   * 0.66   *
* Conv. Total (cfs)  * 5027.5 * Conv. (cfs)     * 2770.8 * 2187.6 * 69.1   *
* Length Wtd. (ft)  * 94.36 * Wetted Per. (ft) * 111.66 * 17.11  * 9.50   *
* Min Ch El (ft)    * 938.37 * Shear (lb/sq ft) * 0.42   * 1.12   * 0.37   *
* Alpha             * 1.45  * Stream Power (lb/ft s) * 472.01 * 0.00   * 0.00   *
* Frctn Loss (ft)   * 0.72  * Cum Volume (acre-ft) * 5.01   * 2.59   * 1.05   *
* C & E Loss (ft)   * 0.01  * Cum SA (acres)   * 4.98   * 0.68   * 0.83   *
*****

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CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 12075.53

INPUT

Description:

Station Elevation Data		num= 102	
Sta	Elev	Sta	Elev
0	960	29.07	958.02
41.93	957.55	45.21	957.5
81.81	954.95	95.66	954
123.73	952	136.93	951.16
157.16	950	175.09	949.24
200.32	947.87	205.43	947.47
265.5	944.04	266.42	944
300.4	942	307.52	941.06
346.89	940	388.94	939.79
472.34	937.67	473.24	938.67
477.39	941.35	479.23	942
485.34	944.12	489.19	945.12
496.1	948	497.56	948.81
503.38	952	504.66	952.7
514.5	955.74	514.68	955.82
518.92	958	521.58	959.8
524.48	962	525.3	962.65
537.52	965.96	538.01	965.96
553.5	964.98	553.7	964.9
557.9	965.82	558.05	965.91
563.4	970	563.47	970.06

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 456.9 .035 475.88 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 456.9 475.88 204.78 165.56 176.18 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 940.97 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.33 \* Wt. n-Val. \* 0.035 \* 0.035 \* \* \*  
 \* W.S. Elev (ft) \* 940.64 \* Reach Len. (ft) \* 204.78 \* 165.56 \* 176.18 \*  
 \* Crit W.S. (ft) \* 940.62 \* Flow Area (sq ft) \* 87.31 \* 46.95 \* \* \*  
 \* E.G. Slope (ft/ft) \* 0.006381 \* Area (sq ft) \* 87.31 \* 46.95 \* \* \*  
 \* Q Total (cfs) \* 482.70 \* Flow (cfs) \* 210.84 \* 271.86 \* \* \*  
 \* Top Width (ft) \* 164.13 \* Top Width (ft) \* 145.25 \* 18.88 \* \* \*  
 \* Vel Total (ft/s) \* 3.60 \* Avg. Vel. (ft/s) \* 2.41 \* 5.79 \* \* \*  
 \* Max Chl Dpth (ft) \* 3.63 \* Hydr. Depth (ft) \* 0.60 \* 2.49 \* \* \*  
 \* Conv. Total (cfs) \* 6042.6 \* Conv. (cfs) \* 2639.3 \* 3403.3 \* \* \*  
 \* Length wtd. (ft) \* 187.12 \* Wetted Per. (ft) \* 145.31 \* 21.04 \* \* \*  
 \* Min Ch El (ft) \* 937.01 \* Shear (lb/sq ft) \* 0.24 \* 0.89 \* \* \*  
 \* Alpha \* 1.66 \* Stream Power (lb/ft s) \* 563.47 \* 0.00 \* 0.00 \* \*  
 \* Frctn Loss (ft) \* 1.14 \* Cum Volume (acre-ft) \* 4.81 \* 2.51 \* 1.04 \* \*  
 \* C & E Loss (ft) \* 0.03 \* Cum SA (acres) \* 4.68 \* 0.65 \* 0.82 \* \*  
 \*\*\*\*\*

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 11904.55

INPUT  
 Description:

Station Elevation Data		num= 83							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	2.14	959.57	9.31	958	11.95	957.61	19.02	956
19.61	956	22.47	955.39	30.39	954	44.44	952.06	44.97	952
49.05	952	66.6	950.06	66.74	950.05	67.06	950.01	67.17	950
67.22	949.99	72.01	949.15	78.41	948	78.62	947.96	89.47	946
89.79	945.94	92.19	945.53	100.5	944	102.3	943.67	111.59	942
120.54	940.39	121.43	940.29	121.84	940.28	122.71	940.25	122.85	940.23
124.03	940	169.17	939.27	179.12	939.11	186.55	938.98	199.46	938.75
202.83	938.7	203.67	938.69	207.06	938.64	210.94	938.58	213.81	938.54
221.06	938.43	270.9	938.53	273.4	938.55	283.93	938.63	306.68	938.9
326.88	939.14	334.13	939.08	339.23	939.31	340.31	938.2	340.51	938

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341.46	936.95	341.61	936.8	351.71	936.77	353.46	936.84	353.93	936.78
354.09	936.85	354.81	938	355.4	939.34	355.52	939.56	357.42	939.65
360.44	940	362.43	940.29	364.1	940.58	372.19	942	376.58	943.87
376.89	944	381.59	945.96	381.68	946	381.85	946.07	387.42	948
388.28	948.3	388.47	948.37	393.04	950	395.58	951.46	396.84	952
397.94	952.75	399.93	954	401.35	954.92	403.03	956	405.07	957.47
405.92	958	407.44	958.9	408.91	959.88				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	339.23	.035	355.52	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	339.23	355.52		212.95	131.78	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 939.80	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.23	* Wt. n-val.	* 0.035	* 0.035	* 0.000
* W.S. Elev (ft)	* 939.57	* Reach Len. (ft)	* 212.95	* 131.78	* 72.41
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 143.02	* 40.40	* 0.00
* E.G. Slope (ft/ft)	* 0.005835	* Area (sq ft)	* 143.02	* 40.40	* 0.00
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 385.49	* 216.41	* 0.00
* Top Width (ft)	* 205.30	* Top Width (ft)	* 188.75	* 16.29	* 0.26
* Vel Total (ft/s)	* 3.28	* Avg. Vel. (ft/s)	* 2.70	* 5.36	* 0.04
* Max Chl Dpth (ft)	* 2.80	* Hydr. Depth (ft)	* 0.76	* 2.48	* 0.01
* Conv. Total (cfs)	* 7879.6	* Conv. (cfs)	* 5046.5	* 2833.1	* 0.0
* Length wtd. (ft)	* 187.77	* Wetted Per. (ft)	* 188.77	* 19.03	* 0.26
* Min Ch El (ft)	* 936.77	* Shear (lb/sq ft)	* 0.28	* 0.77	*
* Alpha	* 1.39	* Stream Power (lb/ft s)	* 408.91	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.58	* Cum Volume (acre-ft)	* 4.27	* 2.34	* 1.04
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 3.89	* 0.58	* 0.82

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 11770.60

INPUT

Description:

Station	Elevation	Data	num=	93	Sta	Elev	Sta	Elev	Sta	Elev
0	959.97	3.39	958.76	5.44	958	10.37	956.25	10.84	956.07	
11.06	956	11.31	955.94	11.72	955.84	12.94	955.49	17.73	954	

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22.4	952.32	23.43	952	27.05	950.68	28.96	950	31.92	948.97
34.63	948	35.15	947.81	40.07	946	40.57	945.82	41.22	945.6
45.63	944	49.18	942.72	51.13	942	55.54	940.47	57.34	940
75.12	938.5	81.19	938	106.77	937.41	128.7	938	141.15	938.12
171.62	938.18	210.62	938	235.66	937.68	258.34	938	272.87	938.28
273	938.15	273.28	938	274.03	937.19	275.22	936	275.9	935.06
276.25	934.71	277.33	934.78	280.57	934.9	280.85	935.04	282.64	936
284.11	936.93	285.06	937.34	285.75	937.45	289.39	938	301.46	939.8
302.78	940	303.94	940.16	319.47	942	320	942.07	320.3	942.11
320.31	942.11	321.61	942.3	326	944	328.22	944.85	331.49	946
334.64	947.13	341.12	949.52	342.44	950	344.29	950.66	348.45	952
352.07	953.31	355.49	954	358.4	954.86	362.46	956	364.72	956.95
368.47	958	383.23	958	386.17	957.05	387.42	956.47	388.06	956.28
389.09	956	389.14	955.98	389.37	955.92	389.81	955.96	393.59	955.94
396.98	956	399.04	956.04	399.21	956.03	399.23	956.04	399.24	956.04
401.62	956.77	401.63	956.77	401.78	956.72	404.26	956.23	404.38	956.31
406.82	957.68	407.27	958.02	410.26	960.03				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	272.87	.035	285.06	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	272.87	285.06		66.99	132.69	134.32	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 939.19	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.10	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 939.09	* Reach Len. (ft)	* 66.99	* 132.69	* 134.32
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 227.19	* 40.12	* 10.14
* E.G. Slope (ft/ft)	*0.001890	* Area (sq ft)	* 227.19	* 40.12	* 10.14
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 449.27	* 146.71	* 5.93
* Top width (ft)	* 228.60	* Top width (ft)	* 204.76	* 12.19	* 11.65
* Vel Total (ft/s)	* 2.17	* Avg. vel. (ft/s)	* 1.98	* 3.66	* 0.58
* Max Chl Dpth (ft)	* 4.38	* Hydr. Depth (ft)	* 1.11	* 3.29	* 0.87
* Conv. Total (cfs)	* 13846.1	* Conv. (cfs)	* 10335.0	* 3374.8	* 136.3
* Length wtd. (ft)	* 96.22	* Wetted Per. (ft)	* 204.83	* 14.39	* 11.78
* Min Ch El (ft)	* 934.71	* Shear (lb/sq ft)	* 0.13	* 0.33	* 0.10
* Alpha	* 1.31	* Stream Power (lb/ft s)	* 410.26	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.28	* Cum Volume (acre-ft)	* 3.36	* 2.22	* 1.04
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 2.93	* 0.54	* 0.81

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper

RS: 11632.87

INPUT

Description:

Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	3.26	958.93	6.12	958	9.54	957.53	10.66	957.31
14.77	956	21.02	954.53	23.58	954	32.2	952.02	32.35	951.98
39.73	950	42.38	949.32	47.66	948	52.6	946.76	55.61	946
62.93	944.13	63.44	944	64.5	943.72	69.14	942.38	70.43	942
75.91	941.26	78.88	940	93.6	939.03	109.52	938	131.39	938
210.03	937.57	240.41	937.41	243	937.31	243.16	937.07	243.96	936
244.79	934.65	245.78	934	246.03	933.83	246.2	933.83	246.58	933.86
247.37	934	247.8	934	248.38	934.18	256.29	934.82	257.84	935.84
258.08	936	258.3	936.14	259.41	937.6	268.24	938	283.83	939.04
287.82	939.25	292.58	939.5	295.29	939.61	295.81	939.64	300.44	940
311.72	941.28	317.13	942	329.19	943.58	332.34	944	333.59	944.16
347.29	945.77	347.37	945.78	347.4	945.79	347.69	946	349.52	946.95
350.86	948	351.69	948.66	353.47	950	354.52	950.78	355.37	951.44
359.06	951.82	360.88	952	361.65	952.08	361.71	952.08	363.24	952.12
372.06	952.3	372.93	952.35	373.7	952.33	373.79	952.33	373.84	952.32
376.37	951.97	376.49	951.95	376.54	951.97	376.68	952	377.81	952.63
380.85	954.33	381.67	954.78	381.69	954.8	381.75	954.84	383.23	956
383.85	956.5	385.88	958	387.01	958.72	388.94	959.89		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	243	.035	259.41	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	243	259.41		286.13	220.98	202.96	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 938.87	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.43	* Wt. n-val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 938.44	* Reach Len. (ft)	* 286.13	* 220.98	* 202.96
* Crit w.s. (ft)	* 938.44	* Flow Area (sq ft)	* 93.83	* 58.84	* 7.05
* E.G. slope (ft/ft)	* 0.005172	* Area (sq ft)	* 93.83	* 58.84	* 7.05
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 219.16	* 378.26	* 4.48
* Top width (ft)	* 172.02	* Top width (ft)	* 140.23	* 16.41	* 15.38
* Vel Total (ft/s)	* 3.77	* Avg. vel. (ft/s)	* 2.34	* 6.43	* 0.63
* Max Chl Dpth (ft)	* 4.61	* Hydr. Depth (ft)	* 0.67	* 3.59	* 0.46
* Conv. Total (cfs)	* 8369.1	* Conv. (cfs)	* 3047.3	* 5259.5	* 62.3
* Length wtd. (ft)	* 248.26	* Wetted Per. (ft)	* 140.25	* 19.26	* 15.40
* Min Ch El (ft)	* 933.83	* Shear (lb/sq ft)	* 0.22	* 0.99	* 0.15
* Alpha	* 1.97	* Stream Power (lb/ft s)	* 388.94	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	* 3.12	* 2.07	* 1.01
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.66	* 0.49	* 0.76



\*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 11351.13

INPUT

Description:

Station Elevation Data		num= 104		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	8.69	958	12.73	957.24	16.21	956.63	19.81	956		
24.99	954.96	31.77	954	33.45	953.6	36.16	952.9	37.93	952.4		
39.69	952	46.26	950.46	48.09	950	55.41	948.21	56.25	948		
61.54	946.27	62.07	946	64.18	944.84	65.9	944	68.58	942.6		
69.8	942	70.2	941.91	80.88	940.56	83.09	940.28	85.34	940		
90.77	939.25	99.86	938	100.58	937.89	110.49	936	159.57	936		
196.96	935.86	198.63	935.88	219.49	935.97	227.82	935.95	235	935.96		
242.46	935.94	245.11	935.93	265.79	935.95	299.93	935.98	299.97	935.93		
301.62	934	301.96	933.65	302.06	933.52	302.08	933.52	311.76	933.12		
311.79	933.2	314.29	935.14	314.49	935.31	315.82	935.55	316.68	935.74		
321.25	937.05	323.4	937.62	324.82	938	331.09	939.72	332.17	940		
333.57	940.38	339.6	942	346.3	943.86	346.79	944	347.02	944.08		
348.35	944.33	351.47	944.91	351.53	944.93	356.15	946	358.67	946.58		
364.61	948	369.76	949.48	372.16	950	373	950.27	373.13	950.29		
373.48	950.3	375.58	950.31	376.01	950.34	380.52	950.23	385.22	950.44		
386.2	950.47	387.36	950.55	388.19	950.65	389.93	950.65	399.61	950.3		
399.82	950.28	401.71	950.06	401.94	950.01	401.96	950	402.2	949.93		
404.05	949.55	404.45	949.48	404.56	949.58	405.23	950	405.74	950.54		
406.04	950.9	407.22	951.92	407.32	952	407.35	952.02	408.67	953.23		
408.78	953.3	410.1	954	413.27	955.85	413.54	956	413.84	956.18		
417.29	958	418.56	958.43	423.98	959.29	428.7	959.98				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	299.93	.035	314.29	.1

Bank Sta: Left Right Lengths: Left Channel Right OXF157-159Bridges.rep  
 299.93 314.29 158.28 141.28 210.48 Coeff Contr. Expan.  
 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft) * 937.20 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.41 * Wt. n-Val. * 0.060 * 0.035 * 0.100 *
* W.S. Elev (ft) * 936.79 * Reach Len. (ft) * 158.28 * 141.28 * 210.48 *
* Crit W.S. (ft) * 936.79 * Flow Area (sq ft) * 159.57 * 44.71 * 5.04 *
* E.G. Slope (ft/ft) * 0.006855 * Area (sq ft) * 159.57 * 44.71 * 5.04 *
* Q Total (cfs) * 601.90 * Flow (cfs) * 287.58 * 308.99 * 5.33 *
* Top width (ft) * 214.01 * Top width (ft) * 193.59 * 14.36 * 6.06 *
* Vel Total (ft/s) * 2.88 * Avg. vel. (ft/s) * 1.80 * 6.91 * 1.06 *
* Max Chl Dpth (ft) * 3.67 * Hydr. Depth (ft) * 0.82 * 3.11 * 0.83 *
* Conv. Total (cfs) * 7269.8 * Conv. (cfs) * 3473.4 * 3732.0 * 64.4 *
* Length Wtd. (ft) * 152.71 * Wetted Per. (ft) * 193.66 * 16.21 * 6.31 *
* Min Ch El (ft) * 933.12 * Shear (lb/sq ft) * 0.35 * 1.18 * 0.34 *
* Alpha * 3.15 * Stream Power (lb/ft s) * 428.70 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.53 * Cum Volume (acre-ft) * 2.28 * 1.81 * 0.98 *
* C & E Loss (ft) * 0.10 * Cum SA (acres) * 1.57 * 0.41 * 0.71 *
*****
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper

RS: 11189.95

INPUT

Description:

Station Elevation Data		num=		95					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	949.99	1.6	949.56	8.15	948	13.4	946.56	14.9	946.14
15.46	946	22.5	944.11	22.9	944	26.68	942.99	29.86	942.16
30.47	942	30.99	941.87	38.05	940	44.66	938.3	47.34	938
59.53	936.64	61.72	936.46	65.02	936	67.37	936	81.56	934.73

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89.53	934.14	90.77	934.09	93.56	934.08	97.91	934.12	103.27	934.02
129.26	934.03	134.7	934.06	143.11	934.05	146.21	934.04	149.97	934
151.38	933.98	154.39	934	182.46	934	198.26	934.26	222.23	934.45
236.94	934.63	264.31	934.96	269.77	934.99	269.99	934.65	271.72	932.86
272.02	932.58	272.11	932.45	273.32	932.28	274.87	932.04	275.36	932
275.72	932	275.92	932.09	278.61	932.67	279.21	933.31	280.03	933.82
280.05	933.84	280.45	933.92	283.23	934.5	283.81	934.63	289.66	936
295.2	937.3	300.27	938.53	306.24	940	312.92	941.88	313.26	941.98
313.31	942	313.33	942.01	313.37	942.03	317.66	944	320.94	945.62
321.79	946	322.58	946.36	326.25	948	328.3	948.96	330.59	950.24
330.8	950.36	331.17	950.33	338.76	950.65	344.51	950.72	350.13	950.9
352.54	950.85	352.73	950.83	355.75	950.01	355.77	950	356.2	949.91
356.5	949.9	356.55	949.9	357.28	950.01	357.87	950.25	361.03	951.68
361.62	951.91	362.01	952	363.81	952.69	367.01	954	371.17	955.65
372.07	956	372.89	956.31	377.18	958	382.11	959.96	382.16	959.98

Manning's n Values num= 3  
 Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .06 269.77 .035 280.03 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 269.77 280.03 65.71 199.34 191.45 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 935.97	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.07	* Wt. n-val.	* 0.060	* 0.035	* 0.100
* W.S. Elev (ft)	* 935.89	* Reach Len. (ft)	* 65.71	* 199.34	* 191.45
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 311.93	* 32.41	* 9.70
* E.G. slope (ft/ft)	* 0.002088	* Area (sq ft)	* 311.93	* 32.41	* 9.70
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 472.71	* 122.48	* 6.72
* Top width (ft)	* 220.63	* Top width (ft)	* 201.20	* 10.26	* 9.17
* Vel Total (ft/s)	* 1.70	* Avg. vel. (ft/s)	* 1.52	* 3.78	* 0.69
* Max chl dpth (ft)	* 3.89	* Hydr. Depth (ft)	* 1.55	* 3.16	* 1.06
* Conv. Total (cfs)	* 13172.5	* Conv. (cfs)	* 10345.1	* 2680.4	* 147.0
* Length wtd. (ft)	* 114.62	* Wetted Per. (ft)	* 201.28	* 11.92	* 9.41
* Min Ch El (ft)	* 932.00	* Shear (lb/sq ft)	* 0.20	* 0.35	* 0.13
* Alpha	* 1.63	* Stream Power (lb/ft s)	* 382.16	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.15	* Cum Volume (acre-ft)	* 1.43	* 1.68	* 0.95
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 0.85	* 0.37	* 0.68

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper

RS: 10974.14

INPUT

Description:

Station Elevation Data num= 100									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950.05	.25	950	3.51	949.3	8.79	948.25	9.99	948
10.53	947.89	13.9	947.11	17.85	946	25.1	944.07	25.34	944
25.83	943.86	32.12	942	36.48	940.98	40.06	940	46.05	938.56
48.4	938	52.71	936.98	56.78	936	61.04	934.88	62.48	934.63
65.55	934	66.62	934	70.28	933.92	128.37	933.37	134.04	933.26
147.26	933.75	153.2	933.9	155.49	933.96	163.84	933.72	167.89	933.84
177.32	933.25	180.12	932.05	180.19	932	180.31	931.84	181.14	930.28
181.96	930.1	182.54	930	188.88	930	191.45	929.91	191.5	930.04
191.91	930.76	191.97	930.91	192.37	932	192.46	933.02	192.66	933.64
196	933.57	201.38	933.63	209.25	934	219.98	934	224.45	934.69
226.67	935.04	230.8	935.61	232.56	936	234.23	936.17	239.67	936.39
245.58	936.73	266.43	938	271.42	938.51	275.93	938.84	282.18	939.36
288.93	940	291.42	940.41	303.12	942	305.11	943.34	306.16	944
306.69	944.33	309.12	946	309.65	946.31	312.06	948	312.69	948.37
314.72	949.67	315.17	950	315.26	950.04	315.51	950.31	316.28	950.39
317.29	950.33	318.02	950.29	319.69	950.24	321.98	950.17	330	950.13
330.36	950.12	330.7	950.11	330.85	950.08	332.05	949.87	332.77	949.72
334.01	949.45	334.03	949.45	334.29	949.66	336.11	950.7	338.34	951.8
338.72	952	339.62	952.5	342.66	954	346.35	955.75	346.84	956
347.3	956.2	350.07	957.27	351.68	958	355.93	959.86	356.27	959.99

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	177.32	.035	192.66	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	177.32	192.66		205.41	261.21	240.88	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 935.81	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.08	* Wt. n-val.	* 0.060	* 0.035	* 0.060
* W.S. Elev (ft)	* 935.73	* Reach Len. (ft)	* 205.41	* 261.21	* 240.88
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 239.54	* 77.49	* 62.05
* E.G. slope (ft/ft)	* 0.000924	* Area (sq ft)	* 239.54	* 77.49	* 62.05
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 286.31	* 251.73	* 63.86
* Top width (ft)	* 173.54	* Top width (ft)	* 119.52	* 15.34	* 38.69
* Vel Total (ft/s)	* 1.59	* Avg. vel. (ft/s)	* 1.20	* 3.25	* 1.03
* Max Chl Dpth (ft)	* 5.82	* Hydr. Depth (ft)	* 2.00	* 5.05	* 1.60
* Conv. Total (cfs)	* 19798.9	* Conv. (cfs)	* 9417.9	* 8280.4	* 2100.6
* Length wtd. (ft)	* 242.94	* Wetted Per. (ft)	* 119.75	* 19.40	* 38.83
* Min Ch El (ft)	* 929.91	* Shear (lb/sq ft)	* 0.12	* 0.23	* 0.09
* Alpha	* 2.06	* Stream Power (lb/ft s)	* 356.27	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.56	* Cum Volume (acre-ft)	* 1.01	* 1.43	* 0.79
* C & E Loss (ft)	* 0.12	* Cum SA (acres)	* 0.61	* 0.32	* 0.57

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 10615.35

INPUT

Description:

Station Elevation Data		num= 78		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950.07	.23	950	4.39	948.66	6.24	948.1	6.54	948		
6.93	947.86	12.37	946	12.77	945.86	18.27	944	19.53	943.56		
22.08	942.72	23.81	942.23	24.56	942	25.83	941.56	30.73	940		
45.25	940	53.93	938.94	57	938.25	58.13	938	62.01	937.21		
67.82	936	74.83	934.57	77.59	934	80.19	933.47	87.06	932.33		
87.09	932.32	87.57	932	89.72	930.44	90.33	930	92.18	928.65		
92.27	928.51	92.29	928.53	92.3	928.48	92.41	928.47	92.5	928.47		
93.94	928.71	94.09	928.73	94.45	928.98	94.49	929	94.66	929.25		
96.53	930.72	97.28	931.15	97.66	931.33	97.85	931.42	97.95	931.43		
98.47	931.46	103.32	932	109.19	932.65	109.51	932.66	121.31	933.59		
132.54	934	133.01	934	136.9	934	139.46	934.04	146.56	934.09		
149.6	934.07	151.88	934.01	207.6	936	241.9	946	260.8	946		
290.14	938	291.27	938.1	314.2	940	323.67	941.2	330.09	941.69		
333.34	942	333.49	942	338.41	942.82	341.29	943.3	345.56	944		
345.8	944	353.14	945.47	356.47	946	364.43	947.54	366.78	948		
367.4	948.12	379.99	950	380.02	950.01						

Manning's n Values		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	87.06	.035	97.66	.035		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	87.06	97.66		165.46	196.08	242.91	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 935.14	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.27	* wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 933.87	* Reach Len. (ft)	* 165.46	* 196.08	* 242.91
* Crit W.S. (ft)	* 933.87	* Flow Area (sq ft)	* 7.06	* 40.57	* 31.71
* E.G. Slope (ft/ft)	* 0.012785	* Area (sq ft)	* 7.06	* 40.57	* 31.71
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 28.92	* 420.00	* 152.98

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* Top Width (ft)      * 50.78 * Top width (ft)      * 8.84 * 10.60 * 31.34 *
* Vel Total (ft/s)   * 7.59 * Avg. Vel. (ft/s)   * 4.09 * 10.35 * 4.82 *
* Max Chl Dpth (ft) * 5.40 * Hydr. Depth (ft)   * 0.80 * 3.83 * 1.01 *
* Conv. Total (cfs)  * 5323.1 * Conv. (cfs)        * 255.8 * 3714.4 * 1352.9 *
* Length Wtd. (ft)  * 195.82 * Wetted Per. (ft)   * 8.97 * 12.81 * 31.47 *
* Min Ch El (ft)    * 928.47 * Shear (lb/sq ft)   * 0.63 * 2.53 * 0.80 *
* Alpha              * 1.42 * Stream Power (lb/ft s) * 380.02 * 0.00 * 0.00 *
* Frctn Loss (ft)   * 1.19 * Cum Volume (acre-ft) * 0.43 * 1.08 * 0.53 *
* C & E Loss (ft)   * 0.28 * Cum SA (acres)     * 0.31 * 0.24 * 0.38 *
*****

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Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Upper

RS: 10402.90

INPUT

Description:

Station		Elevation Data		num= 94		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	949.98	4.75	949.07	9.99	948	12.35	947.16	13.4	946.71				
15.19	946	16.9	945.32	20.16	944	22.21	943.19	25.98	942				
27.3	941.58	33.58	940	41.79	938	48.68	936.32	50.12	936				
52.93	935.42	59.48	934	66.15	933.44	69.83	933.02	78.61	932				
81.03	932	107.82	931.32	108.61	931.3	113.64	931.2	113.78	930.95				
114.87	930	115.19	929.31	115.46	929.17	117.12	928	125.15	928				
125.65	928.15	125.93	928.39	126.93	929.7	127.14	930	128.2	931.45				
128.47	931.79	128.48	931.79	128.85	931.9	130.37	932.31	132.68	933.01				
133.56	933.28	139.51	934	163.9	934	177.25	934.27	198.2	934.69				
222	936	244.6	942	273.4	942	290.7	938	305.09	938				
320.66	939.68	324.3	940	330.46	940.55	340.25	941.36	347.45	942				
355.87	942.74	360.6	943.16	370.55	944	371.63	944.09	382.42	944.63				
403.27	945.55	406.61	945.77	406.88	945.79	407.7	945.82	410.75	946				

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414.76	946.39	431.53	948	437.56	948.59	440.88	949.27	442.55	949.54
443.39	949.69	449.98	950	452.83	950.14	453.61	950.21	458.16	950.6
460.13	950.82	469.57	952	479.29	953.24	482.87	953.97	482.96	953.98
483.07	954	484.93	954.28	494.49	955.7	496.35	956	497.23	956.08
497.98	956.22	500.36	956.54	507.37	957.51	509.34	957.74	511.66	958
525.32	958.8	526.25	958.85	533.6	959.6	537.12	959.97		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	113.64	.035	139.51	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	113.64	139.51		195.34	212.37	143.13	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 933.66	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.34	* Wt. n-Val.	* 0.035	* 0.035	*
* W.S. Elev (ft)	* 933.31	* Reach Len. (ft)	* 195.34	* 212.37	* 143.13
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 66.91	* 72.50	*
* E.G. Slope (ft/ft)	* 0.003531	* Area (sq ft)	* 66.91	* 72.50	*
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 215.22	* 386.68	*
* Top Width (ft)	* 66.59	* Top width (ft)	* 46.39	* 20.20	*
* Vel Total (ft/s)	* 4.32	* Avg. Vel. (ft/s)	* 3.22	* 5.33	*
* Max Chl Dpth (ft)	* 5.31	* Hydr. Depth (ft)	* 1.44	* 3.59	*
* Conv. Total (cfs)	* 10129.3	* Conv. (cfs)	* 3622.0	* 6507.3	*
* Length Wtd. (ft)	* 189.01	* Wetted Per. (ft)	* 46.48	* 23.58	*
* Min Ch El (ft)	* 928.00	* Shear (lb/sq ft)	* 0.32	* 0.68	*
* Alpha	* 1.18	* Stream Power (lb/ft s)	* 537.12	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.32	* Cum Volume (acre-ft)	* 0.29	* 0.82	* 0.44
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 0.20	* 0.17	* 0.29

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 10179.69

INPUT

Description:

Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	7.02	948	7.65	947.79	12.75	946	16.04	944.89
18.45	944	18.83	943.86	21.31	943.03	24.14	942	24.95	941.72
30	940	30.34	939.88	30.41	939.86	35.66	938	36.55	937.7



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41.32	936	43.87	935.16	47.2	934	52.51	933.3	63.17	932
70.31	931.07	73.42	930.68	73.8	930.3	74.91	929.23	75.38	928.56
81.38	928.17	83.78	928.19	84.51	928.78	87.28	930	88.71	930.67
89.62	931.15	100.19	930.83	109.2	930.7	131.77	931.45	139.29	931.7
143.11	931.76	154.22	931.96	156.23	931.97	158.62	931.98	164.24	931.98
166.29	932	205.48	932	211.15	932.07	211.99	932.07	218.22	932.55
222.7	932.85	230.07	933.41	238.55	934	245.91	934.6	253.87	934.91
258.79	935.16	261.36	935.28	263.95	935.43	276.63	936	285.33	936
295.58	936.42	308.18	936.84	318.94	937.07	346.1	937.98	347.82	938.05
350.52	938.17	355.55	938.45	380.49	940	385.34	940.26	406.85	941.41
417.23	942	442.02	943.97	442.54	944	454.48	944.96	464.56	946
474.51	946.87	485.59	948	486.82	948.12	506.82	950		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	73.42	.035	89.62	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	73.42	89.62		111.2	58.47	28.87	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 933.26	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.09	* Wt. n-val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 933.17	* Reach Len. (ft)	* 111.20	* 58.47	* 28.87
* Crit W.S. (ft)	* 932.32	* Flow Area (sq ft)	* 24.38	* 67.58	* 199.48
* E.G. Slope (ft/ft)	* 0.001003	* Area (sq ft)	* 24.38	* 67.58	* 199.48
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 37.43	* 220.45	* 344.02
* Top width (ft)	* 173.29	* Top width (ft)	* 19.83	* 16.20	* 137.26
* Vel Total (ft/s)	* 2.07	* Avg. vel. (ft/s)	* 1.54	* 3.26	* 1.72
* Max Chl Dpth (ft)	* 5.00	* Hydr. Depth (ft)	* 1.23	* 4.17	* 1.45
* Conv. Total (cfs)	* 19005.0	* Conv. (cfs)	* 1181.9	* 6960.6	* 10862.5
* Length wtd. (ft)	* 58.47	* Wetted Per. (ft)	* 19.98	* 17.88	* 137.33
* Min Ch El (ft)	* 928.17	* Shear (lb/sq ft)	* 0.08	* 0.24	* 0.09
* Alpha	* 1.35	* Stream Power (lb/ft s)	* 506.82	* 0.00	* 0.00
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 0.08	* 0.48	* 0.11
* C & E Loss (ft)	*	* Cum SA (acres)	* 0.05	* 0.08	* 0.07

CULVERT

RIVER: Bluestone Creek  
 REACH: Upper RS: 10155.71

INPUT  
 Description:  
 Distance from Upstream XS = 14.5  
 Deck/Roadway Width = 17  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates

```

num=      2
Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
*****
63.17    932      0 155.61    932      0
    
```

Upstream Bridge Cross Section Data

```

Station Elevation Data      num=      74
Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev
*****
0        950      7.02      948      7.65      947.79    12.75      946      16.04      944.89
18.45    944      18.83      943.86    21.31      943.03    24.14      942      24.95      941.72
30        940      30.34      939.88    30.41      939.86    35.66      938      36.55      937.7
41.32    936      43.87      935.16    47.2       934       52.51      933.3     63.17      932
70.31    931.07     73.42      930.68    73.8       930.3     74.91      929.23    75.38      928.56
81.38    928.17     83.78      928.19    84.51      928.78    87.28      930      88.71      930.67
89.62    931.15     100.19     930.83    109.2      930.7     131.77     931.45    139.29     931.7
143.11   931.76     154.22     931.96    156.23     931.97    158.62     931.98    164.24     931.98
166.29   932       205.48     932       211.15     932.07    211.99     932.07    218.22     932.55
222.7    932.85     230.07     933.41    238.55     934       245.91     934.6     253.87     934.91
258.79   935.16     261.36     935.28    263.95     935.43    276.63     936      285.33     936
295.58   936.42     308.18     936.84    318.94     937.07    346.1      937.98    347.82     938.05
350.52   938.17     355.55     938.45    380.49     940      385.34     940.26    406.85     941.41
417.23   942       442.02     943.97    442.54     944      454.48     944.96    464.56     946
474.51   946.87     485.59     948      486.82     948.12    506.82     950
    
```

```

Manning's n Values      num=      3
Sta      n Val      Sta      n Val      Sta      n Val
*****
0        .035      73.42     .035      89.62     .035
    
```

```

Bank Sta: Left      Right      Coeff Contr.      Expan.
          73.42      89.62              .1              .3
    
```

Downstream Deck/Roadway Coordinates

```

num=      2
Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
*****
76.48    932      0 191.31    932
    
```

Downstream Bridge Cross Section Data

```

Station Elevation Data      num=      94
Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev
*****
0        949.98     .99      949.69    3.05      948.99    5.8       948      7.27      947.54
14.25    945.18     17.77     944       20.76     943.12    25.92     942      32.18     940.67
41.53    938.63     44.67     938       50.24     936.88    54.17     936.09    54.63     936
55.48    935.83     64.84     934       70.21     933.14    76.48     932      85.69     930.67
90.55    930       91.37     930       95.59     929.44    96.66     929.56    98.88     929.36
99.87    928.89     100.02     928.83    100.45     928.82    111.15     928.34    112.41     928.5
113.52   928.63     115.72     928.63    118.68     928.83    126.56     929.92    127        930
128.72   930.19     128.95     930.24    129.4     930.24    139.65     930.26    145.17     930.51
145.53   930.52     154.16     930.43    160.26     930.69    161.88     930.74    167.53     930.9
    
```

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180.55	931.6	185.13	931.66	186.41	931.78	191.31	932	196.93	932
200.87	931.76	221.57	931.83	225.16	932	227.58	932	233.04	932.16
255.77	932.65	256.55	932.66	263.77	933.02	274.11	933.29	279.11	934
282.89	934	297.09	935.18	310.65	935.92	315.18	936	322.12	936
325.63	936.14	340.23	936.23	341.92	936.25	343.41	936.28	350.49	936.52
360.44	937.28	367.48	937.74	371.77	938	382.05	938	390.77	938.58
414.08	939.62	416.45	939.72	431.9	940.53	452.2	941.54	453.87	941.68
457.84	942	470.95	943.01	480.09	943.75	483.03	944	485.82	944.22
488.38	944.37	510.98	945.88	512.74	946	523.97	946.96	536.1	948
542.07	948.51	543.76	948.68	545.85	948.86	558.19	950.01		

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 90.55 .035 129.4 .035

Bank Sta: Left Right Coeff Contr. Expan.  
 90.55 129.4 .1 .3

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 2  
 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
4	39	.024	.024	0	.9	1

Upstream Elevation = 928.61  
 Centerline Station = 79.2  
 Downstream Elevation = 928.54  
 Centerline Station = 103.08

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

\*\*\*\*\*  
 \* Q Culv Group (cfs) \* 18.88 \* Culv Full Len (ft) \* 39.00 \*  
 \* # Barrels \* 1 \* Culv Vel US (ft/s) \* 6.01 \*  
 \* Q Barrel (cfs) \* 18.88 \* Culv Vel DS (ft/s) \* 6.01 \*  
 \* E.G. US. (ft) \* 933.26 \* Culv Inv El Up (ft) \* 928.61 \*  
 \* W.S. US. (ft) \* 933.17 \* Culv Inv El Dn (ft) \* 928.54 \*  
 \* E.G. DS (ft) \* 931.74 \* Culv Frctn Ls (ft) \* 0.93 \*  
 \* W.S. DS (ft) \* 931.27 \* Culv Exit Loss (ft) \* 0.09 \*  
 \* Delta EG (ft) \* 1.52 \* Culv Entr Loss (ft) \* 0.50 \*  
 \* Delta WS (ft) \* 1.90 \* Q Weir (cfs) \* 582.53 \*

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```
* E.G. IC (ft)      * 933.25 * Weir Sta Lft (ft) * 52.83 *
* E.G. OC (ft)     * 933.26 * Weir Sta Rgt (ft) * 228.11 *
* Culvert Control  * Outlet * Weir Submerg     * 0.00 *
* Culv WS Inlet (ft) * 930.61 * Weir Max Depth (ft) * 1.29 *
* Culv WS Outlet (ft) * 930.54 * Weir Avg Depth (ft) * 1.16 *
* Culv Nml Depth (ft) * * * Weir Flow Area (sq ft) * 203.72 *
* Culv Crt Depth (ft) * 1.56 * Min El Weir Flow (ft) * 931.98 *
*****
```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 10120.86

INPUT

Description:

Station Elevation Data		num= 94		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	949.98	.99	949.69	3.05	948.99	5.8	948	7.27	947.54		
14.25	945.18	17.77	944	20.76	943.12	25.92	942	32.18	940.67		
41.53	938.63	44.67	938	50.24	936.88	54.17	936.09	54.63	936		
55.48	935.83	64.84	934	70.21	933.14	76.48	932	85.69	930.67		
90.55	930	91.37	930	95.59	929.44	96.66	929.56	98.88	929.36		
99.87	928.89	100.02	928.83	100.45	928.82	111.15	928.34	112.41	928.5		
113.52	928.63	115.72	928.63	118.68	928.83	126.56	929.92	127	930		
128.72	930.19	128.95	930.24	129.4	930.24	139.65	930.26	145.17	930.51		
145.53	930.52	154.16	930.43	160.26	930.69	161.88	930.74	167.53	930.9		
180.55	931.6	185.13	931.66	186.41	931.78	191.31	932	196.93	932		
200.87	931.76	221.57	931.83	225.16	932	227.58	932	233.04	932.16		
255.77	932.65	256.55	932.66	263.77	933.02	274.11	933.29	279.11	934		
282.89	934	297.09	935.18	310.65	935.92	315.18	936	322.12	936		
325.63	936.14	340.23	936.23	341.92	936.25	343.41	936.28	350.49	936.52		
360.44	937.28	367.48	937.74	371.77	938	382.05	938	390.77	938.58		
414.08	939.62	416.45	939.72	431.9	940.53	452.2	941.54	453.87	941.68		
457.84	942	470.95	943.01	480.09	943.75	483.03	944	485.82	944.22		
488.38	944.37	510.98	945.88	512.74	946	523.97	946.96	536.1	948		
542.07	948.51	543.76	948.68	545.85	948.86	558.19	950.01				

Manning's n Values

num= 3		Sta n Val		Sta n Val		Sta n Val	
0	.035	90.55	.035	129.4	.035		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 90.55 129.4 24.44 64.93 4.53 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft)      * 931.74 * Element * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.47 * Wt. n-val. * 0.035 * 0.035 * 0.035 *
*****
```

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* W.S. Elev (ft)	* 931.27	* Reach Len. (ft)	* 24.44	* 64.93	* 4.53
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 5.79	* 83.98	* 31.53
* E.G. Slope (ft/ft)	* 0.007053	* Area (sq ft)	* 5.79	* 83.98	* 31.53
* Q Total (cfs)	* 601.90	* Flow (cfs)	* 15.28	* 497.99	* 88.63
* Top Width (ft)	* 92.88	* Top width (ft)	* 9.02	* 38.85	* 45.02
* Vel Total (ft/s)	* 4.96	* Avg. Vel. (ft/s)	* 2.64	* 5.93	* 2.81
* Max Chl Dpth (ft)	* 2.93	* Hydr. Depth (ft)	* 0.64	* 2.16	* 0.70
* Conv. Total (cfs)	* 7167.1	* Conv. (cfs)	* 181.9	* 5929.8	* 1055.4
* Length Wtd. (ft)	* 51.19	* Wetted Per. (ft)	* 9.11	* 39.15	* 45.04
* Min Ch El (ft)	* 928.34	* Shear (lb/sq ft)	* 0.28	* 0.94	* 0.31
* Alpha	* 1.24	* Stream Power (lb/ft s)	* 558.19	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.28	* Cum Volume (acre-ft)	* 0.08	* 0.25	* 0.11
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.02	* 0.04	* 0.01

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Upper RS: 10055.03

INPUT  
 Description:

Station Elevation Data		num= 84		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	948	5.36	946.09	5.66	946	5.94	945.91	7.71	945.44
12.65	944	14.95	943.34	19.57	942	20.89	941.67	27.6	940
32.7	938.74	35.61	938	38.21	937.36	44.1	936	50.58	934.61
52.86	934	65.23	932.13	66.07	932	72.32	931.05	74.99	930.58
78	930.52	84.21	930.7	84.32	930.7	90.95	930.51	96.46	930.27
101.25	930	105.17	929.78	117.92	929.06	118.72	928.21	118.75	928
118.79	927.94	118.84	927.85	124.42	927.1	125.29	927.05	130.6	926.98
131.9	927.79	134.05	928.33	136.16	928.87	139.86	929.03	140.44	929.13
140.8	929.2	148.83	930	148.94	930.01	149.01	930	149.06	930
152.14	930	183.83	930.86	210.76	931.59	211.22	931.59	215.97	931.59
236.55	932	261.82	932	280.12	932.82	283.06	932.89	292.78	933.23
312.13	934	313.48	934	315.96	934	321.4	932.5	326.6	934.19
346.8	935.37	379.9	937.29	405.69	937.92	405.8	937.93	407.05	938
417.98	938	430.86	938.85	447.39	940	447.76	940	474.23	941.4
474.89	941.43	486.01	942	494.93	942.66	500.74	943.07	513.48	944
527.16	945.01	531.24	945.31	532.15	945.36	542.48	946	555.19	946.86
570.48	948	573.55	948.26	582.3	949.12	592.99	950		

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	117.92	.035	136.16	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	117.92	136.16		378.38	63.02	3.7	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 931.45 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.43  * Wt. n-Val.      * 0.035  * 0.035  * 0.035  *
* W.S. Elev (ft)     * 931.01 * Reach Len. (ft) * 63.02  * 63.02  * 63.02  *
* Crit W.S. (ft)     *       * Flow Area (sq ft) * 39.57  * 62.84  * 43.09  *
* E.G. Slope (ft/ft) * 0.004494 * Area (sq ft)    * 39.57  * 62.84  * 43.09  *
* Q Total (cfs)      * 601.90 * Flow (cfs)      * 102.65 * 393.00 * 106.25 *
* Top Width (ft)     * 117.00 * Top Width (ft)  * 45.40  * 18.24  * 53.36  *
* Vel Total (ft/s)   * 4.14  * Avg. vel. (ft/s) * 2.59  * 6.25  * 2.47  *
* Max chl Dpth (ft)  * 4.03  * Hydr. Depth (ft) * 0.87  * 3.45  * 0.81  *
* Conv. Total (cfs)  * 8979.0 * Conv. (cfs)     * 1531.3 * 5862.7 * 1585.0 *
* Length Wtd. (ft)   * 63.02  * Wetted Per. (ft) * 45.48  * 19.29  * 53.43  *
* Min Ch El (ft)     * 926.98 * Shear (lb/sq ft) * 0.24  * 0.91  * 0.23  *
* Alpha              * 1.62  * Stream Power (lb/ft s) * 592.99 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 0.16  * Cum Volume (acre-ft) * 0.07  * 0.14  * 0.11  *
* C & E Loss (ft)   * 0.08  * Cum SA (acres)   *       *       *       *
*****
    
```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 9989.380

INPUT  
 Description:

Station Elevation Data num= 116

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	6.78	948.23	7.68	948	12.44	946.77	15.96	946
19.13	945.41	26.98	944	34.58	942.62	38.01	942	47.87	940.48
50.44	940	51.37	939.82	61.13	938	69.54	936.99	79.48	936
90.28	934.88	97.08	934.59	102.68	934.35	108.18	934	114.32	933.52
117.71	933.3	122.23	933.03	149.35	932	156.09	932	163.89	931.38
174.5	930.9	190.54	930.99	191.64	930.96	195.98	930.92	201.84	930.74
206.74	930.71	222.7	930.61	245.44	930	272.47	930	275.63	930.1
275.69	930	276.36	928.6	276.72	928	277.33	926.66	277.37	926.59
277.79	926.51	280.69	926	283.89	926	284.17	926.05	286.59	926.49
289.13	927.66	290.94	927.93	291.31	927.98	293.28	928.05	295.53	928.23
297.27	928.35	300.41	928.54	304.16	928.42	307.66	928.66	309.14	928.69
312.58	928.73	313.27	928.82	315.76	929.32	316.87	929.39	320.05	930
320.12	930.01	320.55	929.86	340.59	929.99	340.75	930	340.79	930
340.85	930	354.42	930	374.53	930	385.2	929.94	385.46	929.95
408.61	929.97	410.15	929.92	412.39	930	418.73	930.31	430.01	931.64
442.98	932.41	456.83	933.25	458.09	932	460.76	932	461.29	932.02
461.39	932.02	461.45	932.02	482.89	934	492.29	934	495.58	934.3
498.35	934.64	513.4	936	528.03	936	538.96	936.62	540.05	936.64
541	936.68	542.09	936.69	544.24	936.68	554.1	937.02	567.8	938
580.99	939.15	590.94	940	612.75	941.43	616.44	941.64	620.65	941.87
623.48	942	624.95	942	630.69	942.37	654.37	944	682.42	945.98
682.81	946	683.06	946.02	683.12	946.03	683.3	946.04	686.85	946.3

689.58 946.47 706.49 947.51 713.64 948 725.84 948.97 730.86 949.43  
 738.37 950

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 275.63 .035 320.05 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 275.63 320.05 195.82 107.19 3.14 .1 .3  
 Ineffective Flow num= 1  
 Sta L Sta R Elev Permanent  
 377.89 738.37 929.84 T

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 931.19 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.15 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.035 \*  
 \* W.S. Elev (ft) \* 931.04 \* Reach Len. (ft) \* 195.82 \* 107.19 \* 3.14 \*  
 \* Crit W.S. (ft) \* \* \* Flow Area (sq ft) \* 59.55 \* 134.69 \* 107.39 \*  
 \* E.G. Slope (ft/ft) \* 0.001823 \* Area (sq ft) \* 59.55 \* 134.69 \* 107.39 \*  
 \* Q Total (cfs) \* 763.60 \* Flow (cfs) \* 74.27 \* 491.73 \* 197.60 \*  
 \* Top Width (ft) \* 253.67 \* Top Width (ft) \* 104.33 \* 44.42 \* 104.91 \*  
 \* Vel Total (ft/s) \* 2.53 \* Avg. Vel. (ft/s) \* 1.25 \* 3.65 \* 1.84 \*  
 \* Max Chl Dpth (ft) \* 5.04 \* Hydr. Depth (ft) \* 0.57 \* 3.03 \* 1.02 \*  
 \* Conv. Total (cfs) \* 17885.0 \* Conv. (cfs) \* 1739.5 \* 11517.3 \* 4628.1 \*  
 \* Length Wtd. (ft) \* 109.30 \* Wetted Per. (ft) \* 104.35 \* 47.12 \* 104.99 \*  
 \* Min Ch El (ft) \* 926.00 \* Shear (lb/sq ft) \* 0.06 \* 0.33 \* 0.12 \*  
 \* Alpha \* 1.50 \* Stream Power (lb/ft s) \* 738.37 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.08 \* Cum Volume (acre-ft) \* 9.48 \* 7.09 \* 5.43 \*  
 \* C & E Loss (ft) \* 0.03 \* Cum SA (acres) \* 6.82 \* 1.97 \* 5.53 \*  
 \*\*\*\*\*

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 9878.981

INPUT  
 Description:

Station Elevation Data num= 128  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 950 4.8 949.53 7.9 949.15 13.94 948.68 14.57 948.65  
 19.82 948.64 22.92 948.43 28.6 948 36.23 947.42 38.01 947.28  
 40.52 947.05 43.32 946.8 49.84 946 65.68 944.08 66.29 944  
 68.72 943.53 77.49 942.88 85.06 942 90.53 941.35 92.76 941.02



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99.15	940	109.22	938.39	111.6	938	112.08	937.92	114.63	937.49
122.08	936.19	123.13	936	130.87	934.55	133.79	934	134.08	933.94
144.55	932	154.05	931.31	159.25	931.06	164.49	930.83	172.69	930
190.8	930	241.47	929.03	242.52	929.03	246.37	928.91	252.9	928.72
254.26	928.69	256.02	928.64	257.24	928.6	265.38	928.43	270.83	928.46
272.2	928.45	302.77	928	328.21	928	351.67	928	357.35	928.03
359.64	928.03	363.81	928	371.82	928	374.99	928.06	386.33	928.34
396.74	928.95	396.9	928.63	397.31	928	397.65	927.15	397.67	927.13
397.83	927.11	401.97	926.16	402.03	926.15	402.57	925.98	408.69	925.9
408.75	925.9	421.17	925.64	421.31	925.63	422.27	925.77	423.32	926
430.06	927.37	432.58	928	433.75	928.27	434.69	928.51	440.55	928.22
443.31	928.17	449.78	928	477.57	928	480.12	928.03	484.5	928.02
490.05	928.01	490.7	928.01	491.25	928	493.62	928.3	510.08	930
516.31	931	518.01	930.99	522.1	932	523.47	932	527.88	933.02
531.88	934	532.08	934	534.58	934.59	540.76	936	542.41	936
554.21	936.98	557.73	937.17	562.44	937.36	572.35	938	586.11	938.71
597.72	938.97	600.91	938.94	608.51	939.18	612.38	939.43	614.73	939.43
615.77	939.46	624.09	940	638.78	940.69	640.88	940.79	644.35	940.93
649.05	941.09	659.4	941.52	666.33	942	692.47	943.99	692.53	943.99
692.59	943.99	692.88	944.01	725.52	946	737.66	946.97	739.81	947.16
746.09	947.63	746.61	947.66	752.55	948	754.92	948.16	758.84	948.44
773.85	949.46	776.43	949.67	781.45	950				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	396.74	.035	434.69	.035

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

396.74	434.69	38.17	45.78	26.43	.1	.3
--------	--------	-------	-------	-------	----	----

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	376.9	929.84	T
431.25	781.45	929.84	T

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 931.08	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.05	* Wt. n-val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 931.03	* Reach Len. (ft)	* 16.20	* 16.20	* 16.20
* Crit w.s. (ft)	* 928.82	* Flow Area (sq ft)	* 297.23	* 170.30	* 93.31
* E.G. slope (ft/ft)	* 0.000402	* Area (sq ft)	* 535.95	* 176.32	* 209.40
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 294.29	* 383.90	* 85.40
* Top width (ft)	* 358.35	* Top Width (ft)	* 236.90	* 37.95	* 83.50
* Vel Total (ft/s)	* 1.36	* Avg. vel. (ft/s)	* 0.99	* 2.25	* 0.92
* Max Chl Dpth (ft)	* 5.40	* Hydr. Depth (ft)	* 1.25	* 4.49	* 1.12
* Conv. Total (cfs)	* 38079.0	* Conv. (cfs)	* 14675.8	* 19144.3	* 4258.9
* Length wtd. (ft)	* 16.20	* Wetted Per. (ft)	* 236.99	* 39.52	* 83.70
* Min Ch El (ft)	* 925.63	* Shear (lb/sq ft)	* 0.03	* 0.11	* 0.03
* Alpha	* 1.63	* Stream Power (lb/ft s)	* 781.45	* 0.00	* 0.00
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 8.14	* 6.71	* 5.42
* C & E Loss (ft)	*	* Cum SA (acres)	* 6.06	* 1.86	* 5.52

\*\*\*\*\*

BRIDGE

RIVER: Bluestone Creek  
 REACH: Middle RS: 9855.351

INPUT

Description:  
 Distance from Upstream XS = 16.2  
 Deck/Roadway Width = 13  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates  
 num= 12

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
65.68		944			208.1		944			300.9		936		
322.8		934			345.4		932			387.9	929.84			
391.9	929.84		928		423.9	929.84		928		427.9	929.84			
485.36		932			521.7		934			564.5		936		

Upstream Bridge Cross Section Data

Station Elevation Data num= 128											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	4.8	949.53	7.9	949.15	13.94	948.68	14.57	948.65		
19.82	948.64	22.92	948.43	28.6	948	36.23	947.42	38.01	947.28		
40.52	947.05	43.32	946.8	49.84	946	65.68	944.08	66.29	944		
68.72	943.53	77.49	942.88	85.06	942	90.53	941.35	92.76	941.02		
99.15	940	109.22	938.39	111.6	938	112.08	937.92	114.63	937.49		
122.08	936.19	123.13	936	130.87	934.55	133.79	934	134.08	933.94		
144.55	932	154.05	931.31	159.25	931.06	164.49	930.83	172.69	930		
190.8	930	241.47	929.03	242.52	929.03	246.37	928.91	252.9	928.72		
254.26	928.69	256.02	928.64	257.24	928.6	265.38	928.43	270.83	928.46		
272.2	928.45	302.77	928	328.21	928	351.67	928	357.35	928.03		
359.64	928.03	363.81	928	371.82	928	374.99	928.06	386.33	928.34		
396.74	928.95	396.9	928.63	397.31	928	397.65	927.15	397.67	927.13		
397.83	927.11	401.97	926.16	402.03	926.15	402.57	925.98	408.69	925.9		
408.75	925.9	421.17	925.64	421.31	925.63	422.27	925.77	423.32	926		
430.06	927.37	432.58	928	433.75	928.27	434.69	928.51	440.55	928.22		
443.31	928.17	449.78	928	477.57	928	480.12	928.03	484.5	928.02		
490.05	928.01	490.7	928.01	491.25	928	493.62	928.3	510.08	930		
516.31	931	518.01	930.99	522.1	932	523.47	932	527.88	933.02		
531.88	934	532.08	934	534.58	934.59	540.76	936	542.41	936		
554.21	936.98	557.73	937.17	562.44	937.36	572.35	938	586.11	938.71		
597.72	938.97	600.91	938.94	608.51	939.18	612.38	939.43	614.73	939.43		
615.77	939.46	624.09	940	638.78	940.69	640.88	940.79	644.35	940.93		
649.05	941.09	659.4	941.52	666.33	942	692.47	943.99	692.53	943.99		
692.59	943.99	692.88	944.01	725.52	946	737.66	946.97	739.81	947.16		
746.09	947.63	746.61	947.66	752.55	948	754.92	948.16	758.84	948.44		
773.85	949.46	776.43	949.67	781.45	950						

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 396.74 .035 434.69 .035

Bank Sta: Left Right Coeff Contr. Expan.  
 396.74 434.69 .1 .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 0 376.9 929.84 T  
 431.25 781.45 929.84 T

Downstream Deck/Roadway Coordinates num= 13  
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 \*\*\*\*\*  
 68.53 944 161 944 227 944  
 332.3 936 354.6 934 376.5 932  
 423.9 929.84 427.9 929.84 928 459.9 929.84 928  
 463.9 929.84 492.4 932 529.6 934  
 572.5 936

Downstream Bridge Cross Section Data Station Elevation Data num= 103  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 950 .62 949.94 1.97 949.77 2.65 949.68 12.72 948.44  
 16.26 948 24.3 947.03 31.67 946.22 33.25 946.14 36.05 946  
 46.56 945.46 48.89 945.34 50.99 945.18 55.91 944.9 57.95 944.68  
 60.1 944.52 63.02 944.39 65.19 944.24 68.53 944 77.67 943.2  
 87.53 942 88.02 941.94 88.59 941.86 92.27 941.19 98.96 940  
 100.01 939.81 102.09 939.46 109.74 938 113.2 937.35 117.77 936.75  
 122.15 936.19 123.91 936 135.87 934.87 139.96 934.13 140.13 934.11  
 140.69 934 142.26 933.7 147.64 932.68 151.24 932 153.9 931.83  
 158.53 931.45 177.34 930 179.69 930 189.56 929.72 208.57 929.28  
 210.24 929.31 275.59 928 362.44 928 413.03 928 430.29 928.49  
 430.85 928.5 434.04 928.55 434.11 928.43 434.38 928 435.37 926.06  
 435.42 926 435.96 925.22 436.02 925.17 436.53 925.03 440.72 924  
 441.16 924 443.57 924.61 447.27 924.94 448.43 925.87 450.36 926  
 454.8 926.27 459.96 926.65 528.73 928.39 528.77 928.41 528.82 928.43  
 533.83 930 538.24 931.38 540.23 932 541.75 932.49 546.66 934  
 548.26 934.51 553.19 936 554.61 936.46 559.48 938 577.6 939.07  
 590.07 939.69 591.24 939.73 595.65 940 597.48 940 613.88 940.57  
 624.97 940.82 637.69 941.46 647.48 942 656.53 942.42 661.12 942.55  
 670.37 942.89 676.39 943.05 679.98 943.21 684.39 943.31 688.66 943.57  
 694.37 944 723.14 945.97 723.56 946 723.64 946.01 723.7 946.01  
 723.86 946.02 753.12 948 771.15 950

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

0 .035 434.04 .035 459.96 .06

Bank Sta: Left Right Coeff Contr. Expan.  
 434.04 459.96 .1 .3

Ineffective Flow num= 1  
 Sta L Sta R Elev Permanent  
 0 409.82 930.1 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .98  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow

Submerged Inlet Cd =  
 Submerged Inlet + Outlet Cd = .8  
 Max Low Cord =

Additional Bridge Parameters

Add Friction component to Momentum

Do not add weight component to Momentum

Class B flow critical depth computations use critical depth  
 inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

```

*****
* E.G. US. (ft) * 931.08 * Element *Inside BR US *Inside BR DS *
* W.S. US. (ft) * 931.03 * E.G. Elev (ft) * 931.08 * 931.08 *
* Q Total (cfs) * 763.60 * W.S. Elev (ft) * 931.03 * 930.72 *
* Q Bridge (cfs) * 546.10 * Crit w.s. (ft) * 930.86 * 930.71 *
* Q Weir (cfs) * 217.50 * Max Chl Dpth (ft) * 5.40 * 6.72 *
* Weir Sta Lft (ft) * 363.48 * Vel Total (ft/s) * 5.50 * 5.41 *
* Weir Sta Rgt (ft) * 460.92 * Flow Area (sq ft) * 138.72 * 141.06 *
* Weir Submerg * 0.00 * Froude # Chl * 0.44 * 0.49 *
* Weir Max Depth (ft) * 1.24 * Specif Force (cu ft) * 396.95 * 453.27 *
* Min El Weir Flow (ft) * 929.85 * Hydr Depth (ft) * 1.46 * 1.99 *
* Min El Prs (ft) * 928.00 * W.P. Total (ft) * 151.15 * 125.54 *
* Delta EG (ft) * 1.84 * Conv. Total (cfs) * * *
* Delta WS (ft) * 2.48 * Top width (ft) * 95.27 * 70.86 *
* BR Open Area (sq ft) * 53.43 * Frctn Loss (ft) * * *
* BR Open Vel (ft/s) * 10.22 * C & E Loss (ft) * * *
    
```

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\* Coef of Q \* \* Shear Total (lb/sq ft) \* \*  
 \* Br Sel Method \* Press/weir \* Power Total (lb/ft s) \* 0.00 \* 0.00 \*  
 \*\*\*\*\*

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.  
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.  
 Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.  
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.  
 Note: For the cross section inside the bridge at the downstream end, the water surface is based on critical depth over the weir. The energy has been projected.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 9831.906

INPUT

Description:

Station Elevation Data num= 103

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	.62	949.94	1.97	949.77	2.65	949.68	12.72	948.44
16.26	948	24.3	947.03	31.67	946.22	33.25	946.14	36.05	946
46.56	945.46	48.89	945.34	50.99	945.18	55.91	944.9	57.95	944.68
60.1	944.52	63.02	944.39	65.19	944.24	68.53	944	77.67	943.2
87.53	942	88.02	941.94	88.59	941.86	92.27	941.19	98.96	940
100.01	939.81	102.09	939.46	109.74	938	113.2	937.35	117.77	936.75
122.15	936.19	123.91	936	135.87	934.87	139.96	934.13	140.13	934.11
140.69	934	142.26	933.7	147.64	932.68	151.24	932	153.9	931.83
158.53	931.45	177.34	930	179.69	930	189.56	929.72	208.57	929.28
210.24	929.31	275.59	928	362.44	928	413.03	928	430.29	928.49
430.85	928.5	434.04	928.55	434.11	928.43	434.38	928	435.37	926.06
435.42	926	435.96	925.22	436.02	925.17	436.53	925.03	440.72	924
441.16	924	443.57	924.61	447.27	924.94	448.43	925.87	450.36	926
454.8	926.27	459.96	926.65	528.73	928.39	528.77	928.41	528.82	928.43
533.83	930	538.24	931.38	540.23	932	541.75	932.49	546.66	934
548.26	934.51	553.19	936	554.61	936.46	559.48	938	577.6	939.07
590.07	939.69	591.24	939.73	595.65	940	597.48	940	613.88	940.57
624.97	940.82	637.69	941.46	647.48	942	656.53	942.42	661.12	942.55
670.37	942.89	676.39	943.05	679.98	943.21	684.39	943.31	688.66	943.57
694.37	944	723.14	945.97	723.56	946	723.64	946.01	723.7	946.01
723.86	946.02	753.12	948	771.15	950				

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 434.04 .035 459.96 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 434.04 459.96 9.93 158.21 292.75 .1 .3  
 Ineffective Flow num= 1  
 Sta L Sta R Elev Permanent  
 0 409.82 930.1 T

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 929.25 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.70 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 928.55 \* Reach Len. (ft) \* 9.93 \* 158.21 \* 292.75 \*  
 \* Crit W.S. (ft) \* 928.55 \* Flow Area (sq ft) \* 7.13 \* 78.57 \* 70.82 \*  
 \* E.G. Slope (ft/ft) \* 0.008112 \* Area (sq ft) \* 88.40 \* 78.57 \* 70.82 \*  
 \* Q Total (cfs) \* 763.60 \* Flow (cfs) \* 12.06 \* 591.24 \* 160.30 \*  
 \* Top Width (ft) \* 280.98 \* Top width (ft) \* 185.82 \* 25.92 \* 69.24 \*  
 \* Vel Total (ft/s) \* 4.88 \* Avg. vel. (ft/s) \* 1.69 \* 7.53 \* 2.26 \*  
 \* Max Chl Dpth (ft) \* 4.55 \* Hydr. Depth (ft) \* 0.29 \* 3.03 \* 1.02 \*  
 \* Conv. Total (cfs) \* 8478.2 \* Conv. (cfs) \* 133.9 \* 6564.5 \* 1779.8 \*  
 \* Length Wtd. (ft) \* 158.98 \* Wetted Per. (ft) \* 24.19 \* 28.46 \* 69.29 \*  
 \* Min Ch El (ft) \* 924.00 \* Shear (lb/sq ft) \* 0.15 \* 1.40 \* 0.52 \*  
 \* Alpha \* 1.89 \* Stream Power (lb/ft s) \* 771.15 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.97 \* Cum Volume (acre-ft) \* 8.01 \* 6.60 \* 5.36 \*  
 \* C & E Loss (ft) \* 0.08 \* Cum SA (acres) \* 5.96 \* 1.83 \* 5.48 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.  
 Warning: Divided flow computed for this cross-section.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.  
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 9559.249

INPUT  
 Description:

Station Elevation Data num= 60  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev

OXF157-159Bridges.rep

```

*****
0      924    57.9    924  101.99    944   228.9    944   264.2    928
267.36  927.3  269.93  927.35  278.42  927.39  283.01  927.46  296.59  927.39
304.78  927.39  309.38  927.41  310.75  927.41  311.24  927.41  312.58  927.41
316.06  927.34  318.72  927.37   320.4  927.34  322.96  927.36  355.93  926.89
396.93  926.29  398.44  926.27  403.58  926.19  406.77  926.19  406.83  926.09
  407    926    407.94  924.21  408.12  923.89  408.27  923.69  408.28  923.69
413.07  923.36  418.12  923.03  418.58  923.27  418.93  923.48  420.16  923.98
420.18    924   420.2  924.03  421.52  924.69  436.31    926  449.91  927.02
468.93  927.91  470.78    928  472.99  928.18  476.74    930  478.04  930.63
480.87    932  482.09  932.59  485.05    934  486.2    934.6  489.71  935.73
490.51    936  495.97  937.99    496    938  496.06  938.03  496.13  938.04
502.74  939.21  507.61    940   516.5  941.42   518.5    942  564.97   957

```

```

Manning's n Values      num=      3
Sta   n Val      Sta   n Val      Sta   n Val
*****
0     .035  406.77    .035  421.52    .06

```

```

Bank Sta: Left   Right   Lengths: Left Channel   Right   Coeff Contr.   Expan.
          406.77  421.52          20.59  105.55  110.93          .1          .3
Left Levee      Station=  228.9          Elevation=  944

```

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 928.16 * Element      * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.44  * Wt. n-Val.   * 0.035  * 0.035  * 0.060  *
* W.S. Elev (ft)     * 927.72 * Reach Len. (ft) * 20.59  * 105.55 * 110.93 *
* Crit W.S. (ft)     * 927.72 * Flow Area (sq ft) * 99.58  * 60.22  * 56.90  *
* E.G. slope (ft/ft) * 0.004763 * Area (sq ft) * 99.58  * 60.22  * 56.90  *
* Q Total (cfs)      * 763.60 * Flow (cfs)    * 230.98 * 416.30 * 116.32 *
* Top Width (ft)     * 199.46 * Top width (ft) * 141.31 * 14.75  * 43.39  *
* Vel Total (ft/s)   * 3.52  * Avg. vel. (ft/s) * 2.32  * 6.91  * 2.04  *
* Max Chl Dpth (ft) * 4.69  * Hydr. Depth (ft) * 0.70  * 4.08  * 1.31  *
* Conv. Total (cfs) * 11063.9 * Conv. (cfs) * 3346.6 * 6031.8 * 1685.4 *
* Length wtd. (ft)  * 75.03 * Wetted Per. (ft) * 141.37 * 16.61 * 43.50 *
* Min Ch El (ft)    * 923.03 * Shear (lb/sq ft) * 0.21  * 1.08  * 0.39  *
* Alpha             * 2.28  * Stream Power (lb/ft s) * 564.97 * 228.90 * 0.00  *
* Frctn Loss (ft)   * 0.36  * Cum Volume (acre-ft) * 7.99  * 6.34  * 4.93  *
* C & E Loss (ft)   * 0.03  * Cum SA (acres) * 5.92  * 1.76  * 5.10  *
*****

```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

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



CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 9443.656

INPUT  
 Description:

Station Elevation Data num= 55

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	924	60.05	924	101.1	944	219.6	944	256.44	926
274.3	925.56	292.5	926	295.2	926.06	314.99	926.06	340.53	926
342.39	925.93	363.18	925.08	363.37	924.92	364.26	924	364.29	924
365.42	922.91	365.43	922.9	365.46	922.86	366.4	922.89	366.63	922.91
380.44	924	381.13	924.16	382.1	924.15	382.12	924.17	382.9	925.03
383.93	926	383.94	926.01	398.08	926	426	926.42	439.72	926
445.48	926	447.38	928	448.15	928.45	450.82	930	451.47	930.36
454.14	932	454.84	932.4	457.62	933.98	457.65	934	457.94	934.19
460.71	936	460.9	936.1	463.56	938	467.83	939.62	468.69	940
470.48	940.71	473.58	942	476.5	943.1	478.82	944	483.26	945.76
483.89	946	484.96	946.45	488.7	948	492.64	948.96	495.25	950

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	363.18	.035	383.93	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 363.18 383.93 30.34 114.86 56.64 .1 .3  
 Left Levee Station= 219.6 Elevation= 944

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 927.23	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.35	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 926.88	* Reach Len. (ft)	* 30.34	* 114.86	* 56.64
* Crit W.S. (ft)	* 926.74	* Flow Area (sq ft)	* 110.78	* 66.38	* 45.60
* E.G. Slope (ft/ft)	* 0.004727	* Area (sq ft)	* 110.78	* 66.38	* 45.60
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 327.34	* 398.61	* 37.65
* Top width (ft)	* 191.67	* Top width (ft)	* 108.54	* 20.75	* 62.38
* Vel Total (ft/s)	* 3.43	* Avg. vel. (ft/s)	* 2.95	* 6.00	* 0.83
* Max Chl Dpth (ft)	* 4.02	* Hydr. Depth (ft)	* 1.02	* 3.20	* 0.73
* Conv. Total (cfs)	* 11106.0	* Conv. (cfs)	* 4760.9	* 5797.5	* 547.6
* Length Wtd. (ft)	* 80.93	* Wetted Per. (ft)	* 108.77	* 22.50	* 62.78
* Min Ch El (ft)	* 922.86	* Shear (lb/sq ft)	* 0.30	* 0.87	* 0.21
* Alpha	* 1.92	* Stream Power (lb/ft s)	* 495.25	* 219.60	* 0.00
* Frctn Loss (ft)	* 0.17	* Cum Volume (acre-ft)	* 7.94	* 6.19	* 4.80
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	* 5.86	* 1.71	* 4.96

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

This may indicate the need for additional cross sections.

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 9322.807

INPUT  
 Description:

Station Elevation Data num= 63											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	924	102.02	944	191.63	944	226.4	928	236.93	926.73		
238.25	926.66	245.34	926	248.86	926	280.73	925.57	301.42	925.29		
315.41	925.14	316.42	924.79	317.04	924.39	317.5	924.03	317.54	924		
319.17	922.5	319.97	922	326.91	921.73	332.46	921.52	335.76	921.44		
338.49	921.28	338.92	921.9	340.13	923.5	340.28	923.71	342.76	923.61		
360.65	923.1	370.45	923.93	371.05	924	371.21	924	371.29	924		
403.15	925.77	403.45	925.79	405.9	925.96	407.61	926	408.21	926.16		
414.2	928	416.35	928.68	420.64	930	426.69	931.84	426.94	932		
427.08	932.09	429.92	934	431.63	935.02	433.14	936	434.72	937.03		
436.09	938	438.21	939.59	438.53	939.81	438.79	940	439.08	940.2		
439.67	940.6	441.71	942	443.29	943.14	444.01	943.67	444.43	944		
445.03	944.41	446.74	945.72	447.16	946	448.27	946.82	449.8	947.89		
449.94	948	450.02	948.06	452.79	950						

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	315.41	.035	340.28	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	315.41	340.28		111.46	51.15	.1	.3
Left Levee		Station=	191.63	Elevation=	944		

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 927.00	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.15	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 926.85	* Reach Len. (ft)	* 111.46	* 51.15	* 47.84
* Crit W.S. (ft)	* 925.06	* Flow Area (sq ft)	* 93.49	* 118.36	* 173.89
* E.G. Slope (ft/ft)	* 0.001147	* Area (sq ft)	* 93.49	* 118.36	* 173.89
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 149.67	* 454.09	* 159.84
* Top width (ft)	* 174.57	* Top width (ft)	* 79.51	* 24.87	* 70.19
* Vel Total (ft/s)	* 1.98	* Avg. Vel. (ft/s)	* 1.60	* 3.84	* 0.92
* Max Chl Dpth (ft)	* 5.57	* Hydr. Depth (ft)	* 1.18	* 4.76	* 2.48
* Conv. Total (cfs)	* 22549.9	* Conv. (cfs)	* 4420.0	* 13409.7	* 4720.3

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```
* Length Wtd. (ft)      * 57.28 * Wetted Per. (ft)      * 79.56 * 27.15 * 70.42 *
* Min Ch El (ft)      * 921.28 * Shear (lb/sq ft)      * 0.08 * 0.31 * 0.18 *
* Alpha                * 2.41 * Stream Power (lb/ft s) * 452.79 * 191.63 * 0.00 *
* Frctn Loss (ft)     * 0.15 * Cum Volume (acre-ft)  * 7.87 * 5.95 * 4.66 *
* C & E Loss (ft)     * 0.09 * Cum SA (acres)        * 5.79 * 1.65 * 4.88 *
*****
```

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

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

This may indicate the need for additional cross sections.

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

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 9266.019

INPUT

Description:

Station Elevation Data		num= 72									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	952	56.9	946	64.95	944	75.5	944	158.53	944		
201.45	930	206.54	929.01	211.15	928.92	234.74	928.32	244.3	928		
249.75	928	252.28	927.87	300.08	926	322.02	926	343.87	925.87		
348.04	925.86	353.31	925.84	354.41	925.83	359.99	925.84	365.96	925.79		
374.02	925.72	388.44	925.09	392.14	925.1	394.8	924.76	397.19	924.27		
398.04	924.17	399.58	924	404.99	923.41	406.68	923.3	407.05	922.98		
409.08	922	409.17	921.94	409.18	921.93	409.42	921.93	410.45	921.88		
421.24	921.33	421.57	922	421.6	922.06	422.79	924.47	422.82	924.53		
423.39	924.5	424.51	924.57	426.3	924.61	426.87	924.63	428.38	924.67		
469.04	925.82	475.23	926	476.61	926.63	479.59	928	481.78	929.01		
483.99	930	486.57	931.22	488.01	932	491.21	933.97	491.25	934		
491.7	934.31	494.19	936	496.36	937.66	496.82	938	498.42	938.96		
499.89	940	501.53	941.13	502.68	942	504.3	943.1	505.42	943.89		
505.58	944	508.1	945.84	508.33	946	511.92	947.99	511.92	948		
511.93	948.01	515.43	950								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	392.14	.035	422.79	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 392.14 422.79 19.4 235.37 285.83 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*

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```

* E.G. Elev (ft)          * 926.76 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)         * 1.02  * Wt. n-Val.      * 0.035  * 0.035  * 0.100  *
* W.S. Elev (ft)        * 925.74 * Reach Len. (ft) * 19.40  * 235.37 * 285.83 *
* Crit W.S. (ft)        * 925.74 * Flow Area (sq ft) * 7.33  * 85.91  * 26.86  *
* E.G. Slope (ft/ft)    * 0.010847 * Area (sq ft)    * 7.33  * 85.91  * 26.86  *
* Q Total (cfs)         * 763.60 * Flow (cfs)      * 16.10  * 717.43 * 30.07  *
* Top Width (ft)        * 95.15  * Top Width (ft)  * 20.92  * 30.65  * 43.57  *
* Vel Total (ft/s)      * 6.36  * Avg. Vel. (ft/s) * 2.20  * 8.35  * 1.12  *
* Max Chl Dpth (ft)     * 4.41  * Hydr. Depth (ft) * 0.35  * 2.80  * 0.62  *
* Conv. Total (cfs)     * 7331.7 * Conv. (cfs)     * 154.6  * 6888.3 * 288.8  *
* Length Wtd. (ft)     * 177.07 * Wetted Per. (ft) * 20.94  * 33.10  * 43.63  *
* Min Ch El (ft)       * 921.33 * Shear (lb/sq ft) * 0.24  * 1.76  * 0.42  *
* Alpha                 * 1.62  * Stream Power (lb/ft s) * 515.43 * 0.00  * 0.00  *
* Frctn Loss (ft)      * 1.60  * Cum Volume (acre-ft) * 7.74  * 5.83  * 4.55  *
* C & E Loss (ft)      * 0.18  * Cum SA (acres)   * 5.67  * 1.62  * 4.82  *
*****

```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 9003.470

INPUT

Description:

Station Elevation Data		num= 73									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	6.15	958.34	7.4	958	8.55	957.67	14.61	956		
16.54	955.46	21.78	954	28.56	952.15	29.08	952	64.3	950		
123.3	930	124.47	929.19	150.31	928	162.33	927.31	167.22	927.22		
182.56	926	183.29	926	206.7	924.02	206.87	924	210.21	924		
287.67	923.39	288.83	923.38	307.05	923.27	327.91	923.23	329.31	922.93		
329.48	922.89	329.96	922.27	330.12	922	332.94	920.67	334.1	920.45		
336.2	921.07	337.6	921.41	338.95	921.49	339.73	921.53	339.84	921.54		
341.8	921.95	342.66	922.14	350.23	923.93	358.7	925.87	359.21	926		
359.25	926	359.43	926.04	360.41	926.18	361.49	926.73	363.5	927		
363.79	927.05	364.79	927.3	367.44	928	371.24	929.02	373.54	929.63		

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374.91	930	376.77	930.5	382.17	932	385.61	933.13	387.14	934
389.87	935.58	390.58	936	393.04	937.42	394.79	938	396.08	938.43
400.75	940	404.45	941.23	406.81	942	408.16	942.43	412.87	944
414.75	944.55	415.61	944.8	416.74	945.07	418.95	946	420.22	946.49
424.13	948	425.93	948.69	429.35	950				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 327.91 .035 350.23 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 327.91 350.23 59.54 96.43 71.3 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 924.92	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.41	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 924.51	* Reach Len. (ft)	* 59.54	* 96.43	* 71.30
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 115.85	* 55.13	* 0.74
* E.G. Slope (ft/ft)	* 0.007603	* Area (sq ft)	* 115.85	* 55.13	* 0.74
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 403.25	* 359.93	* 0.41
* Top width (ft)	* 151.90	* Top Width (ft)	* 127.03	* 22.32	* 2.54
* Vel Total (ft/s)	* 4.45	* Avg. Vel. (ft/s)	* 3.48	* 6.53	* 0.56
* Max Chl Dpth (ft)	* 4.06	* Hydr. Depth (ft)	* 0.91	* 2.47	* 0.29
* Conv. Total (cfs)	* 8757.4	* Conv. (cfs)	* 4624.7	* 4127.9	* 4.8
* Length wtd. (ft)	* 74.42	* Wetted Per. (ft)	* 127.06	* 23.54	* 2.61
* Min Ch El (ft)	* 920.45	* Shear (lb/sq ft)	* 0.43	* 1.11	* 0.13
* Alpha	* 1.34	* Stream Power (lb/ft s)	* 429.35	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.47	* Cum Volume (acre-ft)	* 7.71	* 5.45	* 4.46
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 5.63	* 1.48	* 4.66

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8906.253

INPUT

Description:

Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	976	46.1	976	144.2	928	150.82	926.26	153.19	926
153.36	925.97	153.55	925.94	160.26	924.87	165.42	924	178.5	924
217.3	923.2	271.94	922.69	298.77	922.44	299.61	922.44	311.14	922.54
311.16	922.31	311.28	922	311.28	920.72	311.65	920.37	311.74	920
311.84	919.8	311.98	919.77	312.18	919.73	312.52	919.75	312.79	919.78
314.05	919.84	315.84	919.8	316.35	920	317.06	920.3	319.49	921.3
321.29	921.81	321.94	921.85	327.01	922	336.16	922	338.01	923.04
339.62	924	340.68	924.36	349.46	926	353	927.26	354.34	927.7

OXF157-159Bridges.rep

355.24	928	358.77	929.23	361.15	930	363.74	930.87	366.7	932
369.46	933.33	370.87	934	375.22	935.95	375.33	936	375.6	936.13
379.33	938	380.1	938.35	383.39	940	384.22	940.4	387.29	942
388.66	942.28	392.47	944	395.71	945.04	398.78	946	404.01	947.68
405.06	948	407	948.59	412.03	950				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 311.14 .035 321.29 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 311.14 321.29 95.99 63.07 70.55 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 924.42	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.29	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 924.13	* Reach Len. (ft)	* 95.99	* 63.07	* 70.55
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 148.90	* 37.37	* 36.09
* E.G. Slope (ft/ft)	* 0.005342	* Area (sq ft)	* 148.90	* 37.37	* 36.09
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 467.05	* 237.00	* 59.56
* Top width (ft)	* 175.32	* Top Width (ft)	* 146.47	* 10.15	* 18.70
* Vel Total (ft/s)	* 3.43	* Avg. Vel. (ft/s)	* 3.14	* 6.34	* 1.65
* Max Chl Dpth (ft)	* 4.40	* Hydr. Depth (ft)	* 1.02	* 3.68	* 1.93
* Conv. Total (cfs)	* 10448.0	* Conv. (cfs)	* 6390.4	* 3242.7	* 814.9
* Length Wtd. (ft)	* 83.95	* Wetted Per. (ft)	* 146.49	* 12.79	* 19.26
* Min Ch El (ft)	* 919.73	* Shear (lb/sq ft)	* 0.34	* 0.97	* 0.62
* Alpha	* 1.59	* Stream Power (lb/ft s)	* 412.03	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.41	* Cum Volume (acre-ft)	* 7.53	* 5.34	* 4.43
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 5.45	* 1.44	* 4.65

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8843.186

INPUT

Description:

Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	976	103.93	926	109.9	925.11	128.5	924	128.7	924
197.13	922.4	202.18	922.29	211.57	922	229.36	922	243.55	922
246.14	922.01	263.96	922.07	263.97	922.03	264.02	922	264.14	921.67
264.67	920	264.72	919.95	265.1	919.53	265.28	919.47	265.37	919.39
266.79	919.52	269.36	919.63	269.61	919.37	271.23	919.61	272.08	920
274.31	921.23	274.32	921.23	283.46	921.78	287.45	922	293.84	923.51
295.06	923.77	296.23	924	300.2	924.7	302.18	925.08	302.85	925.21
304.39	926	307.66	927.89	308.11	928	311.37	929.74	311.85	930

OXF157-159Bridges.rep

312.45	930.34	315.65	932	318.25	933.45	319.32	934	319.62	934.17
322.77	936	323.38	936.36	324.5	936.94	326.17	938	327.31	938.72
329.3	940	330.4	940.67	332.57	942	335.05	943.17	335.41	943.17
339.74	943.03	346.3	943.66	346.84	943.73	347.85	943.84	348.41	944
348.97	944.22	353.75	946	356.68	947.16	358.94	948	364.07	950

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 263.96 .035 274.31 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 263.96 274.31 78.94 118.84 128.57 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 924.01	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.28	* Wt. n-val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 923.73	* Reach Len. (ft)	* 78.94	* 118.84	* 128.57
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 149.62	* 39.67	* 34.05
* E.G. Slope (ft/ft)	* 0.004389	* Area (sq ft)	* 149.62	* 39.67	* 34.05
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 477.64	* 239.38	* 46.58
* Top width (ft)	* 154.63	* Top Width (ft)	* 123.71	* 10.35	* 20.56
* Vel Total (ft/s)	* 3.42	* Avg. Vel. (ft/s)	* 3.19	* 6.03	* 1.37
* Max Chl Dpth (ft)	* 4.36	* Hydr. Depth (ft)	* 1.21	* 3.83	* 1.66
* Conv. Total (cfs)	* 11525.6	* Conv. (cfs)	* 7209.4	* 3613.1	* 703.0
* Length wtd. (ft)	* 103.50	* Wetted Per. (ft)	* 123.74	* 12.63	* 20.78
* Min Ch El (ft)	* 919.37	* Shear (lb/sq ft)	* 0.33	* 0.86	* 0.45
* Alpha	* 1.53	* Stream Power (lb/ft s)	* 364.07	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.28	* Cum Volume (acre-ft)	* 7.20	* 5.29	* 4.37
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 5.15	* 1.43	* 4.61

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8712.623

INPUT

Description:

Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	975	99.94	926	105.6	925.45	108.02	925.39	149.01	924
159.02	924	162.97	923.65	170.08	923.55	183.95	922.99	184.61	922.98
214.4	922	229.09	922	237.23	922	244.86	920.77	249.7	920
257.02	918.83	258.23	918.56	261.74	918.51	261.89	918.52	262	918.51



OXF157-159Bridges.rep

272.22	918.4	272.38	918.68	273.2	920.15	273.28	920.26	273.44	920.07
274.06	920.4	276.69	922	278.85	922.94	279.81	923.57	280.72	924
282.33	924.76	286.44	926	290.65	928	293.9	929.42	295.07	930
298.47	931.59	299.29	932	300.91	932.75	304.2	933.62	305.64	934
309.99	935.15	313.25	936	323.21	936.98	331.46	938	334.47	938.54
342.42	940	344.45	940.52	350.22	942	351.64	942.37	352.97	942.71
356.5	943.65	357.82	944	358.86	944.32	364.96	946	367.36	946.9
370.22	948	375.55	950						

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 237.23 .035 276.69 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 237.23 276.69 179.1 165.74 140.27 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 923.72	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.25	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 923.47	* Reach Len. (ft)	* 179.10	* 165.74	* 140.27
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 65.69	* 148.90	* 2.36
* E.G. Slope (ft/ft)	*0.001869	* Area (sq ft)	* 65.69	* 148.90	* 2.36
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 121.30	* 641.09	* 1.21
* Top width (ft)	* 107.50	* Top width (ft)	* 65.08	* 39.46	* 2.96
* Vel Total (ft/s)	* 3.52	* Avg. Vel. (ft/s)	* 1.85	* 4.31	* 0.51
* Max Chl Dpth (ft)	* 5.07	* Hydr. Depth (ft)	* 1.01	* 3.77	* 0.80
* Conv. Total (cfs)	* 17662.4	* Conv. (cfs)	* 2805.7	* 14828.7	* 28.0
* Length wtd. (ft)	* 171.05	* Wetted Per. (ft)	* 65.10	* 41.44	* 3.32
* Min Ch El (ft)	* 918.40	* Shear (lb/sq ft)	* 0.12	* 0.42	* 0.08
* Alpha	* 1.30	* Stream Power (lb/ft s)	* 375.55	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.27	* Cum Volume (acre-ft)	* 7.01	* 5.03	* 4.32
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 4.98	* 1.36	* 4.58

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8542.514

INPUT

Description:

Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	15.6	928	20.7	927.39	33.6	926	39.69	925.33
42.53	925.1	51.88	924.16	53.32	924	54.75	923.85	56.09	923.74
66.89	922.65	73.01	922	96.1	920.8	127.27	921.08	161.78	921.96
188.75	921.47	189.21	920.81	189.79	920	190.62	918.96	191.62	918.22
195.91	918.11	197.2	918.08	197.64	918.33	200.72	920	201.63	920.64

OXF157-159Bridges.rep

201.8	920.78	213.92	921.89	214.12	922	214.68	922.27	219.08	924
220.07	924.36	223.63	925.7	224.41	926	228.92	927.76	229.8	928
230.63	928.23	236.77	930	238.66	930.54	243.97	932	245.45	932.41
250.42	933.53	252.52	934	262.73	935.17	267.43	935.7	268.87	935.85
271.24	936	283.7	936	287.85	936.53	289.75	936.63	293.22	938
296.52	939.3	298.17	939.95						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	188.75	.035	201.8	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	188.75	201.8		234.69	160.81	130.54	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 923.40	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.12	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 923.28	* Reach Len. (ft)	* 234.69	* 160.81	* 130.54
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 227.47	* 57.20	* 25.82
* E.G. Slope (ft/ft)	* 0.001383	* Area (sq ft)	* 227.47	* 57.20	* 25.82
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 526.24	* 217.56	* 19.81
* Top Width (ft)	* 156.64	* Top Width (ft)	* 128.13	* 13.05	* 15.46
* Vel Total (ft/s)	* 2.46	* Avg. Vel. (ft/s)	* 2.31	* 3.80	* 0.77
* Max Chl Dpth (ft)	* 5.20	* Hydr. Depth (ft)	* 1.78	* 4.38	* 1.67
* Conv. Total (cfs)	* 20534.0	* Conv. (cfs)	* 14151.0	* 5850.3	* 532.7
* Length Wtd. (ft)	* 202.01	* Wetted Per. (ft)	* 128.25	* 15.30	* 15.79
* Min Ch El (ft)	* 918.08	* Shear (lb/sq ft)	* 0.15	* 0.32	* 0.14
* Alpha	* 1.29	* Stream Power (lb/ft s)	* 298.17	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.50	* Cum Volume (acre-ft)	* 6.40	* 4.64	* 4.27
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 4.58	* 1.26	* 4.55

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle

RS: 8379.502

INPUT

Description:

Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	929.99	1.37	929.86	2	929.81	6.43	929.38	11.59	928.86
20.74	928	27.84	927.51	51.79	926	70.04	925.39	82.11	925.12
103.62	924.48	131.5	924	132.66	924	137.78	923.92	138.07	923.91

OXF157-159Bridges.rep

149.17	923.7	153.48	923.6	175.63	923.07	205.41	922.39	218.41	922
231.41	921.91	245.45	921.79	308.74	921.33	315.6	921.29	316.52	921.28
345.72	920.83	346.18	920.2	346.32	920	346.61	919.66	347.98	918
348.05	917.92	348.63	917.1	354.42	917.74	354.6	917.75	354.68	917.78
355.09	918	355.7	918.23	356.96	918.96	358.64	920	359.67	920.56
360.55	921.1	360.93	921.33	384.61	921.96	385.87	922	386.22	922.16
390.19	924	390.38	924.09	392.19	924.95	393.22	925.44	394.35	926
394.81	926.28	398.16	928	399.11	928.54	401.53	930	403.65	931.22
405.03	932	407.32	933.35	408.52	934	410.94	935.72	411.41	936
411.95	936.44	414.22	938	416.48	939.57	417.07	939.89	417.22	939.97

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 345.72 .035 360.93 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 345.72 360.93 54.15 191.61 366.55 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 922.87	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.45	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 922.42	* Reach Len. (ft)	* 54.15	* 191.61	* 366.55
* Crit w.s. (ft)	* 922.40	* Flow Area (sq ft)	* 120.31	* 58.54	* 19.17
* E.G. Slope (ft/ft)	* 0.005537	* Area (sq ft)	* 120.31	* 58.54	* 19.17
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 340.71	* 405.58	* 17.31
* Top width (ft)	* 182.80	* Top Width (ft)	* 141.74	* 15.21	* 25.86
* Vel Total (ft/s)	* 3.86	* Avg. Vel. (ft/s)	* 2.83	* 6.93	* 0.90
* Max Chl Dpth (ft)	* 5.32	* Hydr. Depth (ft)	* 0.85	* 3.85	* 0.74
* Conv. Total (cfs)	* 10261.7	* Conv. (cfs)	* 4578.6	* 5450.4	* 232.6
* Length wtd. (ft)	* 202.83	* Wetted Per. (ft)	* 141.75	* 18.02	* 25.96
* Min Ch El (ft)	* 917.10	* Shear (lb/sq ft)	* 0.29	* 1.12	* 0.26
* Alpha	* 1.96	* Stream Power (lb/ft s)	* 417.22	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.29	* Cum Volume (acre-ft)	* 5.47	* 4.43	* 4.20
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 3.85	* 1.21	* 4.49

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 8109.907

INPUT

Description:  
 Station Elevation Data num= 75  
 Sta Elev Sta Elev Sta Elev Sta Elev

OXF157-159Bridges.rep

```
*****
0      930    7.95   929.2   19.72   928    44.1   926.29   48.51   926
91.2   924.68  111.71   924    112.56   924   119.49  923.75   141.98  923.18
142.75 923.18  231.99   922    304.72   922   321.57   922    343.78  920.19
345.75 920    351.71   920    358.84   920.37 361.48   920.5   362.42  920.47
362.48 920.57 363.64   918.05 363.67   918    364.19  916.86   364.2   916.84
365.79 916.84 368.97   916.84 369.05   916.84 369.09  916.88   370.67  918
373.15 919.36 373.7    919.76 373.84   919.85 373.87  919.85   377.03  920
381.99 920.23 383.39   920.32 389.05   920.56 390.33  920.61   406.68  920.77
412.66 920.95 417.17   920.69 420.19   920.62 431.69  920.52   475.33  920.15
490.51 920    514.63   920    515.65   920.1   517.3   920.19   524.52  920.68
528.33 920.91 530.66   921.05 542.57   921.56   545     922    553.73  923.63
555.76 924    556.91   924.22 558.4    924.49 567.11   926    574.43  927.04
582.06 928    588.4    929.17 593.95   930    609.47   930    612.68  931.24
614.68 932    618.91   933.62 619.92   934    622.18  934.87   625.73  936
626.68 936.33 630.69   938    631.42  938.38 632.59  938.98   634.84  939.95
*****
```

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	362.48	.035	373.87	.035	542.57	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	362.48	373.87		237.06	210.48	130.06	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft) * 921.56 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.37 * Wt. n-Val. * 0.035 * 0.035 * 0.035 *
* W.S. Elev (ft) * 921.19 * Reach Len. (ft) * 237.06 * 210.48 * 130.06 *
* Crit w.s. (ft) * 921.19 * Flow Area (sq ft) * 25.20 * 38.81 * 129.44 *
* E.G. Slope (ft/ft) * 0.007440 * Area (sq ft) * 25.20 * 38.81 * 129.44 *
* Q Total (cfs) * 763.60 * Flow (cfs) * 80.24 * 271.99 * 411.37 *
* Top width (ft) * 202.36 * Top width (ft) * 30.95 * 11.39 * 160.02 *
* Vel Total (ft/s) * 3.95 * Avg. Vel. (ft/s) * 3.18 * 7.01 * 3.18 *
* Max Chl Dpth (ft) * 4.35 * Hydr. Depth (ft) * 0.81 * 3.41 * 0.81 *
* Conv. Total (cfs) * 8853.0 * Conv. (cfs) * 930.3 * 3153.4 * 4769.3 *
* Length Wtd. (ft) * 163.18 * Wetted Per. (ft) * 31.07 * 14.66 * 160.09 *
* Min Ch El (ft) * 916.84 * Shear (lb/sq ft) * 0.38 * 1.23 * 0.38 *
* Alpha * 1.54 * Stream Power (lb/ft s) * 634.84 * 0.00 * 0.00 *
* Frctn Loss (ft) * 1.20 * Cum Volume (acre-ft) * 5.38 * 4.21 * 3.58 *
* C & E Loss (ft) * 0.02 * Cum SA (acres) * 3.75 * 1.15 * 3.71 *
*****
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 7770.441

INPUT

Description:

Station Elevation Data		num= 98		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	940	9.71	938.57	13.6	938	15.77	937.74	23.51	936.71		
29.11	936	35.65	935.3	47.86	934	51.79	933.68	56.81	933.28		
73.67	932	93.25	930.9	101.17	930.9	106.76	930.2	107.16	930.19		
112.82	930	136.4	929.24	142.92	929.12	154.49	928.83	166.92	928.46		
184.67	928.11	188.89	928	189.47	928	192.94	927.91	195.37	927.82		
203.38	927.54	212.63	927.18	219.51	926.91	248.3	926	259.1	925.67		
259.96	925.64	268.71	925.33	315.38	924	316.23	923.97	316.34	923.97		
316.93	923.95	317.19	923.94	322.63	923.75	334.49	923.28	338.7	923.1		
369.55	922	378.44	920.53	381.36	920	384.59	919.42	385.67	919.25		
385.87	918.77	386.48	918	387.67	916.49	388.06	916.02	388.08	916.01		
388.45	915.97	390.36	916	393.11	916	394.44	916.18	394.62	916.44		
396.23	917.79	396.5	917.99	396.51	918	398.09	919.2	456.78	919.62		
471.53	919.53	515.67	918.28	521.85	918	535.46	919.52	561.54	918.51		
592.86	918.71	618.57	920	633.45	920	646.56	920.3	648.41	920.3		
654.78	920.28	655.28	920.28	663.87	920.19	666.05	920.2	670.79	920.25		
680.82	920.78	684.5	920.95	687.89	921.16	694.13	921.48	701.54	922		
702.39	922	706.35	923.93	706.67	924.09	710.75	926	714.38	927.7		
715.02	928	715.39	928.17	718.83	930	719.77	930.52	722.23	932		
722.73	932.28	724.96	933.56	725.79	934	725.84	934.03	729.55	936		
733.14	937.9	733.34	938	737.04	939.96						

Manning's n Values		num= 4		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	385.67	.035	398.09	.035	680.82	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 385.67 398.09 60.47 240.54 355.76 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 920.16	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.32	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 919.84	* Reach Len. (ft)	* 60.47	* 240.54	* 355.76
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 1.04	* 37.47	* 168.28
* E.G. slope (ft/ft)	* 0.007284	* Area (sq ft)	* 1.04	* 37.47	* 168.28
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 1.68	* 247.95	* 513.97

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* Top Width (ft)	* 233.12	* Top Width (ft)	* 3.42	* 12.42	* 217.28
* Vel Total (ft/s)	* 3.69	* Avg. Vel. (ft/s)	* 1.62	* 6.62	* 3.05
* Max Chl Dpth (ft)	* 3.87	* Hydr. Depth (ft)	* 0.30	* 3.02	* 0.77
* Conv. Total (cfs)	* 8947.2	* Conv. (cfs)	* 19.6	* 2905.3	* 6022.3
* Length wtd. (ft)	* 214.75	* Wetted Per. (ft)	* 3.47	* 15.18	* 217.44
* Min Ch El (ft)	* 915.97	* Shear (lb/sq ft)	* 0.14	* 1.12	* 0.35
* Alpha	* 1.50	* Stream Power (lb/ft s)	* 737.04	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.63	* Cum Volume (acre-ft)	* 5.30	* 4.03	* 3.13
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	* 3.65	* 1.09	* 3.14

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 7438.793

INPUT  
 Description:

Station	Elevation	Data	num=	109	Sta	Elev	Sta	Elev	Sta	Elev
0	940	16.63	938	19.14	937.72	23.78	937.2	34.3	936	
44.11	935.29	59.53	934	75.52	933.33	82.58	933.09	98.14	932.45	
108.23	932.2	108.84	932.18	114.29	932	117.12	932	129.37	931.72	
132.62	931.61	141.96	931.33	146.53	931.18	182.86	930	197.1	929.6	
199.67	929.53	204.14	929.39	208.43	929.25	245.62	928.06	247.4	928	
274.27	927.1	285.61	926.7	301.46	926.14	306.33	926	313.9	925.46	
320.25	925.08	326.1	924.7	340.91	924	359	922.93	363.42	922.72	
376.3	922	376.73	921.92	376.84	921.89	381.08	920.82	382.67	920	
384.2	919.07	384.63	918.93	386.33	918	386.98	917.7	396.37	917.35	
424.77	917.6	455.06	917.55	486.41	917.42	507.09	918	521.66	918.38	
522.05	918.39	522.07	918.25	522.37	918	523.33	916.72	523.95	916.07	
523.98	916	524.53	915.22	525.22	915.21	530.56	915.16	531.05	915.43	
532.83	916.66	534.65	917.53	540.1	918	540.31	918.02	542.15	918.04	
555.68	918.76	561.02	918.95	565.18	919.14	582.07	919.69	582.6	919.72	
587.3	919.91	590.17	920	609.32	920.85	623.01	921.46	626.73	921.6	
629.18	921.66	639.8	922	650.79	922.3	654.85	922.38	659.76	922.39	
666.4	922.52	671.68	922.64	712.7	923.9	715.7	924	732.96	924	
748.88	924.61	757.11	925.2	757.74	925.23	759.18	925.39	761.01	925.59	
763.68	926	765.89	926.34	776.89	928	791.76	929.74	793.92	930	
799.74	930.98	802.44	931.48	805.4	932	807.19	932.38	814.76	934	
825.1	935.78	826.63	936	827.55	936.36	829.14	937.27	830.57	938	
832.31	939	834.49	939.97	834.55	940	834.69	939.98			

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

0 .035 522.05 .035 534.65 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 522.05 534.65 435.42 145.52 25.67 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 919.47 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.10 * Wt. n-Val. * 0.035 * 0.035 * 0.035 *
* W.S. Elev (ft) * 919.36 * Reach Len. (ft) * 435.42 * 145.52 * 25.67 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 238.19 * 43.51 * 29.24 *
* E.G. Slope (ft/ft) * 0.001559 * Area (sq ft) * 238.19 * 43.51 * 29.24 *
* Q Total (cfs) * 763.60 * Flow (cfs) * 572.51 * 149.48 * 41.61 *
* Top width (ft) * 188.28 * Top width (ft) * 138.33 * 12.60 * 37.35 *
* Vel Total (ft/s) * 2.46 * Avg. Vel. (ft/s) * 2.40 * 3.44 * 1.42 *
* Max Chl Dpth (ft) * 4.20 * Hydr. Depth (ft) * 1.72 * 3.45 * 0.78 *
* Conv. Total (cfs) * 19336.8 * Conv. (cfs) * 14497.8 * 3785.3 * 1053.7 *
* Length wtd. (ft) * 260.11 * Wetted Pcr. (ft) * 138.76 * 14.83 * 37.40 *
* Min Ch El (ft) * 915.16 * Shear (lb/sq ft) * 0.17 * 0.29 * 0.08 *
* Alpha * 1.12 * Stream Power (lb/ft s) * 834.69 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.67 * Cum Volume (acre-ft) * 5.14 * 3.80 * 2.33 *
* C & E Loss (ft) * 0.03 * Cum SA (acres) * 3.55 * 1.02 * 2.10 *
*****
    
```

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 7150.429

INPUT

Description:

Station Elevation Data num= 77

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	940	1.43	939.31	4.02	938	6.22	936.97	8.31	936
11.04	934.79	12.69	934	14.35	933.2	18.22	932	19.69	931.46
22.43	930	24.92	928.71	26.26	928	27.78	927.21	32.8	926
38.16	925.16	45.94	924	49.34	922.8	51.37	922	52.83	921.41
56.39	920	59.71	918.68	60.85	918.53	65.8	918	66.62	918
67.96	917.93	70	917.86	70.24	917.85	110.28	916.16	113.59	916.02
114.02	916	114.22	915.99	114.39	915.97	114.4	915.96	115.45	915.12
116.07	914.42	116.24	914.24	116.51	914.24	126.06	914.6	129.8	914.74
130.94	915.99	130.96	916	131.75	917.53	134.95	917.66	158.58	918
182.07	918.33	203.14	918	230.5	917.53	281.5	917.51	305.6	918
322.5	918.5	333.42	919.26	338.97	919.43	345.58	920	367.04	921.32
377.22	922	382.54	922.18	403.49	922.59	410.44	922.67	434.16	923.26
447.57	923.43	458.92	924	466.41	925.64	468.06	926	469.38	926.29



478.61 928 483 928.81 489.41 930 493.34 930.71 499.95 932  
 504.19 932.81 511.15 934 518.93 935.28 522.09 936 527.42 937.19  
 531.06 938 540.27 940

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .06 113.59 .035 131.75 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 113.59 131.75 253.96 243.08 108.87 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 918.77 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.40 \* Wt. n-Val. \* 0.060 \* 0.035 \* 0.035 \*  
 \* W.S. Elev (ft) \* 918.37 \* Reach Len. (ft) \* 253.96 \* 243.08 \* 108.87 \*  
 \* Crit W.S. (ft) \* 918.37 \* Flow Area (sq ft) \* 64.94 \* 65.28 \* 101.98 \*  
 \* E.G. Slope (ft/ft) \* 0.004994 \* Area (sq ft) \* 64.94 \* 65.28 \* 101.98 \*  
 \* Q Total (cfs) \* 763.60 \* Flow (cfs) \* 132.93 \* 426.06 \* 204.61 \*  
 \* Top width (ft) \* 255.89 \* Top width (ft) \* 51.27 \* 18.16 \* 186.46 \*  
 \* Vel Total (ft/s) \* 3.29 \* Avg. vel. (ft/s) \* 2.05 \* 6.53 \* 2.01 \*  
 \* Max Chl Dpth (ft) \* 4.13 \* Hydr. Depth (ft) \* 1.27 \* 3.59 \* 0.55 \*  
 \* Conv. Total (cfs) \* 10805.0 \* Conv. (cfs) \* 1881.0 \* 6028.8 \* 2895.3 \*  
 \* Length Wtd. (ft) \* 195.20 \* Wetted Per. (ft) \* 51.34 \* 20.35 \* 186.48 \*  
 \* Min Ch El (ft) \* 914.24 \* Shear (lb/sq ft) \* 0.39 \* 1.00 \* 0.17 \*  
 \* Alpha \* 2.36 \* Stream Power (lb/ft s) \* 540.27 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.17 \* Cum Volume (acre-ft) \* 3.62 \* 3.62 \* 2.29 \*  
 \* C & E Loss (ft) \* 0.00 \* Cum SA (acres) \* 2.61 \* 0.97 \* 2.04 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 6893.619

INPUT

Description:  
 Station Elevation Data num= 82

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Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	940	.63	939.87	9.41	938	12.99	937.14	17.91	936
20.37	935.42	26.13	934	27.78	933.6	30.03	933.05	33.04	932.2
34.28	931.84	40.09	930	40.82	929.59	43.84	928	45.33	927.25
47.62	926	50.25	925.61	59.48	924.26	59.94	924.25	61.68	924
61.79	923.95	65.65	922	65.82	921.91	66.02	921.82	69.61	920
70.09	919.75	73.76	918	77.08	916.27	77.83	915.83	78.32	915.46
78.37	915.44	78.69	915.29	79.16	915.16	81.46	914.3	81.96	914.11
82.11	914	83.8	913.28	83.84	913.26	84.09	913.26	95.28	913.18
97.26	913.16	97.44	913.3	98.13	914	99.65	915.5	100.08	916
100.09	916.21	103.23	916	108.05	915.57	141.24	916	147.363	916.03
149.52	916	170.28	915.43	220.71	915.66	245.16	916	256.9	916.87
272.3	918	275.45	918.35	289.44	920	303.62	921.66	306.58	922
320.13	923.58	323.84	924	332.93	925.7	334.13	925.91	334.61	926
341.03	927.74	341.98	928	342.57	928.16	347.76	929.6	349.24	930
350.19	930.26	356.83	932	364.7	933.97	364.94	934	377.68	935.85
378.87	936	388.73	936.78	392.9	938	395.7	939.36	405.9	939.89
416.1	939.61	418.77	938						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	77.08	.035	100.09	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	77.08	100.09		109.73	264.07	195.16	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 916.94	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.44	* Wt. n-Val.	* 0.060	* 0.035	* 0.035
* W.S. Elev (ft)	* 916.51	* Reach Len. (ft)	* 109.73	* 264.07	* 195.16
* Crit W.S. (ft)	* 916.51	* Flow Area (sq ft)	* 0.05	* 62.11	* 115.87
* E.G. Slope (ft/ft)	* 0.007307	* Area (sq ft)	* 0.05	* 62.11	* 115.87
* Q Total (cfs)	* 763.60	* Flow (cfs)	* 0.03	* 412.61	* 350.96
* Top Width (ft)	* 175.36	* Top Width (ft)	* 0.45	* 23.01	* 151.90
* Vel Total (ft/s)	* 4.29	* Avg. Vel. (ft/s)	* 0.47	* 6.64	* 3.03
* Max Chl Dpth (ft)	* 3.35	* Hydr. Depth (ft)	* 0.12	* 2.70	* 0.76
* Conv. Total (cfs)	* 8932.9	* Conv. (cfs)	* 0.3	* 4826.9	* 4105.7
* Length wtd. (ft)	* 221.10	* Wetted Per. (ft)	* 0.51	* 25.07	* 151.96
* Min Ch El (ft)	* 913.16	* Shear (lb/sq ft)	* 0.05	* 1.13	* 0.35
* Alpha	* 1.53	* Stream Power (lb/ft s)	* 418.77	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	* 3.43	* 3.27	* 2.02
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.46	* 0.86	* 1.61

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.  
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 6579.154

INPUT

Description:

Station Elevation Data		num= 86		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	940.02	.06	940	5.43	938.33	6.49	938	7.82	937.59		
9.98	936.87	12.85	936	15.15	935.26	19.28	934	28.1	934		
37.5	934	75.8	922	85.2	920.68	89.31	920	92.03	919.7		
99.86	918	108.56	916.32	111.03	916	120.18	915.34	121.45	915.25		
124.67	915.08	125.63	915.04	143.77	914.2	145.78	914.18	153.28	914.17		
154.3	914	170.48	914	175.12	914.07	178.78	914	179.5	914		
187.84	914	196.89	913.99	199.42	913.99	211.43	913.71	213.31	913.69		
214.23	913.67	223.82	913.36	224	913.28	226.75	912	227.03	911.87		
229.01	910.95	230.34	910.97	240.31	910.57	240.32	910.58	240.84	911.5		
241.04	912	241.93	913.85	241.94	913.9	248.99	914	249.09	914		
262.21	914	268.01	914.23	269.61	914.28	270.41	914.3	271.49	914.33		
275.32	914.47	276.64	914.53	277.25	914.56	303.38	916	309.91	917.22		
314.26	918	315.84	918.36	319.68	919.08	320.18	920	331.35	925.6		
341.64	926.27	351.93	926.13	356.6	924	358.4	924	358.64	924.24		
360.5	925.5	361.05	925.92	361.53	926.39	363.07	927.8	363.41	928		
363.81	928.11	367.54	930	369.07	930.42	374.67	932	378.16	933.01		
381.86	934	387.36	935.49	388.93	936	389.8	936.28	395.37	938		
401.81	940										

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	223.82	.035	241.93	.035		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 223.82 241.93 97.68 95.13 91.27 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 915.39	* Element	* Left OB	* Channel	* Right OB
* vel Head (ft)	* 0.51	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 914.87	* Reach Len. (ft)	* 97.68	* 95.13	* 91.27
* Crit W.S. (ft)	* 914.87	* Flow Area (sq ft)	* 80.10	* 64.61	* 27.91
* E.G. slope (ft/ft)	* 0.006048	* Area (sq ft)	* 80.10	* 64.61	* 27.91

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* Q Total (cfs)	* 763.60	* Flow (cfs)	* 236.66	* 455.70	* 71.25
* Top Width (ft)	* 153.70	* Top Width (ft)	* 94.59	* 18.11	* 41.00
* Vel Total (ft/s)	* 4.42	* Avg. Vel. (ft/s)	* 2.95	* 7.05	* 2.55
* Max Chl Dpth (ft)	* 4.30	* Hydr. Depth (ft)	* 0.85	* 3.57	* 0.68
* Conv. Total (cfs)	* 9818.7	* Conv. (cfs)	* 3043.0	* 5859.5	* 916.1
* Length wtd. (ft)	* 95.65	* Wetted Per. (ft)	* 94.63	* 20.69	* 41.06
* Min Ch El (ft)	* 910.57	* Shear (lb/sq ft)	* 0.32	* 1.18	* 0.26
* Alpha	* 1.69	* Stream Power (lb/ft s)	* 401.81	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.54	* Cum Volume (acre-ft)	* 3.33	* 2.88	* 1.69
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 2.34	* 0.73	* 1.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 6481.438

INPUT

Description:

Station Elevation Data num= 52											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	15.6	934	33.2	934	89.5	916	111.84	914		
140.07	912.86	143.41	912.75	165.44	912.38	179.04	912.18	179.22	912.18		
182.55	912.22	183.12	912.21	207.49	912.64	207.61	912.42	207.83	912		
208.27	911.12	208.84	910	208.86	909.96	208.97	909.95	209.04	909.95		
210.26	909.96	212.74	910	214.24	910	214.55	910.02	217.56	910.23		
219.96	911.8	220.65	912	221.21	912.16	221.72	912.3	238.67	912.73		
239.95	912.76	248.15	912.99	280.34	914	283.77	915.56	294.27	916.35		
304.77	916.28	306.06	916	318.37	916.71	319.29	917.42	321.35	918.98		
322.57	920	324.99	921.72	325.98	921.87	326.3	922	327.59	922.32		
331.31	924	335.39	925.87	335.66	926	340.01	927.82	340.4	928		
341.02	928.29	344.66	930								

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	207.49	.035	221.72	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 207.49 221.72 241.25 133.84 29.29 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 914.28 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.34 * Wt. n-Val. * 0.035 * 0.035 * 0.035 *
* W.S. Elev (ft) * 913.94 * Reach Len. (ft) * 241.25 * 133.84 * 29.29 *
* Crit w.s. (ft) * * * Flow Area (sq ft) * 115.46 * 48.01 * 49.01 *
* E.G. slope (ft/ft) * 0.005382 * Area (sq ft) * 115.46 * 48.01 * 49.01 *
* Q Total (cfs) * 855.60 * Flow (cfs) * 411.59 * 305.76 * 138.25 *
* Top width (ft) * 165.31 * Top Width (ft) * 94.25 * 14.23 * 56.82 *
* Vel Total (ft/s) * 4.03 * Avg. vel. (ft/s) * 3.56 * 6.37 * 2.82 *
* Max Chl Dpth (ft) * 3.99 * Hydr. Depth (ft) * 1.22 * 3.37 * 0.86 *
* Conv. Total (cfs) * 11663.2 * Conv. (cfs) * 5610.6 * 4168.0 * 1884.5 *
* Length wtd. (ft) * 136.64 * Wetted Per. (ft) * 94.29 * 16.42 * 56.85 *
* Min Ch El (ft) * 909.95 * Shear (lb/sq ft) * 0.41 * 0.98 * 0.29 *
* Alpha * 1.35 * Stream Power (lb/ft s) * 344.66 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.59 * Cum Volume (acre-ft) * 3.11 * 2.76 * 1.61 *
* C & E Loss (ft) * 0.00 * Cum SA (acres) * 2.12 * 0.70 * 1.08 *
*****
    
```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 6323.723

INPUT

Description:

Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	5.5	928.8	15.94	926.55	16.03	926.53	16.13	926.51
16.25	926.48	18.64	926	18.75	925.98	22.73	924.95	24.61	924.93
25.2	924.94	26	925.11	26.07	925.11	29.27	924.79	31.88	924.59
38.62	924	38.73	923.99	41.83	923.78	42.04	923.76	55.69	922
56.39	921.95	56.84	921.91	64.77	920.83	64.91	920.77	66.93	920
67.61	919.73	69.48	919.06	70.58	918.58	71.86	918	73.8	917.24
74.84	916.79	75.56	915.95	77.31	914	78.59	912.47	78.76	912.22
78.99	912.31	82.22	914	82.66	914.3	83.33	914.5	85.67	914.33
85.82	914.38	86.93	914.36	89.4	914.25	97.18	914.07	110.38	912.81
112.69	912.51	116.01	912	120.99	911.26	121.12	911.25	121.66	911.23
126.53	911.07	129.58	910.97	139.3	910.64	144.92	910.19	146.28	910.16
147.41	910	150.01	910	153.07	909.91	153.88	909.82	154.53	909.75
154.9	909.63	154.92	909.62	156.8	908.56	156.91	908.41	157.83	908.41
163.61	908.84	164.93	909.5	165.33	909.89	165.37	909.9	166.36	909.86
170.63	910	175.08	910.22	177.04	910.27	179.21	910.3	184.74	910.31
190.64	910.23	192.48	910.24	197.7	910.54	222.31	911.91	226.5	912
226.72	912	234.67	912	251.65	912.28	251.9	912.28	264.42	912.49
281.17	912.8	294.59	913.03	301.95	913.19	307.2	913.27	320.01	913.2
320.65	913.2	321.01	913.16	324.87	912.66	327.12	913.1	328.95	913.86

328.97	913.86	329.43	914	330.9	914.45	335.98	916	341.81	917.78
342.5	918	348.7	919.85	349.18	920	352.14	920.8	356.3	922
356.96	922.17	363.59	924	364.92	924.36	371.16	926	373.35	926.59
376.99	928	379.87	929.8	380.19	930				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 153.07 .035 165.33 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 153.07 165.33 34.18 34.13 38.06 .1 .3

Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 101.4 149.05 912.44 T  
 181.06 264.42 912.44 T

Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 0 83.33 914.5

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 913.70	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.33	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 913.37	* Reach Len. (ft)	* 13.44	* 13.44	* 13.44
* Crit w.s. (ft)	* 913.16	* Flow Area (sq ft)	* 50.57	* 54.14	* 153.85
* E.G. Slope (ft/ft)	* 0.003504	* Area (sq ft)	* 103.67	* 54.14	* 230.69
* Q Total (cfs)	* 855.60	* Flow (cfs)	* 130.33	* 352.68	* 372.59
* Top width (ft)	* 223.20	* Top width (ft)	* 48.51	* 12.26	* 162.43
* Vel Total (ft/s)	* 3.31	* Avg. vel. (ft/s)	* 2.58	* 6.51	* 2.42
* Max chl Dpth (ft)	* 4.96	* Hydr. Depth (ft)	* 1.04	* 4.42	* 0.95
* Conv. Total (cfs)	* 14454.3	* Conv. (cfs)	* 2201.8	* 5958.0	* 6294.5
* Length wtd. (ft)	* 13.44	* Wetted Per. (ft)	* 48.70	* 12.97	* 162.63
* Min Ch El (ft)	* 908.41	* Shear (lb/sq ft)	* 0.23	* 0.91	* 0.21
* Alpha	* 1.92	* Stream Power (lb/ft s)	* 380.19	* 0.00	* 0.00
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 2.51	* 2.60	* 1.52
* C & E Loss (ft)	*	* Cum SA (acres)	* 1.73	* 0.66	* 1.01

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

BRIDGE

RIVER: Bluestone Creek  
 REACH: Middle RS: 6303.783

INPUT

Description:  
 Distance from Upstream XS = 13.44

Deck/Roadway Width = 13  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates  
 num= 7

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
94.9		914			127.1		912.75			145.06		912.44		
149.06	912.44		910.6		181.06	912.44		910.6		185.06	912.44			
272.5	912.52													

Upstream Bridge Cross Section Data

Station Elevation Data num= 113

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	5.5	928.8	15.94	926.55	16.03	926.53	16.13	926.51
16.25	926.48	18.64	926	18.75	925.98	22.73	924.95	24.61	924.93
25.2	924.94	26	925.11	26.07	925.11	29.27	924.79	31.88	924.59
38.62	924	38.73	923.99	41.83	923.78	42.04	923.76	55.69	922
56.39	921.95	56.84	921.91	64.77	920.83	64.91	920.77	66.93	920
67.61	919.73	69.48	919.06	70.58	918.58	71.86	918	73.8	917.24
74.84	916.79	75.56	915.95	77.31	914	78.59	912.47	78.76	912.22
78.99	912.31	82.22	914	82.66	914.3	83.33	914.5	85.67	914.33
85.82	914.38	86.93	914.36	89.4	914.25	97.18	914.07	110.38	912.81
112.69	912.51	116.01	912	120.99	911.26	121.12	911.25	121.66	911.23
126.53	911.07	129.58	910.97	139.3	910.64	144.92	910.19	146.28	910.16
147.41	910	150.01	910	153.07	909.91	153.88	909.82	154.53	909.75
154.9	909.63	154.92	909.62	156.8	908.56	156.91	908.41	157.83	908.41
163.61	908.84	164.93	909.5	165.33	909.89	165.37	909.9	166.36	909.86
170.63	910	175.08	910.22	177.04	910.27	179.21	910.3	184.74	910.31
190.64	910.23	192.48	910.24	197.7	910.54	222.31	911.91	226.5	912
226.72	912	234.67	912	251.65	912.28	251.9	912.28	264.42	912.49
281.17	912.8	294.59	913.03	301.95	913.19	307.2	913.27	320.01	913.2
320.65	913.2	321.01	913.16	324.87	912.66	327.12	913.1	328.95	913.86
328.97	913.86	329.43	914	330.9	914.45	335.98	916	341.81	917.78
342.5	918	348.7	919.85	349.18	920	352.14	920.8	356.3	922
356.96	922.17	363.59	924	364.92	924.36	371.16	926	373.35	926.59
376.99	928	379.87	929.8	380.19	930				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	153.07	.035	165.33	.035

Bank Sta: Left Right Coeff Contr. Expan.  
 153.07 165.33 .1 .3

Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 101.4 149.05 912.44 T  
 181.06 264.42 912.44 T

Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*



0 83.33 914.5

Downstream Deck/Roadway Coordinates

num= 7

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
12.2	912.75				143.2	912.44				147.2	912.44			910.6
179.2	912.44	910.6			183.2	912.44				270.6	912.52			
275.8	912.54													

Downstream Bridge Cross Section Data

Station Elevation Data num= 96

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	2.09	929.42	9.69	928	12.16	927.53	19.82	926
23.34	925.29	29.64	924	33.21	923.4	38.81	922.59	39.96	922.33
40.07	922.32	41.54	921.9	42.12	921.71	47.2	920	50.39	918.97
53.23	918	56.03	917.13	56.12	917.1	56.3	917.04	56.45	917.01
59.85	916	61.22	915.67	61.95	915.44	63.02	915.65	64.63	915.48
65.01	915.6	67.94	915.63	69.32	915.44	85.09	914.42	89.83	914.14
90.65	914.07	91.93	913.92	96.45	913.47	110.72	912	113.27	911.89
122.89	911.32	136.15	910.55	144.19	910	151.88	910	151.96	909.98
153.75	909.85	153.93	909.82	154.32	909.7	155.74	908.86	158.89	908.68
162.03	908.07	162.07	908.07	163.96	909.05	164.95	910	165.11	910.17
165.38	910.41	170.27	910.24	172.12	910.24	185.12	910.15	194.99	910.48
195.18	910.49	214.79	911.67	220.68	911.85	223.65	911.89	224.21	912
228.6	912.86	234.42	914	244.04	914	251.31	913.07	259.69	912
264.12	912	265.03	911.99	265.27	911.99	266.25	911.89	271.28	911.54
273.09	911.97	274.66	912.26	290.64	913.16	298.76	913.58	299.89	913.66
306.57	914	308.83	914	313.63	915.46	314.88	916	315.63	916.34
319.4	918	321.08	918.69	324.05	920	328.49	921.98	328.52	922
328.6	922.03	336.51	924	342.41	925.47	343.41	925.69	344.64	926
349.12	927.1	353.22	928	353.66	928.11	360.84	929.85	361.34	929.96
361.44	930								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	151.88	.035	165.38	.035

Bank Sta: Left Right Coeff Contr. Expan.  
 151.88 165.38 .1 .3

Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 0 135.75 912.44 T  
 189.55 361.44 912.44 T

Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 251.31 361.44 912.3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical

Downstream Embankment side slope =  
 Maximum allowable submergence for weir flow = .98  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data  
 Energy  
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method  
 Pressure and weir flow  
 Submerged Inlet Cd =  
 Submerged Inlet + Outlet Cd = .8  
 Max Low Cord =

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

BRIDGE OUTPUT Profile #PF 1

* E.G. US. (ft)	* 913.70	* Element	* Inside BR US	* Inside BR DS
* W.S. US. (ft)	* 913.37	* E.G. Elev (ft)	* 913.69	* 913.69
* Q Total (cfs)	* 855.60	* W.S. Elev (ft)	* 913.37	* 913.30
* Q Bridge (cfs)	* 245.56	* Crit w.s. (ft)	* 913.34	* 913.30
* Q weir (cfs)	* 610.04	* Max chl Dpth (ft)	* 4.96	* 5.23
* Weir Sta Lft (ft)	* 102.81	* Vel Total (ft/s)	* 3.36	* 3.65
* Weir Sta Rgt (ft)	* 328.55	* Flow Area (sq ft)	* 254.67	* 234.41
* Weir Submerg	* 0.00	* Froude # chl	* 0.38	* 0.41
* Weir Max Depth (ft)	* 1.25	* Specif Force (cu ft)	* 292.85	* 294.18
* Min El Weir Flow (ft)	* 912.45	* Hydr Depth (ft)	* 1.18	* 1.33
* Min El Prs (ft)	* 910.60	* W.P. Total (ft)	* 282.30	* 242.91
* Delta EG (ft)	* 0.76	* Conv. Total (cfs)	*	*
* Delta WS (ft)	* 1.39	* Top width (ft)	* 216.53	* 176.38
* BR Open Area (sq ft)	* 29.09	* Frctn Loss (ft)	*	*
* BR Open Vel (ft/s)	* 8.44	* C & E Loss (ft)	*	*
* Coef of Q	*	* Shear Total (lb/sq ft)	*	*
* Br Sel Method	* Press/weir	* Power Total (lb/ft s)	* 0.00	* 0.00

Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.  
 Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

OXF157-159Bridges.rep

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

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

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

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

The energy has been projected.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 6289.579

INPUT

Description:

Station Elevation Data		num= 96		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	2.09	929.42	9.69	928	12.16	927.53	19.82	926		
23.34	925.29	29.64	924	33.21	923.4	38.81	922.59	39.96	922.33		
40.07	922.32	41.54	921.9	42.12	921.71	47.2	920	50.39	918.97		
53.23	918	56.03	917.13	56.12	917.1	56.3	917.04	56.45	917.01		
59.85	916	61.22	915.67	61.95	915.44	63.02	915.65	64.63	915.48		
65.01	915.6	67.94	915.63	69.32	915.44	85.09	914.42	89.83	914.14		
90.65	914.07	91.93	913.92	96.45	913.47	110.72	912	113.27	911.89		
122.89	911.32	136.15	910.55	144.19	910	151.88	910	151.96	909.98		
153.75	909.85	153.93	909.82	154.32	909.7	155.74	908.86	158.89	908.68		
162.03	908.07	162.07	908.07	163.96	909.05	164.95	910	165.11	910.17		
165.38	910.41	170.27	910.24	172.12	910.24	185.12	910.15	194.99	910.48		
195.18	910.49	214.79	911.67	220.68	911.85	223.65	911.89	224.21	912		
228.6	912.86	234.42	914	244.04	914	251.31	913.07	259.69	912		
264.12	912	265.03	911.99	265.27	911.99	266.25	911.89	271.28	911.54		
273.09	911.97	274.66	912.26	290.64	913.16	298.76	913.58	299.89	913.66		
306.57	914	308.83	914	313.63	915.46	314.88	916	315.63	916.34		
319.4	918	321.08	918.69	324.05	920	328.49	921.98	328.52	922		
328.6	922.03	336.51	924	342.41	925.47	343.41	925.69	344.64	926		
349.12	927.1	353.22	928	353.66	928.11	360.84	929.85	361.34	929.96		
361.44	930										

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	151.88	.035	165.38	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 151.88 165.38 17.53 109.18 143.43 .1 .3

Ineffective Flow

num= 2 Permanent

Sta L	Sta R	Elev	Permanent
0	135.75	912.44	T
189.55	361.44	912.44	T

Blocked Obstructions num= 1

Sta L Sta R Elev  
 \*\*\*\*\*  
 251.31 361.44 912.3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 912.94 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.97  * Wt. n-Val.      * 0.035  * 0.035  * 0.035  *
* W.S. Elev (ft)     * 911.97 * Reach Len. (ft) * 17.53  * 109.18 * 143.43 *
* Crit W.S. (ft)     * 911.97 * Flow Area (sq ft) * 29.37  * 40.08  * 42.10  *
* E.G. Slope (ft/ft) * 0.012094 * Area (sq ft)    * 46.17  * 40.08  * 70.06  *
* Q Total (cfs)      * 855.60 * Flow (cfs)      * 204.35 * 366.70 * 284.55 *
* Top width (ft)     * 112.70 * Top width (ft)  * 40.51  * 13.50  * 58.69  *
* Vel Total (ft/s)   * 7.67  * Avg. vel. (ft/s) * 6.96  * 9.15  * 6.76  *
* Max Chl Dpth (ft) * 3.90  * Hydr. Depth (ft) * 1.82  * 2.97  * 1.74  *
* Conv. Total (cfs)  * 7780.0 * Conv. (cfs)     * 1858.2 * 3334.4 * 2587.4 *
* Length Wtd. (ft)  * 80.01 * Wetted Per. (ft) * 16.15  * 14.61  * 24.18  *
* Min Ch El (ft)    * 908.07 * Shear (lb/sq ft) * 1.37  * 2.07  * 1.31  *
* Alpha             * 1.06  * Stream Power (lb/ft s) * 361.44 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 0.44  * Cum Volume (acre-ft) * 2.47  * 2.57  * 1.42  *
* C & E Loss (ft)   * 0.20  * Cum SA (acres)   * 1.69  * 0.65  * 0.90  *
*****
    
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle

RS: 6179.412

INPUT

Description:

```

Station Elevation Data num= 54
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev
*****
0 930 8.88 928 12.35 927.22 14.32 926 35.49 915.41
38.53 916.9 48.65 917.23 58.76 916.77 61.8 915.27 63.34 916
67.67 916 70.76 915.48 78.89 914 85.43 912.88 90.57 912
    
```

OXF157-159Bridges.rep

108.94	911.38	118.83	911.12	141.25	910.41	153.13	910	156.13	910
167.3	909.85	171.02	909.73	178.21	909.49	179.13	909.47	187.07	908.78
193.08	908.55	193.12	908.55	193.19	908.11	193.38	908	194.36	907.7
194.84	907.57	194.88	907.5	199.31	907.31	202.22	907	203.35	907.3
204.73	908	206.5	908.91	206.88	909.12	209.4	909.46	209.79	909.5
215.96	910	219.41	910.28	228.03	911	239.97	912	241.45	912.26
245.51	912.69	256.67	914	259	914.44	260.59	914.81	265.03	916
268.28	916.83	274.05	918	281.01	919.43	285.04	920		

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 193.08 .035 206.88 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 193.08 206.88 87.02 117.95 167.42 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 912.17	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.31	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 911.86	* Reach Len. (ft)	* 87.02	* 117.95	* 167.42
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 147.85	* 58.90	* 41.29
* E.G. Slope (ft/ft)	* 0.003150	* Area (sq ft)	* 147.85	* 58.90	* 41.29
* Q Total (cfs)	* 855.60	* Flow (cfs)	* 462.06	* 352.33	* 41.21
* Top Width (ft)	* 143.59	* Top Width (ft)	* 98.37	* 13.80	* 31.42
* Vel Total (ft/s)	* 3.45	* Avg. Vel. (ft/s)	* 3.13	* 5.98	* 1.00
* Max Chl Dpth (ft)	* 4.86	* Hydr. Depth (ft)	* 1.50	* 4.27	* 1.31
* Conv. Total (cfs)	* 15244.6	* Conv. (cfs)	* 8232.7	* 6277.7	* 734.3
* Length Wtd. (ft)	* 107.45	* Wetted Per. (ft)	* 98.44	* 14.81	* 31.54
* Min Ch El (ft)	* 907.00	* Shear (lb/sq ft)	* 0.30	* 0.78	* 0.26
* Alpha	* 1.69	* Stream Power (lb/ft s)	* 285.04	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.50	* Cum Volume (acre-ft)	* 2.43	* 2.45	* 1.24
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 1.66	* 0.61	* 0.75

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 6057.761

INPUT

Description:  
 Station Elevation Data num= 53

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
*****	*****	*****	*****	*****	*****	*****	*****	*****	*****
0	928	18.3	918.75	21.3	920.25	31.3	920.64	41.3	920.25

OXF157-159Bridges.rep

44.3	918.75	49.99	918	55.17	916.03	55.34	915.96	55.76	915.81
60.39	914.21	61	914	65.83	912.37	66.88	912	80.17	910.38
81.59	910	111.1	910	135.84	909.62	150.99	909.39	152.18	909.38
152.92	908.51	153.44	908	153.72	907.6	154.58	906.63	161.44	906.51
161.65	906.52	161.71	906.58	164.13	907.84	164.88	908.23	164.99	908.24
181.89	909.37	190.82	909.97	191.69	910	191.83	910.1	194.46	912
195.42	912.66	197.28	914	198.66	914.96	200.15	916	201.62	917.02
203.04	918	204.33	918.89	205.91	920	207.22	920.89	208.98	922
211.36	923.24	212.96	924	216.28	925.7	217.16	926	217.75	926.2
223.08	928	225.16	928.7	230.24	929.99				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	152.18	.035	164.99	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	152.18	164.99		141.72	156.04	142.63	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 911.64	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.65	* Wt. n-val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 910.99	* Reach Len. (ft)	* 141.72	* 156.04	* 142.63
* Crit w.s. (ft)	* 910.99	* Flow Area (sq ft)	* 85.30	* 50.33	* 50.20
* E.G. Slope (ft/ft)	* 0.007526	* Area (sq ft)	* 85.30	* 50.33	* 50.20
* Q Total (cfs)	* 855.60	* Flow (cfs)	* 336.10	* 424.99	* 94.51
* Top Width (ft)	* 117.87	* Top Width (ft)	* 77.00	* 12.81	* 28.07
* Vel Total (ft/s)	* 4.60	* Avg. Vel. (ft/s)	* 3.94	* 8.44	* 1.88
* Max Chl Dpth (ft)	* 4.48	* Hydr. Depth (ft)	* 1.11	* 3.93	* 1.79
* Conv. Total (cfs)	* 9862.4	* Conv. (cfs)	* 3874.2	* 4898.8	* 1089.4
* Length Wtd. (ft)	* 148.20	* Wetted Per. (ft)	* 77.09	* 14.50	* 28.45
* Min Ch El (ft)	* 906.51	* Shear (lb/sq ft)	* 0.52	* 1.63	* 0.83
* Alpha	* 1.98	* Stream Power (lb/ft s)	* 230.24	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.63	* Cum Volume (acre-ft)	* 2.20	* 2.30	* 1.06
* C & E Loss (ft)	* 0.12	* Cum SA (acres)	* 1.49	* 0.58	* 0.64

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 5898.334

INPUT  
 Description:

Station Elevation Data		num= 64		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	929	13.89	921.7	16.9	923.01	26.9	923.41	36.9	923
38.9	922	39.68	921.47	45.97	920.47	46.03	920.46	46.48	920.33
47.81	919.83	52.47	918.16	52.91	918	52.98	917.98	58.25	916
58.59	915.87	64.02	914	65.46	913.5	69.75	912	73.12	910.8
75.35	910	76.13	910	113.99	908.58	129.63	908	148.93	908
158.14	908	162.61	907.98	166.9	907.94	167.03	907.88	168.45	907.34
170.7	906.45	171.48	906.1	171.89	906.09	176.56	906	178.35	905.89
178.4	905.89	178.52	906.02	178.78	906.32	184.56	907.77	184.97	907.9
188.65	909.84	188.97	910	189.53	910.3	192.8	912	193.29	912.27
196.2	913.63	197.01	914	197.24	914.09	198.57	914.65	201.8	916
204.34	917.2	206.05	918	208.55	919.11	210.95	919.71	212.06	920
212.84	920.2	220.11	922	224.99	923.25	228.06	924	232.84	925.42
235.06	926	240.78	927.75	241.6	928	248.22	930		

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.035	166.9	.035	184.97	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 166.9 184.97 150.38 175.2 214.49 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 910.60	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.26	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 910.34	* Reach Len. (ft)	* 150.38	* 175.20	* 214.49
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 159.72	* 66.69	* 5.65
* E.G. slope (ft/ft)	* 0.002715	* Area (sq ft)	* 159.72	* 66.69	* 5.65
* Q Total (cfs)	* 855.60	* Flow (cfs)	* 508.14	* 342.86	* 4.60
* Top width (ft)	* 115.21	* Top width (ft)	* 92.50	* 18.07	* 4.64
* Vel Total (ft/s)	* 3.69	* Avg. vel. (ft/s)	* 3.18	* 5.14	* 0.81
* Max Chl Dpth (ft)	* 4.45	* Hydr. Depth (ft)	* 1.73	* 3.69	* 1.22
* Conv. Total (cfs)	* 16421.3	* Conv. (cfs)	* 9752.5	* 6580.4	* 88.4
* Length wtd. (ft)	* 166.93	* Wetted Per. (ft)	* 92.60	* 18.82	* 5.24
* Min Ch El (ft)	* 905.89	* Shear (lb/sq ft)	* 0.29	* 0.60	* 0.18
* Alpha	* 1.22	* Stream Power (lb/ft s)	* 248.22	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.70	* Cum Volume (acre-ft)	* 1.80	* 2.09	* 0.97
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 1.21	* 0.52	* 0.58



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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 5722.175

INPUT  
 Description:

Station Elevation Data num= 58

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	10.6	928	31.02	917.4	34.8	918.89	44.8	919.26
54.87	918.86	61.8	918	61.98	918	63.84	917.81	66.98	917.58
67	917.58	67.97	917.13	70.44	916	72.19	915.2	74.87	914
78.51	912.34	80.13	911.64	83.91	910	86.01	910	126.88	908.85
133.69	908.68	157.43	908	163.87	908	169.8	907.7	187.43	906.82
187.56	906.82	188.64	906.77	188.68	906.74	189.15	906.47	189.82	906
192.1	904.7	192.24	904.61	192.25	904.61	192.28	904.61	198.7	904.46
199.65	904.94	201.87	905.82	201.91	905.84	202.06	905.85	203.87	905.95
204.99	906	208.9	906.22	215.57	906.89	221.25	907.51	223.79	907.79
225.77	908	226.24	908.23	228.37	909.16	230.31	910	232.68	910.98
235.01	912	239.07	913.9	239.27	914	239.44	914.08	244.79	916
247.92	917.15	250.26	918	257.27	920				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	188.64	.035	201.87	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	188.64	201.87		128.15	130.09	113.52	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 909.85	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.76	* Wt. n-Val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 909.10	* Reach Len. (ft)	* 128.15	* 130.09	* 113.52
* Crit W.S. (ft)	* 909.10	* Flow Area (sq ft)	* 70.85	* 54.23	* 56.65
* E.G. Slope (ft/ft)	* 0.007242	* Area (sq ft)	* 70.85	* 54.23	* 56.65
* Q Total (cfs)	* 855.60	* Flow (cfs)	* 256.74	* 480.55	* 118.31
* Top Width (ft)	* 110.08	* Top Width (ft)	* 70.49	* 13.23	* 26.35
* Vel Total (ft/s)	* 4.71	* Avg. vel. (ft/s)	* 3.62	* 8.86	* 2.09
* Max Chl Dpth (ft)	* 4.64	* Hydr. Depth (ft)	* 1.01	* 4.10	* 2.15
* Conv. Total (cfs)	* 10054.2	* Conv. (cfs)	* 3017.0	* 5647.0	* 1390.3
* Length wtd. (ft)	* 128.33	* Wetted Per. (ft)	* 70.54	* 14.12	* 26.70
* Min Ch El (ft)	* 904.46	* Shear (lb/sq ft)	* 0.45	* 1.74	* 0.96
* Alpha	* 2.19	* Stream Power (lb/ft s)	* 257.27	* 0.00	* 0.00

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\* Frctn Loss (ft) \* 1.04 \* Cum Volume (acre-ft) \* 1.40 \* 1.85 \* 0.82 \*  
 \* C & E Loss (ft) \* 0.02 \* Cum SA (acres) \* 0.93 \* 0.46 \* 0.51 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.  
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 5588.448

INPUT

Description:

Station Elevation Data num= 90

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	913	3.91	910.87	6.92	912.35	16.98	912.67	27.04	912.23
30.05	910.61	32.82	912	36.72	912.23	37.74	911.58	38.06	911.4
38.71	911.01	38.75	911	39.48	911.14	40.59	911.3	40.87	911.34
41.17	911.36	41.53	911.38	42	911.37	42.05	911.37	42.07	911.37
42.56	911.33	45.98	911.03	48.99	910.78	50.38	910.78	55.17	910.81
55.26	910.81	55.3	910.81	55.91	910.77	56.13	910.9	56.43	910.87
56.84	911.17	57	911.18	57.06	911.18	57.42	911.17	57.72	911.16
62.55	910.83	67.1	910.53	68.61	910.55	84.21	910	117.64	910
131.69	908.56	136.31	908	142.34	907.54	146.77	907.22	160.08	906
166.09	905.9	168.39	905.87	182.31	905.44	184	904.54	184.7	904
185.43	903.63	185.6	903.47	193.71	903.52	194.45	903.52	194.61	903.52
194.8	903.69	196.3	904.13	197.49	904.46	197.66	904.52	197.69	904.53
197.7	904.54	200.59	905.84	200.84	905.99	200.92	906	200.96	906.03
203.35	908	204.59	909.17	205.56	910	206.42	910.81	207.65	912
208.84	913.25	209.59	914	211.63	915.97	211.65	916	211.7	916.04
215.49	918	215.67	918.1	218.62	919.66	219.3	920	220.77	920.74
222.1	920.94	225.87	922	226.83	922.85	228.31	924	233.49	925.98
233.52	926	233.6	926.02	237.98	927.24	241.22	928	247.9	930

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	182.31	.035	200.59	.1

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

182.31 200.59

6.34 82.42 137.81

.1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 908.57 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 1.00  * Wt. n-Val.      * 0.035  * 0.035  * 0.100  *
* W.S. Elev (ft)     * 907.57 * Reach Len. (ft) * 6.34   * 82.42  * 137.81 *
* Crit W.S. (ft)     * 907.57 * Flow Area (sq ft) * 54.02  * 64.51  * 2.05   *
* E.G. Slope (ft/ft) * 0.009191 * Area (sq ft)    * 54.02  * 64.51  * 2.05   *
* Q Total (cfs)      * 855.60 * Flow (cfs)      * 266.49 * 586.77 * 2.34   *
* Top width (ft)     * 60.93  * Top width (ft)  * 40.40  * 18.28  * 2.24   *
* Vel Total (ft/s)   * 7.10   * Avg. Vel. (ft/s) * 4.93   * 9.10   * 1.14   *
* Max Chl Dpth (ft) * 4.10   * Hydr. Depth (ft) * 1.34   * 3.53   * 0.91   *
* Conv. Total (cfs)  * 8924.5 * Conv. (cfs)     * 2779.7 * 6120.4 * 24.4   *
* Length wtd. (ft)  * 70.15  * Wetted Per. (ft) * 40.48  * 19.31  * 2.85   *
* Min Ch El (ft)    * 903.47 * Shear (lb/sq ft) * 0.77   * 1.92   * 0.41   *
* Alpha             * 1.28   * Stream Power (lb/ft s) * 247.90 * 0.00   * 0.00   *
* Frctn Loss (ft)   * 0.35   * Cum Volume (acre-ft) * 1.22   * 1.67   * 0.74   *
* C & E Loss (ft)   * 0.14   * Cum SA (acres)    * 0.77   * 0.41   * 0.47   *
*****

```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
REACH: Middle

RS: 5493.950

INPUT

Description:

```

Station Elevation Data      num=      84
Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev
*****
0         913        6.15   910.19   9.59   911.54   21.06   911.48   32.55   910.58
36.05    908.93    45.06   912      46.83   912      50.46   910.89   53.21   910
58.87    908.16     59     908.11   59.27   907.98   60.09   907.56   62.18   906.46
62.29    906.47    64.84   906.92   64.86   906.92   66.46   907.04   66.87   907.08
66.88    907.08    69.8    906.97   78.97   906.91   81.24   906.89   81.55   906.89
82.46    906.89    82.57   906.91   82.63   906.92   83.6    907.56   83.9    907.76
84.11    907.77    84.37   907.76   90.94   907.5    108.56   907.53   121.88   907.79
123.56   907.82    124.18   907.83   125.34   907.81   130.84   907.49   133.17   907.3

```

OXF157-159Bridges.rep

134.06	907.19	143.77	906.03	144.52	905.92	144.75	905.85	145.56	905.44
148.31	904	150.76	902.84	177.58	902.84	177.93	903.81	178.08	904
178.63	904.89	179.9	906	180.29	906.36	181.5	907.58	182.44	908
183.34	908.39	185.77	910	187.37	911.06	188.77	912	191.1	913.02
191.27	913.1	192.75	913.15	193.08	913.18	196.13	913.25	201.35	913.5
203.48	914	206.31	914.64	212.25	916	215.76	916.48	221.29	918
222.05	918.31	222.67	918.52	224.05	918.81	229.45	920	232.81	920.78
235.86	921.46	236.62	921.6	237.43	921.7	238.45	922	245.15	922
249.34	922.59	260.51	924	272.91	924	285.23	926		

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 143.77 .035 179.9 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 143.77 179.9 6.86 80.28 173.13 .1 .3  
 Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 0 124.18 907.83

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 907.87	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.52	* Wt. n-val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 907.35	* Reach Len. (ft)	* 6.86	* 80.28	* 173.13
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 7.31	* 146.55	* 0.94
* E.G. Slope (ft/ft)	* 0.003156	* Area (sq ft)	* 7.31	* 146.55	* 0.94
* Q Total (cfs)	* 865.00	* Flow (cfs)	* 13.03	* 851.48	* 0.49
* Top width (ft)	* 48.73	* Top width (ft)	* 11.23	* 36.13	* 1.37
* Vel Total (ft/s)	* 5.59	* Avg. Vel. (ft/s)	* 1.78	* 5.81	* 0.52
* Max Chl Dpth (ft)	* 4.51	* Hydr. Depth (ft)	* 0.65	* 4.06	* 0.69
* Conv. Total (cfs)	* 15396.9	* Conv. (cfs)	* 231.9	* 15156.2	* 8.7
* Length Wtd. (ft)	* 68.13	* Wetted Per. (ft)	* 11.31	* 38.55	* 1.93
* Min Ch El (ft)	* 902.84	* Shear (lb/sq ft)	* 0.13	* 0.75	* 0.10
* Alpha	* 1.07	* Stream Power (lb/ft s)	* 285.23	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.14	* Cum Volume (acre-ft)	* 1.21	* 1.47	* 0.74
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 0.77	* 0.36	* 0.47

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 5409.687

INPUT

OXF157-159Bridges.rep

Description:

Station Elevation Data		num= 86		Sta Elev		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	5.97	919.19	15.3	918	16.27	917.87	18.28	917.67		
23.57	916.75	28.28	916	29.77	915.75	35.94	914.9	42.46	914		
44.97	913.48	53.42	912	60.65	910.19	61.41	910	62.29	909.78		
69.13	908	70.23	907.86	79.98	906.91	87.19	906.17	87.39	906.15		
88.31	906	93.38	905.78	117.22	904.61	118.79	904.19	121.7	903.48		
121.83	903.47	121.98	903.47	124.86	903.62	125.45	903.65	126.05	903.67		
127.72	903.71	127.78	903.71	128.07	903.71	129.5	903.67	136.55	903.5		
151.53	903.14	153.62	903.4	156.1	903.47	156.68	903.48	163.29	903.61		
163.83	903.52	165.5	903.54	168.36	903.16	168.56	903.14	169.18	902.69		
174.3	902.42	179	902.42	180.56	902.71	181.94	903.62	183.06	903.7		
187.61	904	193.91	904.79	207.91	905.82	208.23	905.85	209.86	905.97		
210.14	906	211.43	906.16	214.58	906.51	228.12	908	233.03	908.92		
238.83	910	247.65	911.68	248.22	911.77	250.1	912.05	258.61	912.78		
270.46	914	272.58	914	279.31	914.41	289.5	915	294.01	915.29		
306.55	916	315.77	916.78	329.83	918	333.55	918.5	336.92	918.96		
344	920	348.21	920.65	354.66	922	359.29	923.05	363.61	924		
368.9	925.16	372.66	926	379.67	927.58	381.64	928	382.34	928.17		
390.15	930										

Manning's n Values		num= 3		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	165.5	.035	181.94	.06		

Bank Sta:	Left	Right	Lengths:		Left Channel	Right	Coeff Contr.	Expan.
	165.5	181.94	34.62	29.59		30.52	.1	.3
Ineffective Flow	num= 2							
	Sta L	Sta R	Elev	Permanent				
	107.2	159.36	905.51	T				
	199.76	219	906.09	T				

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 907.63	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.17	* Wt. n-Val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 907.46	* Reach Len. (ft)	* 7.50	* 7.50	* 7.50
* Crit w.s. (ft)	* 906.44	* Flow Area (sq ft)	* 171.03	* 77.76	* 77.87
* E.G. Slope (ft/ft)	* 0.001404	* Area (sq ft)	* 261.67	* 77.76	* 82.95
* Q Total (cfs)	* 865.00	* Flow (cfs)	* 413.04	* 341.94	* 110.02
* Top width (ft)	* 148.83	* Top width (ft)	* 91.14	* 16.44	* 41.25
* Vel Total (ft/s)	* 2.65	* Avg. vel. (ft/s)	* 2.42	* 4.40	* 1.41
* Max chl dpth (ft)	* 5.04	* Hydr. Depth (ft)	* 1.88	* 4.73	* 1.89
* Conv. Total (cfs)	* 23085.7	* Conv. (cfs)	* 11023.4	* 9125.9	* 2936.4
* Length Wtd. (ft)	* 7.50	* Wetted Per. (ft)	* 91.43	* 16.92	* 41.44
* Min Ch El (ft)	* 902.42	* Shear (lb/sq ft)	* 0.16	* 0.40	* 0.16
* Alpha	* 1.52	* Stream Power (lb/ft s)	* 390.15	* 0.00	* 0.00
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 1.19	* 1.26	* 0.57
* C & E Loss (ft)	*	* Cum SA (acres)	* 0.76	* 0.31	* 0.38

\*\*\*\*\*

BRIDGE

RIVER: Bluestone Creek  
 REACH: Middle RS: 5395.595

INPUT

Description:  
 Distance from Upstream XS = 7.5  
 Deck/Roadway Width = 13  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates

num= 8

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
88.7	905.51				122.2	906				158.6	906.09			
162.6	906.09	904.25			194.6	906.09	904.25			198.6	906.09			
210	906.42				225.4	906.91								

Upstream Bridge Cross Section Data

Station Elevation Data num= 86

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	5.97	919.19	15.3	918	16.27	917.87	18.28	917.67
23.57	916.75	28.28	916	29.77	915.75	35.94	914.9	42.46	914
44.97	913.48	53.42	912	60.65	910.19	61.41	910	62.29	909.78
69.13	908	70.23	907.86	79.98	906.91	87.19	906.17	87.39	906.15
88.31	906	93.38	905.78	117.22	904.61	118.79	904.19	121.7	903.48
121.83	903.47	121.98	903.47	124.86	903.62	125.45	903.65	126.05	903.67
127.72	903.71	127.78	903.71	128.07	903.71	129.5	903.67	136.55	903.5
151.53	903.14	153.62	903.4	156.1	903.47	156.68	903.48	163.29	903.61
163.83	903.52	165.5	903.54	168.36	903.16	168.56	903.14	169.18	902.69
174.3	902.42	179	902.42	180.56	902.71	181.94	903.62	183.06	903.7
187.61	904	193.91	904.79	207.91	905.82	208.23	905.85	209.86	905.97
210.14	906	211.43	906.16	214.58	906.51	228.12	908	233.03	908.92
238.83	910	247.65	911.68	248.22	911.77	250.1	912.05	258.61	912.78
270.46	914	272.58	914	279.31	914.41	289.5	915	294.01	915.29
306.55	916	315.77	916.78	329.83	918	333.55	918.5	336.92	918.96
344	920	348.21	920.65	354.66	922	359.29	923.05	363.61	924
368.9	925.16	372.66	926	379.67	927.58	381.64	928	382.34	928.17
390.15	930								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	165.5	.035	181.94	.06

Bank Sta: Left Right Coeff Contr. Expan.  
 165.5 181.94 .1 .3  
 Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
107.2	159.36	905.51	T
199.76	219	906.09	T

Downstream Deck/Roadway Coordinates

num= 9

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
76.7	905.51		102.8	906		139.1	906.09	
143.1	906.09	904.25	175.1	906.09	904.25	179.1	906.09	
191.4	906.42		206.6	906.91		248.7	910	

Downstream Bridge Cross Section Data

Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	12.21	918.02	12.33	918	12.55	917.96	13.33	917.84
24.8	916	27.19	915.3	32.83	914	37.1	912.81	40.41	912
41.59	911.71	48.6	910	55.02	908.42	57.66	908	60.99	907.48
67.25	906.71	81.75	906	82.38	906	84.85	905.91	86.04	905.86
90.51	905.69	110.36	904.81	128.86	904	131.97	904	132.49	903.97
136.65	903.66	142.64	903.21	144.16	903.07	146.19	902.95	147.3	902.28
147.76	902.28	154.61	902.28	158.14	902.78	160.66	902.98	163.53	902.97
166.25	902.99	182.57	904	183.92	904	186.47	904.17	195.73	904.78
201.54	905.08	201.58	905.09	204.88	905.38	205.6	905.43	206.29	905.52
210.11	905.88	211.77	905.9	213.29	906.18	213.5	906.21	223.57	907.06
224.47	907.23	227.48	907.72	229.15	908	233.24	908.65	234.62	908.88
241.66	909.42	244.66	909.7	245.61	910	246.97	910.31	256.6	912
261.91	912.67	266.32	913.24	267.75	913.38	268.65	913.46	270.11	913.55
273.67	913.66	281.28	914	297.54	914.72	300.24	914.83	306.74	915.57
307.23	915.63	310.03	916	318.92	917.19	324.9	918	326.6	918.26
336.44	920	344.94	921.86	345.19	921.92	345.58	922	346.12	922.12
354.96	924	360.71	925.22	364.36	926	373.34	927.95	373.5	928
373.58	928.02	380.55	930						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	146.19	.035	158.14	.035

Bank Sta: Left Right Coeff Contr. Expan.  
 146.19 158.14 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
110	130.6	905.51	T
182.97	222.2	906.09	T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .98  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =



Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow

Submerged Inlet Cd =  
 Submerged Inlet + Outlet Cd = .8  
 Max Low Cord =

Additional Bridge Parameters

Add Friction component to Momentum

Do not add weight component to Momentum

Class B flow critical depth computations use critical depth  
 inside the bridge at the upstream end

Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #PF 1

```
*****
* E.G. US. (ft) * 907.63 * Element *Inside BR US *Inside BR DS *
* W.S. US. (ft) * 907.46 * E.G. Elev (ft) * 907.62 * 907.54 *
* Q Total (cfs) * 865.00 * W.S. Elev (ft) * 907.46 * 907.09 *
* Q Bridge (cfs) * 154.08 * Crit W.S. (ft) * 906.98 * 906.90 *
* Q Weir (cfs) * 710.92 * Max Chl Dpth (ft) * 5.04 * 4.81 *
* Weir Sta Lft (ft) * 72.66 * Vel Total (ft/s) * 3.48 * 3.36 *
* Weir Sta Rgt (ft) * 224.70 * Flow Area (sq ft) * 248.44 * 257.37 *
* Weir Submerg * 0.58 * Froude # Chl * 0.33 * 0.40 *
* Weir Max Depth (ft) * 2.00 * Specif Force (cu ft) * 364.14 * 361.75 *
* Min El Weir Flow (ft) * 905.75 * Hydr Depth (ft) * 1.67 * 1.78 *
* Min El Prs (ft) * 904.25 * W.P. Total (ft) * 204.15 * 211.07 *
* Delta EG (ft) * 0.50 * Conv. Total (cfs) * * *
* Delta WS (ft) * 0.47 * Top width (ft) * 148.83 * 144.95 *
* BR Open Area (sq ft) * 29.78 * Frctn Loss (ft) * * *
* BR Open Vel (ft/s) * 5.17 * C & E Loss (ft) * * *
* Coef of Q * * Shear Total (lb/sq ft) * * *
* Br Sel Method * Press/weir * Power Total (lb/ft s) * 0.00 * 0.00 *
*****
```

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

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

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

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

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

was used.

Note: For the cross section inside the bridge at the downstream end, the water surface and energy are based on critical depth over the weir.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 5379.960

INPUT  
 Description:

Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	12.21	918.02	12.33	918	12.55	917.96	13.33	917.84
24.8	916	27.19	915.3	32.83	914	37.1	912.81	40.41	912
41.59	911.71	48.6	910	55.02	908.42	57.66	908	60.99	907.48
67.25	906.71	81.75	906	82.38	906	84.85	905.91	86.04	905.86
90.51	905.69	110.36	904.81	128.86	904	131.97	904	132.49	903.97
136.65	903.66	142.64	903.21	144.16	903.07	146.19	902.95	147.3	902.28
147.76	902.28	154.61	902.28	158.14	902.78	160.66	902.98	163.53	902.97
166.25	902.99	182.57	904	183.92	904	186.47	904.17	195.73	904.78
201.54	905.08	201.58	905.09	204.88	905.38	205.6	905.43	206.29	905.52
210.11	905.88	211.77	905.9	213.29	906.18	213.5	906.21	223.57	907.06
224.47	907.23	227.48	907.72	229.15	908	233.24	908.65	234.62	908.88
241.66	909.42	244.66	909.7	245.61	910	246.97	910.31	256.6	912
261.91	912.67	266.32	913.24	267.75	913.38	268.65	913.46	270.11	913.55
273.67	913.66	281.28	914	297.54	914.72	300.24	914.83	306.74	915.57
307.23	915.63	310.03	916	318.92	917.19	324.9	918	326.6	918.26
336.44	920	344.94	921.86	345.19	921.92	345.58	922	346.12	922.12
354.96	924	360.71	925.22	364.36	926	373.34	927.95	373.5	928
373.58	928.02	380.55	930						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	146.19	.035	158.14	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 146.19 158.14 110.49 88.75 69.17 .1 .3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
110	130.6	905.51	T
182.97	222.2	906.09	T

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 907.14	* Element	* Left OB	* Channel	* Right OB
* vel Head (ft)	* 0.15	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* w.s. Elev (ft)	* 906.98	* Reach Len. (ft)	* 110.49	* 88.75	* 69.17

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* Crit W.S. (ft)	*	* Flow Area (sq ft)	*	137.26	*	54.95	*	121.64	*
* E.G. Slope (ft/ft)	*0.001477	* Area (sq ft)	*	160.58	*	54.95	*	156.13	*
* Q Total (cfs)	* 865.00	* Flow (cfs)	*	317.66	*	244.96	*	302.39	*
* Top Width (ft)	* 157.64	* Top Width (ft)	*	81.16	*	11.95	*	64.52	*
* Vel Total (ft/s)	* 2.76	* Avg. Vel. (ft/s)	*	2.31	*	4.46	*	2.49	*
* Max Chl Dpth (ft)	* 4.70	* Hydr. Depth (ft)	*	1.69	*	4.60	*	1.89	*
* Conv. Total (cfs)	* 22503.9	* Conv. (cfs)	*	8264.2	*	6372.9	*	7866.9	*
* Length Wtd. (ft)	* 85.74	* Wetted Per. (ft)	*	81.28	*	12.17	*	64.70	*
* Min Ch El (ft)	* 902.28	* Shear (lb/sq ft)	*	0.16	*	0.42	*	0.17	*
* Alpha	* 1.28	* Stream Power (lb/ft s)	*	380.55	*	0.00	*	0.00	*
* Frctn Loss (ft)	* 0.26	* Cum Volume (acre-ft)	*	1.10	*	1.23	*	0.52	*
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	*	0.70	*	0.30	*	0.35	*

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 5291.039

INPUT

Description:

Station Elevation Data num= 83									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	930	8.82	927.33	13.47	926	15.58	925.37	20.07	924
23.56	922.92	26.52	922	29.93	920.97	32.98	920	36.72	918.86
39.71	918	44.38	916.68	46.9	916	50.23	915.03	53.91	914
55.43	913.55	56.03	913.37	60.48	912	64.01	910.98	67.49	910
71.69	908.81	74.32	908	76.93	907.23	79.67	906	80.44	905.69
82.39	905.1	83.1	904.14	83.64	903.63	84.78	902.21	85.91	902.06
86.8	902.01	86.86	902	91.4	902	92.16	901.97	97.1	901.85
97.14	901.88	97.31	902	97.51	902.16	98.35	902.62	108.24	903.37
111.01	903.6	116.97	904	119.26	904	124.72	904.14	132.29	904.33
190.11	906	203.24	906	204.47	906.18	210.19	907.08	218.24	907.27
224.81	907.25	231.41	907.28	231.96	907.25	232.54	907.24	233.62	907.31
235.81	907.56	236.52	907.72	237.47	908	240.12	908.68	243.69	909.08
247.1	909.4	253.72	910	260.3	912	261.4	912.43	271.4	912.87
281.6	912.51	284.7	911	290.7	914	295.35	916	301.76	917.82
302.38	918	305.04	918.75	309.62	920	310.02	920.11	316.91	922
317.92	922.28	324.25	924	327.85	924.98	331.58	926	337.2	927.52
339.02	928	346.3	929.96	346.44	930				

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

0 .06 83.64 .035 98.35 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 83.64 98.35 221.48 200.96 67.86 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft)          * 906.79 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)          * 0.97  * Wt. n-Val.      * 0.060  * 0.035  * 0.060  *
* W.S. Elev (ft)         * 905.82 * Reach Len. (ft) * 221.48 * 200.96 * 67.86  *
* Crit W.S. (ft)        * 905.82 * Flow Area (sq ft) * 2.73  * 55.02  * 110.20 *
* E.G. Slope (ft/ft)     * 0.009910 * Area (sq ft)    * 2.73  * 55.02  * 110.20 *
* Q Total (cfs)          * 865.00 * Flow (cfs)      * 4.96  * 538.13 * 321.90 *
* Top Width (ft)         * 103.59 * Top Width (ft)  * 3.51  * 14.71  * 85.37  *
* Vel Total (ft/s)       * 5.15  * Avg. vel. (ft/s) * 1.82  * 9.78   * 2.92   *
* Max chl dpth (ft)     * 3.97  * Hydr. Depth (ft) * 0.78  * 3.74   * 1.29   *
* Conv. Total (cfs)     * 8689.3 * Conv. (cfs)     * 49.9  * 5405.8 * 3233.6 *
* Length Wtd. (ft)      * 178.05 * Wetted Per. (ft) * 4.31  * 15.63  * 85.44  *
* Min Ch El (ft)        * 901.85 * Shear (lb/sq ft) * 0.39  * 2.18   * 0.80   *
* Alpha                  * 2.36  * Stream Power (lb/ft s) * 346.44 * 0.00   * 0.00   *
* Frctn Loss (ft)       * 1.75  * Cum Volume (acre-ft) * 0.89  * 1.12   * 0.31   *
* C & E Loss (ft)       * 0.03  * Cum SA (acres)   * 0.59  * 0.27   * 0.23   *
*****
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 5071.499

INPUT  
 Description:

Station Elevation Data		num= 84							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	928	7.24	926	12.79	924.51	14.65	924	19.89	922.6
22.02	922	22.68	921.82	29.64	920	35.52	918.09	36.11	918
38.46	916.9	40.86	916	45.98	914.02	46.02	914	46.37	913.87
51.36	912	54.51	910.82	56.76	910	59.93	908.75	61.46	908.18
61.94	908	62.33	907.86	67.25	906	70.79	904.71	72.66	904

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76.36	902.58	76.86	902.39	79.73	902.44	87.4	902.49	98.15	902.55
120.15	902.03	124	902.03	132.07	902.09	162.54	902.28	162.88	902
163.21	901.74	165.24	900	165.88	899.46	173.45	899.36	173.49	899.36
173.5	899.36	173.56	899.39	175.21	900	175.74	900.18	180.99	902
183.34	902.53	183.37	902.54	183.42	902.69	183.45	902.67	183.8	902.69
187.71	902.94	202.09	904	203.46	904.22	205.42	904.54	214.36	906
219.18	907.21	221.54	908	222.48	908.31	225.28	909.27	228.91	909.72
230.44	909.73	230.56	909.66	230.6	909.65	230.65	909.65	232.1	910
242.4	914.78	253.1	915.14	263.6	914.66	266.8	913.1	272.6	916
276.37	916.92	282.45	918	295.83	919.65	298.25	920	301.81	920.42
304.18	920.73	311.42	922	316.52	922.83	323.9	924	332.34	925.32
336.58	926	345.99	927.67	347.61	928	356.94	930		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	162.54	.035	183.42	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	162.54	183.42		160.74	187.46	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 904.62	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.87	* Wt. n-val.	* 0.100	* 0.035	* 0.060
* W.S. Elev (ft)	* 903.75	* Reach Len. (ft)	* 160.74	* 187.46	* 109.68
* Crit w.s. (ft)	* 903.75	* Flow Area (sq ft)	* 128.97	* 69.00	* 8.44
* E.G. Slope (ft/ft)	* 0.009743	* Area (sq ft)	* 128.97	* 69.00	* 8.44
* Q Total (cfs)	* 865.00	* Flow (cfs)	* 241.35	* 609.74	* 13.90
* Top width (ft)	* 125.31	* Top Width (ft)	* 89.22	* 20.88	* 15.21
* Vel Total (ft/s)	* 4.19	* Avg. vel. (ft/s)	* 1.87	* 8.84	* 1.65
* Max chl dpth (ft)	* 4.39	* Hydr. Depth (ft)	* 1.45	* 3.30	* 0.55
* Conv. Total (cfs)	* 8763.5	* Conv. (cfs)	* 2445.2	* 6177.4	* 140.9
* Length wtd. (ft)	* 180.19	* Wetted Per. (ft)	* 89.47	* 22.53	* 15.26
* Min Ch El (ft)	* 899.36	* Shear (lb/sq ft)	* 0.88	* 1.86	* 0.34
* Alpha	* 3.19	* Stream Power (lb/ft s)	* 356.94	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.68	* Cum Volume (acre-ft)	* 0.56	* 0.83	* 0.22
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 0.36	* 0.19	* 0.15

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Middle RS: 4871.481

INPUT  
 Description:

Station Elevation Data num= 89

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	5.38	918.05	5.52	918	5.65	917.95	6.96	917.66
14.19	916	14.84	915.84	16.08	915.49	21.68	914	27	912.5
28.76	912	29.54	911.78	35.84	910	36.65	909.77	42.81	908
44.16	907.61	49.71	906	50.94	905.74	56.53	904	60.94	904
69.34	902.62	70.81	902.36	72.03	902.12	74.17	902.15	75.16	902
91.05	900.95	96.24	900.59	104.87	900	116.51	900	121.21	900.24
121.94	900.27	122.18	900.26	122.62	900	123.59	899.18	125.37	898
127.08	896.91	127.24	896.83	127.26	896.82	128.12	896.82	133.39	896.92
138.5	897.09	139.63	897.09	139.85	897.26	140.85	898	143.15	898.84
144.54	899.3	148.46	899.69	151.33	900	155.81	900.45	157.29	900.57
162.61	901.04	164.17	901.17	173.26	902	181.15	903.92	181.64	904
181.77	904.05	182.09	904.15	186.95	905.39	189.36	906	193.81	907.46
195.35	908	196.48	908.53	197.15	908.71	199.51	908.7	206.49	909.63
207.01	909.69	209.35	910	215.49	910.78	218.92	911.32	226.36	912
235.6	910	250.9	907.12	255.7	909.18	271.8	911.35	287.9	912.67
292.5	911.65	303.8	916	305.43	917.28	306.45	917.32	313.58	917.91
315.05	918.09	315.71	918.19	318.09	918.6	318.65	918.7	318.97	918.85
319.74	918.8	319.9	918.81	322.9	919.16	331.86	920		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	121.94	.035	144.54	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 121.94 144.54 69.08 159.41 62.66 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 902.51	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.17	* Wt. n-Val.	* 0.100	* 0.035	* 0.060
* W.S. Elev (ft)	* 901.33	* Reach Len. (ft)	* 69.08	* 159.41	* 62.66
* Crit W.S. (ft)	* 901.33	* Flow Area (sq ft)	* 35.06	* 83.61	* 21.01
* E.G. Slope (ft/ft)	* 0.008976	* Area (sq ft)	* 35.06	* 83.61	* 21.01
* Q Total (cfs)	* 865.00	* Flow (cfs)	* 47.82	* 768.70	* 48.48
* Top Width (ft)	* 80.75	* Top width (ft)	* 36.71	* 22.60	* 21.43
* Vel Total (ft/s)	* 6.19	* Avg. Vel. (ft/s)	* 1.36	* 9.19	* 2.31
* Max chl Dpth (ft)	* 4.51	* Hydr. Depth (ft)	* 0.95	* 3.70	* 0.98
* Conv. Total (cfs)	* 9129.9	* Conv. (cfs)	* 504.7	* 8113.5	* 511.7
* Length Wtd. (ft)	* 139.38	* Wetted Per. (ft)	* 36.76	* 24.19	* 21.53
* Min Ch El (ft)	* 896.82	* Shear (lb/sq ft)	* 0.53	* 1.94	* 0.55

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```
* Alpha * 1.97 * Stream Power (lb/ft s) * 331.86 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.30 * Cum Volume (acre-ft) * 0.25 * 0.51 * 0.18 *
* C & E Loss (ft) * 0.31 * Cum SA (acres) * 0.12 * 0.10 * 0.10 *
*****
```

warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Middle

RS: 4704.612

INPUT

Description:

Station Elevation Data

num= 85

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	6.12	918	11.82	916.1	12.05	916.02	12.11	916
12.18	915.98	12.67	915.81	17.89	914	18.59	913.76	23.43	912
26.69	910.83	28.98	910	31.63	909.1	34.77	908	39.93	906.25
42.28	905.44	46.09	904	50.34	902.55	79.78	902	83.92	902
85.5	901.94	85.63	901.93	87.7	901.86	126.62	900	127.08	899.98
163.96	899.13	184.07	898.84	184.77	898.84	186.1	898.85	196.14	898.95
216.37	898.45	216.84	898.06	216.92	898	217.06	897.9	220.4	895.93
220.52	895.93	222.96	895.93	228.08	895.82	232.21	896	234.43	896
241.37	895.98	241.97	896	242.38	896	245.38	896.67	245.66	896.72
245.67	896.73	245.72	896.86	246.47	898	246.78	898.58	247.3	899.21
248.11	899.35	248.78	899.38	254.05	899.58	262.24	899.88	266.41	900
269.5	898	280.9	900.95	295.1	900.99	309.25	900.1	326.35	900
332.5	900	351.13	900.28	351.64	900.28	354.96	900.44	355.72	900.49
357.73	900.61	369.61	901.34	384.31	901.84	385.5	901.85	385.91	901.85
389.33	902	391.17	902.11	395.29	902.22	396.91	902.4	402.22	903.04
409.88	904	417.49	905.7	418.44	905.84	419.24	906	420.08	906.21
427.14	908	432.77	909.39	435.08	910	439.61	911.14	443.09	912

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	216.37	.035	247.3	.06



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Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 216.37 247.3 434.52 20.21 9.46 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 901.53 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.15 * Wt. n-Val. * 0.100 * 0.035 * 0.060 *
* W.S. Elev (ft) * 901.38 * Reach Len. (ft) * 20.21 * 20.21 * 20.21 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 220.71 * 158.69 * 145.20 *
* E.G. Slope (ft/ft) * 0.000948 * Area (sq ft) * 220.71 * 158.69 * 145.20 *
* Q Total (cfs) * 865.00 * Flow (cfs) * 152.63 * 589.80 * 122.57 *
* Top width (ft) * 273.22 * Top width (ft) * 118.70 * 30.93 * 123.59 *
* Vel Total (ft/s) * 1.65 * Avg. vel. (ft/s) * 0.69 * 3.72 * 0.84 *
* Max Chl Dpth (ft) * 5.56 * Hydr. Depth (ft) * 1.86 * 5.13 * 1.17 *
* Conv. Total (cfs) * 28095.8 * Conv. (cfs) * 4957.7 * 19157.0 * 3981.1 *
* Length Wtd. (ft) * 20.21 * Wetted Per. (ft) * 118.75 * 33.10 * 124.64 *
* Min Ch El (ft) * 895.82 * Shear (lb/sq ft) * 0.11 * 0.28 * 0.07 *
* Alpha * 3.53 * Stream Power (lb/ft s) * 443.09 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.04 * Cum volume (acre-ft) * 0.05 * 0.06 * 0.06 *
* C & E Loss (ft) * 0.05 * Cum SA (acres) * * * *
*****
    
```

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 4682.971

INPUT  
 Description:

Station Elevation Data		num=		82							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	9.22	919.66	22.51	919.17	53.59	918.21	59.01	918.14		
66.49	918	71.31	917.9	80.09	917.67	92.38	917.46	109.04	917.19		
114.13	917.03	114.23	917.02	115.56	916.96	131.81	916.19	135.66	916		
136.23	915.97	136.46	915.97	136.57	915.97	169.06	914.22	177.76	914		
215.95	914	221.22	912.92	231.97	912.39	233.6	912.25	234.03	912.2		
237.36	912	250.48	910.82	258.7	910	261.37	909.19	262.26	908.92		
264.33	908.46	267.07	908	270.57	907.39	273.05	906.83	276.19	906		
281.78	904.64	284.26	904	287.24	903.23	291.8	902	295.03	901.07		
296.56	900.68	296.66	900.64	297.85	900	298.67	899.51	301.33	898		
303.53	896.58	303.92	896.41	305.07	896.25	307.47	895.75	315.99	895.75		
318.38	896.44	320.75	896.6	327.55	900	333.66	901.15	343.69	901		
351.37	898.44	354.79	897.73	364.69	897.93	365.67	898.34	385.26	899.45		
418.85	899.45	427.33	900	437.81	900.66	445.51	900.94	453.48	901.08		
456.11	901.08	458.98	901.21	470.76	902	471.32	902	475.53	902.58		
476.66	902.76	487.83	904	487.89	904.01	497.58	906	504.19	907.69		

505.3 908 509.99 909.28 511.93 910 512.44 910.19 517.29 912  
 520.43 913.17 522.73 914

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 297.85 .035 327.55 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 297.85 327.55 12.96 56.5 9.53 .1 .3

Ineffective Flow num= 1  
 Sta L Sta R Elev Permanent  
 334.44 381.3 901.44 T

Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 343.69 522.73 899.45

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 901.45 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.70 \* Wt. n-Val. \* 0.100 \* 0.035 \* 0.060 \*  
 \* W.S. Elev (ft) \* 900.74 \* Reach Len. (ft) \* 19.00 \* 19.00 \* 19.00 \*  
 \* Crit W.S. (ft) \* 900.31 \* Flow Area (sq ft) \* 0.52 \* 112.01 \* 62.93 \*  
 \* E.G. Slope (ft/ft) \* 0.005239 \* Area (sq ft) \* 0.52 \* 112.01 \* 107.97 \*  
 \* Q Total (cfs) \* 914.40 \* Flow (cfs) \* 0.25 \* 799.27 \* 114.88 \*  
 \* Top Width (ft) \* 130.72 \* Top width (ft) \* 1.53 \* 29.70 \* 99.50 \*  
 \* Vel Total (ft/s) \* 5.21 \* Avg. vel. (ft/s) \* 0.48 \* 7.14 \* 1.83 \*  
 \* Max Chl Dpth (ft) \* 4.99 \* Hydr. Depth (ft) \* 0.34 \* 3.77 \* 1.00 \*  
 \* Conv. Total (cfs) \* 12632.6 \* Conv. (cfs) \* 3.5 \* 11042.1 \* 1587.0 \*  
 \* Length Wtd. (ft) \* 19.00 \* Wetted Per. (ft) \* 1.70 \* 31.66 \* 62.77 \*  
 \* Min Ch El (ft) \* 895.75 \* Shear (lb/sq ft) \* 0.10 \* 1.16 \* 0.33 \*  
 \* Alpha \* 1.65 \* Stream Power (lb/ft s) \* 522.73 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* \* Cum Volume (acre-ft) \* 3.83 \* 7.84 \* 4.48 \*  
 \* C & E Loss (ft) \* \* Cum SA (acres) \* 2.18 \* 1.73 \* 2.54 \*  
 \*\*\*\*\*

BRIDGE

RIVER: Bluestone Creek  
 REACH: Lower RS: 4657.419

INPUT

Description:

Distance from Upstream XS = 19  
 Deck/Roadway Width = 13  
 Weir Coefficient = 2.6  
 Upstream Deck/Roadway Coordinates

num= 10

Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 \*\*\*\*\*

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292.6	902		294.4	901.44	298.4	901.44	899.6
330.4	901.44	899.6	334.4	901.44	382.9	900	
400.2	899.4		419.4	900	442.4	902	
522.73	914						

Upstream Bridge Cross Section Data

Station Elevation Data num= 82

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	9.22	919.66	22.51	919.17	53.59	918.21	59.01	918.14
66.49	918	71.31	917.9	80.09	917.67	92.38	917.46	109.04	917.19
114.13	917.03	114.23	917.02	115.56	916.96	131.81	916.19	135.66	916
136.23	915.97	136.46	915.97	136.57	915.97	169.06	914.22	177.76	914
215.95	914	221.22	912.92	231.97	912.39	233.6	912.25	234.03	912.2
237.36	912	250.48	910.82	258.7	910	261.37	909.19	262.26	908.92
264.33	908.46	267.07	908	270.57	907.39	273.05	906.83	276.19	906
281.78	904.64	284.26	904	287.24	903.23	291.8	902	295.03	901.07
296.56	900.68	296.66	900.64	297.85	900	298.67	899.51	301.33	898
303.53	896.58	303.92	896.41	305.07	896.25	307.47	895.75	315.99	895.75
318.38	896.44	320.75	896.6	327.55	900	333.66	901.15	343.69	901
351.37	898.44	354.79	897.73	364.69	897.93	365.67	898.34	385.26	899.45
418.85	899.45	427.33	900	437.81	900.66	445.51	900.94	453.48	901.08
456.11	901.08	458.98	901.21	470.76	902	471.32	902	475.53	902.58
476.66	902.76	487.83	904	487.89	904.01	497.58	906	504.19	907.69
505.3	908	509.99	909.28	511.93	910	512.44	910.19	517.29	912
520.43	913.17	522.73	914						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	297.85	.035	327.55	.06

Bank Sta: Left Right Coeff Contr. Expan.  
 297.85 327.55 .1 .3

Ineffective Flow num= 1  
 Sta L Sta R Elev Permanent  
 334.44 381.3 901.44 T

Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 343.69 522.73 899.45

Downstream Deck/Roadway Coordinates

num= 10

Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord	Sta	Hi	Cord	Lo	Cord
294.9		902			324.1		901.44			328.1		901.44		899.6
360.1	901.44		899.6		364.1	901.44				390.3	900			
410.04	899.4			431.35	900					455.8	902			
521	914													

Downstream Bridge Cross Section Data

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Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	4.75	919.82	65	918.01	65.42	918	65.48	918
73.2	917.77	106.68	916.75	115.06	916.45	120.58	916.21	120.95	916.19
126.43	916	130.05	915.87	131.14	915.83	154.3	914.65	155.22	914.58
157.11	914.48	175.44	914	180.58	914	192.42	913.71	199.82	913.68
203.08	913.53	208.93	913.4	211.35	913.3	218.7	912.93	220.99	912.87
230.75	912.64	243.69	912	251.45	911.21	253.52	911	262.94	910
267.91	909.44	280.8	908	284.95	907.46	287.19	907.18	288.2	907.03
292.15	906.32	293.96	906	302.29	904.49	304.83	904.03	310.11	902.97
310.51	902.89	310.66	902.86	319.01	900.9	321.81	900	327.68	898
335.96	897.69	339.6	896.86	340	895.59	353	895.59	354.18	897.59
356.51	897.89	362.55	898	379.6	898.84	400.44	898.75	429.33	898.11
453.96	899.38	466	900	480.88	901.64	481.74	902	483.75	902
490.29	902.92	491.36	903	492.05	903.23	494.45	904	495.17	904.24
500.02	906	501.42	906.53	505.66	908	509.19	909.41	510.78	910
514.31	911.3	516.18	912	517.5	912.49	521.7	914		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	335.96	.035	356.51	.06

Bank Sta: Left Right Coeff Contr. Expan.

335.96	356.51		.1	.3
--------	--------	--	----	----

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	324.1	901.44	T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .98  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data

Energy

Selected Low Flow Methods = Highest Energy Answer

High Flow Method

Pressure and Weir flow

Submerged Inlet Cd =  
 Submerged Inlet + Outlet Cd = .8  
 Max Low Cord =

Additional Bridge Parameters

Add Friction component to Momentum

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

BRIDGE OUTPUT Profile #PF 1

```

*****
* E.G. US. (ft)          *      901.45 * Element          *Inside BR US *Inside BR DS *
* W.S. US. (ft)         *      900.74 * E.G. Elev (ft)  *      901.44 *      901.44 *
* Q Total (cfs)         *      914.40 * W.S. Elev (ft)  *      900.74 *      900.74 *
* Q Bridge (cfs)        *      661.16 * Crit W.S. (ft)  *      900.71 *      900.91 *
* Q Weir (cfs)          *      253.24 * Max Chl Dpth (ft) *      4.99 *      5.15 *
* Weir Sta Lft (ft)     *      381.30 * Vel Total (ft/s) *      0.00 *      4.75 *
* Weir Sta Rgt (ft)     *      435.94 * Flow Area (sq ft) *      *      192.53 *
* Weir Submerg         *      0.01 * Froude # chl    *      0.68 *      0.67 *
* Weir Max Depth (ft)   *      1.99 * Specif Force (cu ft) *      478.08 *      502.30 *
* Min El Weir Flow (ft) *      899.46 * Hydr Depth (ft)  *      *      3.03 *
* Min El Prs (ft)       *      899.60 * W.P. Total (ft)  *      104.88 *      133.11 *
* Delta EG (ft)         *      0.99 * Conv. Total (cfs) *      *      *
* Delta WS (ft)         *      1.02 * Top Width (ft)   *      69.96 *      63.58 *
* BR Open Area (sq ft)  *      78.43 * Frctn Loss (ft)  *      *      *
* BR Open Vel (ft/s)    *      8.43 * C & E Loss (ft)  *      *      *
* Coef of Q             *      * * Shear Total (lb/sq ft) *      *      *
* Br Sel Method         * Press/weir * Power Total (lb/ft s) *      0.00 *      0.00 *
*****
    
```

- Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.
- Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
- Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.
- Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
- Note: For the cross section inside the bridge at the downstream end, the water surface and energy have been projected from the downstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 4626.456

INPUT

Description:

Station Elevation Data num= 74

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	4.75	919.82	65	918.01	65.42	918
							65.48
							918

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73.2	917.77	106.68	916.75	115.06	916.45	120.58	916.21	120.95	916.19
126.43	916	130.05	915.87	131.14	915.83	154.3	914.65	155.22	914.58
157.11	914.48	175.44	914	180.58	914	192.42	913.71	199.82	913.68
203.08	913.53	208.93	913.4	211.35	913.3	218.7	912.93	220.99	912.87
230.75	912.64	243.69	912	251.45	911.21	253.52	911	262.94	910
267.91	909.44	280.8	908	284.95	907.46	287.19	907.18	288.2	907.03
292.15	906.32	293.96	906	302.29	904.49	304.83	904.03	310.11	902.97
310.51	902.89	310.66	902.86	319.01	900.9	321.81	900	327.68	898
335.96	897.69	339.6	896.86	340	895.59	353	895.59	354.18	897.59
356.51	897.89	362.55	898	379.6	898.84	400.44	898.75	429.33	898.11
453.96	899.38	466	900	480.88	901.64	481.74	902	483.75	902
490.29	902.92	491.36	903	492.05	903.23	494.45	904	495.17	904.24
500.02	906	501.42	906.53	505.66	908	509.19	909.41	510.78	910
514.31	911.3	516.18	912	517.5	912.49	521.7	914		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	335.96	.035	356.51	.06

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

335.96	356.51	4.13	67.17	17.78	.1	.3
--------	--------	------	-------	-------	----	----

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	324.1	901.44	T

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 900.46	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.74	* Wt. n-Val.	* 0.100	* 0.035	* 0.060
* W.S. Elev (ft)	* 899.72	* Reach Len. (ft)	* 4.13	* 67.17	* 17.78
* Crit W.S. (ft)	* 899.72	* Flow Area (sq ft)	* 19.54	* 72.36	* 114.92
* E.G. Slope (ft/ft)	* 0.008219	* Area (sq ft)	* 19.91	* 72.36	* 114.92
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 36.29	* 602.66	* 275.45
* Top width (ft)	* 138.01	* Top width (ft)	* 13.34	* 20.55	* 104.12
* Vel Total (ft/s)	* 4.42	* Avg. vel. (ft/s)	* 1.86	* 8.33	* 2.40
* Max Chl Dpth (ft)	* 4.13	* Hydr. Depth (ft)	* 1.65	* 3.52	* 1.10
* Conv. Total (cfs)	* 10086.0	* Conv. (cfs)	* 400.3	* 6647.4	* 3038.3
* Length wtd. (ft)	* 41.64	* Wetted Per. (ft)	* 12.07	* 22.74	* 104.19
* Min Ch El (ft)	* 895.59	* Shear (lb/sq ft)	* 0.83	* 1.63	* 0.57
* Alpha	* 2.43	* Stream Power (lb/ft s)	* 521.70	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.24	* Cum Volume (acre-ft)	* 3.82	* 7.73	* 4.38
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 2.18	* 1.71	* 2.44

warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the

calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 4559.288

INPUT  
 Description:

Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	924	72.03	930.3	104.95	926.46	241.39	907.97	272.23	903.38
282.37	902.24	285.46	900.75	287.95	902	294.17	903.28	294.32	903.26
294.33	903.26	294.34	903.26	294.37	903.25	294.38	903.25	298.64	902
305.23	900.14	305.82	900	305.97	899.96	310.59	898.89	314.92	898.97
325.06	899.49	329.32	899.76	330.59	899.81	331.29	899.8	339.39	899.47
340.56	899.42	358.16	898.68	372.95	898	374.45	897.93	381.56	897.59
386.91	896.15	387.89	896	389.37	895.78	389.59	895.75	389.62	895.75
389.96	895.74	398.29	895.42	398.44	895.41	398.45	895.43	398.55	895.63
398.97	896	399.1	896.1	399.42	896.33	400.94	897.55	403.11	897.5
412.05	897.55	413.56	897.54	421.19	897.35	424.22	897.34	432.24	897.65
435.33	897.6	441.6	897.19	447.14	897.13	452.67	897.08	459.34	897.21
475.11	896.79	477.93	896.97	482.04	897.2	484.93	898	491.22	899.83
491.87	900	492.45	900.15	499.95	902	502.87	902.77	506.53	904
510.13	905.29	512.09	906	513.59	906.57	517.42	908	519.55	908.82
522.69	910	524.94	910.83	528.08	912	529.98	912.77	533.3	914
538.72	916								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	381.56	.035	400.94	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 381.56 400.94 20.28 144.92 262.06 .1 .3

Blocked Obstructions num= 1

Sta L	Sta R	Elev
0	329.32	899.76

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 899.29	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.30	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 898.99	* Reach Len. (ft)	* 20.28	* 144.92	* 262.06
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 20.93	* 55.67	* 144.85
* E.G. Slope (ft/ft)	*0.004331	* Area (sq ft)	* 20.93	* 55.67	* 144.85

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* Q Total (cfs)	* 914.40	* Flow (cfs)	* 45.27	* 303.53	* 565.60
* Top Width (ft)	* 137.45	* Top Width (ft)	* 30.69	* 19.38	* 87.38
* Vel Total (ft/s)	* 4.13	* Avg. Vel. (ft/s)	* 2.16	* 5.45	* 3.90
* Max Chl Dpth (ft)	* 3.58	* Hydr. Depth (ft)	* 0.68	* 2.87	* 1.66
* Conv. Total (cfs)	* 13894.5	* Conv. (cfs)	* 687.8	* 4612.2	* 8594.5
* Length Wtd. (ft)	* 163.17	* Wetted Per. (ft)	* 30.72	* 20.42	* 87.67
* Min Ch El (ft)	* 895.41	* Shear (lb/sq ft)	* 0.18	* 0.74	* 0.45
* Alpha	* 1.15	* Stream Power (lb/ft s)	* 538.72	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.60	* Cum Volume (acre-ft)	* 3.82	* 7.63	* 4.33
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.18	* 1.68	* 2.40

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 4258.834

INPUT

Description:

Station		Elevation Data		num= 84		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	934	20.62	938.5	35.4	937.2	50.14	935.47	91	918
117.03	916	132.44	914.79	136.26	914.48	141.38	914	143.17	913.63
147.63	912.72	148.91	912.43	151.02	912	159.23	910.18	160.19	910
161.8	909.69	169.8	908	176.95	906.3	178.71	906	190.33	904
191.11	903.83	198.6	902	209.6	897.34	212.8	898.89	228.3	899.52
240.6	899.28	243.8	898.16	249.49	898	250.5	898	259.83	897.72
260.27	897.71	276.78	897.54	276.99	897.54	281.84	897.47	284.23	897.46
287.06	897.47	300.35	896.94	302.59	896.77	306.79	896.59	307.57	896.55
307.7	896.55	310.14	896.49	312.03	896.48	312.52	896.45	329.02	896.49
330.17	896.45	332.69	896.28	332.72	896.28	332.74	896.28	333.18	896
333.43	895.47	333.63	895.38	334.55	894.21	334.67	894.21	337.29	894
340.82	894	343.98	893.86	347.4	893.67	347.97	893.62	356.14	893.17
356.31	893.32	357.06	894	357.64	894.78	360.58	897.43	362.16	898.68
362.21	898.71	362.24	898.73	362.73	898.97	370.08	902	371.3	902.49
375.03	904	378.1	905.18	380.37	906	384.94	907.74	385.62	908
390.7	909.9	390.96	910	397.71	912	399.17	912.4	404.67	914
407.08	914.73	411.46	916	414.31	916.9	415.64	917.01		

Manning's n Values		num= 3	
Sta	n Val	Sta	n Val
0	.035	329.02	.035
		360.58	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 329.02 360.58 15.43 180.39 150.97 .1 .3

Blocked Obstructions			num= 1
Sta L	Sta R	Elev	
0	215.4	898.9	



CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft)      * 898.68 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.40  * Wt. n-Val.      * 0.035  * 0.035  * 0.100  *
* W.S. Elev (ft)     * 898.28 * Reach Len. (ft) * 15.43  * 180.39 * 150.97 *
* Crit W.S. (ft)     *        * Flow Area (sq ft) * 89.06  * 123.71 * 0.46  *
* E.G. Slope (ft/ft) * 0.003174 * Area (sq ft)    * 89.06  * 123.71 * 0.46  *
* Q Total (cfs)      * 914.40 * Flow (cfs)      * 218.71 * 695.51 * 0.19  *
* Top Width (ft)     * 118.21 * Top Width (ft)  * 85.57  * 31.56  * 1.08  *
* Vel Total (ft/s)   * 4.29  * Avg. Vel. (ft/s) * 2.46  * 5.62  * 0.40  *
* Max Chl Dpth (ft) * 5.11  * Hydr. Depth (ft) * 1.04  * 3.92  * 0.43  *
* Conv. Total (cfs)  * 16229.5 * Conv. (cfs)     * 3881.8 * 12344.4 * 3.3  *
* Length Wtd. (ft)  * 156.43 * Wetted Per. (ft) * 85.62  * 34.33  * 1.38  *
* Min Ch El (ft)    * 893.17 * Shear (lb/sq ft) * 0.21  * 0.71  * 0.07  *
* Alpha             * 1.39  * Stream Power (lb/ft s) * 415.64 * 0.00  * 0.00  *
* Frctn Loss (ft)   * 0.77  * Cum Volume (acre-ft) * 3.79  * 7.34  * 3.89  *
* C & E Loss (ft)   * 0.05  * Cum SA (acres)   * 2.15  * 1.60  * 2.13  *
*****
    
```

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 4054.239

INPUT

Description:

Station Elevation Data num= 65

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	941.3	10.99	941.26	21.99	940.09	66.66	918	78.95	916
79.54	916	92.08	914.78	95.42	914.44	100.98	914	116.74	912.15
118.15	912	118.27	911.98	129.78	910	133.83	909.22	134.88	908
158.33	896.61	161.4	898.11	171.8	898.4	182.2	897.89	189.06	897.63
190.1	897.66	192.29	897.99	192.41	898	192.51	898.01	197.05	898.53
197.25	898.21	197.42	898	198.69	896.34	198.99	896	199.28	895.62
200.48	894.24	200.67	894.03	200.72	894	200.75	893.97	203.14	892.27
203.15	892.26	204.75	892.04	205.09	892	207.15	892	212.47	892.46
213.4	892.52	215.45	893.9	215.58	894	216.7	894.75	216.75	895.24
251.3	895.96	280.14	895.55	300.45	894.88	320.61	896	324.34	897.74
324.85	898	325.58	898.33	329.21	900	332.69	901.61	333.58	902
334	902.2	336.17	903.15	336.93	903.53	337.87	904	338.87	904.36
342.86	906	344.62	906.52	349.59	908	352.14	908.78	356.1	910

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
*****		*****		*****	

0 .035 197.05 .035 216.75 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 197.05 216.75 224.35 114.06 104.56 .1 .3

Blocked Obstructions num= 1

Sta L Sta R Elev  
 \*\*\*\*\*  
 0 197.05 898.53

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*

* E.G. Elev (ft)	* 897.86	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.88	* Wt. n-Val.	* 0.035	* 0.100	*
* W.S. Elev (ft)	* 896.99	* Reach Len. (ft)	* 224.35	* 114.06	* 104.56
* Crit W.S. (ft)	* 896.99	* Flow Area (sq ft)	* 73.60	* 151.47	*
* E.G. Slope (ft/ft)	* 0.008511	* Area (sq ft)	* 73.60	* 151.47	*
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 651.39	* 263.01	*
* Top Width (ft)	* 124.53	* Top Width (ft)	* 18.55	* 105.97	*
* Vel Total (ft/s)	* 4.06	* Avg. Vel. (ft/s)	* 8.85	* 1.74	*
* Max Chl Dpth (ft)	* 4.99	* Hydr. Depth (ft)	* 3.97	* 1.43	*
* Conv. Total (cfs)	* 9911.8	* Conv. (cfs)	* 7060.9	* 2850.9	*
* Length wtd. (ft)	* 111.32	* Wetted Per. (ft)	* 21.67	* 106.24	*
* Min Ch El (ft)	* 892.00	* Shear (lb/sq ft)	* 1.80	* 0.76	*
* Alpha	* 3.43	* Stream Power (lb/ft s)	* 356.10	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.00	* Cum Volume (acre-ft)	* 3.78	* 6.93	* 3.63
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.13	* 1.49	* 1.95

\*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 3934.570

INPUT

Description:

Station Elevation Data num= 64

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	7.4	918	8.75	917.63	14.18	916
						17.7	914.95

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20.85	914	27.03	912.09	27.43	912	28.15	911.82	34.88	910
65.74	896.02	69.4	897.35	81.65	897.24	93.89	896.45	95.75	897.03
96.58	897.04	96.59	897.04	97.84	896.97	102.52	896.85	103.03	896.33
103.35	896	105.15	894.12	105.28	894	105.42	893.85	107.47	892.34
107.49	892.34	116.39	892	120.34	891.78	121.35	891.76	121.7	891.98
121.72	892	121.83	892.17	124.65	894	125.79	894.56	142.86	895.29
147.07	895.48	150.66	895.53	166.39	895.38	168.67	895.15	171.33	895.23
174.72	895.27	176.02	895.09	182.46	894.32	182.99	894.28	183.93	894.19
186.22	894	231.86	894	235.51	895.61	236.43	896	240.77	897.91
240.99	898	245.34	899.85	245.73	900	245.85	900.05	248.47	901.14
250.26	901.85	250.59	902	256.43	903.44	258.41	904	268.48	905.99
268.54	906	268.57	906.01	279.91	908	297.63	910		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	102.52	.035	125.79	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	102.52	125.79		111.8	133.81	33.19	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 896.84	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.85	* Wt. n-Val.	* 0.035	* 0.100	*
* W.S. Elev (ft)	* 896.00	* Reach Len. (ft)	* 111.80	* 133.81	* 33.19
* Crit W.S. (ft)	* 896.00	* Flow Area (sq ft)	* 74.90	* 149.37	*
* E.G. Slope (ft/ft)	* 0.009531	* Area (sq ft)	* 74.90	* 149.37	*
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 650.54	* 263.86	*
* Top Width (ft)	* 133.07	* Top Width (ft)	* 22.44	* 110.63	*
* Vel Total (ft/s)	* 4.08	* Avg. Vel. (ft/s)	* 8.69	* 1.77	*
* Max Chl Dpth (ft)	* 4.24	* Hydr. Depth (ft)	* 3.34	* 1.35	*
* Conv. Total (cfs)	* 9366.2	* Conv. (cfs)	* 6663.5	* 2702.7	*
* Length Wtd. (ft)	* 93.49	* Wetted Per. (ft)	* 24.69	* 111.15	*
* Min Ch El (ft)	* 891.76	* Shear (lb/sq ft)	* 1.80	* 0.80	*
* Alpha	* 3.28	* Stream Power (lb/ft s)	* 297.63	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.32	* Cum Volume (acre-ft)	* 3.78	* 6.73	* 3.27
* C & E Loss (ft)	* 0.19	* Cum SA (acres)	* 2.13	* 1.44	* 1.69

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 3797.323

INPUT

Description:

Station Elevation Data		num= 80		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	7.71	918	12.86	916.64	13.48	916	29.86	907.75
32.98	909.13	43.2	909.32	53.45	908.81	56.65	908	56.68	908
56.96	907.96	57.05	907.89	59.43	906	61.96	904.02	61.98	904
62.16	903.85	64.27	902	65.06	901.32	66.56	900	68.26	898.65
68.99	898	70.2	896.83	71.17	896	72.66	894.5	73.28	894
73.81	893.66	73.84	893.65	73.85	893.65	74.04	893.66	75.43	893.8
76.13	893.86	76.77	893.73	77.13	893.63	82.34	892.55	82.69	892.48
84.91	893.39	86.57	893.81	89.23	893.93	90.96	894	99.91	894
99.93	893.96	100.26	893.55	101.3	892	101.96	891.2	102.39	890.6
102.56	890.58	102.62	890.58	102.65	890.57	102.66	890.56	114.28	890.71
114.57	890.7	117.54	891.94	117.64	892.03	118.64	892.14	118.77	892.15
119.83	892.18	137.23	892.86	164.72	893.94	166.29	894	174.51	894
178.03	894.62	179.07	894.76	183.39	896.78	185.93	898	186.07	898.06
186.56	898.28	189.81	899.61	190.9	900	193.23	900.55	201.13	902
202	902	204.31	902.32	206.94	902.58	214.8	903.37	218.22	904
225.57	905.37	230.3	906	232.72	906.25	250.41	908	274.46	910

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	99.91	.035	117.64	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	99.91	117.64		110.31	113.41	135.84	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 895.85	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.21	* Wt. n-val.	* 0.060	* 0.035	* 0.035
* W.S. Elev (ft)	* 895.64	* Reach Len. (ft)	* 110.31	* 113.41	* 135.84
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 54.74	* 82.46	* 146.06
* E.G. Slope (ft/ft)	* 0.001741	* Area (sq ft)	* 54.74	* 82.46	* 146.06
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 85.38	* 378.70	* 450.32
* Top width (ft)	* 109.42	* Top Width (ft)	* 28.38	* 17.73	* 63.31
* Vel Total (ft/s)	* 3.23	* Avg. vel. (ft/s)	* 1.56	* 4.59	* 3.08
* Max Chl Dpth (ft)	* 5.08	* Hydr. Depth (ft)	* 1.93	* 4.65	* 2.31
* Conv. Total (cfs)	* 21915.8	* Conv. (cfs)	* 2046.3	* 9076.5	* 10793.1
* Length wtd. (ft)	* 118.49	* Wetted Per. (ft)	* 29.52	* 19.75	* 63.61
* Min Ch El (ft)	* 890.56	* Shear (lb/sq ft)	* 0.20	* 0.45	* 0.25

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\* Alpha \* 1.31 \* Stream Power (lb/ft s) \* 274.46 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.23 \* Cum Volume (acre-ft) \* 3.71 \* 6.49 \* 3.15 \*  
 \* C & E Loss (ft) \* 0.01 \* Cum SA (acres) \* 2.10 \* 1.38 \* 1.62 \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 3679.344

INPUT

Description:

Station Elevation Data num= 74											
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	917	17.8	908.03	20.8	909.5	30.95	909.83	41.1	909.35		
43.66	909.32	44.26	909.29	45.58	909.2	45.72	909.18	45.81	909.15		
46.28	908.85	47.42	908	48.61	907.25	50.45	906	53.35	904.03		
53.4	904	56.66	902	57.83	901.27	59.85	900	61.27	899.07		
63.05	898	65.03	896.76	66.09	896	66.61	895.7	68.77	894.44		
69.03	894.41	72.17	894	76.19	893.47	76.6	893.46	83.62	892.54		
85.68	892.63	86.96	892.39	87.28	892.38	87.45	892.38	101.05	893.07		
121.9	893.22	127.66	893.26	130.6	892.28	131.49	892	133.66	891.27		
139.17	890.11	139.69	890.05	140.04	890	149.06	890	152.35	890.26		
154.2	890.43	155.22	891.76	155.42	892	155.63	892.2	156.5	893.66		
156.98	893.71	158.35	893.85	160.46	894	166.62	894.48	170.66	894.89		
181.56	896	184.14	896.48	191.23	898	197.13	899.68	198.21	900		
199.35	900.32	204.29	902	208.51	902.96	212.33	904	221.63	905.77		
222.81	906	227.86	906.97	231	907.55	233.33	908	233.6	908.05		
234.13	908.14	241.32	909.64	242.93	909.92	243.8	910				

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	127.66	.035	156.5	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 127.66 156.5 90.48 111.12 141.6 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 895.62	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.30	* Wt. n-Val.	* 0.060	* 0.035	* 0.100
* W.S. Elev (ft)	* 895.32	* Reach Len. (ft)	* 90.48	* 111.12	* 141.60
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 130.90	* 130.33	* 15.90
* E.G. slope (ft/ft)	* 0.002082	* Area (sq ft)	* 130.90	* 130.33	* 15.90
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 246.67	* 657.95	* 9.77
* Top width (ft)	* 107.58	* Top width (ft)	* 60.39	* 28.84	* 18.35
* Vel Total (ft/s)	* 3.30	* Avg. Vel. (ft/s)	* 1.88	* 5.05	* 0.61
* Max chl Dpth (ft)	* 5.32	* Hydr. Depth (ft)	* 2.17	* 4.52	* 0.87
* Conv. Total (cfs)	* 20037.9	* Conv. (cfs)	* 5405.5	* 14418.2	* 214.2

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* Length wtd. (ft)      * 111.13 * Wetted Per. (ft)      * 60.80 * 30.99 * 18.43 *
* Min Ch El (ft)      * 890.00 * Shear (lb/sq ft)     * 0.28 * 0.55 * 0.11 *
* Alpha                * 1.77 * Stream Power (lb/ft s) * 243.80 * 0.00 * 0.00 *
* Frctn Loss (ft)     * 0.36 * Cum Volume (acre-ft) * 3.47 * 6.21 * 2.90 *
* C & E Loss (ft)     * 0.05 * Cum SA (acres)       * 1.99 * 1.32 * 1.49 *
*****
```

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 3568.220

INPUT

Description:

Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	904	1.5	902.83	4.8	904.23	15.9	904.25	26.9	903.5
30.2	901.9	35.15	904	36.03	903.97	38.62	902.02	38.63	902
38.9	901.8	41.38	900	42.01	899.51	44.29	898	45.11	897.45
47.26	896	48.64	895.12	50.32	894	51.25	893.35	51.63	893.09
53.9	892.71	57.21	892.16	58.22	892	59.62	891.79	62.87	891.46
65.93	890.81	67.99	890	69.28	889.4	70.79	889.26	74.47	889.18
76.96	889.19	77.18	889.54	78.55	890.71	79.66	891.4	93.83	891.58
104.42	891.72	108.05	892	109.92	892	125.74	893.73	128.13	894
142.95	895.6	144.52	895.76	147.17	896	153.48	897.16	157	898
162.83	899.38	165.33	900	167.02	900.42	173.69	902	179.27	903.57
180.67	904	182.35	904.52	187.1	906	192.78	907.83	193.31	908
199.65	910								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	62.87	.035	79.66	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 62.87 79.66 84.06 127.97 121.99 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft)      * 895.21 * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)      * 0.75 * Wt. n-val.            * 0.060 * 0.035 * 0.100 *
* W.S. Elev (ft)     * 894.46 * Reach Len. (ft)      * 84.06 * 127.97 * 121.99 *
* Crit w.s. (ft)     *      * Flow Area (sq ft)    * 26.80 * 75.66 * 113.48 *
* E.G. Slope (ft/ft) * 0.005604 * Area (sq ft)        * 26.80 * 75.66 * 113.48 *
* Q Total (cfs)      * 914.40 * Flow (cfs)          * 77.42 * 626.93 * 210.05 *
* Top width (ft)     * 82.75 * Top Width (ft)      * 13.24 * 16.79 * 52.73 *
*****
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* Vel Total (ft/s)	* 4.23	* Avg. Vel. (ft/s)	* 2.89	* 8.29	* 1.85
* Max Chl Dpth (ft)	* 5.28	* Hydr. Depth (ft)	* 2.02	* 4.51	* 2.15
* Conv. Total (cfs)	* 12214.6	* Conv. (cfs)	* 1034.2	* 8374.5	* 2805.9
* Length Wtd. (ft)	* 119.69	* Wetted Per. (ft)	* 13.79	* 17.97	* 52.87
* Min Ch El (ft)	* 889.18	* Shear (lb/sq ft)	* 0.68	* 1.47	* 0.75
* Alpha	* 2.71	* Stream Power (lb/ft s)	* 199.65	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.59	* Cum Volume (acre-ft)	* 3.31	* 5.95	* 2.69
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 1.91	* 1.26	* 1.38

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 3438.299

INPUT  
 Description:

Station Elevation Data		num= 74									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	7	918	8.77	917.5	13.97	916	17.61	915.1		
21.61	914	28.86	912.31	30.16	912	36.84	910.38	38.42	910		
46.44	908.12	46.92	908	48.28	907.68	52.95	906.58	55.13	906		
55.3	905.95	58.55	905.12	58.59	905.09	59.96	904	62.63	902.24		
62.93	902	63.19	901.78	65.64	900	66.29	899.54	68.33	898		
72.61	896	75.5	897.44	85.5	897.3	95.5	897.4	98.2	896		
101.12	894.65	103.13	894	103.68	893.87	105.18	893.4	141.78	892.44		
149.76	892.17	155.05	892	156.57	892	166.51	891.96	177.29	891.92		
178.99	891.91	180.36	891.37	187.51	888.64	187.6	888.58	187.7	888.56		
187.79	888.55	187.82	888.55	192.76	888.21	193.05	888.22	193.62	888.5		
194.72	889	196.89	890	200.32	891.58	201.2	892	205.23	893.86		
205.58	894.16	205.7	894.21	209.4	896	209.81	896.21	213.5	898		
214.47	898.45	215.49	898.95	217.63	900	221.32	901.8	221.73	902		
223.5	902.85	225.96	903.74	226.64	904	227.33	904.25	231.9	906		
237.38	907.73	238.22	908	239.71	908.48	244.87	910				

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	178.99	.035	201.2	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 178.99 201.2 128.72 150.25 115.25 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 894.57	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.58	* Wt. n-Val.	* 0.060	* 0.035	* 0.035
* W.S. Elev (ft)	* 893.99	* Reach Len. (ft)	* 128.72	* 150.25	* 115.25
* Crit W.S. (ft)	* 893.60	* Flow Area (sq ft)	* 111.98	* 94.44	* 4.29
* E.G. Slope (ft/ft)	* 0.004360	* Area (sq ft)	* 111.98	* 94.44	* 4.29

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```

* Q Total (cfs) * 914.40 * Flow (cfs) * 237.27 * 665.73 * 11.40 *
* Top Width (ft) * 102.22 * Top width (ft) * 75.82 * 22.21 * 4.18 *
* Vel Total (ft/s) * 4.34 * Avg. Vel. (ft/s) * 2.12 * 7.05 * 2.66 *
* Max Chl Dpth (ft) * 5.78 * Hydr. Depth (ft) * 1.48 * 4.25 * 1.02 *
* Conv. Total (cfs) * 13848.1 * Conv. (cfs) * 3593.4 * 10082.1 * 172.7 *
* Length Wtd. (ft) * 146.61 * Wetted Per. (ft) * 75.93 * 23.68 * 4.64 *
* Min Ch El (ft) * 888.21 * Shear (lb/sq ft) * 0.40 * 1.09 * 0.25 *
* Alpha * 1.99 * Stream Power (lb/ft s) * 244.87 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.91 * Cum Volume (acre-ft) * 3.17 * 5.70 * 2.53 *
* C & E Loss (ft) * 0.07 * Cum SA (acres) * 1.82 * 1.20 * 1.30 *
*****

```

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 3282.877

INPUT

Description:

Station Elevation Data num= 66

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	4.37	908.5	5.75	908	6.31	907.81	11.97	906
16.07	904.54	17.7	904	19.81	903.26	23.62	902	26.06	901.11
29.43	900	31.4	899.31	35.21	898	35.57	897.93	41.7	897.73
51.7	898.13	61.7	897.74	65.2	896	66.65	894.76	69.14	894.74
69.58	894.82	71.26	895.01	86.76	894.24	91.81	894	127.63	892.86
141.05	892.33	144.37	892.2	149.62	892	152.84	891.8	157.55	891.51
157.83	891.11	158.65	890	159.49	888.77	160.25	888	160.32	887.85
160.34	887.83	167.31	887.94	170.19	887.97	170.87	888	173.27	888.1
173.41	888.1	173.56	888.14	178.77	889.38	180.85	890	182.32	890.38
183.56	890.74	189.69	891.12	198.43	891.65	205.03	892	214.64	893.93
215.04	894	217.75	895.8	218.04	896	220.84	897.86	221.04	898
221.25	898.14	223.89	900	225.25	900.92	226.98	902	227.68	902.44
230.45	904	232.54	904.97	234.77	906	238.21	907.66	238.96	908
243.2	910								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	157.55	.035	183.56	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 157.55 183.56 131.38 138.39 148.67 .1 .3



CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft)      * 893.59 * Element          * Left OB * Channel * Right OB *
* Vel Head (ft)      * 1.29  * Wt. n-val.      * 0.035  * 0.035  * 0.100  *
* W.S. Elev (ft)     * 892.30 * Reach Len. (ft) * 131.38 * 138.39 * 148.67 *
* Crit W.S. (ft)     * 892.30 * Flow Area (sq ft) * 5.53  * 94.34  * 19.80  *
* E.G. Slope (ft/ft) * 0.009580 * Area (sq ft)    * 5.53  * 94.34  * 19.80  *
* Q Total (cfs)      * 914.40 * Flow (cfs)      * 11.42 * 876.95 * 26.02  *
* Top Width (ft)     * 64.76 * Top Width (ft)  * 15.78 * 26.01  * 22.97  *
* Vel Total (ft/s)   * 7.64  * Avg. vel. (ft/s) * 2.06  * 9.30   * 1.31   *
* Max chl dpth (ft) * 4.47  * Hydr. Depth (ft) * 0.35  * 3.63   * 0.86   *
* Conv. Total (cfs)  * 9342.4 * Conv. (cfs)     * 116.7 * 8959.8 * 265.9  *
* Length wtd. (ft)   * 138.49 * Wetted Per. (ft) * 15.80 * 28.20  * 23.04  *
* Min Ch El (ft)     * 887.83 * Shear (lb/sq ft) * 0.21  * 2.00   * 0.51   *
* Alpha              * 1.42  * Stream Power (lb/ft s) * 243.20 * 0.00   * 0.00   *
* Frctn Loss (ft)    * 1.20  * Cum Volume (acre-ft) * 3.00  * 5.38   * 2.50   *
* C & E Loss (ft)    * 0.08  * Cum SA (acres)    * 1.69  * 1.12   * 1.26   *
*****
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 3129.654

INPUT

Description:

Station Elevation Data		num=		69							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	8.57	908	14.45	906.66	17.22	906	25.46	904.05		
25.7	904	25.92	903.96	28.5	903.52	35.6	902	38.6	901.43		
46.03	900	47.73	899.68	54.17	898.43	55.1	898	64.6	893.2		
67.7	894.7	77.7	895.06	87.6	894.63	92.9	892	94.46	890.63		
94.47	890.63	95.65	890.83	97.65	890.9	98.64	890.9	107.86	891.19		
109.72	891.31	119.23	892	124.68	892.4	128.93	892.69	139.1	892.94		
144.81	893.18	155.08	893.45	156.96	893.46	178.83	893.05	183.17	892.94		
185.79	892.9	185.98	892.89	194.86	892.4	195.22	892.17	195.41	892		
197.77	890.47	198.53	890	200.07	888	201	886.61	225	886.61		
226.81	888.84	228.08	890	228.93	890.81	230.23	892	231.22	892.85		

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232.47	894	234.48	895.57	235	896	236.24	897.08	236.96	897.71
237.3	898	239.49	899.89	239.61	900	239.79	900.16	240.99	901.2
241.87	902	243.65	903.61	244.07	904	244.33	904.22	246.1	906
247.29	907.04	248.37	908	250.21	909.58	251.32	910		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.06	194.86	.035	230.23	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	194.86	230.23		41.42	177.15	191.92	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 891.75	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.03	* Wt. n-Val.	* 0.060	* 0.035	*
* W.S. Elev (ft)	* 890.72	* Reach Len. (ft)	* 41.42	* 177.15	* 191.92
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 0.03	* 112.10	*
* E.G. Slope (ft/ft)	* 0.007870	* Area (sq ft)	* 0.03	* 112.10	*
* Q Total (cfs)	* 914.40	* Flow (cfs)	* 0.01	* 914.39	*
* Top Width (ft)	* 32.06	* Top width (ft)	* 0.62	* 31.44	*
* Vel Total (ft/s)	* 8.15	* Avg. vel. (ft/s)	* 0.26	* 8.16	*
* Max Chl Dpth (ft)	* 4.11	* Hydr. Depth (ft)	* 0.04	* 3.57	*
* Conv. Total (cfs)	* 10307.4	* Conv. (cfs)	* 0.1	* 10307.3	*
* Length wtd. (ft)	* 149.21	* Wetted Per. (ft)	* 0.66	* 35.17	*
* Min Ch El (ft)	* 886.61	* Shear (lb/sq ft)	* 0.02	* 1.57	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	* 251.32	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.73	* Cum Volume (acre-ft)	* 2.99	* 5.05	* 2.46
* C & E Loss (ft)	* 0.20	* Cum SA (acres)	* 1.66	* 1.03	* 1.22

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 2951.927

INPUT

Description:

Station Elevation Data num= 57

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	908.12	1.19	908	3.23	908	6.78	906.8	9.26	906
46	887.85	49.3	889.23	60.36	888.93	71.4	888.11	72.05	888

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81.63	886.67	81.99	886.58	83.4	886.54	90.81	886.38	98.79	886.12
101.06	886.12	101.09	886.12	101.1	886.12	105.46	886.83	116.85	888
122.73	888.47	129.85	889.05	133.31	889.2	135.43	889	135.45	888.99
136.26	888	137.32	886.78	137.9	886	138.17	885.73	138.81	885.19
153.57	885.52	154.19	886	155.46	887.19	156.45	888	157.77	888.97
158.24	889.41	159.55	889.91	162.78	891.13	165.23	892	169.05	893.47
170.53	894	173.86	895.16	175.09	895.58	176.25	896	177.64	896.43
183.13	898	188.56	899.58	190.02	900	191.17	900.32	195.17	901.45
197.15	902	201.59	903.22	202.74	903.5	204.78	904	207.94	904.56
214.36	906	255.68	916						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	135.43	.035	157.77	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	135.43	157.77		5.71	75.59	135.21	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 890.83	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.38	* Wt. n-Val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 890.44	* Reach Len. (ft)	* 5.71	* 75.59	* 135.21
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 244.85	* 99.95	* 2.00
* E.G. slope (ft/ft)	* 0.003438	* Area (sq ft)	* 244.85	* 99.95	* 2.00
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 398.51	* 621.51	* 1.18
* Top width (ft)	* 120.22	* Top Width (ft)	* 94.68	* 22.34	* 3.20
* Vel Total (ft/s)	* 2.94	* Avg. vel. (ft/s)	* 1.63	* 6.22	* 0.59
* Max Chl Dpth (ft)	* 5.25	* Hydr. Depth (ft)	* 2.59	* 4.47	* 0.62
* Conv. Total (cfs)	* 17417.5	* Conv. (cfs)	* 6796.9	* 10600.4	* 20.2
* Length wtd. (ft)	* 52.70	* Wetted Per. (ft)	* 95.89	* 25.31	* 3.56
* Min Ch El (ft)	* 885.19	* Shear (lb/sq ft)	* 0.55	* 0.85	* 0.12
* Alpha	* 2.83	* Stream Power (lb/ft s)	* 255.68	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.19	* Cum Volume (acre-ft)	* 2.87	* 4.62	* 2.46
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 1.62	* 0.92	* 1.22

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 2875.345

INPUT

Description:

Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	908	7.92	906	11.54	905.11	15.9	904	18.25	903.39
23.72	902	23.78	901.98	23.84	901.97	29.02	900.38	30.28	900
35.56	898.45	37.08	898	38.58	897.57	43.81	896	46.71	895.29

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51.08	894	55.6	892.88	59.25	892	63.64	890.93	67.52	890
71.69	888.98	75.83	888	118.56	886.06	138.34	885.52	140.27	884.64
152.36	884.64	154.47	886	154.8	886.19	156.01	887.08	157.94	887.16
168.75	887.95	168.94	888	175.31	889.65	176.66	890	180.14	890.92
183.87	891.85	184.49	892	191.42	893.77	192.43	894	195.55	894.73
200.18	895.7	201.94	896	214.35	897.62	224.9	899.03	227.92	899.42
233.12	900	254.5	901.9	255.52	902	268.07	903.27	271.36	903.54
276.96	904	292.96	905.2	306.22	906	322.22	906.92	330.2	907.24
355.28	908	359.55	908.13	360.14	908.16	361.76	908.26	364.83	908.43
368	908.69	375.23	909.27	383.06	910				

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 138.34 .035 156.01 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 138.34 156.01 20.87 29.24 34.41 .1 .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 78.63 134.4 887.26 T  
 166.4 175 889.05 T

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 890.63	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.55	* Wt. n-Val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 890.07	* Reach Len. (ft)	* 2.60	* 2.60	* 2.60
* Crit W.S. (ft)	* 889.17	* Flow Area (sq ft)	* 185.20	* 90.76	* 36.42
* E.G. Slope (ft/ft)	* 0.003585	* Area (sq ft)	* 223.49	* 90.76	* 41.54
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 311.06	* 663.68	* 46.46
* Top width (ft)	* 109.69	* Top width (ft)	* 71.11	* 17.67	* 20.91
* Vel Total (ft/s)	* 3.27	* Avg. Vel. (ft/s)	* 1.68	* 7.31	* 1.28
* Max Chl Dpth (ft)	* 5.43	* Hydr. Depth (ft)	* 2.60	* 5.14	* 1.74
* Conv. Total (cfs)	* 17054.5	* Conv. (cfs)	* 5194.9	* 11083.7	* 775.9
* Length wtd. (ft)	* 2.60	* Wetted Per. (ft)	* 71.41	* 18.60	* 21.21
* Min Ch El (ft)	* 884.64	* Shear (lb/sq ft)	* 0.58	* 1.09	* 0.38
* Alpha	* 3.34	* Stream Power (lb/ft s)	* 383.06	* 0.00	* 0.00
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	* 2.84	* 4.45	* 2.39
* C & E Loss (ft)	*	* Cum SA (acres)	* 1.61	* 0.88	* 1.18

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

BRIDGE

RIVER: Bluestone Creek  
 REACH: Lower RS: 2862.727

INPUT

Description:

Distance from Upstream XS = 2.6  
 Deck/Roadway Width = 13  
 Weir Coefficient = 2.6

Upstream Deck/Roadway Coordinates

num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
60.83	888		69.75	887.26		83.18	888	
130.4	889.05		134.4	889.05	887.21	166.4	889.05	887.21
170.4	889.05		182.8	889				

Upstream Bridge Cross Section Data

Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	908	7.92	906	11.54	905.11	15.9	904	18.25	903.39
23.72	902	23.78	901.98	23.84	901.97	29.02	900.38	30.28	900
35.56	898.45	37.08	898	38.58	897.57	43.81	896	46.71	895.29
51.08	894	55.6	892.88	59.25	892	63.64	890.93	67.52	890
71.69	888.98	75.83	888	118.56	886.06	138.34	885.52	140.27	884.64
152.36	884.64	154.47	886	154.8	886.19	156.01	887.08	157.94	887.16
168.75	887.95	168.94	888	175.31	889.65	176.66	890	180.14	890.92
183.87	891.85	184.49	892	191.42	893.77	192.43	894	195.55	894.73
200.18	895.7	201.94	896	214.35	897.62	224.9	899.03	227.92	899.42
233.12	900	254.5	901.9	255.52	902	268.07	903.27	271.36	903.54
276.96	904	292.96	905.2	306.22	906	322.22	906.92	330.2	907.24
355.28	908	359.55	908.13	360.14	908.16	361.76	908.26	364.83	908.43
368	908.69	375.23	909.27	383.06	910				

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	138.34	.035	156.01	.1

Bank Sta: Left Right Coeff Contr. Expan.

138.34 156.01 .1 .3

Ineffective Flow

num= 2

Sta L	Sta R	Elev	Permanent
78.63	134.4	887.26	T
166.4	175	889.05	T

Downstream Deck/Roadway Coordinates

num= 8

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
35.75	888		53.6	887.26		72.26	888	
116.8	889.05		120.8	889.05	887.21	152.8	889.05	887.21
156.8	889.05		195.6	889				

Downstream Bridge Cross Section Data

Station Elevation Data num= 75

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Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	6.22	908.17	6.82	908	13.37	906.07	13.62	906
16.31	905.2	20.55	904	20.86	903.91	27.43	901.99	34.42	900
34.85	899.88	41.47	898	48.23	896.15	48.76	896	56.9	894.11
57.4	894.01	57.45	894	66.03	892.22	67.09	892	70.75	891.25
76.81	890	82.15	888.91	85.39	888	91.5	886.3	116.35	886.05
119.95	886	124.93	885.92	125	885.91	127.77	884.44	141.02	884.44
144.39	886.93	148.49	887.01	148.96	886.91	151.56	886.9	155.53	886.61
160.15	886	163.43	885.54	164.73	886	165.23	886	165.68	886.22
166.67	887	172.27	887.34	176.91	887.62	179.55	888	184.89	888.81
190.72	890	197.52	891.37	200.59	892	204.67	892.81	207.71	893.41
211.26	894	213.32	894.31	217.45	894.79	229.11	896	239.25	897.09
242.76	897.4	250.7	898.01	267.78	899.11	279.26	900	285.83	900.52
293.51	901.1	299.82	901.53	306.61	902	306.93	902.02	313.94	902.57
322.97	903.16	327.48	903.48	333.23	903.78	333.62	903.79	334.09	903.82
338.43	904	348.61	904.37	349.75	904.41	355.81	904.66	374.49	906

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 124.93 .035 144.39 .035

Bank Sta: Left Right Coeff Contr. Expan.  
 124.93 144.39 .1 .3  
 Ineffective Flow num= 2  
 Sta L Sta R Elev Permanent  
 78.6 100.6 887.26 T  
 152.8 188 889.05 T

Upstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 0 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .98  
 Elevation at which weir flow begins =  
 Energy head used in spillway design =  
 Spillway height used in design =  
 Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data  
 Energy  
 Selected Low Flow Methods = Highest Energy Answer

High Flow Method  
 Pressure and weir flow  
 Submerged Inlet Cd =  
 Submerged Inlet + Outlet Cd = .8  
 Max Low Cord =

Additional Bridge Parameters  
 Add Friction component to Momentum

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

BRIDGE OUTPUT Profile #PF 1

```

*****
* E.G. US. (ft)      *      890.63 * Element          *Inside BR US *Inside BR DS *
* W.S. US. (ft)     *      890.07 * E.G. Elev (ft)  *      890.62 *      890.62 *
* Q Total (cfs)     *     1021.20 * W.S. Elev (ft)  *      890.07 *      890.07 *
* Q Bridge (cfs)    *      282.18 * Crit W.S. (ft)  *      890.09 *      890.08 *
* Q Weir (cfs)      *      739.02 * Max chl Dpth (ft) *      5.43 *      5.63 *
* Weir Sta Lft (ft) *      64.92 * Vel Total (ft/s) *      4.05 *      4.16 *
* Weir Sta Rgt (ft) *     179.02 * Flow Area (sq ft) *     252.08 *     245.28 *
* Weir Submerg      *      0.54 * Froude # chl    *      0.54 *      0.50 *
* Weir Max Depth (ft) *      2.81 * Specif Force (cu ft) *     501.37 *     503.33 *
* Min El Weir Flow (ft) *     888.30 * Hydr Depth (ft) *      2.30 *      2.14 *
* Min El Prs (ft)   *     887.21 * W.P. Total (ft)  *     161.07 *     181.74 *
* Delta EG (ft)     *      0.37 * Conv. Total (cfs) *      *      *
* Delta WS (ft)     *      0.32 * Top width (ft)   *     109.69 *     114.59 *
* BR Open Area (sq ft) *     46.87 * Frctn Loss (ft)  *      *      *
* BR Open Vel (ft/s) *      6.02 * C & E Loss (ft)  *      *      *
* Coef of Q         *      * Shear Total (lb/sq ft) *      *      *
* Br Sel Method     * Press/weir * Power Total (lb/ft s) *     0.00 *     0.00 *
*****
    
```

- Note: The downstream water surface is above the minimum elevation required for orifice flow. The orifice flow equation was used for pressure flow.
- Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
- Note: For the cross section inside the bridge at the upstream end, the water surface and energy have been projected from the upstream cross section. The selected bridge modeling method does not compute answers inside the bridge.
- Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
- Note: For the cross section inside the bridge at the downstream end, the water surface and energy have been projected from the downstream cross section. The selected bridge modeling method does not compute answers inside the bridge.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 2846.103

INPUT

Description:

Station Elevation Data		num=	75						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	6.22	908.17	6.82	908	13.37	906.07	13.62	906

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16.31	905.2	20.55	904	20.86	903.91	27.43	901.99	34.42	900
34.85	899.88	41.47	898	48.23	896.15	48.76	896	56.9	894.11
57.4	894.01	57.45	894	66.03	892.22	67.09	892	70.75	891.25
76.81	890	82.15	888.91	85.39	888	91.5	886.3	116.35	886.05
119.95	886	124.93	885.92	125	885.91	127.77	884.44	141.02	884.44
144.39	886.93	148.49	887.01	148.96	886.91	151.56	886.9	155.53	886.61
160.15	886	163.43	885.54	164.73	886	165.23	886	165.68	886.22
166.67	887	172.27	887.34	176.91	887.62	179.55	888	184.89	888.81
190.72	890	197.52	891.37	200.59	892	204.67	892.81	207.71	893.41
211.26	894	213.32	894.31	217.45	894.79	229.11	896	239.25	897.09
242.76	897.4	250.7	898.01	267.78	899.11	279.26	900	285.83	900.52
293.51	901.1	299.82	901.53	306.61	902	306.93	902.02	313.94	902.57
322.97	903.16	327.48	903.48	333.23	903.78	333.62	903.79	334.09	903.82
338.43	904	348.61	904.37	349.75	904.41	355.81	904.66	374.49	906

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	124.93	.035	144.39	.035

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

124.93	144.39	174.03	63.81	6.65	.1	.3
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Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
78.6	100.6	887.26	T
152.8	188	889.05	T

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 890.26	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.51	* Wt. n-Val.	* 0.100	* 0.035	* 0.035
* W.S. Elev (ft)	* 889.75	* Reach Len. (ft)	* 174.03	* 63.81	* 6.65
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 131.92	* 96.91	* 47.99
* E.G. Slope (ft/ft)	*0.003398	* Area (sq ft)	* 142.73	* 96.91	* 112.02
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 226.33	* 672.33	* 122.54
* Top width (ft)	* 111.42	* Top width (ft)	* 46.87	* 19.46	* 45.08
* Vel Total (ft/s)	* 3.69	* Avg. Vel. (ft/s)	* 1.72	* 6.94	* 2.55
* Max Chl Dpth (ft)	* 5.31	* Hydr. Depth (ft)	* 2.81	* 4.98	* 1.06
* Conv. Total (cfs)	* 17519.9	* Conv. (cfs)	* 3883.0	* 11534.5	* 2102.3
* Length wtd. (ft)	* 66.18	* Wetted Per. (ft)	* 47.32	* 20.65	* 45.78
* Min Ch El (ft)	* 884.44	* Shear (lb/sq ft)	* 0.59	* 1.00	* 0.22
* Alpha	* 2.43	* Stream Power (lb/ft s)	* 374.49	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.22	* Cum Volume (acre-ft)	* 2.77	* 4.40	* 2.35
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 1.57	* 0.87	* 1.15

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower

RS: 2773.556



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INPUT  
Description:

Station Elevation Data num= 61

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	4	908	4.48	907.77	8.06	906	9.5	905.28
12.21	904	15.94	902.15	16.25	902	17.11	901.56	19.32	900.6
20.71	900	23.17	898.85	25.11	898	25.22	897.96	28.87	896.36
29.33	896.15	29.36	896.13	29.5	896	29.67	895.82	31.56	894
32.23	893.28	33.63	892	34.36	891.29	35.47	890.54	36.27	890
38.33	888.36	38.82	888	40.75	886.63	41.65	886	42.36	885.47
42.46	885.39	44.53	883.92	44.55	883.92	55.28	883.97	56.85	883.94
59.19	883.92	59.38	884	61.44	885.34	62.51	886	62.59	886.06
63.53	886.67	63.59	886.68	67.7	886.75	83.72	887.08	108.82	887.61
113.71	888	115.9	889	127.1	889.42	138.2	889.04	150.02	890
163.82	892	175.78	894	188.14	896	195.99	897.38	201.3	898
215.1	899.67	228.13	898.26	234.72	900	254.56	906	280.39	906
322.01	898								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	40.75	.035	63.53	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 40.75 63.53 88.56 82.82 18.59 .1 .3

Ineffective Flow num= 1  
 Sta L Sta R Elev Permanent  
 95.4 322.01 889.05 T

Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 127.1 322.01 889.42

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 890.03	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.56	* Wt. n-Val.	* 0.100	* 0.035	* 0.035
* W.S. Elev (ft)	* 889.47	* Reach Len. (ft)	* 88.56	* 82.82	* 18.59
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 5.57	* 115.10	* 91.28
* E.G. Slope (ft/ft)	* 0.003205	* Area (sq ft)	* 5.57	* 115.10	* 119.83
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 5.20	* 776.92	* 239.08
* Top width (ft)	* 106.57	* Top Width (ft)	* 3.82	* 22.78	* 79.98
* Vel Total (ft/s)	* 4.82	* Avg. vel. (ft/s)	* 0.93	* 6.75	* 2.62
* Max chl Dpth (ft)	* 5.55	* Hydr. Depth (ft)	* 1.46	* 5.05	* 1.14
* Conv. Total (cfs)	* 18039.6	* Conv. (cfs)	* 91.9	* 13724.3	* 4223.4
* Length wtd. (ft)	* 71.89	* Wetted Per. (ft)	* 4.76	* 24.45	* 80.23
* Min Ch El (ft)	* 883.92	* Shear (lb/sq ft)	* 0.23	* 0.94	* 0.23
* Alpha	* 1.56	* Stream Power (lb/ft s)	* 322.01	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.37	* Cum Volume (acre-ft)	* 2.48	* 4.25	* 2.33
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 1.47	* 0.84	* 1.14

OXF157-159Bridges.rep

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 2690.443

INPUT

Description:

Station Elevation Data		num= 72		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	7.23	907.07	9.64	906	12.9	904.66	15.2	904
17.27	903.42	17.87	903.18	17.93	903.16	18.52	902.66	19.52	901.8
19.72	901.63	21.59	900	22.47	899.26	24	898	24.89	897.21
26.31	896	27.35	895.03	28.55	894	29.91	892.83	30.74	892
31.41	891.45	33.29	890	35.18	888.26	35.52	888	35.84	887.72
37.88	886	40.12	884.1	40.24	884	40.81	883.53	40.84	883.5
42.71	883.5	56.6	883.34	56.73	883.57	57.01	884	57.57	884.92
58.02	886	58.29	886.56	58.32	886.58	58.41	886.57	58.49	886.57
58.52	886.56	58.57	886.56	69.58	886.77	77.51	887.56	79.69	887.95
79.79	887.95	79.91	887.95	79.97	887.96	79.98	887.96	80.04	888
80.1	888.03	80.24	888.04	82.17	888.19	99.08	889.56	99.56	889.6
105.18	890	114.8	890	120.4	887.63	125.1	889.12	136.4	889.4
147.4	888.96	150.7	889.55	162.15	889.74	165.26	890	177.63	891.13
187.62	892	189.6	892.21	192.53	892.49	197.36	894	225.94	906
243.74	906	308.6	892						

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	37.88	.035	58.29	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	37.88	58.29	143.99	173.74	92.68	.1	.3
Right Levee	Station=	105.18	Elevation=	890			

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 889.58	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.45	* Wt. n-Val.	* 0.100	* 0.035	* 0.035
* W.S. Elev (ft)	* 888.13	* Reach Len. (ft)	* 143.99	* 173.74	* 92.68
* Crit w.s. (ft)	* 888.13	* Flow Area (sq ft)	* 2.68	* 89.63	* 25.12
* E.G. slope (ft/ft)	* 0.009447	* Area (sq ft)	* 2.68	* 89.63	* 25.12
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 3.37	* 908.50	* 109.33
* Top width (ft)	* 46.02	* Top Width (ft)	* 2.53	* 20.41	* 23.08

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```

* Vel Total (ft/s)      * 8.70 * Avg. Vel. (ft/s)      * 1.26 * 10.14 * 4.35 *
* Max Chl Dpth (ft)    * 4.79 * Hydr. Depth (ft)     * 1.06 * 4.39 * 1.09 *
* Conv. Total (cfs)    * 10506.7 * Conv. (cfs)          * 34.7 * 9347.2 * 1124.8 *
* Length Wtd. (ft)     * 168.31 * Wetted Per. (ft)     * 3.30 * 23.28 * 23.19 *
* Min Ch El (ft)       * 883.34 * Shear (lb/sq ft)     * 0.48 * 2.27 * 0.64 *
* Alpha                 * 1.24 * Stream Power (lb/ft s) * 308.60 * 0.00 * 105.18 *
* Frctn Loss (ft)      * 1.30 * Cum volume (acre-ft) * 2.47 * 4.05 * 2.30 *
* C & E Loss (ft)      * 0.12 * Cum SA (acres)       * 1.46 * 0.80 * 1.12 *
*****

```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower

RS: 2515.269

INPUT

Description:

Station Elevation Data num= 73

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	910	7.06	908	11.47	906.79	14.7	906	20.49	904.53
20.84	904.43	27.19	902.78	30.1	902	31.92	901.53	37.75	900
41.22	898.37	42.08	898	45.84	896.17	46.19	896	47.68	895.27
49.99	894	50.43	893.75	53.57	892	54.47	891.48	57.12	890
58.34	889.31	60.69	888	62.18	887.15	68.07	886	71.85	885.28
75.35	884.61	77.1	884.27	87.55	884.1	87.98	883.82	89.91	882.68
90.2	882.5	91.58	881.57	91.7	881.47	92.28	881.25	99.15	881.3
104.87	881.69	107.35	881.59	107.45	881.74	107.7	882	109.16	883.43
109.6	884	111.33	885.7	111.64	886	112.38	886.9	113.08	886.88
131.72	886.8	140.18	886.76	144.29	886.84	144.83	886.71	147.47	886.33
147.55	886.32	147.68	886.31	149.36	886.28	150	886.27	155.8	886.17
157.03	886.18	157.46	886.19	157.51	886.2	157.79	886.27	161.85	887.31
164.61	888	166.38	888.47	168.76	888.95	173.79	889.7	177.59	890
183.28	890.64	194.83	892	201.18	892.85	203.5	894	228.69	906
243.7	906	291.75	891	299.36	891				

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 87.55 .035 112.38 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 87.55 112.38 217.05 95.01 46.45 .1 .3  
 Blocked Obstructions num= 1  
 Sta L Sta R Elev  
 \*\*\*\*\*  
 144.29 299.36 886.84

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 887.74 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 1.07 \* Wt. n-val. \* 0.100 \* 0.035 \* \*  
 \* W.S. Elev (ft) \* 886.68 \* Reach Len. (ft) \* 217.05 \* 95.01 \* 46.45 \*  
 \* Crit W.S. (ft) \* 885.92 \* Flow Area (sq ft) \* 41.11 \* 110.72 \* \*  
 \* E.G. Slope (ft/ft) \* 0.006419 \* Area (sq ft) \* 41.11 \* 110.72 \* \*  
 \* Q Total (cfs) \* 1021.20 \* Flow (cfs) \* 71.73 \* 949.47 \* \*  
 \* Top Width (ft) \* 47.59 \* Top Width (ft) \* 22.95 \* 24.65 \* \*  
 \* Vel Total (ft/s) \* 6.73 \* Avg. vel. (ft/s) \* 1.74 \* 8.58 \* \*  
 \* Max Chl Dpth (ft) \* 5.43 \* Hydr. Depth (ft) \* 1.79 \* 4.49 \* \*  
 \* Conv. Total (cfs) \* 12745.6 \* Conv. (cfs) \* 895.2 \* 11850.4 \* \*  
 \* Length Wtd. (ft) \* 118.00 \* Wetted Per. (ft) \* 23.18 \* 27.66 \* \*  
 \* Min Ch El (ft) \* 881.25 \* Shear (lb/sq ft) \* 0.71 \* 1.60 \* \*  
 \* Alpha \* 1.52 \* Stream Power (lb/ft s) \* 299.36 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.67 \* Cum Volume (acre-ft) \* 2.40 \* 3.65 \* 2.28 \*  
 \* C & E Loss (ft) \* 0.13 \* Cum SA (acres) \* 1.42 \* 0.71 \* 1.10 \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 2420.230

INPUT  
 Description:

Station Elevation Data num= 70  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 900 6.78 898.19 7.43 898 7.69 897.93 14.61 896  
 16.11 895.54 18.15 895.29 18.16 895.29 25.17 894 25.92 893.86  
 35.82 892 38.47 891.48 41.89 891.3 43.02 891.21 46.41 890.81  
 55.27 890 62.34 889.35 67.04 889.14 70.08 888.77 71.17 888.69  
 85.13 888.1 87.25 887.97 91.86 887.62 96.72 887.47 103.59 887.02  
 112.19 886 115.5 885.77 135.66 884.76 146.19 884.24 148.91 884.1  
 149.37 884.08 150.87 884 152.68 884 159.92 883.04 162.94 883.02  
 163.48 882.96 164.66 882.47 170.46 880.81 177.08 882.43 177.92 882.89  
 178.66 883.08 181.26 883.17 183.38 884 183.39 884 185.51 884.4  
 186.08 884.51 187.72 884.94 195.67 885.8 196.94 885.82 199.54 886  
 201 886 205.22 886.39 217.76 887.56 221.55 888 228.1 889.97

228.21	890	228.23	890.01	234.18	892	241.38	893.92	241.63	894
242.18	894.14	248.31	896	249.89	896.48	254.87	898	259.66	899.02
262.77	900	274.5	902	282.52	906	297.55	906	347.84	891

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 162.94 .035 178.66 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 162.94 178.66 144.52 97.6 53.98 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 886.94	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.64	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 886.30	* Reach Len. (ft)	* 144.52	* 97.60	* 53.98
* Crit W.S. (ft)	* 886.00	* Flow Area (sq ft)	* 86.05	* 69.57	* 32.13
* E.G. Slope (ft/ft)	* 0.005074	* Area (sq ft)	* 86.05	* 69.57	* 32.13
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 357.57	* 551.56	* 112.08
* Top width (ft)	* 94.63	* Top width (ft)	* 53.30	* 15.72	* 25.61
* Vel Total (ft/s)	* 5.44	* Avg. vel. (ft/s)	* 4.16	* 7.93	* 3.49
* Max Chl Dpth (ft)	* 5.49	* Hydr. Depth (ft)	* 1.61	* 4.43	* 1.25
* Conv. Total (cfs)	* 14336.4	* Conv. (cfs)	* 5019.8	* 7743.2	* 1573.4
* Length Wtd. (ft)	* 104.93	* Wetted Per. (ft)	* 53.43	* 16.39	* 25.94
* Min Ch El (ft)	* 880.81	* Shear (lb/sq ft)	* 0.51	* 1.34	* 0.39
* Alpha	* 1.40	* Stream Power (lb/ft s)	* 347.84	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.61	* Cum Volume (acre-ft)	* 2.08	* 3.46	* 2.26
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 1.23	* 0.67	* 1.08

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 2319.762

INPUT Description:

Station	Elevation	Data	num=	73
Sta	Elev	Sta	Elev	Sta
*****	*****	*****	*****	*****
0	910	5.56	908	9.72
16.47	904	16.72	903.9	20.77
27.95	898.55	29.6	898	36.72
48.89	892.36	50.03	892	51.97
74.36	888	83.71	887.49	86.45
106.95	886	121	885.4	133.84
148.54	884.16	151.75	884	157.82
166.93	882.54	167.8	882	169.81
181.14	880.74	183.94	880.76	184.09
185.1	882	186.07	883.3	186.49

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195.87	884.07	200.81	884.36	207.24	884.57	217.44	885.79	219.21	886
223.87	887.45	225.89	888	228.71	888.86	232.47	890	236.4	891.25
238.77	892	241.44	892.83	244.71	894	245.76	894.36	247.45	894.92
251.29	896	254.61	896.84	259.13	898	264.23	900	276.42	906
291.66	906	350.15	898	356.46	899				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	61.53	.035	165.14	.035	186.59	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	165.14	186.59		134.94	150.07	126.66	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 886.31	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.90	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 885.40	* Reach Len. (ft)	* 134.94	* 150.07	* 126.66
* Crit w.s. (ft)	* 885.40	* Flow Area (sq ft)	* 43.67	* 91.25	* 26.87
* E.G. Slope (ft/ft)	* 0.006756	* Area (sq ft)	* 43.67	* 91.25	* 26.87
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 151.06	* 778.24	* 91.90
* Top Width (ft)	* 93.25	* Top Width (ft)	* 44.19	* 21.45	* 27.61
* Vel Total (ft/s)	* 6.31	* Avg. vel. (ft/s)	* 3.46	* 8.53	* 3.42
* Max Chl Dpth (ft)	* 5.04	* Hydr. Depth (ft)	* 0.99	* 4.25	* 0.97
* Conv. Total (cfs)	* 12424.3	* Conv. (cfs)	* 1837.8	* 9468.3	* 1118.1
* Length Wtd. (ft)	* 145.02	* Wetted Per. (ft)	* 44.24	* 23.88	* 27.68
* Min Ch El (ft)	* 880.36	* Shear (lb/sq ft)	* 0.42	* 1.61	* 0.41
* Alpha	* 1.46	* Stream Power (lb/ft s)	* 356.46	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.56	* Cum Volume (acre-ft)	* 1.87	* 3.28	* 2.22
* C & E Loss (ft)	* 0.16	* Cum SA (acres)	* 1.07	* 0.62	* 1.05

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

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RIVER: Bluestone Creek  
 REACH: Lower

RS: 2130.340

INPUT  
 Description:

Station Elevation Data num= 59

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	4.24	898	8.45	896.17	8.83	896	12.36	894.31
13.06	894	15.34	892.93	17.51	892	18.83	891.4	21.78	890
23.73	889.09	26.16	888	28.82	886.83	30.68	886	34.3	884.08
34.44	884	46.93	884	64.55	883.35	66.26	883.33	83.85	882.83
87.75	882.82	92.7	882.85	97.42	882.44	102.24	882.02	102.28	882
102.47	882	103.93	881.54	108.79	880	108.8	880	110.72	879.17
121.83	879.34	122.47	879.47	123.34	879.66	123.86	880	124.7	880.89
125.46	881.67	128.94	881.96	129.47	882	139.26	882.8	139.78	882.84
150.18	883.68	154.28	884	155.67	884.2	171.07	886	174.76	887.33
176.62	888	179.69	889.07	182.27	890	187.27	891.74	188.04	892
188.57	892.19	190.3	892.82	193.28	894	194.19	894.34	198.38	896
202.82	897.67	203.62	898	204.93	898.28	211.79	900		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	34.3	.035	102.24	.035	125.46	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	102.24	125.46		155.78	149.95	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 885.21	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.38	* Wt. n-val.	* 0.035	* 0.035	* 0.100
* W.S. Elev (ft)	* 884.82	* Reach Len. (ft)	* 155.78	* 149.95	* 51.80
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 104.71	* 113.77	* 59.67
* E.G. Slope (ft/ft)	* 0.002468	* Area (sq ft)	* 104.71	* 113.77	* 59.67
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 292.22	* 666.92	* 62.07
* Top width (ft)	* 128.10	* Top width (ft)	* 69.34	* 23.22	* 35.54
* Vel Total (ft/s)	* 3.67	* Avg. vel. (ft/s)	* 2.79	* 5.86	* 1.04
* Max Chl Dpth (ft)	* 5.65	* Hydr. Depth (ft)	* 1.51	* 4.90	* 1.68
* Conv. Total (cfs)	* 20554.4	* Conv. (cfs)	* 5881.6	* 13423.5	* 1249.2
* Length Wtd. (ft)	* 137.17	* Wetted Per. (ft)	* 69.60	* 24.55	* 35.68
* Min Ch El (ft)	* 879.17	* Shear (lb/sq ft)	* 0.23	* 0.71	* 0.26
* Alpha	* 1.84	* Stream Power (lb/ft s)	* 211.79	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.55	* Cum Volume (acre-ft)	* 1.64	* 2.92	* 2.10
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 0.89	* 0.55	* 0.96

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

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

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 1966.255

INPUT  
 Description:

Station Elevation Data num= 69

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	5.23	898.17	5.74	898	6.1	897.83	9.72	896
10.42	895.66	13.86	894	18.05	892.1	18.28	892	18.61	891.84
22.42	890	22.94	889.75	24.79	888.87	26.62	888	26.82	887.92
30.62	886	34.59	884.14	34.88	884	35.54	883.71	35.6	883.68
35.66	883.6	37.04	882.73	38.14	882	40.64	880.32	41.13	880
43.41	878.48	43.71	878.29	44.34	878.22	47.69	878	49.52	878.11
51.47	878.2	52.64	878.27	53.05	878.3	55.22	879.85	55.49	880
57.33	881.17	57.56	881.3	69.86	881.66	74.97	881.81	82.02	882
92.59	882	125.94	883.3	129.75	883.43	140.41	883.78	144.43	883.86
148.98	884	149.2	884	153.88	884.37	154.56	884.41	172.42	886
173.13	886	177.73	887.75	178.35	888	178.88	888.23	182.01	889.49
183.05	889.85	183.44	890	188.03	891.62	189.05	892	193.51	893.68
194.39	894	200.37	895.88	200.85	896	209.78	897.95	210.04	898
210.89	898.12	212.9	898.4	223.91	899.32	225.35	900		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	38.14	.035	57.56	.06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 38.14 57.56 33.8 57.56 130.71 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 884.58	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.09	* Wt. n-Val.	* 0.100	* 0.035	* 0.060
* W.S. Elev (ft)	* 883.49	* Reach Len. (ft)	* 33.80	* 57.56	* 130.71
* Crit W.S. (ft)	* 883.49	* Flow Area (sq ft)	* 1.70	* 85.11	* 89.44
* E.G. Slope (ft/ft)	* 0.007780	* Area (sq ft)	* 1.70	* 85.11	* 89.44
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 1.62	* 798.24	* 221.34
* Top width (ft)	* 95.86	* Top width (ft)	* 2.31	* 19.42	* 74.13
* Vel Total (ft/s)	* 5.79	* Avg. vel. (ft/s)	* 0.95	* 9.38	* 2.47
* Max Chl Dpth (ft)	* 5.49	* Hydr. Depth (ft)	* 0.74	* 4.38	* 1.21
* Conv. Total (cfs)	* 11577.9	* Conv. (cfs)	* 18.4	* 9050.0	* 2509.4
* Length wtd. (ft)	* 72.84	* Wetted Per. (ft)	* 2.75	* 21.47	* 74.17
* Min Ch El (ft)	* 878.00	* Shear (lb/sq ft)	* 0.30	* 1.93	* 0.59
* Alpha	* 2.09	* Stream Power (lb/ft s)	* 225.35	* 0.00	* 0.00



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\* Frctn Loss (ft) \* 0.19 \* Cum Volume (acre-ft) \* 1.45 \* 2.58 \* 2.01 \*  
 \* C & E Loss (ft) \* 0.26 \* Cum SA (acres) \* 0.76 \* 0.47 \* 0.89 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

This may indicate the need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 1908.167

INPUT

Description:

Station Elevation Data num= 81

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	6.66	898	8.03	897.41	11.86	896	16.69	894.16
17.12	894	17.24	893.96	22.26	892	23.12	891.67	26.71	890.09
26.88	890.01	26.9	890.01	26.92	890	29.73	888.38	30.4	888
33.57	886.35	34.21	886	35.42	885.36	37.92	884	39.31	883.24
41.52	882	44.01	881.35	46.29	880.76	50.01	880	53.95	879.61
54.92	878.73	55.93	878.24	56.63	878.12	57.1	878	61.21	878
77.12	877.81	77.27	877.8	77.36	877.78	77.46	877.82	77.9	878
80.52	878.95	83.57	880	84.35	880.32	89.59	881.2	91.5	881.22
94.15	881.22	95.79	881.2	96.06	881.2	112.43	881.4	114.15	881.36
118.34	881.27	119.74	881.25	144.62	880.97	146.08	880.98	148.15	881.01
152.97	881.08	194.89	882	200.34	882	201.4	882.58	203.89	884
204.97	884.61	207.37	886	209.07	886.97	210.69	888	214.09	889.86
214.36	890	217.02	891.57	217.73	892	220.62	893.66	221.2	894
222.22	894.55	224.63	896	228.07	897.86	228.29	898	228.43	898.08
231.64	900	234.56	901.47	235.77	902	241.04	903.8	241.61	904
242.37	904.27	247.31	906	252.84	907.9	253.14	908	253.89	908.27
258.89	910								

Manning's n Values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	53.95	.035	89.59	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 53.95 89.59 32.1 87.51 147.51 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft) * 883.77 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.22 * Wt. n-Val. * 0.100 * 0.035 * 0.100 *
* W.S. Elev (ft) * 883.55 * Reach Len. (ft) * 32.10 * 87.51 * 147.51 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 39.00 * 175.63 * 244.57 *
* E.G. Slope (ft/ft) * 0.001302 * Area (sq ft) * 39.00 * 175.63 * 244.57 *
* Q Total (cfs) * 1021.20 * Flow (cfs) * 38.10 * 764.88 * 218.22 *
* Top width (ft) * 164.35 * Top width (ft) * 15.20 * 35.64 * 113.51 *
* Vel Total (ft/s) * 2.22 * Avg. vel. (ft/s) * 0.98 * 4.36 * 0.89 *
* Max Chl Dpth (ft) * 5.77 * Hydr. Depth (ft) * 2.57 * 4.93 * 2.15 *
* Conv. Total (cfs) * 28299.9 * Conv. (cfs) * 1055.7 * 21196.7 * 6047.5 *
* Length Wtd. (ft) * 94.87 * Wetted Per. (ft) * 15.86 * 36.64 * 113.93 *
* Min Ch El (ft) * 877.78 * Shear (lb/sq ft) * 0.20 * 0.39 * 0.17 *
* Alpha * 2.91 * Stream Power (lb/ft s) * 258.89 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.12 * Cum Volume (acre-ft) * 1.43 * 2.41 * 1.51 *
* C & E Loss (ft) * 0.00 * Cum SA (acres) * 0.76 * 0.44 * 0.61 *
*****
```

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 1819.717

INPUT

Description:

Station Elevation Data num= 70

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	3.28	898.86	5.79	898	7.47	897.42	11.46	896
15.35	894.44	16.75	894	17.93	893.63	22.92	892	26.61	890.88
29.17	890	35.05	888.36	36.29	888	38.23	887.43	43.17	886
47.53	884.74	49.95	884	50.68	883.76	50.98	883.66	54.2	882.79
56.79	882	66.45	882	87.72	881.89	89.13	881.88	91.71	881.97
93.19	881.92	96.73	881.7	102.39	881.33	103.96	881.22	111.98	880.66
117.45	880.15	119.05	880	121.35	879.74	122.15	879.66	125.56	878.42
126.41	878	127.09	877.64	128.26	877.31	148.11	877.31	148.72	877.89
148.84	878	150.38	879.83	150.57	880	150.62	880.03	151.26	880.79
153.89	880.71	161.76	880.36	169.9	880	194.12	880	196.25	881.53
196.59	882	197.12	882.39	199.36	884	199.94	884.42	202.08	886
202.95	886.61	204.89	888	206.62	889.18	207.73	890	210.57	891.97
210.61	892	210.69	892.05	213.29	894	214.63	894.92	216.1	896
218.26	897.56	218.82	898	219	898.12	219.13	898.23	221.6	900

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	122.15	.035	151.26	.1

OXF157-159Bridges.rep

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 122.15 151.26 135.34 155.41 187.82 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```

*****
* E.G. Elev (ft) * 883.65 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.25 * Wt. n-Val. * 0.100 * 0.035 * 0.100 *
* W.S. Elev (ft) * 883.40 * Reach Len. (ft) * 135.34 * 155.41 * 187.82 *
* Crit W.S. (ft) * * * Flow Area (sq ft) * 127.67 * 164.60 * 145.37 *
* E.G. Slope (ft/ft) * 0.001281 * Area (sq ft) * 127.67 * 164.60 * 145.37 *
* Q Total (cfs) * 1021.20 * Flow (cfs) * 100.91 * 759.46 * 160.83 *
* Top Width (ft) * 146.56 * Top width (ft) * 70.19 * 29.11 * 47.26 *
* Vel Total (ft/s) * 2.33 * Avg. vel. (ft/s) * 0.79 * 4.61 * 1.11 *
* Max Chl Dpth (ft) * 6.09 * Hydr. Depth (ft) * 1.82 * 5.65 * 3.08 *
* Conv. Total (cfs) * 28527.1 * Conv. (cfs) * 2818.8 * 21215.5 * 4492.7 *
* Length Wtd. (ft) * 153.97 * Wetted Per. (ft) * 70.48 * 31.11 * 48.46 *
* Min Ch El (ft) * 877.31 * Shear (lb/sq ft) * 0.14 * 0.42 * 0.24 *
* Alpha * 2.95 * Stream Power (lb/ft s) * 221.60 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.41 * Cum Volume (acre-ft) * 1.37 * 2.07 * 0.85 *
* C & E Loss (ft) * 0.10 * Cum SA (acres) * 0.73 * 0.37 * 0.34 *
*****
    
```

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 1647.228

INPUT

Description:

Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	5.62	898	5.64	897.99	6.01	897.86	11.02	896
13.79	894.81	15.33	894.08	15.49	894	15.57	893.95	19.28	892
19.79	891.74	23.17	890	23.49	889.83	26.85	888	28.44	887.18
30.7	886	32.6	884.99	34.41	884	52.25	882.38	58.78	882
63	882	69.97	881.71	70.39	881.7	74.85	881.57	117.71	880
142.63	880	149.45	879.86	156.13	879.51	168.98	878.82	169.85	878.78
170.32	878.75	170.34	878.74	171.41	878	172.53	876.88	172.73	876.72
174.68	876.66	179.39	876.45	179.95	876.39	182.33	876.57	182.38	876.58
183.21	877.91	183.27	878	183.52	878.58	184.43	880	184.56	880.3
185.37	881.86	185.45	882	185.56	882.2	186.63	884	186.83	884.36
187.79	886	188.06	886.48	189.01	888	189.6	889.12	190.21	890
190.49	890.65	191.23	892	191.47	892.49	191.55	892.63	192.42	892.97

195.03 894 197.53 894.93 198.32 895.24 200.28 896 204.32 897.5  
 205.62 898 210.98 900

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 170.32 .035 183.52 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 170.32 183.52 90.87 130.82 89.72 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 883.14 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 1.21 \* Wt. n-Val. \* 0.100 \* 0.035 \* 0.100 \*  
 \* W.S. Elev (ft) \* 881.93 \* Reach Len. (ft) \* 90.87 \* 130.82 \* 89.72 \*  
 \* Crit W.S. (ft) \* 881.93 \* Flow Area (sq ft) \* 167.15 \* 66.77 \* 3.32 \*  
 \* E.G. Slope (ft/ft) \* 0.008552 \* Area (sq ft) \* 167.15 \* 66.77 \* 3.32 \*  
 \* Q Total (cfs) \* 1021.20 \* Flow (cfs) \* 311.92 \* 705.15 \* 4.13 \*  
 \* Top Width (ft) \* 120.64 \* Top Width (ft) \* 105.55 \* 13.20 \* 1.89 \*  
 \* Vel Total (ft/s) \* 4.30 \* Avg. vel. (ft/s) \* 1.87 \* 10.56 \* 1.24 \*  
 \* Max Chl Dpth (ft) \* 5.54 \* Hydr. Depth (ft) \* 1.58 \* 5.06 \* 1.76 \*  
 \* Conv. Total (cfs) \* 11042.5 \* Conv. (cfs) \* 3372.9 \* 7625.0 \* 44.6 \*  
 \* Length wtd. (ft) \* 119.92 \* Wetted Per. (ft) \* 105.61 \* 15.14 \* 3.85 \*  
 \* Min Ch El (ft) \* 876.39 \* Shear (lb/sq ft) \* 0.84 \* 2.36 \* 0.46 \*  
 \* Alpha \* 4.21 \* Stream Power (lb/ft s) \* 210.98 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 0.52 \* Cum Volume (acre-ft) \* 0.91 \* 1.65 \* 0.53 \*  
 \* C & E Loss (ft) \* 0.23 \* Cum SA (acres) \* 0.45 \* 0.30 \* 0.23 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.  
 warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.  
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.  
 This may indicate the need for additional cross sections.  
 warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.  
 warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower

RS: 1512.215

INPUT

Description:

Station Elevation Data		num= 70		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	4.06	898	4.96	897.58	7.92	896	10.21	894.86		
11.9	894	14.4	892.76	17.98	892	23.23	890.92	26.38	890		
27.28	890	29.42	889.53	32.27	888.87	35.54	888	35.81	887.92		
42.16	886	44.62	885.22	46.31	884.61	48.34	884	50.87	883.19		
54.4	882	55.84	881.82	57.99	881.66	76.45	880	88.83	880		
99.97	880	107.35	879.87	107.92	879.88	108.29	879.1	108.63	879.06		
108.74	878.8	108.82	878	109.1	877.43	109.85	876	112.59	875.15		
113.7	874.99	114.86	875.32	118.78	875.52	118.98	875.64	120.38	875.68		
120.97	875.7	123.59	876	131.62	876.57	131.89	876.64	132.17	877.22		
133.25	877.3	142.04	878	142.11	878	142.17	878	164.5	878.9		
181.21	880	183.49	881.16	185.2	882	187.6	883.19	189.15	884		
191.65	885.25	193.09	886	194.99	886.91	197.15	888	200.1	889.57		
200.94	890	204.32	891.7	204.93	892	208.51	893.79	208.93	894		
212.62	895.82	212.97	896	214.73	896.89	217.35	898	222.08	900		

Manning's n Values		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.1	107.92	.035	132.17	.1		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	107.92	132.17		138.12	114.24	88.5	.1
							.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 881.78	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.45	* Wt. n-Val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 881.33	* Reach Len. (ft)	* 138.12	* 114.24	* 88.50
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 52.45	* 129.37	* 134.87
* E.G. slope (ft/ft)	* 0.002595	* Area (sq ft)	* 52.45	* 129.37	* 134.87
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 43.10	* 785.57	* 192.53
* Top width (ft)	* 122.24	* Top width (ft)	* 46.31	* 24.25	* 51.68
* Vel Total (ft/s)	* 3.22	* Avg. Vel. (ft/s)	* 0.82	* 6.07	* 1.43
* Max Chl Dpth (ft)	* 6.34	* Hydr. Depth (ft)	* 1.13	* 5.33	* 2.61
* Conv. Total (cfs)	* 20045.8	* Conv. (cfs)	* 846.0	* 15420.4	* 3779.4
* Length wtd. (ft)	* 112.91	* Wetted Per. (ft)	* 46.37	* 27.50	* 52.08
* Min Ch El (ft)	* 874.99	* Shear (lb/sq ft)	* 0.18	* 0.76	* 0.42
* Alpha	* 2.77	* Stream Power (lb/ft s)	* 222.08	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.22	* Cum Volume (acre-ft)	* 0.68	* 1.36	* 0.38
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 0.30	* 0.24	* 0.18

CROSS SECTION

RIVER: Bluestone Creek

REACH: Lower

RS: 1387.656

INPUT

Description:

Station Elevation Data		num= 70		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	4.63	898.25	5.26	898	8.92	896.57	10.39	896
11.02	895.6	12.7	894	14.59	892.2	14.78	892	15.33	891.36
17.11	890	17.57	889.6	19.84	888	20.99	887.14	22.45	886
23.88	884.9	25.09	884	26.09	883.25	27.84	882	28.85	881.22
30.33	880	47.89	878.16	49.68	878	57.7	878	62.24	877.92
69.27	877.79	71.24	877.78	74.42	877.78	74.47	877.77	74.53	877.77
75.04	876.93	75.75	876	76.14	875.31	76.95	874.61	82.68	874.55
82.72	874.55	95.38	874.69	96.98	875.11	97.58	876	97.87	876.48
98.07	876.74	106.69	877.83	107.19	877.9	111.17	878	112.77	878
117.81	879.51	120.18	879.73	123.39	880	126.53	880	127.15	880.32
127.37	880.34	129.09	880.54	132.08	882	136.9	882	168.4	883.21
185.85	884	195.97	885.49	198.86	886	199.36	886.28	202.59	888
203.55	888.6	206	890	207.69	890.91	209.6	892	211.61	893.16
213.15	894	216.36	895.85	216.62	896	217.31	896.4	222.27	900

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.1	74.42	.035	98.07	.1

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	74.42	98.07		183.7	132.16	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 881.53	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.35	* Wt. n-Val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 881.18	* Reach Len. (ft)	* 183.70	* 132.16	* 32.28
* Crit w.s. (ft)	*	* Flow Area (sq ft)	* 124.38	* 149.83	* 79.61
* E.G. Slope (ft/ft)	* 0.001534	* Area (sq ft)	* 124.38	* 149.83	* 79.61
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 140.39	* 797.29	* 83.53
* Top Width (ft)	* 101.51	* Top Width (ft)	* 45.52	* 23.65	* 32.34
* Vel Total (ft/s)	* 2.89	* Avg. vel. (ft/s)	* 1.13	* 5.32	* 1.05
* Max Chl Dpth (ft)	* 6.63	* Hydr. Depth (ft)	* 2.73	* 6.34	* 2.46
* Conv. Total (cfs)	* 26071.0	* Conv. (cfs)	* 3584.0	* 20354.6	* 2132.5
* Length Wtd. (ft)	* 130.35	* Wetted Per. (ft)	* 46.05	* 26.17	* 32.89
* Min Ch El (ft)	* 874.55	* Shear (lb/sq ft)	* 0.26	* 0.55	* 0.23
* Alpha	* 2.69	* Stream Power (lb/ft s)	* 222.27	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.36	* Cum Volume (acre-ft)	* 0.40	* 0.99	* 0.17
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 0.15	* 0.18	* 0.09

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

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

1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 1246.924

INPUT  
 Description:

Station Elevation Data num= 71

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	.46	899.63	.97	899.22	1.04	899.28	1.16	898
1.31	897.19	1.63	896	1.68	895.55	1.77	894.69	1.87	894
2.01	893.2	2.24	892	2.43	891.22	2.77	890	2.97	888.88
3.22	888	3.39	886.69	3.56	886	3.81	884.58	3.93	884
4.16	882.47	4.27	882	4.58	880.38	4.65	880	4.72	879.59
5	878	5.3	876.17	5.35	876	5.69	874.04	5.7	874
5.71	873.91	9.41	873.67	11.57	873.55	14.56	873.99	14.6	874
15.17	874.07	16.01	874.34	18.45	875.01	22.1	876	26.47	877.2
27.68	877.49	27.7	877.5	30.68	877.93	31.18	878	35.41	878.63
44.98	880	45.65	880	47.55	880.14	54.95	880.49	57.54	880.44
59.91	880.43	102.71	882	123.84	882	140	882.91	140.8	883.02
142.57	883.02	143.19	883.05	145.47	884	149.95	885.81	150.42	886
152.06	886.66	153.84	888	155.64	889.27	156.75	890	158.57	891.31
159.51	892	161.72	893.49	162.4	894	164.83	895.88	165	896
167.77	898								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	5	.035	27.68	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 5 27.68 43.62 127.93 114.54 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 881.08	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.21	* Wt. n-val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 879.87	* Reach Len. (ft)	* 43.62	* 127.93	* 114.54
* Crit W.S. (ft)	* 879.01	* Flow Area (sq ft)	* 0.31	* 111.29	* 19.35
* E.G. Slope (ft/ft)	* 0.006591	* Area (sq ft)	* 0.31	* 111.29	* 19.35
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 0.11	* 995.19	* 25.90
* Top Width (ft)	* 39.39	* Top Width (ft)	* 0.33	* 22.68	* 16.38
* Vel Total (ft/s)	* 7.80	* Avg. vel. (ft/s)	* 0.36	* 8.94	* 1.34
* Max Chl Dpth (ft)	* 6.32	* Hydr. Depth (ft)	* 0.94	* 4.91	* 1.18
* Conv. Total (cfs)	* 12578.3	* Conv. (cfs)	* 1.4	* 12258.0	* 319.0
* Length Wtd. (ft)	* 120.36	* Wetted Per. (ft)	* 1.90	* 26.63	* 16.56
* Min Ch El (ft)	* 873.55	* Shear (lb/sq ft)	* 0.07	* 1.72	* 0.48

OXF157-159Bridges.rep

```
* Alpha * 1.28 * Stream Power (lb/ft s) * 167.77 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.37 * Cum Volume (acre-ft) * 0.14 * 0.60 * 0.13 *
* C & E Loss (ft) * 0.25 * Cum SA (acres) * 0.05 * 0.11 * 0.08 *
*****
```

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

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower RS: 1109.636

INPUT  
 Description:

Station Elevation Data num= 91

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	7.99	898	12.11	896.99	14.98	896.29	15.03	896.27
16.24	895.94	18.02	895.4	18.05	895.39	18.1	895.36	19.43	894.63
20.13	894.27	20.36	894.21	21.06	894.1	21.82	894	27.98	893.2
29.82	893.02	31.32	892.97	36.62	892.73	36.95	892.72	39.12	892.49
39.4	892.44	39.56	892.42	39.71	892.37	40.58	891.85	44.04	890.63
44.75	890	46.51	888.42	47.03	888	49.37	886	49.49	885.9
50.43	885.55	53.8	884.26	54.33	884	57.59	882.59	58.93	882
59.12	881.92	59.71	881.65	61.96	880.57	63.13	880	64.59	879.28
65.77	878.7	65.78	878.7	72.55	878.12	73.12	878.07	73.51	878
76.08	878	82.72	877.34	96.73	876.97	108.34	876.4	115.12	876.06
115.23	876	115.24	876	116.47	874.96	118.35	874.04	118.39	874.04
118.43	874.04	135.55	873.74	136.55	873.62	136.63	873.62	136.8	873.61
137.2	873.71	137.46	874	138.18	874.61	139.17	876	139.24	876.1
139.69	876.53	147.24	877.72	147.73	877.77	149.98	878	153.88	878.96
158.65	880	160.03	880.32	161.17	880.78	163.42	882	164.58	882.59
167.5	884	168.94	884.73	171.57	886	173.32	886.92	175.49	888
177.39	889.1	179.26	890	180.83	890.83	182.91	892	184.23	892.73
186.38	894	188	895.04	189.55	896	192.14	897.52	193.01	898
196.98	900								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.1	115.12	.035	139.69	.1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 115.12 139.69 24.9 75.62 108.89 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*



OXF157-159Bridges.rep

* E.G. Elev (ft)	* 880.46	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.39	* Wt. n-Val.	* 0.100	* 0.035	* 0.100
* W.S. Elev (ft)	* 880.08	* Reach Len. (ft)	* 24.90	* 75.62	* 108.89
* Crit W.S. (ft)	*	* Flow Area (sq ft)	* 142.94	* 146.11	* 37.47
* E.G. Slope (ft/ft)	* 0.001758	* Area (sq ft)	* 142.94	* 146.11	* 37.47
* Q Total (cfs)	* 1021.20	* Flow (cfs)	* 173.49	* 811.80	* 35.91
* Top Width (ft)	* 96.02	* Top width (ft)	* 52.15	* 24.57	* 19.30
* Vel Total (ft/s)	* 3.13	* Avg. Vel. (ft/s)	* 1.21	* 5.56	* 0.96
* Max Chl Dpth (ft)	* 6.47	* Hydr. Depth (ft)	* 2.74	* 5.95	* 1.94
* Conv. Total (cfs)	* 24356.1	* Conv. (cfs)	* 4137.8	* 19361.8	* 856.5
* Length Wtd. (ft)	* 68.43	* Wetted Per. (ft)	* 52.56	* 26.50	* 19.64
* Min Ch El (ft)	* 873.61	* Shear (lb/sq ft)	* 0.30	* 0.61	* 0.21
* Alpha	* 2.54	* Stream Power (lb/ft s)	* 196.98	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.18	* Cum Volume (acre-ft)	* 0.07	* 0.22	* 0.06
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 0.03	* 0.04	* 0.03

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

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

This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Bluestone Creek  
 REACH: Lower

RS: 1029.896

INPUT

Description:

Station Elevation Data		num= 92		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	900	7.29	898	13.38	896.29	14.35	896	14.84	895.88
16.19	895.51	16.3	895.23	16.34	894	16.53	893.06	16.58	892.62
19.03	892.09	19.43	892	20.5	891.71	20.81	891.67	32.61	889.1
36.25	888.27	37.36	888	39.87	887.4	43.63	886.46	44.41	886.27
45.34	885.89	46.6	885.42	46.61	885.41	48.24	885.28	57.34	885.13
59.31	885.1	63.18	884.99	63.32	884.99	66.5	884.85	68.1	884.77
69.5	884.11	71.81	882.94	73.31	882.21	73.88	882	81.81	880.97
84.22	880.88	85.77	880.87	91.58	880.82	96.85	880	99.09	879.57
105.37	878	114.77	877.24	120.75	877.01	121.4	876.97	124.53	876.92
126.83	876.83	130	876.68	133.54	876.47	140.12	876.07	140.32	876.07
140.72	876.07	141.15	876.07	141.33	876.08	141.37	876.11	141.84	875.84
145.57	874	146.81	873.34	146.86	873.3	146.87	873.3	147.13	873.28
150.42	872.55	157.45	873.73	158.52	873.83	158.68	874	160.27	875.61
160.69	876	161.06	876.4	162.58	878	163.7	879.02	164.65	880
166.2	881.4	166.78	882	167.1	882.3	168.66	884	169.37	884.76
170.62	886	171.51	886.85	172.25	887.61	172.63	888	173.98	889.35
174.77	890	174.91	890.12	175.63	890.85	176.14	891.08	177.95	892
181.74	893.71	182.34	894	182.46	894.06	186.44	896	190.02	898

190.03 898 193.54 900

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .1 141.37 .035 160.27 .1

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 141.37 160.27 1 1 1 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 880.23 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.90 \* Wt. n-val. \* 0.100 \* 0.035 \* 0.100 \*  
 \* W.S. Elev (ft) \* 879.34 \* Reach Len. (ft) \* \* \* \*  
 \* Crit W.S. (ft) \* 878.39 \* Flow Area (sq ft) \* 89.87 \* 105.74 \* 6.87 \*  
 \* E.G. Slope (ft/ft) \* 0.004203 \* Area (sq ft) \* 89.87 \* 105.74 \* 6.87 \*  
 \* Q Total (cfs) \* 1021.20 \* Flow (cfs) \* 144.72 \* 868.60 \* 7.89 \*  
 \* Top Width (ft) \* 63.99 \* Top width (ft) \* 41.35 \* 18.90 \* 3.74 \*  
 \* Vel Total (ft/s) \* 5.04 \* Avg. vel. (ft/s) \* 1.61 \* 8.21 \* 1.15 \*  
 \* Max Chl Dpth (ft) \* 6.79 \* Hydr. Depth (ft) \* 2.17 \* 5.59 \* 1.84 \*  
 \* Conv. Total (cfs) \* 15751.3 \* Conv. (cfs) \* 2232.1 \* 13397.5 \* 121.6 \*  
 \* Length Wtd. (ft) \* \* Wetted Per. (ft) \* 41.59 \* 20.51 \* 5.28 \*  
 \* Min Ch El (ft) \* 872.55 \* Shear (lb/sq ft) \* 0.57 \* 1.35 \* 0.34 \*  
 \* Alpha \* 2.27 \* Stream Power (lb/ft s) \* 193.54 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* \* Cum Volume (acre-ft) \* \* \* \*  
 \* C & E Loss (ft) \* \* Cum SA (acres) \* \* \* \*  
 \*\*\*\*\*

CROSS SECTION

RIVER: Trib 1  
 REACH: Trib 1 RS: 1494.636

INPUT

Description:

Station Elevation Data num= 52  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 930 15.95 928 20.13 927.28 25.47 926.34 26.17 926.15  
 26.4 926.1 27.13 926.02 27.39 926 43.3 924.94 45.42 924.77  
 53.91 924.35 62.06 924 71.7 924 79.1 923.52 96.59 922  
 96.73 921.96 101.41 920 111.87 918.35 114.12 918 114.62 917.71  
 115.54 917.35 119.67 916 123.52 914.71 126.42 914 132.68 912.45  
 134.98 912 135.64 911.88 135.72 911.87 137.14 911.78 140.39 911.8  
 144.88 911.81 145.55 911.81 146.78 911.88 147.48 912 157.45 912  
 158.05 911.87 163.08 910 163.87 909.72 164.15 909.62 166.55 908.17  
 166.75 908 167.1 907.78 167.17 907.72 167.74 907.67 172.91 906.96  
 173.22 907.58 173.49 908 173.99 908.62 174.47 910 196.54 912.02  
 232.54 920 280.78 930

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .06 163.08 .035 174.47 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 163.08 174.47 103.09 138.9 61.92 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 910.99 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.98 \* Wt. n-Val. \* 0.000 \* 0.035 \* 0.000 \*  
 \* W.S. Elev (ft) \* 910.02 \* Reach Len. (ft) \* 103.09 \* 138.90 \* 61.92 \*  
 \* Crit W.S. (ft) \* 910.02 \* Flow Area (sq ft) \* 0.00 \* 22.14 \* 0.00 \*  
 \* E.G. Slope (ft/ft) \* 0.018884 \* Area (sq ft) \* 0.00 \* 22.14 \* 0.00 \*  
 \* Q Total (cfs) \* 175.70 \* Flow (cfs) \* 0.00 \* 175.70 \* 0.00 \*  
 \* Top Width (ft) \* 11.61 \* Top Width (ft) \* 0.04 \* 11.39 \* 0.18 \*  
 \* Vel Total (ft/s) \* 7.94 \* Avg. vel. (ft/s) \* 0.13 \* 7.94 \* 0.14 \*  
 \* Max chl Dpth (ft) \* 3.06 \* Hydr. Depth (ft) \* 0.01 \* 1.94 \* 0.01 \*  
 \* Conv. Total (cfs) \* 1278.6 \* Conv. (cfs) \* 0.0 \* 1278.6 \* 0.0 \*  
 \* Length wtd. (ft) \* 125.42 \* Wetted Per. (ft) \* 0.05 \* 13.95 \* 0.18 \*  
 \* Min Ch El (ft) \* 906.96 \* Shear (lb/sq ft) \* \* 1.87 \* \*  
 \* Alpha \* 1.00 \* Stream Power (lb/ft s) \* 280.78 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 1.87 \* Cum Volume (acre-ft) \* 0.00 \* 0.19 \* 0.07 \*  
 \* C & E Loss (ft) \* 0.18 \* Cum SA (acres) \* 0.00 \* 0.12 \* 0.13 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 1  
 REACH: Trib 1

RS: 1352.345

INPUT

Description:

Station Elevation Data num= 66  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*

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0	930.07	.26	930.04	.51	930	1.32	929.89	8.29	928.89
14.32	928	19.16	927.54	30.08	926.36	31.67	926.17	33.3	926
34.34	925.9	47.73	924.61	54.2	924	56.3	923.88	57.59	923.81
88.84	922	101.43	920.92	102.13	920.86	102.61	920.8	106.2	920.6
117.63	920	117.81	919.99	122.46	919.72	122.55	919.89	123.3	920
124.15	920	125.63	919.88	126.31	919.79	141.39	918	151.12	917.25
157.08	916.89	162.18	916.54	169.68	916	185.93	914.42	190.97	914
191.68	913.86	193.38	913.52	200.99	912	201.2	912	211.09	910.26
212.47	910	219.17	908.95	224.59	908	231.28	906.11	231.61	906.05
231.65	906.04	231.78	905.93	232.27	905.51	234.19	905.5	234.81	905.62
237.41	907.41	263.56	907.12	282.04	908	286.65	908	286.91	908.07
294.68	910	299.45	911.23	302.52	912	310.2	913.92	310.44	914
310.6	914.06	316.43	916	318.9	916.85	322.3	918	354.21	920
399.33	930								

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .06 224.59 .035 237.41 .06

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 224.59 237.41 147.16 222.54 129.92 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 908.44	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.37	* Wt. n-Val.	* 0.060	* 0.035	* 0.060
* W.S. Elev (ft)	* 908.07	* Reach Len. (ft)	* 147.16	* 222.54	* 129.92
* Crit W.S. (ft)	* 908.07	* Flow Area (sq ft)	* 0.02	* 19.52	* 30.99
* E.G. Slope (ft/ft)	* 0.012014	* Area (sq ft)	* 0.02	* 19.52	* 30.99
* Q Total (cfs)	* 175.70	* Flow (cfs)	* 0.00	* 114.18	* 61.51
* Top width (ft)	* 62.75	* Top width (ft)	* 0.42	* 12.82	* 49.51
* Vel Total (ft/s)	* 3.48	* Avg. vel. (ft/s)	* 0.30	* 5.85	* 1.99
* Max Chl Dpth (ft)	* 2.57	* Hydr. Depth (ft)	* 0.04	* 1.52	* 0.63
* Conv. Total (cfs)	* 1603.0	* Conv. (cfs)	* 0.0	* 1041.7	* 561.2
* Length Wtd. (ft)	* 205.20	* Wetted Per. (ft)	* 0.43	* 13.85	* 49.55
* Min Ch El (ft)	* 905.50	* Shear (lb/sq ft)	* 0.03	* 1.06	* 0.47
* Alpha	* 1.95	* Stream Power (lb/ft s)	* 399.33	* 0.00	* 0.00
* Frctn Loss (ft)	* 2.68	* Cum volume (acre-ft)	* 0.00	* 0.12	* 0.05
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 0.00	* 0.08	* 0.09

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 1  
 REACH: Trib 1 RS: 1083.880

INPUT  
 Description:

Station Elevation Data		num= 76		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	920	44.13	918.43	45.34	918.39	46.98	918.34	57.29	917.96
66.46	917.92	80.97	917.33	81.51	917.32	83.4	917.33	86.95	917.29
112.61	916	120.2	916	132.51	914.57	143.16	914	155.57	912.89
161.95	912.27	162.68	912.19	164.29	912	180.16	910.34	183.14	910
183.62	909.93	190.54	908	193.1	907.29	198.47	906	204.66	904.39
205.66	904	205.84	904	207.25	903.86	221.11	902.77	230.86	902.13
232.89	902	233.34	901.98	234.66	901.92	238.04	901.73	241.72	901.49
244.78	901.19	246.01	901.14	256.41	901.41	258.24	900.98	262.76	900
263.22	899.89	266.87	899.11	267.49	898.88	267.55	898.83	267.97	898.82
275.19	898.93	275.88	899.71	276.17	900.13	276.44	900.62	278.38	900.53
279.41	900.54	287.83	900.87	288.68	900.9	315.81	902	319.65	902
323.28	902	337.1	902.73	350.54	903.23	369.17	904	372.26	905.01
375.23	906	381.3	907.86	381.75	908	382.61	908.27	388.05	910
388.86	910.26	389.69	910.52	393.66	911.83	394.18	912	395.5	912.43
403.48	914	404.87	914.21	416.95	916	417.75	916.12	430.76	918.03
443.96	920								

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.06	256.41	.035	276.44	.06

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	256.41	276.44		516.84	78.3	187.93	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 901.58	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.61	* Wt. n-val.	* 0.00	* 0.035	* 0.060
* W.S. Elev (ft)	* 900.97	* Reach Len. (ft)		* 0.00	* 0.00
* Crit w.s. (ft)	* 900.97	* Flow Area (sq ft)		* 27.00	* 3.59
* E.G. Slope (ft/ft)	* 0.014263	* Area (sq ft)		* 27.00	* 3.59
* Q Total (cfs)	* 175.70	* Flow (cfs)		* 171.41	* 4.29
* Top width (ft)	* 32.15	* Top width (ft)		* 18.16	* 13.99
* Vel Total (ft/s)	* 5.74	* Avg. vel. (ft/s)		* 6.35	* 1.19
* Max Chl Dpth (ft)	* 2.15	* Hydr. Depth (ft)		* 1.49	* 0.26
* Conv. Total (cfs)	* 1471.2	* Conv. (cfs)		* 1435.3	* 35.9
* Length wtd. (ft)	* 0.00	* Wetted Per. (ft)		* 19.28	* 14.00
* Min Ch El (ft)	* 898.82	* Shear (lb/sq ft)		* 1.25	* 0.23

OXF157-159Bridges.rep

```
* Alpha * 1.19 * Stream Power (lb/ft s) * 443.96 * 0.00 * 0.00 *
* Frctn Loss (ft) * 0.00 * Cum Volume (acre-ft) * * * *
* C & E Loss (ft) * 0.01 * Cum SA (acres) * * * *
*****
```

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.  
 Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Trib 2  
 REACH: Trib 2 RS: 1293.508

INPUT  
 Description:

Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	6.92	958	11.17	957.22	16.47	956.09	16.9	956
17.06	955.97	28.07	954	34.79	952.48	36.86	952	42.25	950.75
45.35	950	49.67	949.22	54.37	948.32	56.43	948	59.81	947.38
60.81	947.21	67.14	946	73.98	944.19	74.69	944	76.35	943.57
76.69	943.45	81.66	942	82.68	942	87.59	941.4	97.87	940.09
108.08	939.12	117.15	938.26	119.68	938	122.4	937.75	123.11	937.7
131.08	936.69	133.07	936.46	133.37	936.42	133.57	936.41	138.05	936.85
143.16	937.04	151.89	937.22	160.8	937.45	162.89	937.51	177.41	937.97
184.86	938.67	188.18	938.95	189.84	939.14	190.24	939.27	192.38	940
195.61	941.08	198.24	942	200.07	942.62	201.12	942.59	208.36	942.85
208.86	942.87	210.15	942.63	212.83	942.15	213.01	942.11	213.21	942.21
220.91	946	224.58	947.76	225.54	948.24	229.35	950	232.44	951.57
233.44	952	235.43	952.59	240.17	954	241.17	954.21	247.19	956
248.37	956.24	255.48	958	263.61	960				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	131.08	.035	138.05	.035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 131.08 138.05 76.04 126.88 76.93 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

```
*****
* E.G. Elev (ft) * 938.78 * Element * Left OB * Channel * Right OB *
* Vel Head (ft) * 0.44 * Wt. n-Val. * 0.035 * 0.035 * 0.035 *
*****
```

OXF157-159Bridges.rep

* W.S. Elev (ft)	* 938.33	* Reach Len. (ft)	* 76.04	* 126.88	* 76.93
* Crit W.S. (ft)	* 938.33	* Flow Area (sq ft)	* 11.31	* 12.09	* 37.64
* E.G. Slope (ft/ft)	* 0.013633	* Area (sq ft)	* 11.31	* 12.09	* 37.64
* Q Total (cfs)	* 303.00	* Flow (cfs)	* 46.83	* 86.18	* 169.99
* Top Width (ft)	* 64.92	* Top width (ft)	* 14.71	* 6.97	* 43.24
* Vel Total (ft/s)	* 4.96	* Avg. vel. (ft/s)	* 4.14	* 7.13	* 4.52
* Max Chl Dpth (ft)	* 1.92	* Hydr. Depth (ft)	* 0.77	* 1.73	* 0.87
* Conv. Total (cfs)	* 2595.1	* Conv. (cfs)	* 401.1	* 738.1	* 1455.9
* Length Wtd. (ft)	* 94.05	* Wetted Per. (ft)	* 14.81	* 7.01	* 43.27
* Min Ch El (ft)	* 936.41	* Shear (lb/sq ft)	* 0.65	* 1.47	* 0.74
* Alpha	* 1.16	* Stream Power (lb/ft s)	* 263.61	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.03	* Cum Volume (acre-ft)	* 0.09	* 0.08	* 0.06
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.12	* 0.04	* 0.07

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 2

REACH: Trib 2

RS: 1159.413

INPUT

Description:

Station Elevation Data

num= 105

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	960	6.65	958	10.82	957	15.24	956	17.08	955.33
20.5	954	23.7	952.78	25.76	952	29.85	950.38	30.51	950.11
30.77	950	31.21	949.82	35.43	948	39.11	946.47	40.38	946
42.21	945.29	46.26	944	53.16	942.04	53.33	942	53.41	941.98
65.75	940	69.76	939.37	73.05	938.88	80.28	938	81.51	937.85
82.62	937.73	91.12	936.59	95.48	936	97.49	935.89	98.47	935.77
98.8	935.89	99.19	936	100.9	936.79	103.82	937.66	104.11	937.66
106.98	937.67	110.63	937.08	115.17	937.53	115.82	937.6	115.85	937.61
116.02	937.67	116.25	937.67	119.44	937.51	122.06	936.6	124.49	936
124.83	935.91	126.37	935.52	129.8	935.45	130.01	935.45	134.79	935.31
184.34	934.3	194.41	934.09	194.89	934.08	198.88	934	213.13	934
221.76	933.47	226.62	932.98	228.42	932.27	228.87	932.22	229.53	932.23
231.22	932.37	233.97	932.66	237.73	933.86	238.17	934	239.79	934.52
242.86	936	243.61	936.42	245.86	937.56	251.91	937.95	252.94	938.02

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253.26	938.03	253.47	938.03	253.9	938	254.46	938	261.43	937.52
261.45	937.51	261.68	937.5	263.42	937.41	264.59	937.72	265.39	938
266.3	938.3	270.1	939.55	271.25	939.88	271.6	940	271.98	940.11
277.9	942	279.69	942.55	284.82	944	288.89	945.15	291.92	946
293.54	946.44	296.18	946.91	299.1	948	301.91	948.95	305.01	950
306.79	950.62	310.34	952	312.48	952.72	315.83	954	318.57	954.98
320.92	955.53	322.41	956	325.37	956.92	328.76	958	335.19	960

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 226.62 .035 233.97 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 226.62 233.97 41.58 119.28 71.28 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 935.27	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.42	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 934.85	* Reach Len. (ft)	* 41.58	* 119.28	* 71.28
* Crit W.S. (ft)	* 934.85	* Flow Area (sq ft)	* 47.16	* 17.63	* 7.44
* E.G. Slope (ft/ft)	* 0.008935	* Area (sq ft)	* 47.16	* 17.63	* 7.44
* Q Total (cfs)	* 303.00	* Flow (cfs)	* 146.48	* 124.99	* 31.52
* Top Width (ft)	* 83.05	* Top width (ft)	* 69.20	* 7.35	* 6.50
* Vel Total (ft/s)	* 4.19	* Avg. Vel. (ft/s)	* 3.11	* 7.09	* 4.23
* Max chl Dpth (ft)	* 2.63	* Hydr. Depth (ft)	* 0.68	* 2.40	* 1.14
* Conv. Total (cfs)	* 3205.5	* Conv. (cfs)	* 1549.7	* 1322.3	* 333.5
* Length Wtd. (ft)	* 73.88	* Wetted Per. (ft)	* 69.25	* 7.51	* 6.87
* Min ch El (ft)	* 932.22	* Shear (lb/sq ft)	* 0.38	* 1.31	* 0.60
* Alpha	* 1.55	* Stream Power (lb/ft s)	* 335.19	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.80	* Cum Volume (acre-ft)	* 0.04	* 0.04	* 0.02
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.05	* 0.02	* 0.03

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 2  
 REACH: Trib 2

RS: 1030.844



INPUT

Description:

Station Elevation Data		num= 86		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	950	.77	949.7	4.69	948	10.01	946.3	10.87	946		
12.24	945.59	19.11	944	20.32	943.72	27.09	942	36.87	940.69		
43.4	940	44.81	939.85	55.29	938.77	59.92	938.28	62.39	938		
62.88	937.96	63.9	937.89	66.83	937.63	85.74	936	94.69	935.33		
103.34	934.7	113.41	934	122.81	934	158.02	932.96	165.66	932.9		
171.97	932.76	174.56	932.7	179.24	932.57	180.02	932.54	198.58	932		
200.3	931.95	223.22	931.58	233.8	931.88	235.97	931.94	237.04	931.86		
247.93	931.05	262.23	930	265.81	929.74	271.79	929.55	273.11	929.52		
273.38	929.23	274.44	928.73	275.49	928.76	276.43	928.88	276.7	929.03		
277.45	929.54	281.45	929.77	285.33	930	285.43	930.01	286.29	930.07		
287.2	930.13	306.48	931.52	312.44	931.92	313.28	932	314.42	932.11		
315.51	932.21	317.32	932.35	317.47	932.36	320.2	932.45	326.81	932.59		
327.27	932.6	330.31	932.67	330.39	932.67	331.1	932.55	332.38	932.37		
332.64	932.33	333.27	932.49	339.31	934	346.64	935.84	347.25	936		
355.05	937.95	355.24	938	355.37	938.03	355.89	938.15	364.33	940		
367.31	940.66	370.78	941.39	373.55	942	376.93	942.81	382.38	944		
385.59	944.88	390.35	946	395.96	947.78	396.69	948	397.39	948.2		
403.1	950										

Manning's n values

num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	273.11	.035	277.45	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	273.11	277.45		724.28	31.12	41.67	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 931.72	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.50	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 931.22	* Reach Len. (ft)	* 0.00	* 0.00	* 0.00
* Crit W.S. (ft)	* 931.22	* Flow Area (sq ft)	* 26.63	* 9.79	* 21.85
* E.G. Slope (ft/ft)	* 0.013317	* Area (sq ft)	* 26.63	* 9.79	* 21.85
* Q Total (cfs)	* 303.00	* Flow (cfs)	* 127.58	* 77.37	* 98.04
* Top width (ft)	* 56.69	* Top width (ft)	* 27.48	* 4.34	* 24.88
* Vel Total (ft/s)	* 5.20	* Avg. Vel. (ft/s)	* 4.79	* 7.90	* 4.49
* Max Chl Dpth (ft)	* 2.49	* Hydr. Depth (ft)	* 0.97	* 2.26	* 0.88
* Conv. Total (cfs)	* 2625.7	* Conv. (cfs)	* 1105.6	* 670.5	* 849.6
* Length wtd. (ft)	* 0.00	* Wetted Per. (ft)	* 27.53	* 4.78	* 24.94
* Min Ch El (ft)	* 928.73	* Shear (lb/sq ft)	* 0.80	* 1.70	* 0.73
* Alpha	* 1.19	* Stream Power (lb/ft s)	* 403.10	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.00	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	*	*	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Trib 3  
REACH: Trib 3

RS: 1842.591

INPUT  
Description:

Station Elevation Data		num= 81		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	1000	6.4	999.28	20.27	998	20.42	998	44.98	997.36		
52.96	997.15	60.15	996.93	64.74	996.81	74.8	996.62	82.49	996.29		
88.19	996	92.42	995.25	99.72	994	106.71	992.75	110.98	992		
121.35	990	127.51	988.78	131.29	988	135.66	987.27	137.17	986.94		
142.11	986	152.25	984.2	153.42	984	153.82	983.9	155.97	983.64		
167.51	982	173.15	981.05	177.24	980	179.83	979.35	180.72	979.3		
182.8	979.21	189.91	979.03	205.77	978	206.05	978	207.36	977.92		
207.76	977.89	223.86	976.82	243.23	976	248.81	975.84	256.19	975.49		
257.03	975.45	270.58	975.11	278.56	974.91	280.77	974.66	286.86	974.22		
287.94	974	291.06	973.47	291.14	973.42	291.54	973.07	292.08	972.37		
292.27	972.34	292.53	972.29	293.2	972.37	293.92	972.5	306.91	973.1		
307.39	973.1	308.53	972.74	311.83	972.59	311.86	972.61	312.46	973.01		
313	973.06	314.5	973.26	318.97	974	322.06	974.54	323.99	974.92		
330.34	976	334.36	976.65	341.86	978	350.17	979.44	351.08	979.59		
353.42	980	354.85	980.31	360.68	982	365.18	983.32	367.59	983.72		
368.88	984	371	984.46	377.87	986	384.9	987.4	387.97	988		
397.92	990										

Manning's n Values		num= 3		Sta		n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.035	287.94	.035	318.97	.06		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	287.94	318.97		232.84	249	40.66	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 974.76	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.59	* Wt. n-val.	* 0.035	* 0.035	* 0.060
* W.S. Elev (ft)	* 974.17	* Reach Len. (ft)	* 232.84	* 249.00	* 40.66
* Crit w.s. (ft)	* 974.17	* Flow Area (sq ft)	* 0.07	* 35.92	* 0.08

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* E.G. Slope (ft/ft)	*0.018019	* Area (sq ft)	* 0.07	* 35.92	* 0.08
* Q Total (cfs)	* 221.90	* Flow (cfs)	* 0.07	* 221.77	* 0.05
* Top Width (ft)	* 32.82	* Top Width (ft)	* 0.83	* 31.03	* 0.96
* Vel Total (ft/s)	* 6.15	* Avg. Vel. (ft/s)	* 1.08	* 6.17	* 0.63
* Max Chl Dpth (ft)	* 1.88	* Hydr. Depth (ft)	* 0.08	* 1.16	* 0.08
* Conv. Total (cfs)	* 1653.1	* Conv. (cfs)	* 0.6	* 1652.1	* 0.4
* Length wtd. (ft)	* 239.14	* Wetted Per. (ft)	* 0.84	* 31.86	* 0.98
* Min Ch El (ft)	* 972.29	* Shear (lb/sq ft)	* 0.09	* 1.27	* 0.09
* Alpha	* 1.01	* Stream Power (lb/ft s)	* 397.92	* 0.00	* 0.00
* Frctn Loss (ft)	* 3.40	* Cum Volume (acre-ft)	* 0.24	* 0.53	* 0.08
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.26	* 0.23	* 0.03

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

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

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION

RIVER: Trib 3  
 REACH: Trib 3 RS: 1574.434

INPUT

Description:

Station Elevation Data		num= 70		Sta		Elev		Sta		Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	990	10	988	15.71	987.15	19.89	986.59	23.54	986		
25.41	985.57	32.23	984	36.68	982.82	39.63	982	42.32	981.26		
47.1	980	49.68	979.16	53.9	978	56.77	976.83	58.83	976		
63.08	974.23	63.71	974	67.16	972.75	69.22	972	73.69	970.74		
74.68	970.49	75.24	970.4	77.74	970	82.68	969.7	95.02	968		
102.03	968	117.68	966.58	117.78	966.58	118.1	966.54	118.17	966.36		
118.51	966.01	118.52	966	118.54	965.99	119.41	964.47	126.22	966		
126.42	966.04	127.48	966.59	137.35	968	139.81	968.28	155.28	970		
163.75	970	163.78	970	202.11	971.68	206.2	971.8	211.52	972		
256.73	972	266.44	973.46	272.28	973.45	273.54	973.48	279.85	973.6		
286.83	974	315.66	974	340.26	975.28	341.26	975.3	342.57	975.33		
355.08	976	358.38	976	368.38	976.86	382.99	978	391.58	979.77		
392.53	980	393.63	980.26	400.41	982	406.71	983.46	408.96	984		
410.89	984.37	417.72	986	421.38	986.59	427.73	988	442.56	990		

Manning's n Values num= 3

Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 117.68 .035 127.48 .035

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 117.68 127.48 206.74 191.29 82.26 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

\*\*\*\*\*  
 \* E.G. Elev (ft) \* 968.56 \* Element \* Left OB \* Channel \* Right OB \*  
 \* Vel Head (ft) \* 0.70 \* Wt. n-Val. \* 0.035 \* 0.035 \* 0.035 \*  
 \* W.S. Elev (ft) \* 967.85 \* Reach Len. (ft) \* 206.74 \* 191.29 \* 82.26 \*  
 \* Crit W.S. (ft) \* 967.85 \* Flow Area (sq ft) \* 8.93 \* 23.37 \* 5.58 \*  
 \* E.G. Slope (ft/ft) \* 0.011533 \* Area (sq ft) \* 8.93 \* 23.37 \* 5.58 \*  
 \* Q Total (cfs) \* 221.90 \* Flow (cfs) \* 30.04 \* 173.26 \* 18.61 \*  
 \* Top Width (ft) \* 32.67 \* Top width (ft) \* 14.03 \* 9.80 \* 8.84 \*  
 \* Vel Total (ft/s) \* 5.86 \* Avg. vel. (ft/s) \* 3.36 \* 7.41 \* 3.33 \*  
 \* Max Chl Dpth (ft) \* 3.38 \* Hydr. Depth (ft) \* 0.64 \* 2.38 \* 0.63 \*  
 \* Conv. Total (cfs) \* 2066.3 \* Conv. (cfs) \* 279.7 \* 1613.3 \* 173.3 \*  
 \* Length Wtd. (ft) \* 190.24 \* Wetted Per. (ft) \* 14.09 \* 11.27 \* 8.93 \*  
 \* Min Ch El (ft) \* 964.47 \* Shear (lb/sq ft) \* 0.46 \* 1.49 \* 0.45 \*  
 \* Alpha \* 1.32 \* Stream Power (lb/ft s) \* 442.56 \* 0.00 \* 0.00 \*  
 \* Frctn Loss (ft) \* 2.45 \* Cum Volume (acre-ft) \* 0.22 \* 0.36 \* 0.08 \*  
 \* C & E Loss (ft) \* 0.02 \* Cum SA (acres) \* 0.22 \* 0.11 \* 0.03 \*  
 \*\*\*\*\*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The

program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 3

REACH: Trib 3

RS: 1370.118

INPUT

Description:

Station Elevation Data num= 45  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 980 6.3 978 8.38 977.64 13.94 976 17.71 975.16  
 23.15 974 25.83 973.24 30.31 972 37.29 970.07 37.52 970  
 38.72 969.66 44.36 968 52.77 966.36 54.46 966.03 54.63 966

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54.66	966	59.8	965.14	66.71	964	75.77	962.58	79.73	962
88.98	960.2	89.65	960.07	89.95	960	98.13	959.7	98.24	959.57
100.71	958.34	104.95	959.42	110.62	960.9	110.78	960.98	119.04	961.45
132.13	962	137.13	962	148.73	962.58	157.81	963.03	170.75	964
204.44	965.56	218.52	966	218.77	966	220.23	966.05	241.28	966.9
256.7	968	366.5	996	396.2	996	467.6	980	479.77	980

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	98.13	.035	110.78	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	98.13	110.78		227.21	215.79	21.44	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 961.82	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.64	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 961.18	* Reach Len. (ft)	* 227.21	* 215.79	* 21.44
* Crit W.S. (ft)	* 961.18	* Flow Area (sq ft)	* 14.36	* 21.21	* 0.34
* E.G. Slope (ft/ft)	* 0.014524	* Area (sq ft)	* 14.36	* 21.21	* 0.34
* Q Total (cfs)	* 221.90	* Flow (cfs)	* 73.70	* 147.83	* 0.38
* Top width (ft)	* 30.30	* Top width (ft)	* 14.18	* 12.65	* 3.48
* Vel Total (ft/s)	* 6.18	* Avg. vel. (ft/s)	* 5.13	* 6.97	* 1.09
* Max Chl Dpth (ft)	* 2.84	* Hydr. Depth (ft)	* 1.01	* 1.68	* 0.10
* Conv. Total (cfs)	* 1841.3	* Conv. (cfs)	* 611.5	* 1226.6	* 3.1
* Length Wtd. (ft)	* 188.26	* Wetted Per. (ft)	* 14.30	* 13.34	* 3.48
* Min Ch El (ft)	* 958.34	* Shear (lb/sq ft)	* 0.91	* 1.44	* 0.09
* Alpha	* 1.08	* Stream Power (lb/ft s)	* 479.77	* 0.00	* 0.00
* Frctn Loss (ft)	* 1.40	* Cum Volume (acre-ft)	* 0.16	* 0.26	* 0.07
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 0.15	* 0.06	* 0.01

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

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

This may indicate the need for additional cross sections.

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

need for additional cross sections.

Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water

surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program

defaulted to critical depth.

CROSS SECTION

RIVER: Trib 3  
 REACH: Trib 3

RS: 1126.884

INPUT  
 Description:

Station Elevation Data num= 115

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	9.03	978.1	9.52	978	10.1	977.88	18.57	976
23.53	974.92	27.67	974	30.94	973.26	36.86	972	41.73	970.97
46.43	970	50.91	969.02	56.12	968	66.26	966.03	66.41	966
66.48	965.99	66.71	965.94	68.56	965.69	70.27	965.75	71.33	965.71
72.12	965.68	75.26	966	77.3	966	90.43	964.28	92.56	964
92.72	963.98	92.87	963.96	100.81	963.21	104.88	962.51	107.18	962
110.33	961.68	120.99	960.57	126.29	960	127.9	959.87	128.13	959.85
138.1	958.98	156.3	958.07	157.07	958.02	157.15	958.01	157.32	958.01
157.68	958	163.84	957.92	202.16	957.39	210.95	957.27	212.49	957.27
213.32	957.27	222.3	957.1	224.62	957.03	246.62	956.03	248.38	956
256.86	955.52	279.62	955.29	284.16	954.19	284.47	954.05	284.65	954
287.2	952	291.87	953.51	292.71	954	292.85	954.16	293.42	954.37
299.08	954.41	299.22	954.41	306.22	954.81	318.34	955.34	333.26	956
348.54	956	351.7	956.16	352.19	956.16	352.37	956.17	357.02	956.45
370.63	957.14	372.78	957.25	384.84	957.97	385.08	957.98	385.38	958
385.86	958	389.33	958.28	409.3	960	413.52	960	457.56	961.45
459.36	961.51	474.72	962	474.93	962	521.34	963.57	534.61	964
536.11	964.15	537.07	964.19	538.1	964.25	548.77	964.64	572.95	965.53
573.22	965.53	576.97	965.64	584.38	966	594.95	966	618.72	967.34
621.77	967.36	633.66	967.97	634.12	968	641.73	968.53	645.69	968.89
658.74	970	663.93	970.44	672.77	971.43	677.96	972	742.87	972
759.83	972.67	762.87	972.77	784.57	974	797.65	974.9	811.04	975.67
814.8	975.9	816.69	976	818.77	976.28	831.01	978	842.35	980

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	284.16	.035	293.42	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	284.16	293.42		54.31	34.66	9.68	.1
							.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 956.08	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.27	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 955.81	* Reach Len. (ft)	* 54.31	* 34.66	* 9.68
* Crit W.S. (ft)	* 955.65	* Flow Area (sq ft)	* 14.82	* 25.13	* 28.04
* E.G. slope (ft/ft)	* 0.004521	* Area (sq ft)	* 14.82	* 25.13	* 28.04
* Q Total (cfs)	* 221.90	* Flow (cfs)	* 25.03	* 128.59	* 68.29
* Top width (ft)	* 77.23	* Top width (ft)	* 32.42	* 9.26	* 35.54
* Vel Total (ft/s)	* 3.26	* Avg. Vel. (ft/s)	* 1.69	* 5.12	* 2.44
* Max chl Dpth (ft)	* 3.81	* Hydr. Depth (ft)	* 0.46	* 2.71	* 0.79
* Conv. Total (cfs)	* 3300.1	* Conv. (cfs)	* 372.2	* 1912.3	* 1015.6

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```
* Length Wtd. (ft)      * 34.66 * Wetted Per. (ft)      * 32.56 * 10.47 * 35.58 *
* Min Ch El (ft)      * 952.00 * Shear (lb/sq ft)      * 0.13 * 0.68 * 0.22 *
* Alpha                * 1.63 * Stream Power (lb/ft s) * 842.35 * 0.00 * 0.00 *
* Frctn Loss (ft)     *      * Cum Volume (acre-ft)  * 0.09 * 0.14 * 0.06 *
* C & E Loss (ft)     *      * Cum SA (acres)        * 0.03 * 0.01 * 0.01 *
*****
```

CULVERT

RIVER: Trib 3  
 REACH: Trib 3                      RS: 1109.439

INPUT

Description:  
 Distance from Upstream XS =        11  
 Deck/Roadway Width        =        10  
 Weir Coefficient         =        2.6  
 Upstream Deck/Roadway Coordinates  
     num=                    2  
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord  
 \*\*\*\*\*  
     284.16 954.19            0 306.22 954.81            0

Upstream Bridge Cross Section Data

Station Elevation Data        num=        115

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	980	9.03	978.1	9.52	978	10.1	977.88	18.57	976
23.53	974.92	27.67	974	30.94	973.26	36.86	972	41.73	970.97
46.43	970	50.91	969.02	56.12	968	66.26	966.03	66.41	966
66.48	965.99	66.71	965.94	68.56	965.69	70.27	965.75	71.33	965.71
72.12	965.68	75.26	966	77.3	966	90.43	964.28	92.56	964
92.72	963.98	92.87	963.96	100.81	963.21	104.88	962.51	107.18	962
110.33	961.68	120.99	960.57	126.29	960	127.9	959.87	128.13	959.85
138.1	958.98	156.3	958.07	157.07	958.02	157.15	958.01	157.32	958.01
157.68	958	163.84	957.92	202.16	957.39	210.95	957.27	212.49	957.27
213.32	957.27	222.3	957.1	224.62	957.03	246.62	956.03	248.38	956
256.86	955.52	279.62	955.29	284.16	954.19	284.47	954.05	284.65	954
287.2	952	291.87	953.51	292.71	954	292.85	954.16	293.42	954.37
299.08	954.41	299.22	954.41	306.22	954.81	318.34	955.34	333.26	956
348.54	956	351.7	956.16	352.19	956.16	352.37	956.17	357.02	956.45
370.63	957.14	372.78	957.25	384.84	957.97	385.08	957.98	385.38	958
385.86	958	389.33	958.28	409.3	960	413.52	960	457.56	961.45
459.36	961.51	474.72	962	474.93	962	521.34	963.57	534.61	964
536.11	964.15	537.07	964.19	538.1	964.25	548.77	964.64	572.95	965.53
573.22	965.53	576.97	965.64	584.38	966	594.95	966	618.72	967.34
621.77	967.36	633.66	967.97	634.12	968	641.73	968.53	645.69	968.89
658.74	970	663.93	970.44	672.77	971.43	677.96	972	742.87	972
759.83	972.67	762.87	972.77	784.57	974	797.65	974.9	811.04	975.67
814.8	975.9	816.69	976	818.77	976.28	831.01	978	842.35	980

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 284.16 .035 293.42 .035

Bank Sta: Left Right Coeff Contr. Expan.  
 284.16 293.42 .1 .3

Downstream Deck/Roadway Coordinates  
 num= 2  
 Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord  
 \*\*\*\*\*  
 228.78 954.26 0 300.13 954.27 0

Downstream Bridge Cross Section Data  
 Station Elevation Data num= 114  
 Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev  
 \*\*\*\*\*  
 0 970 7.75 968 14.33 966.27 15.77 966 18.18 965.58  
 27.24 964 28.93 963.74 34.28 963.02 36.34 962.71 37.55 962.38  
 37.58 962.38 39.35 962.55 40 962.65 44.1 962.3 52.15 961.38  
 59.99 960.73 66.63 960.17 67.26 960.12 68.38 960 85.41 958.71  
 96.78 958 98.95 957.89 110.89 957.26 145.41 956.82 165.27 956.8  
 175.54 956.82 178.9 956.75 183.31 956.63 187.82 956.5 193.61 956.23  
 194.94 956.21 201.39 956.1 206.69 956 207.42 956 218.14 955.11  
 228.78 954.26 237.22 953.56 238.57 953.45 245.56 953.4 248.36 953.46  
 250.52 953.38 253.9 952.89 262.36 952.08 262.66 952 262.87 952  
 269.68 950.39 273.17 952 273.53 952.14 286.94 953.77 288.62 953.92  
 289.42 953.99 289.43 953.99 289.76 953.86 289.96 953.86 290.36 953.87  
 293.53 954 300.13 954.27 302.74 954.29 303.16 954.26 303.27 954.27  
 303.36 954.27 303.73 954.33 313.71 954.89 326.65 955.61 331.76 956  
 337.5 956.47 349.95 957.63 353.91 958 358.14 958 371.05 958.7  
 372.07 958.74 386.07 959.36 392.59 959.61 397.93 960 438.81 961.29  
 441.87 961.37 460.75 962 461.51 962 463.53 962.14 469.25 962.28  
 490.96 962.99 499.69 963.21 524.28 964 538.22 965.41 546.78 965.74  
 546.93 965.75 554.09 966 566.14 967.05 577.89 968 579.37 968.11  
 579.54 968.13 579.73 968.15 582.66 968.33 584.56 968.41 596.64 968.9  
 609.91 970 629.18 970 633.26 970.34 638.47 970.79 647.29 971.19  
 652.77 972 729.9 972 737.49 972.32 767.13 973.45 768.34 973.49  
 777.47 974 804.59 975.83 807.59 976 808.71 976 811.35 976.32  
 813.23 976.57 822.26 978 823.4 978.2 833.21 980

Manning's n Values num= 3  
 Sta n Val Sta n Val Sta n Val  
 \*\*\*\*\*  
 0 .035 262.36 .035 273.53 .035

Bank Sta: Left Right Coeff Contr. Expan.  
 262.36 273.53 .1 .3

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      1.25  
 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  
                                 6.7      21.4      .024      .024      0      .9      1  
 Upstream      Elevation = 952.39  
                         Centerline Station = 287.2  
 Downstream      Elevation = 952.12  
                         Centerline Station = 269.5

CULVERT OUTPUT Profile #PF 1 Culv Group: Culvert #1

```
*****
* Q Culv Group (cfs)      *      8.54      * Culv Full Len (ft)      *      21.40      *
* # Barrels              *      1      * Culv Vel US (ft/s)      *      6.96      *
* Q Barrel (cfs)         *      8.54      * Culv Vel DS (ft/s)      *      6.96      *
* E.G. US. (ft)          *      956.08      * Culv Inv El Up (ft)      *      952.39      *
* W.S. US. (ft)          *      955.81      * Culv Inv El Dn (ft)      *      952.12      *
* E.G. DS (ft)           *      954.05      * Culv Frctn Ls (ft)      *      1.27      *
* W.S. DS (ft)           *      953.38      * Culv Exit Loss (ft)      *      0.08      *
* Delta EG (ft)          *      2.04      * Culv Entr Loss (ft)      *      0.68      *
* Delta WS (ft)          *      2.43      * Q Weir (cfs)            *      212.96      *
* E.G. IC (ft)           *      956.08      * Weir Sta Lft (ft)      *      245.45      *
* E.G. OC (ft)           *      956.08      * Weir Sta Rgt (ft)      *      350.18      *
* Culvert Control        *      Outlet      * Weir Submerg           *      0.00      *
* Culv WS Inlet (ft)     *      953.64      * Weir Max Depth (ft)    *      1.89      *
* Culv WS Outlet (ft)    *      953.37      * Weir Avg Depth (ft)    *      0.75      *
* Culv Nml Depth (ft)    *                      * Weir Flow Area (sq ft) *      79.05      *
* Culv Crt Depth (ft)    *      1.14      * Min El Weir Flow (ft) *      954.27      *
*****
```

CROSS SECTION

RIVER: Trib 3  
 REACH: Trib 3                      RS: 1089.963

INPUT

Description:

Station Elevation Data      num=      114  
                                 Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev      Sta      Elev  
 \*\*\*\*\*  
                                 0      970      7.75      968      14.33      966.27      15.77      966      18.18      965.58

OXF157-159Bridges.rep

27.24	964	28.93	963.74	34.28	963.02	36.34	962.71	37.55	962.38
37.58	962.38	39.35	962.55	40	962.65	44.1	962.3	52.15	961.38
59.99	960.73	66.63	960.17	67.26	960.12	68.38	960	85.41	958.71
96.78	958	98.95	957.89	110.89	957.26	145.41	956.82	165.27	956.8
175.54	956.82	178.9	956.75	183.31	956.63	187.82	956.5	193.61	956.23
194.94	956.21	201.39	956.1	206.69	956	207.42	956	218.14	955.11
228.78	954.26	237.22	953.56	238.57	953.45	245.56	953.4	248.36	953.46
250.52	953.38	253.9	952.89	262.36	952.08	262.66	952	262.87	952
269.68	950.39	273.17	952	273.53	952.14	286.94	953.77	288.62	953.92
289.42	953.99	289.43	953.99	289.76	953.86	289.96	953.86	290.36	953.87
293.53	954	300.13	954.27	302.74	954.29	303.16	954.26	303.27	954.27
303.36	954.27	303.73	954.33	313.71	954.89	326.65	955.61	331.76	956
337.5	956.47	349.95	957.63	353.91	958	358.14	958	371.05	958.7
372.07	958.74	386.07	959.36	392.59	959.61	397.93	960	438.81	961.29
441.87	961.37	460.75	962	461.51	962	463.53	962.14	469.25	962.28
490.96	962.99	499.69	963.21	524.28	964	538.22	965.41	546.78	965.74
546.93	965.75	554.09	966	566.14	967.05	577.89	968	579.37	968.11
579.54	968.13	579.73	968.15	582.66	968.33	584.56	968.41	596.64	968.9
609.91	970	629.18	970	633.26	970.34	638.47	970.79	647.29	971.19
652.77	972	729.9	972	737.49	972.32	767.13	973.45	768.34	973.49
777.47	974	804.59	975.83	807.59	976	808.71	976	811.35	976.32
813.23	976.57	822.26	978	823.4	978.2	833.21	980		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.035	262.36	.035	273.53	.035

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	262.36	273.53		482.6	81.36	254.05	.1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 954.05	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 0.67	* Wt. n-Val.	* 0.035	* 0.035	* 0.035
* W.S. Elev (ft)	* 953.38	* Reach Len. (ft)	* 0.00	* 0.00	* 0.00
* Crit W.S. (ft)	* 953.38	* Flow Area (sq ft)	* 8.39	* 23.66	* 6.32
* E.G. Slope (ft/ft)	* 0.011404	* Area (sq ft)	* 8.39	* 23.66	* 6.32
* Q Total (cfs)	* 221.90	* Flow (cfs)	* 30.12	* 171.07	* 20.71
* Top Width (ft)	* 33.20	* Top width (ft)	* 11.83	* 11.17	* 10.19
* Vel Total (ft/s)	* 5.78	* Avg. vel. (ft/s)	* 3.59	* 7.23	* 3.28
* Max Chl Dpth (ft)	* 2.99	* Hydr. Depth (ft)	* 0.71	* 2.12	* 0.62
* Conv. Total (cfs)	* 2077.9	* Conv. (cfs)	* 282.0	* 1601.9	* 194.0
* Length Wtd. (ft)	* 0.00	* Wetted Per. (ft)	* 11.91	* 11.75	* 10.27
* Min Ch El (ft)	* 950.39	* Shear (lb/sq ft)	* 0.50	* 1.43	* 0.44
* Alpha	* 1.29	* Stream Power (lb/ft s)	* 833.21	* 0.00	* 0.00
* Frctn Loss (ft)	* 0.00	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	* 0.18	* Cum SA (acres)	*	*	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth

for the water surface and continued on with the calculations.

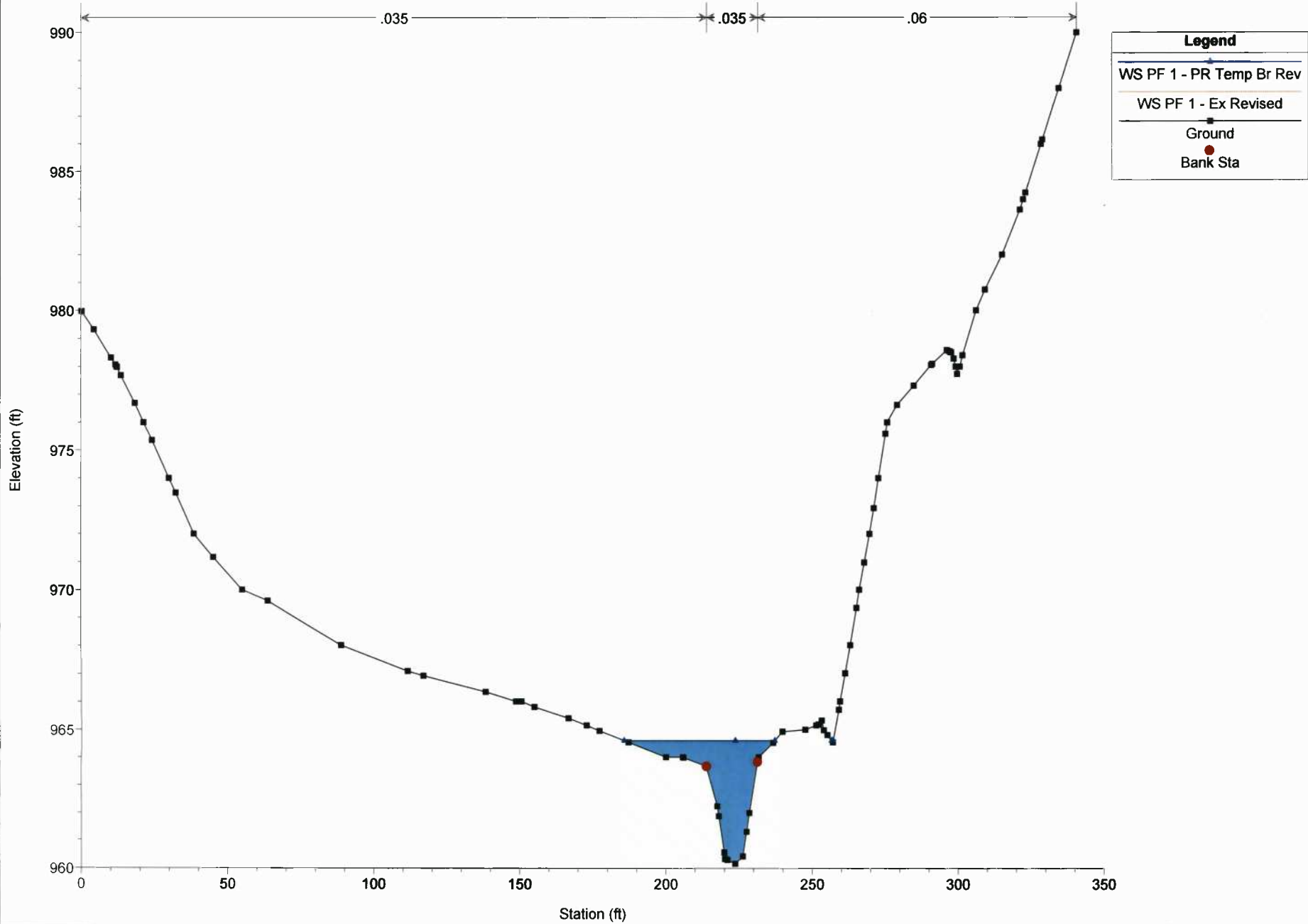
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

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

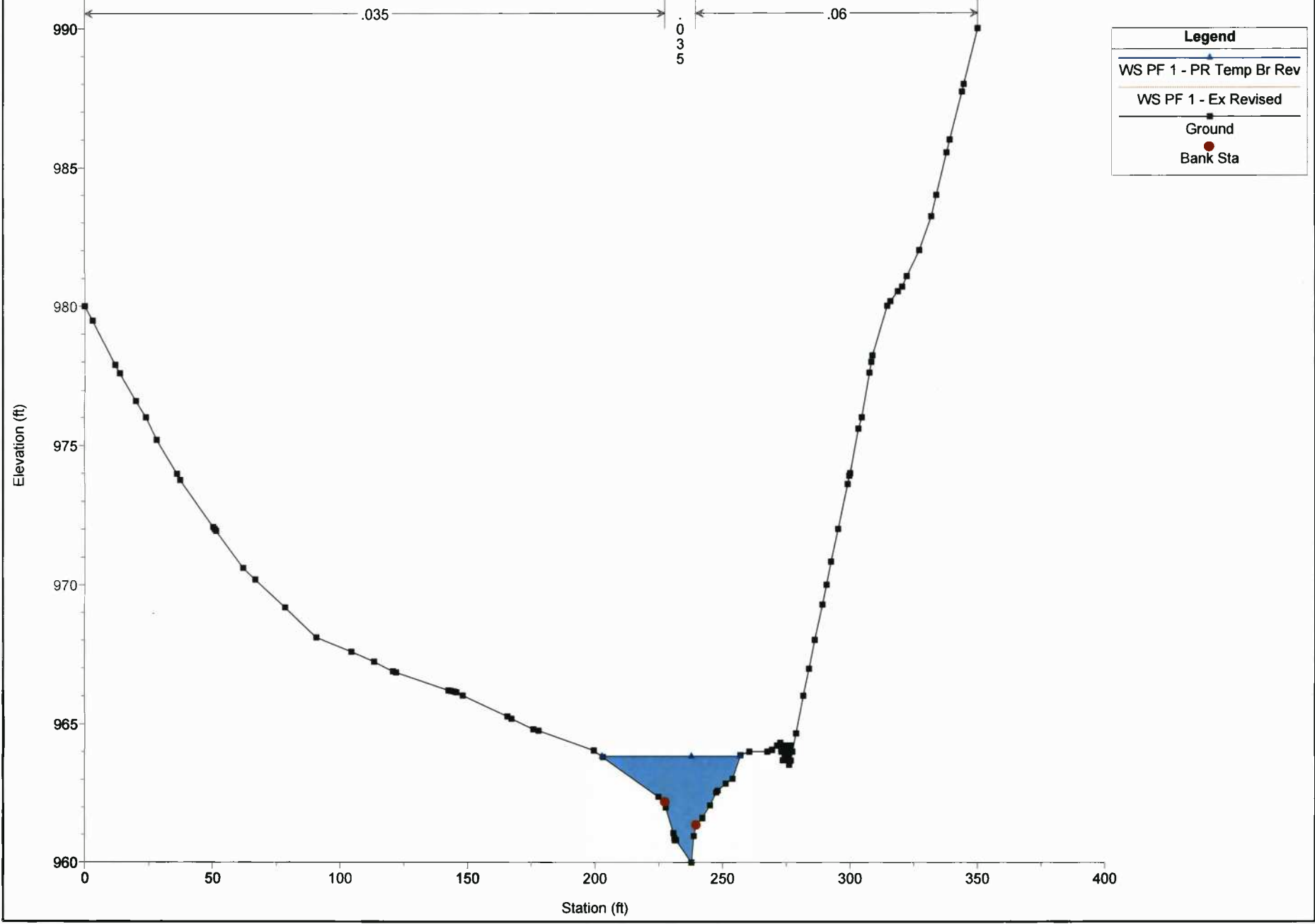
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
River = Bluestone Creek Reach = Bluestone Creek RS = 14659.36



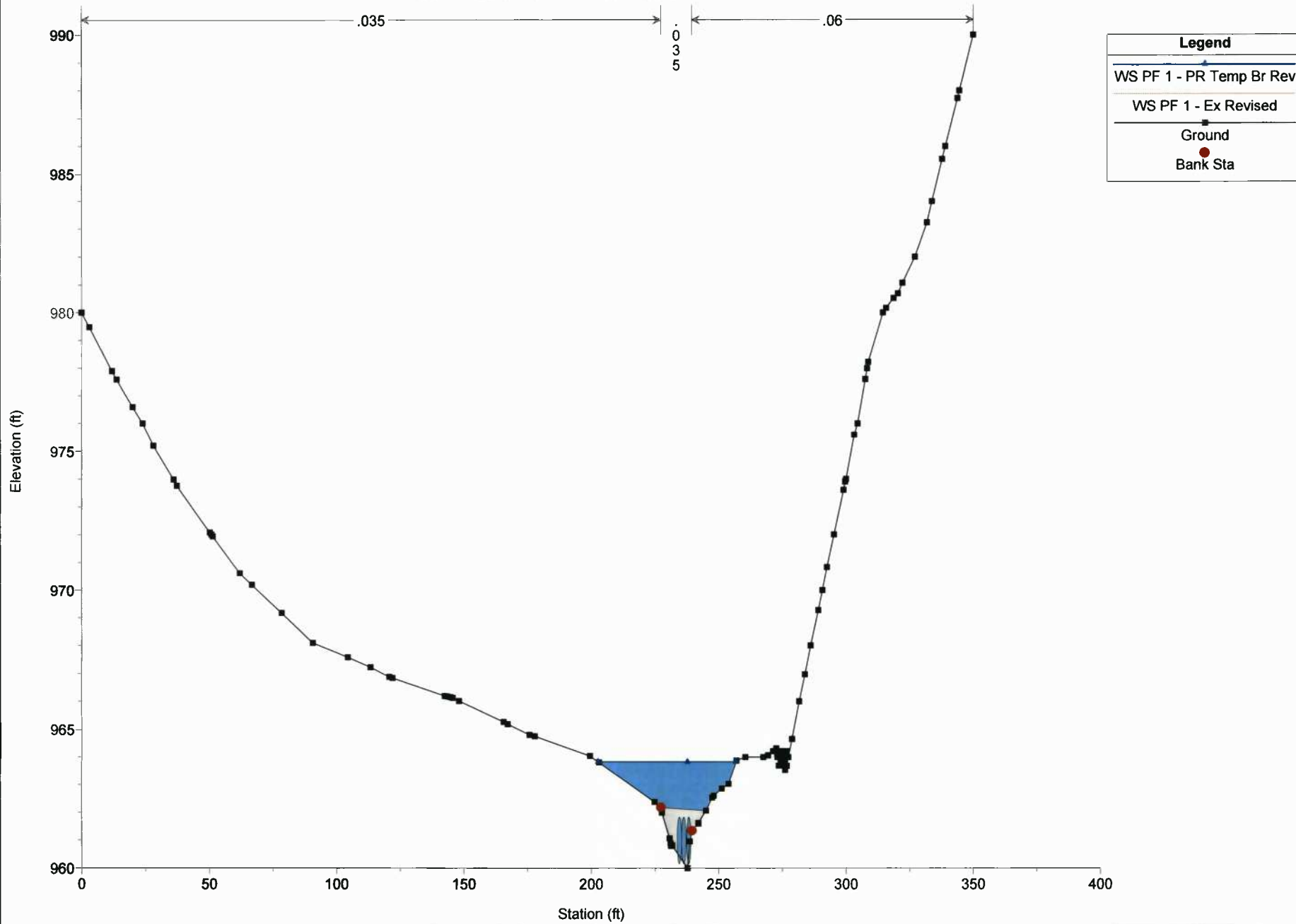
OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Bluestone Creek RS = 14572.23







OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

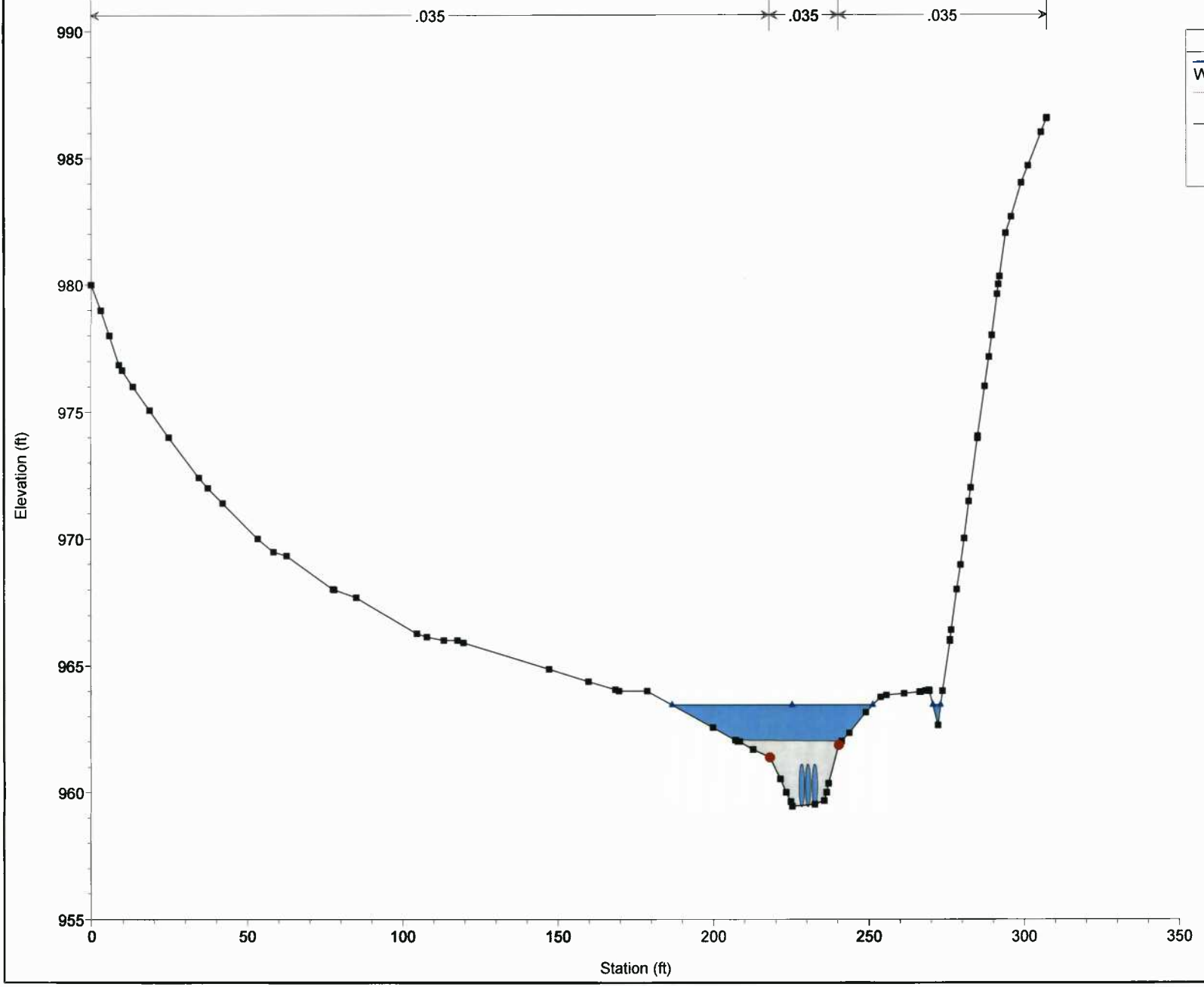
Geom: Proposed Temp Bridge Revised Flow: Structures Revised

River = Bluestone Creek Reach = Bluestone Creek RS = 14557.54 Culv



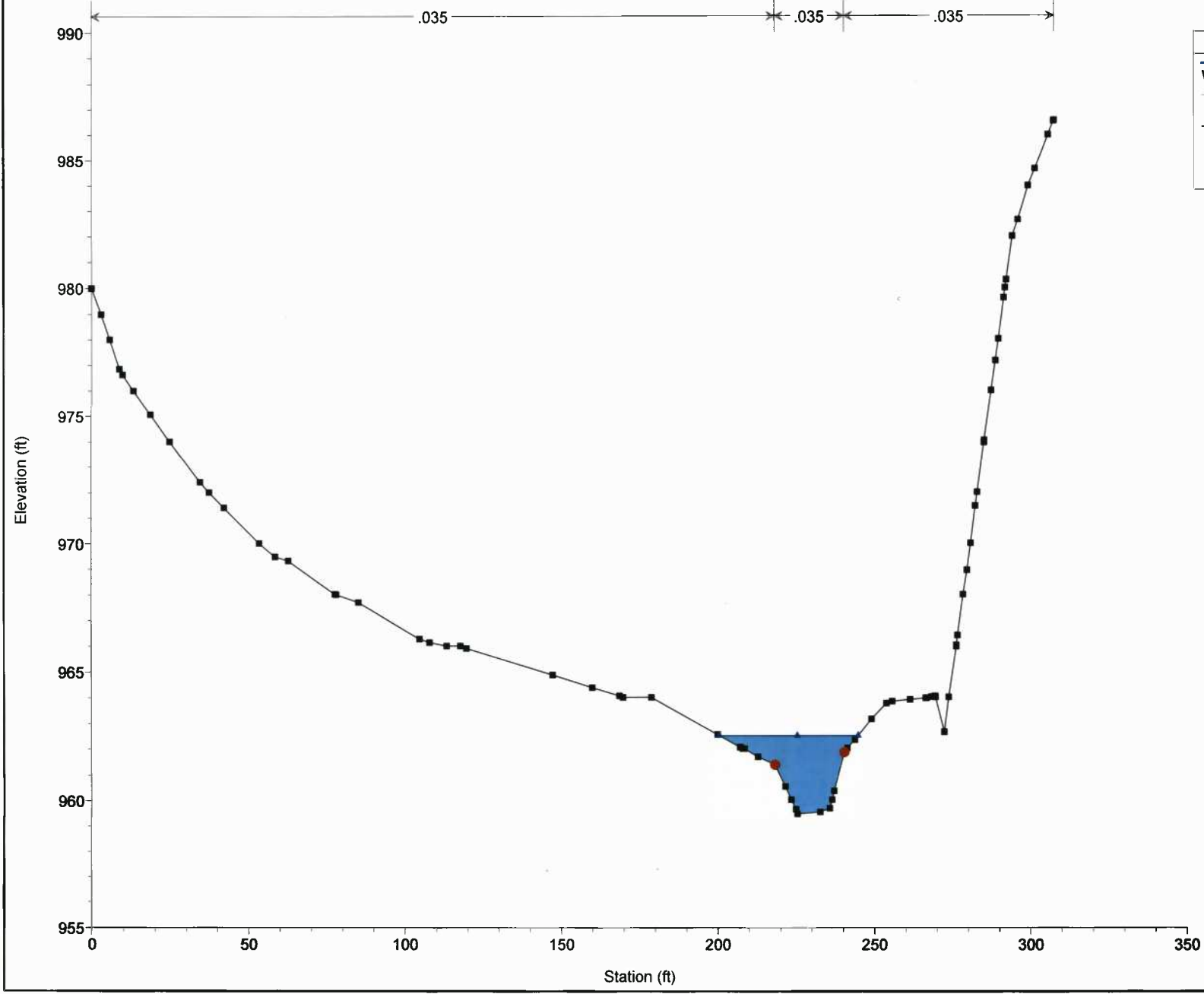
OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Bluestone Creek RS = 14557.54 Culv

Legend	
	WS PF 1 - PR Temp Br Rev
	WS PF 1 - Ex Revised
	Ground
	Bank Sta



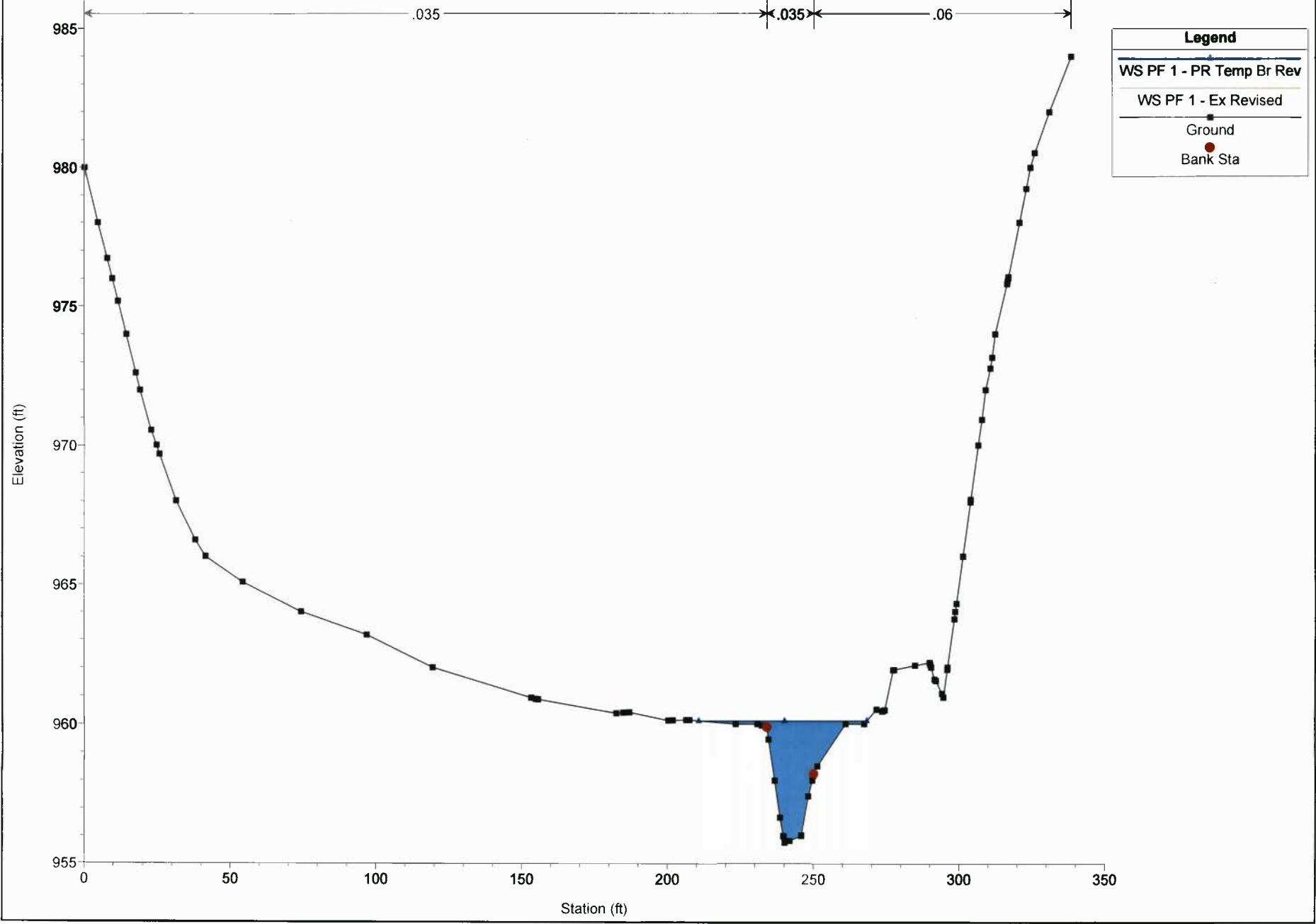
OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Bluestone Creek RS = 14543.33

Legend	
	WS PF 1 - PR Temp Br Rev
	WS PF 1 - Ex Revised
	Ground
	Bank Sta

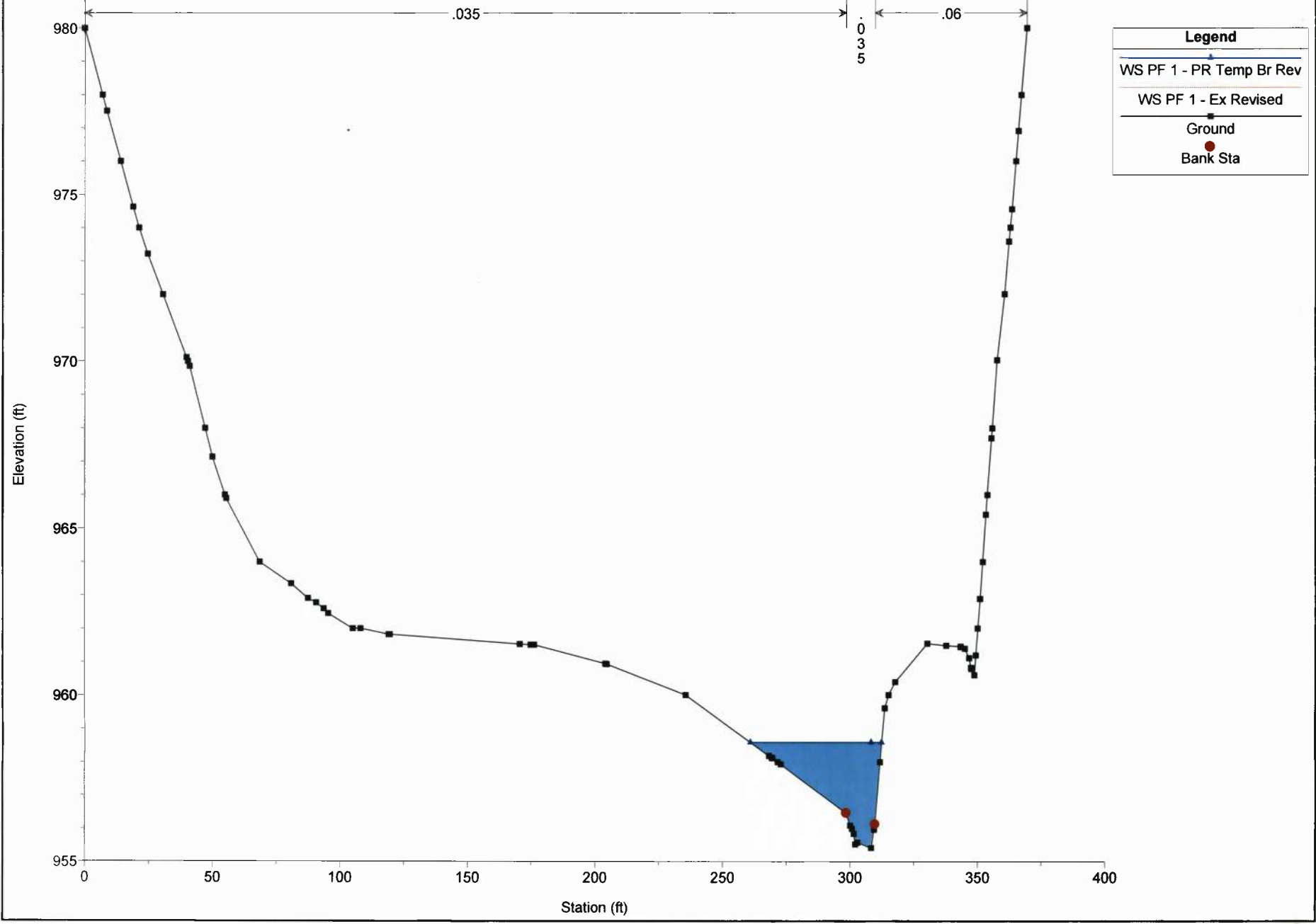




OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
River = Bluestone Creek Reach = Bluestone Creek RS = 14371.96

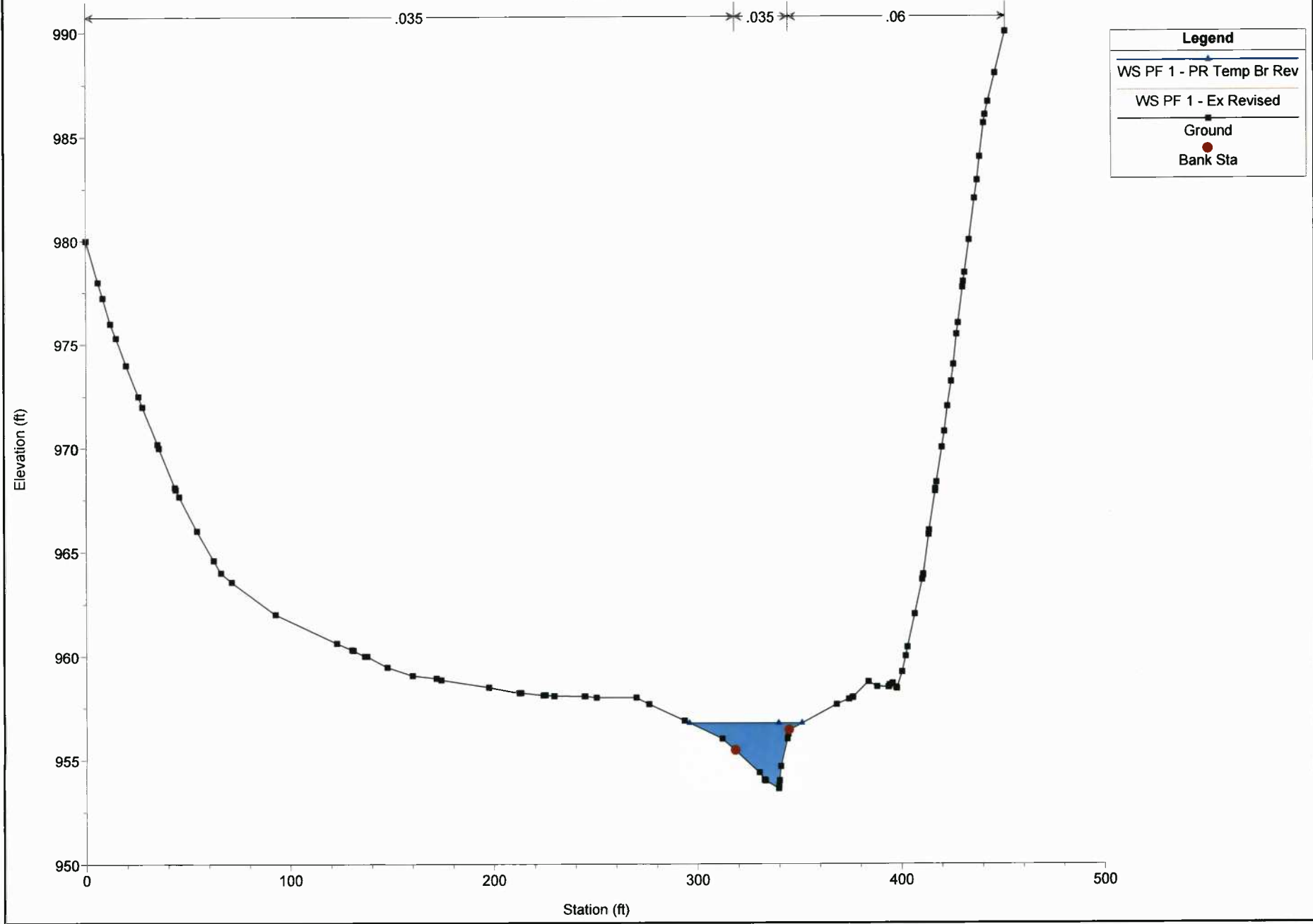


OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Bluestone Creek RS = 14193.22



Legend	
WS PF 1 - PR Temp Br Rev	(Blue shaded area)
WS PF 1 - Ex Revised	(Black line with square markers)
Ground	(Black line with square markers)
Bank Sta	(Red dot)

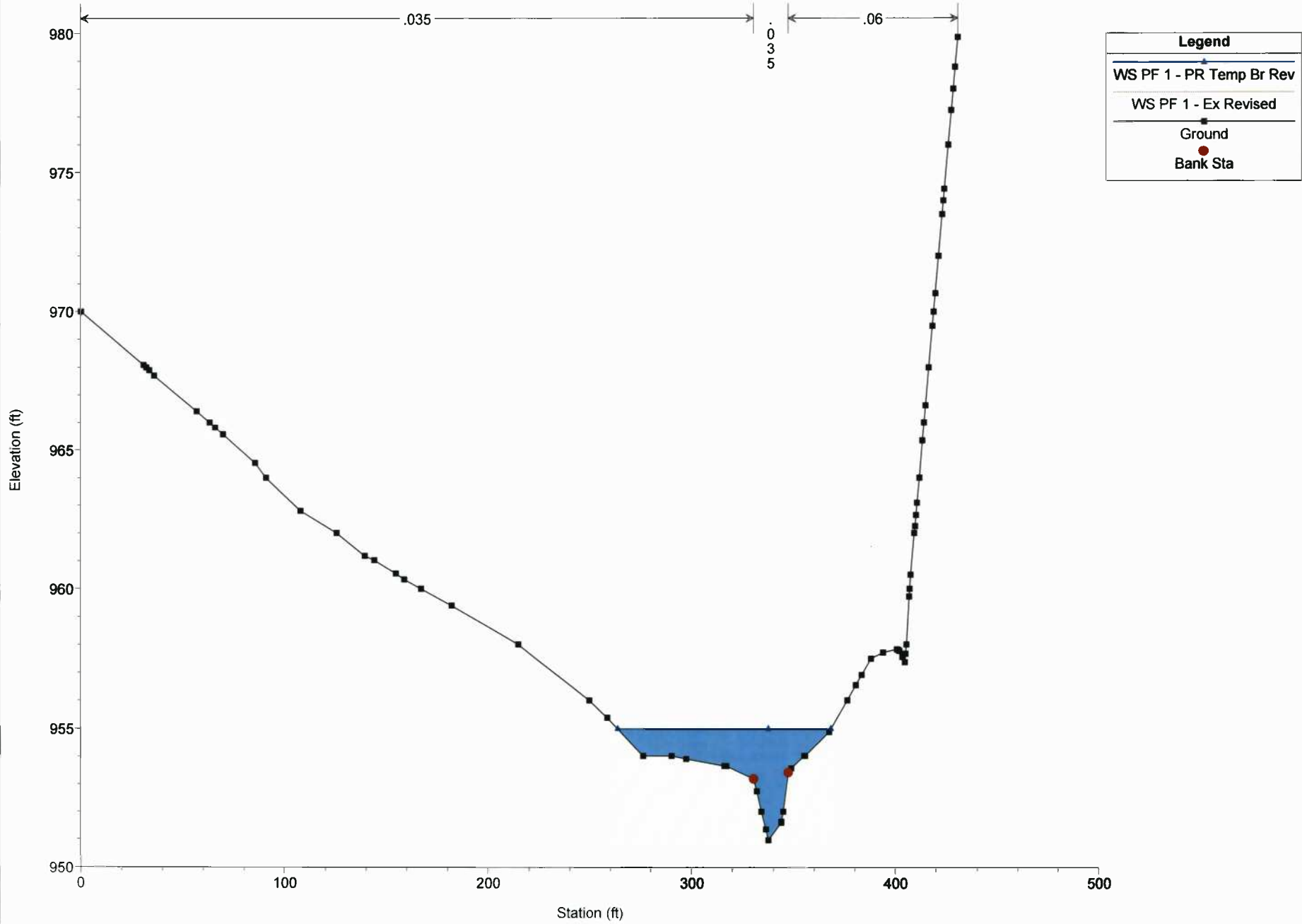
OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Bluestone Creek RS = 14044.56



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

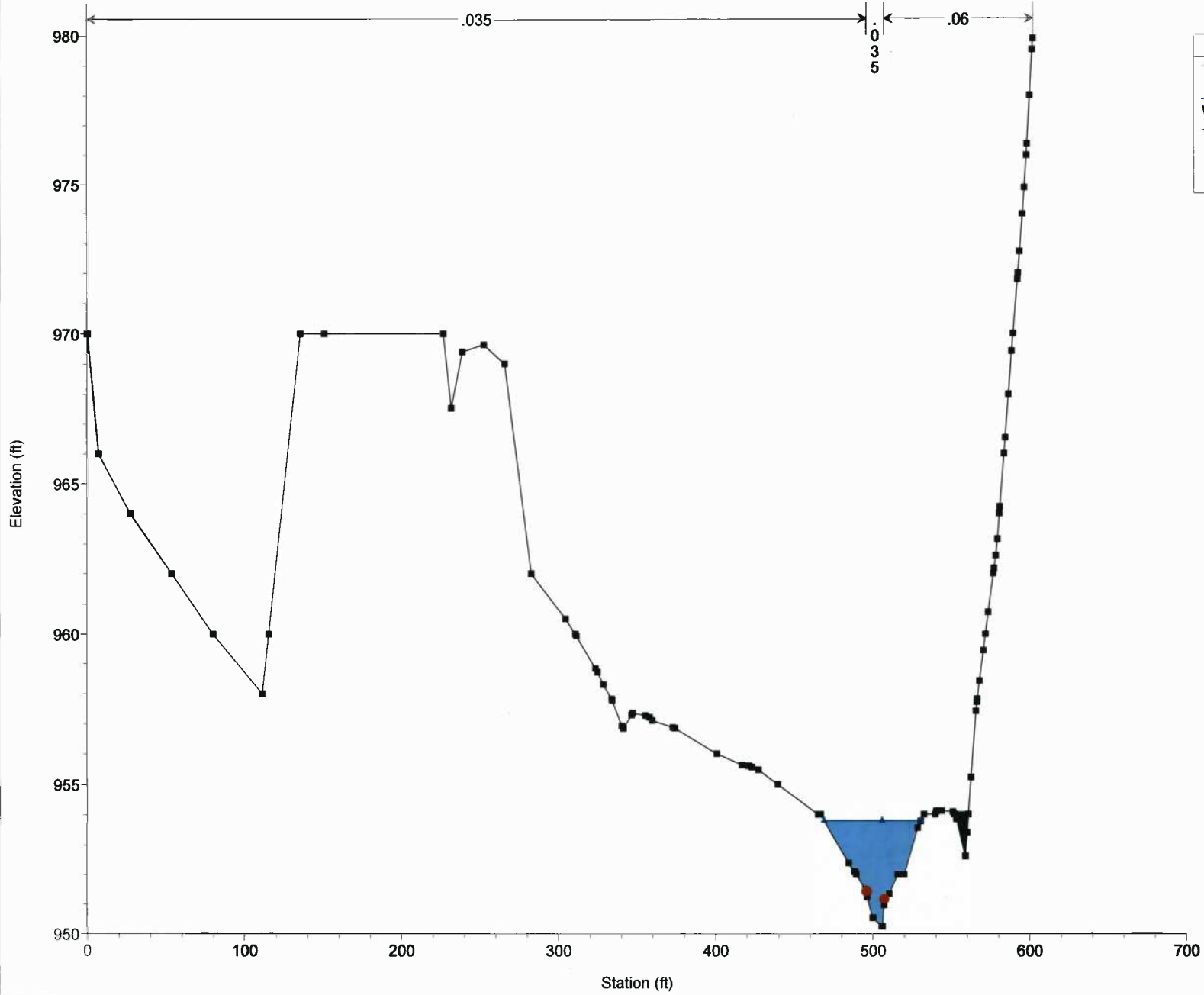
River = Bluestone Creek Reach = Bluestone Creek RS = 13852.52



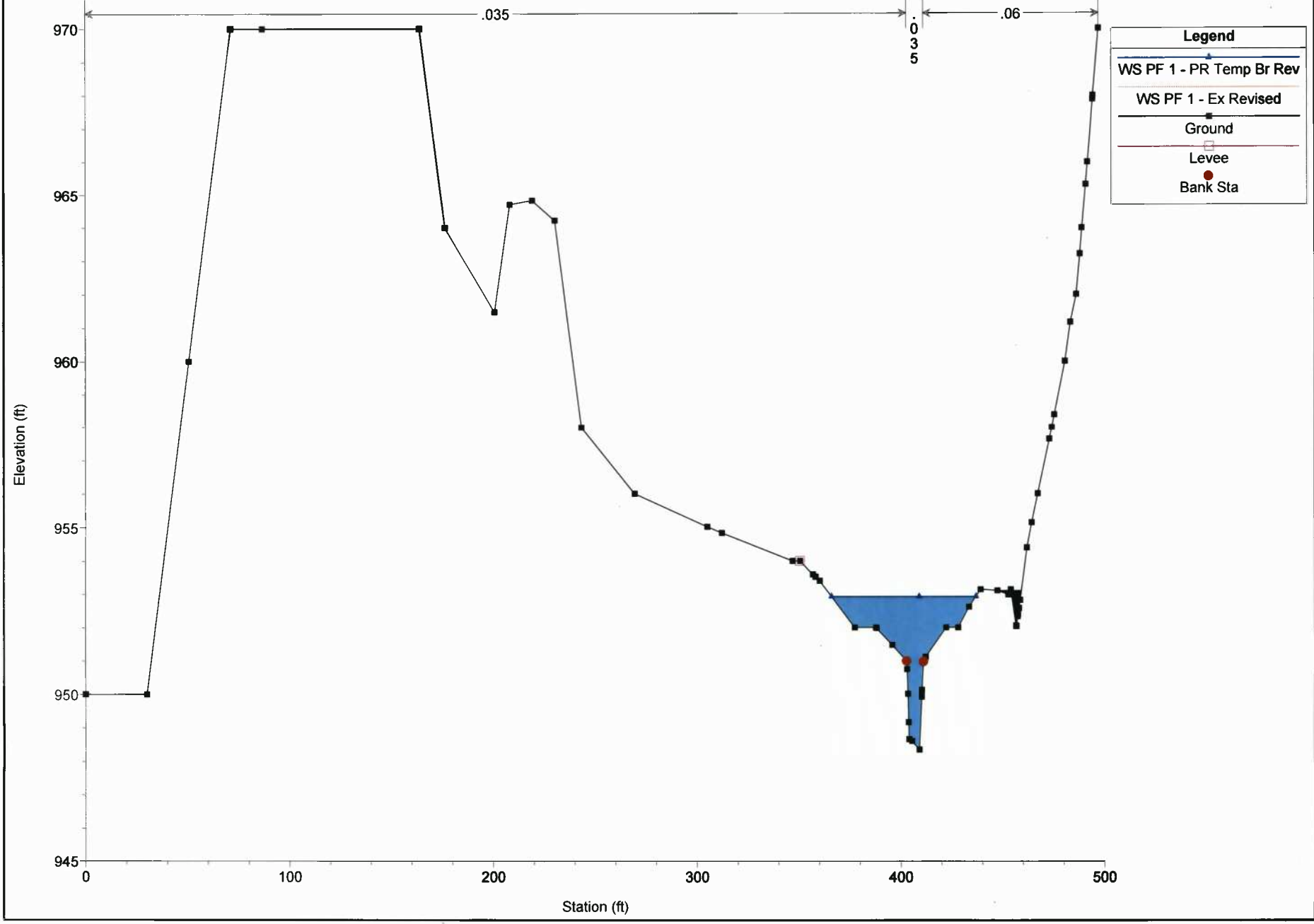
OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

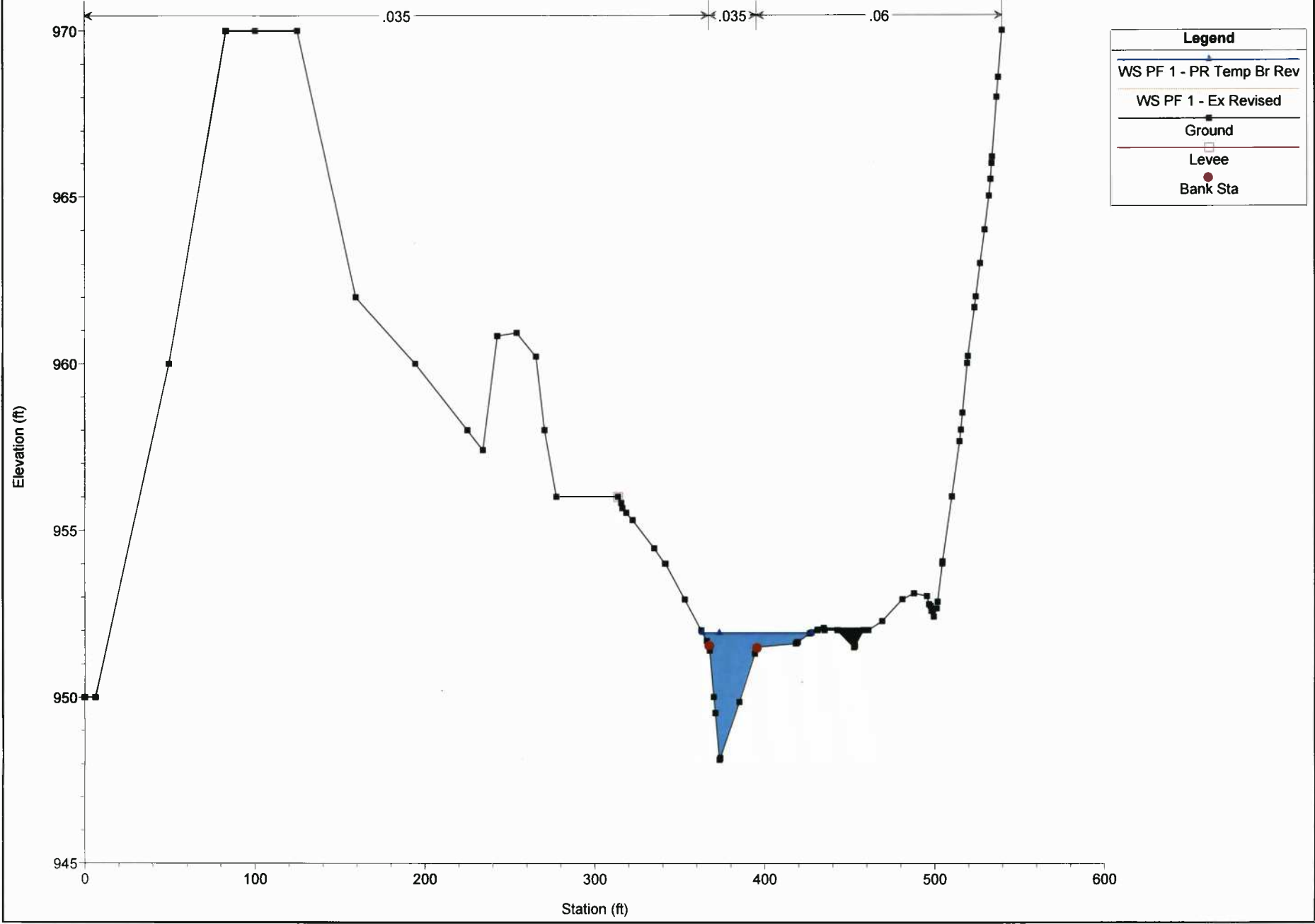
River = Bluestone Creek Reach = Bluestone Creek RS = 13658.52



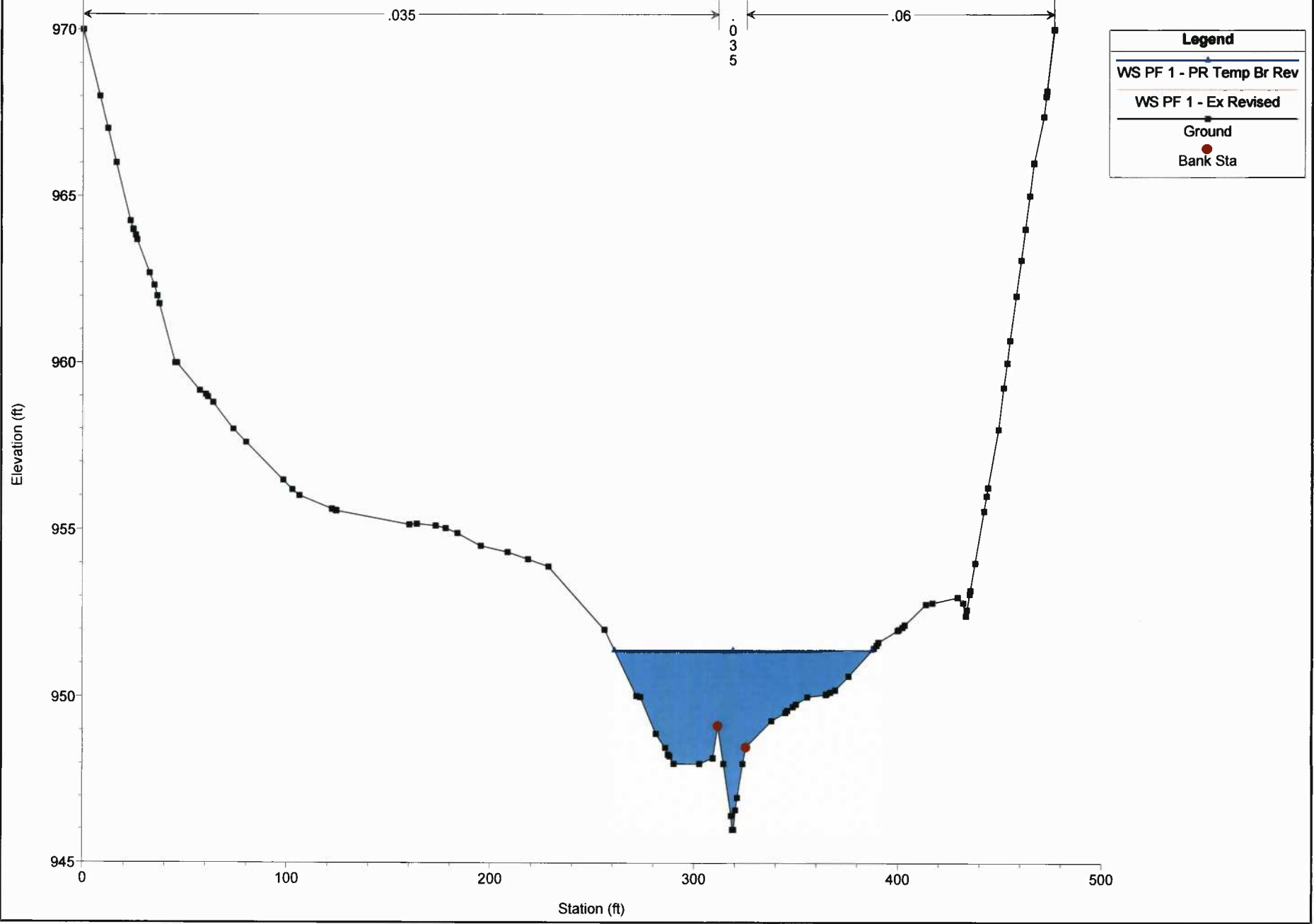
OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Bluestone Creek RS = 13552.07



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Bluestone Creek RS = 13440.10



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
River = Bluestone Creek Reach = Upper RS = 13395.79

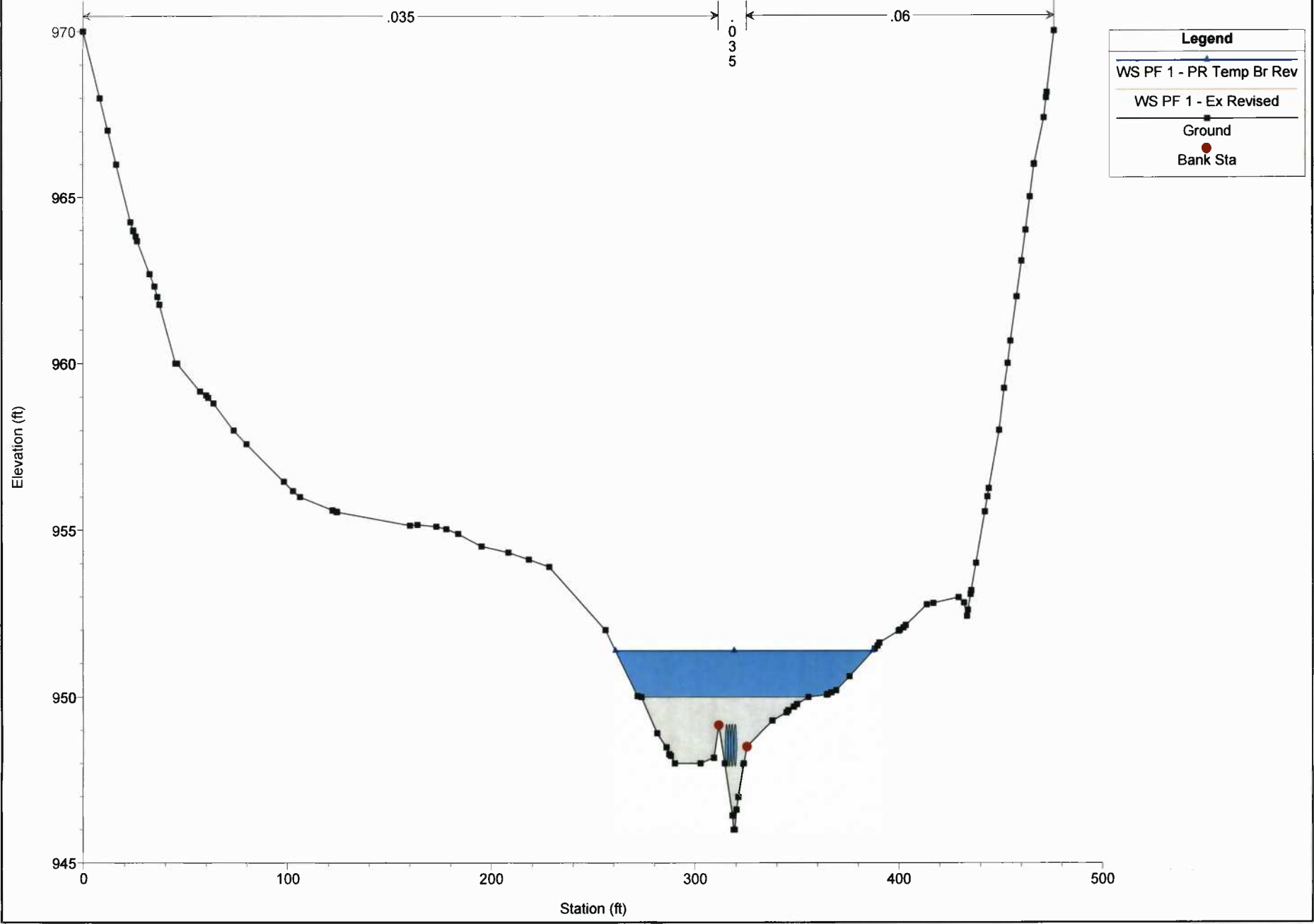




OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

River = Bluestone Creek Reach = Upper RS = 13372.57 Culv

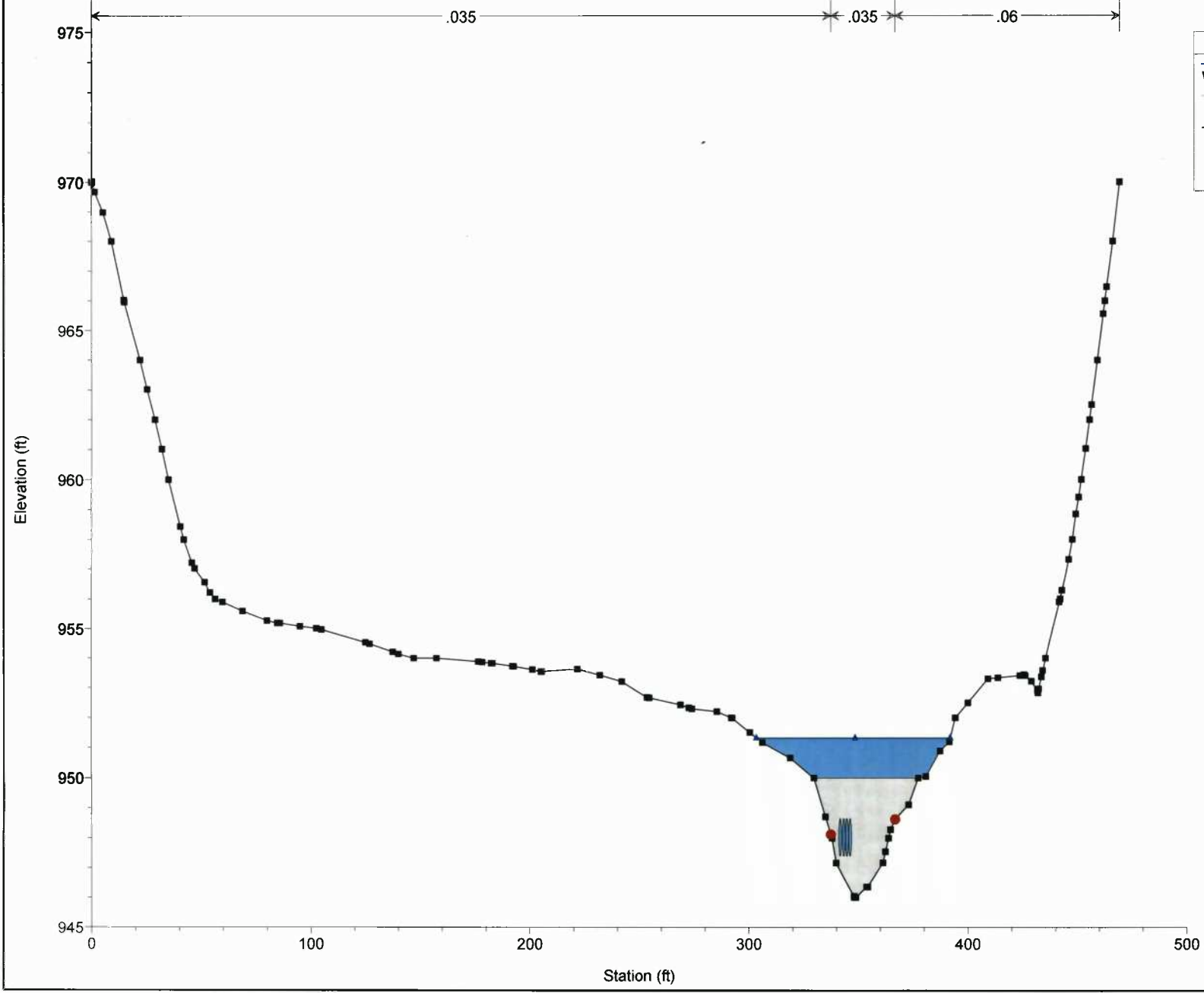


Legend	
WS PF 1 - PR Temp Br Rev	—
WS PF 1 - Ex Revised	—
Ground	■
Bank Sta	●

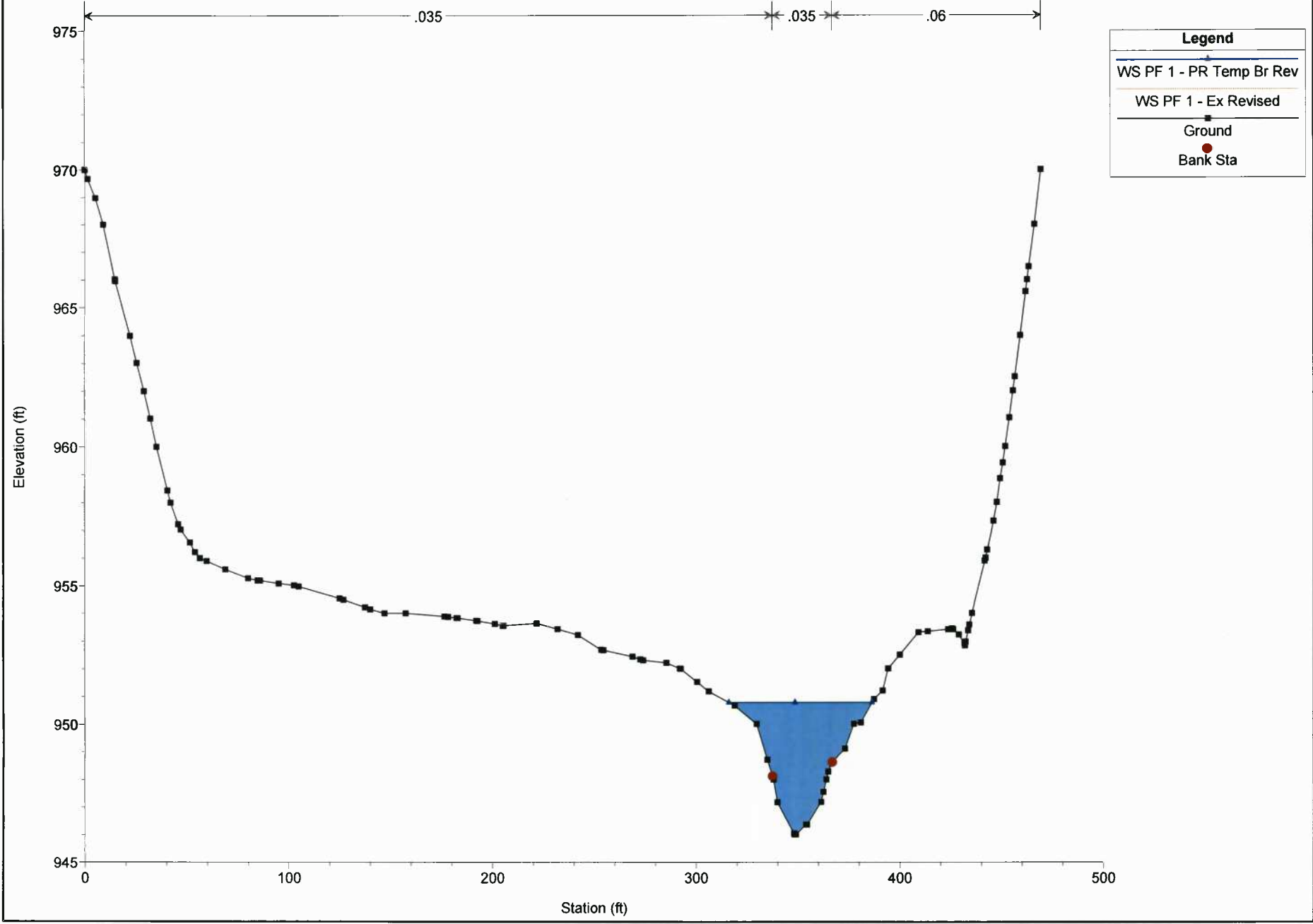
OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Upper RS = 13372.57 Culv

← .035 † .035 † .06 →

Legend	
WS PF 1 - PR Temp Br Rev	●
WS PF 1 - Ex Revised	■
Ground	■
Bank Sta	●



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
River = Bluestone Creek Reach = Upper RS = 13353.46

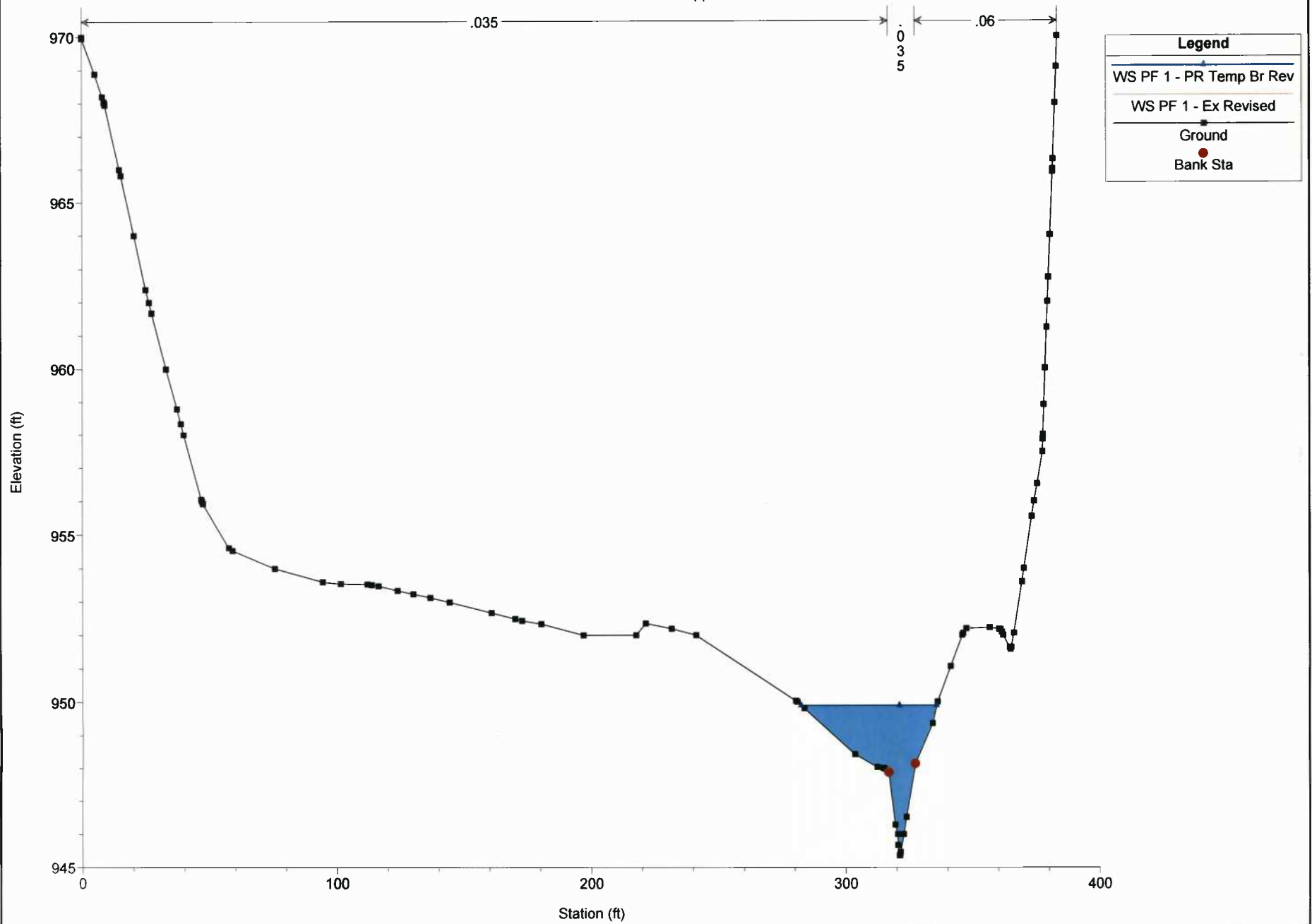


Legend	
WS PF 1 - PR Temp Br Rev	(Blue line with triangle marker)
WS PF 1 - Ex Revised	(Black line with square marker)
Ground	(Black line with square marker)
Bank Sta	(Red dot)

OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

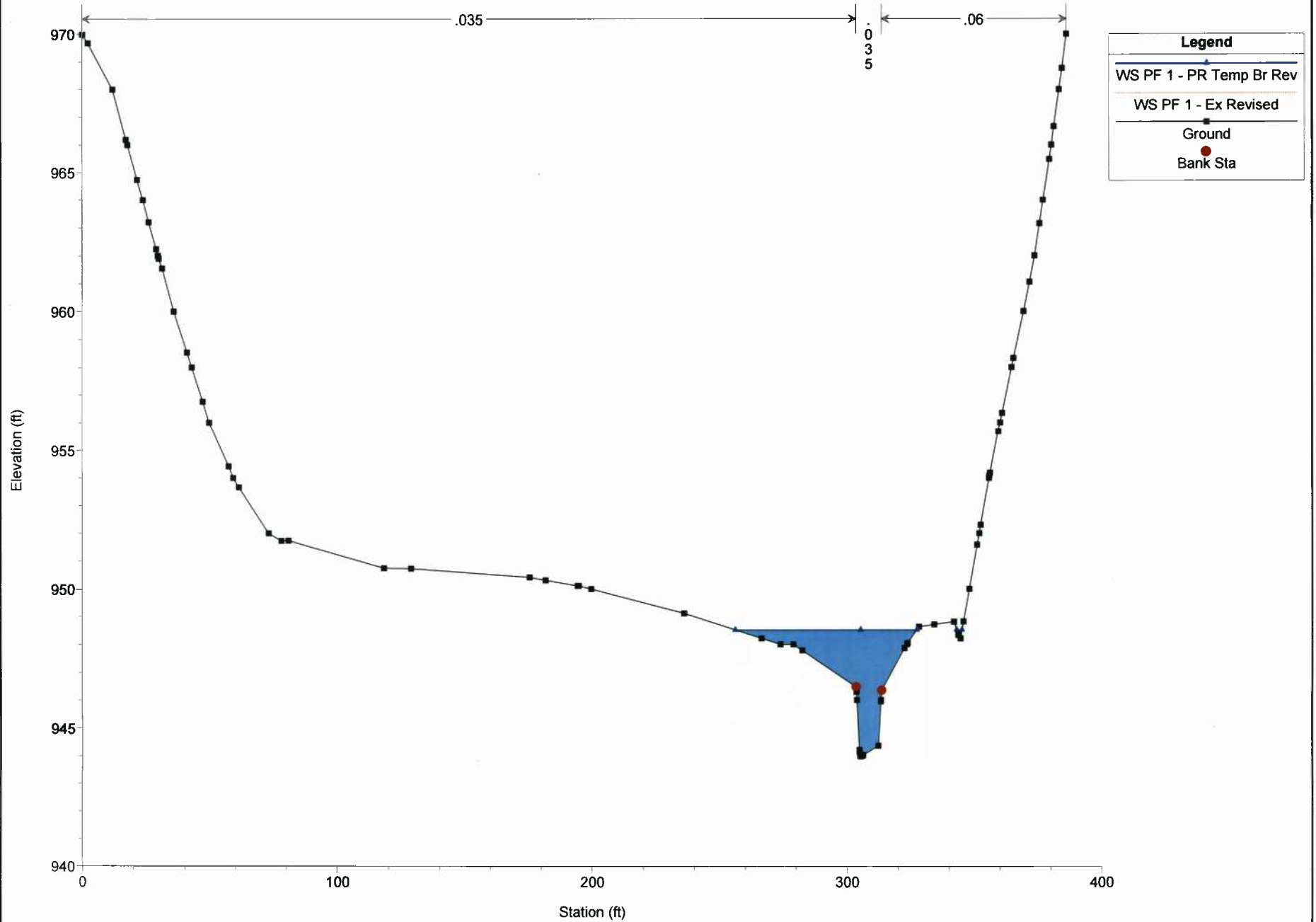
River = Bluestone Creek Reach = Upper RS = 13212.39



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

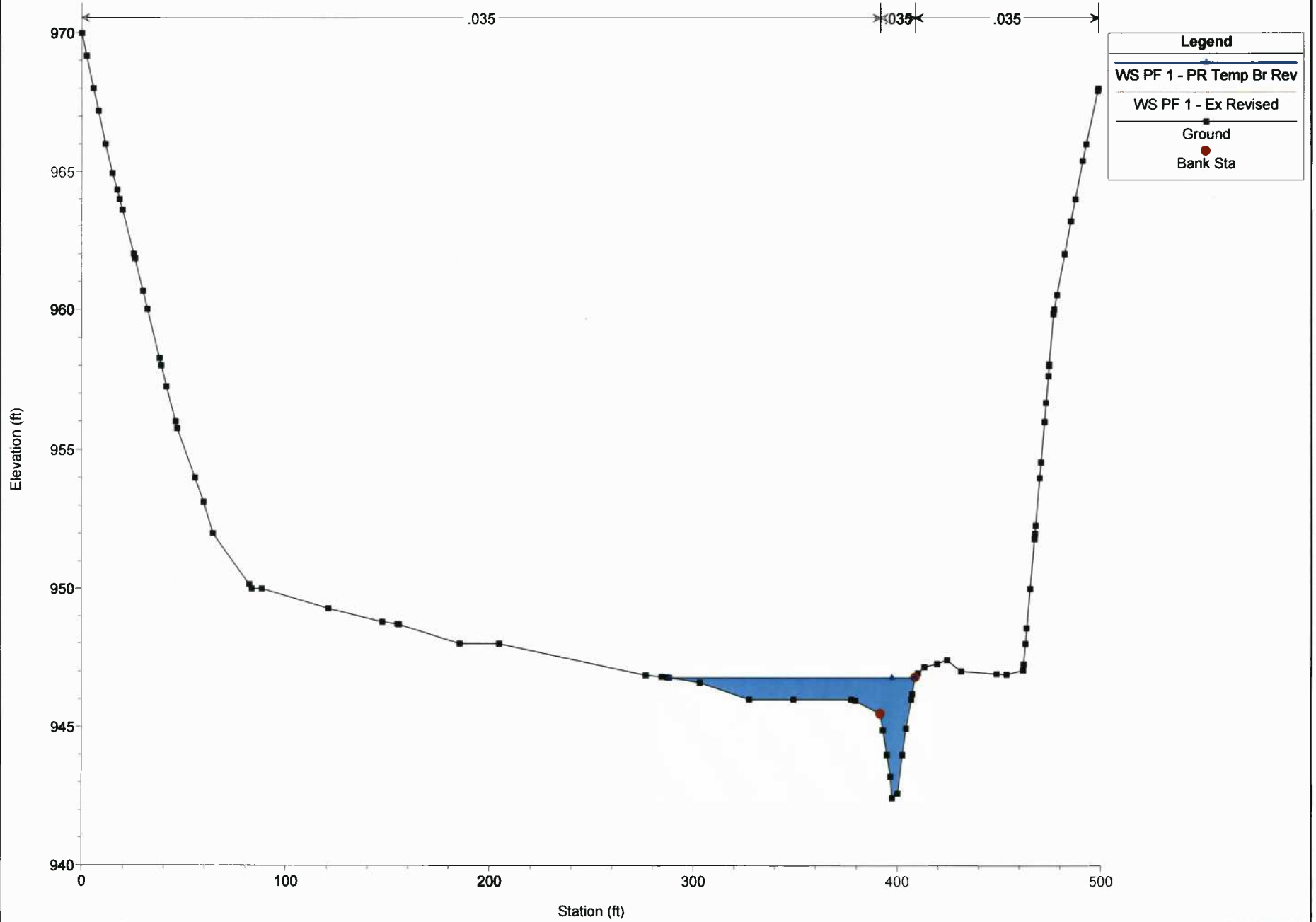
River = Bluestone Creek Reach = Upper RS = 13020.26



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

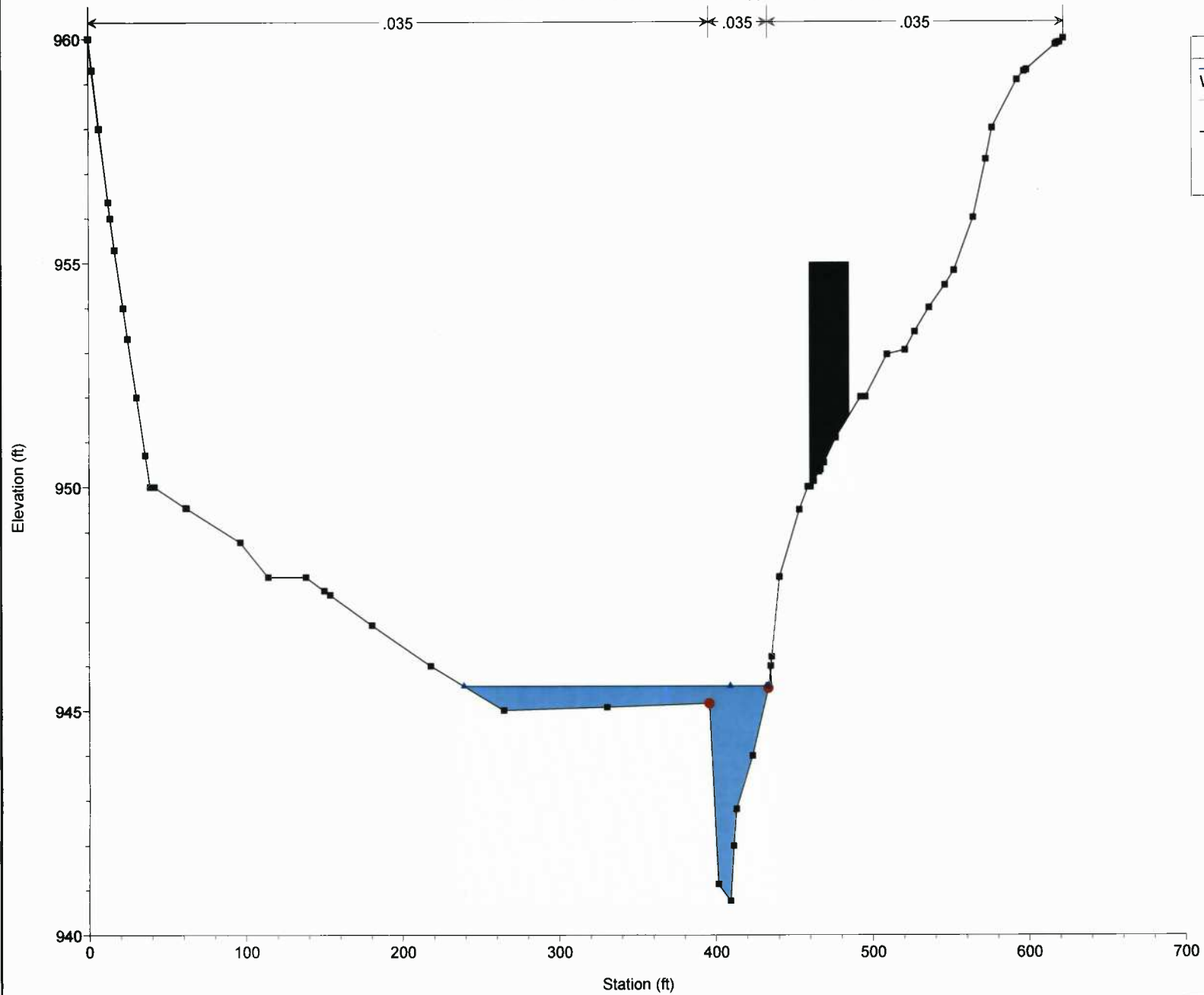
River = Bluestone Creek Reach = Upper RS = 12827.43



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

River = Bluestone Creek Reach = Upper RS = 12694.78

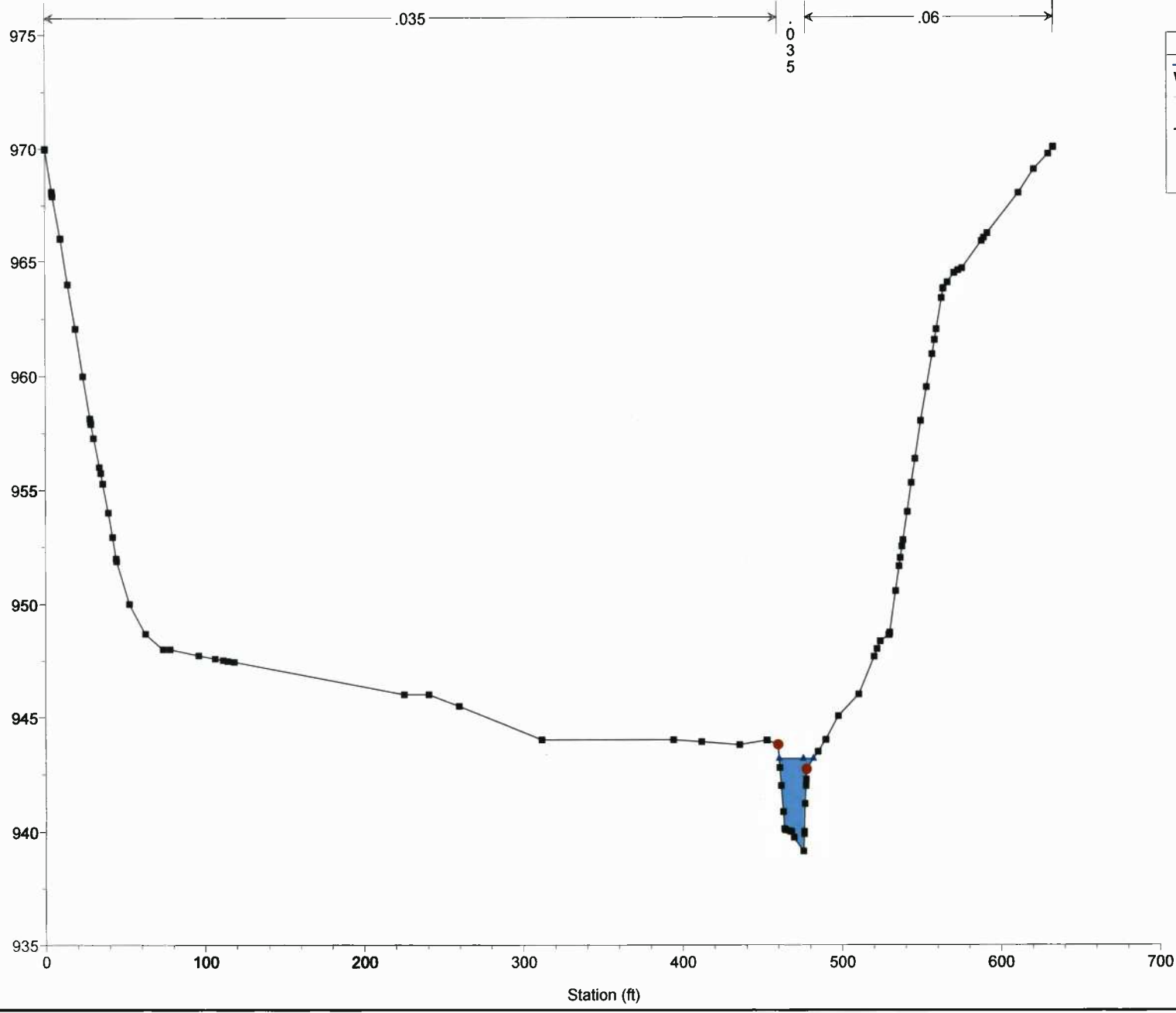


Legend	
WS PF 1 - PR Temp Br Rev	
WS PF 1 - Ex Revised	
Ground	
Bank Sta	

OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

River = Bluestone Creek Reach = Upper RS = 12504.92



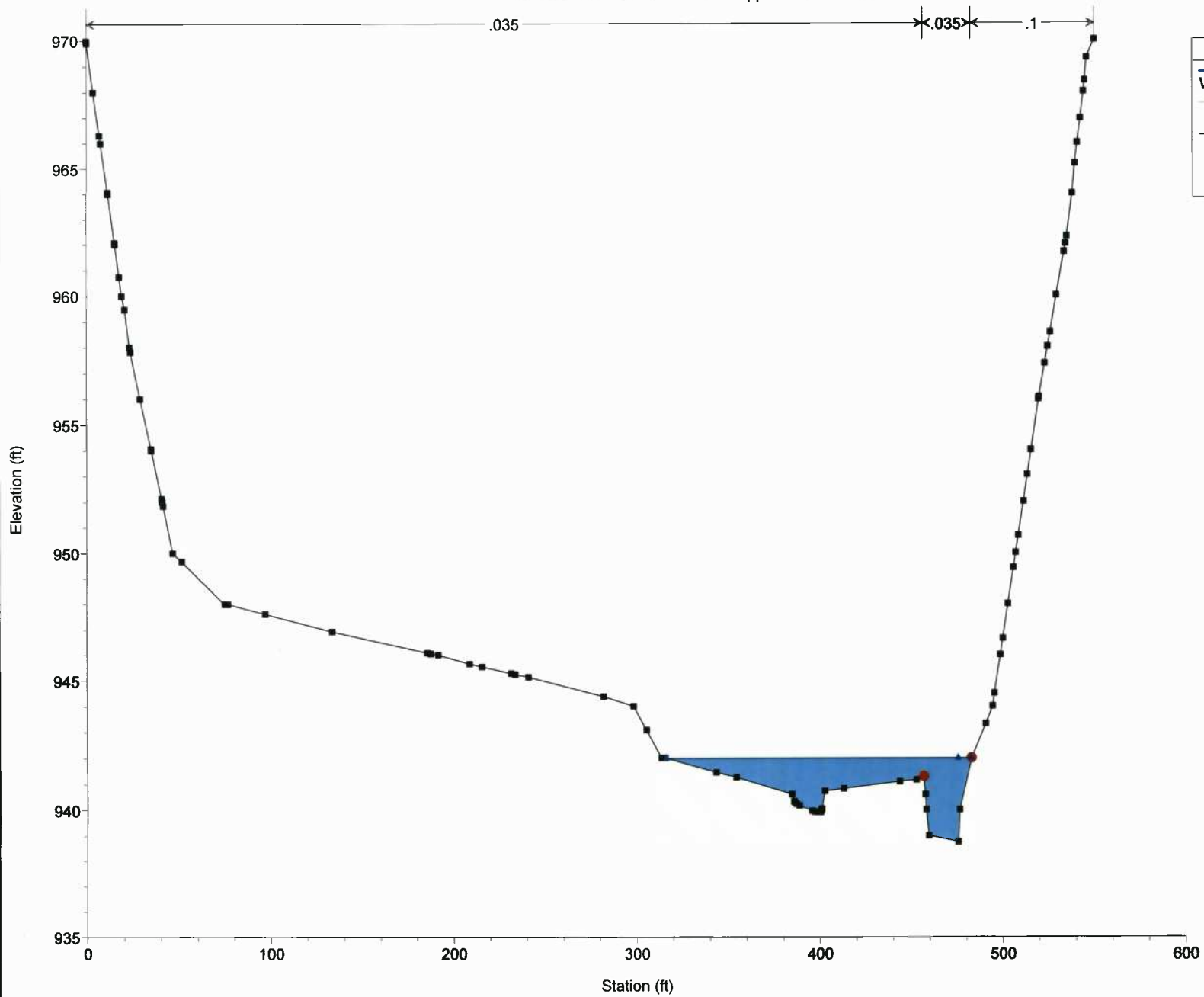
Legend	
WS PF 1 - PR Temp Br Rev	
WS PF 1 - Ex Revised	
Ground	
Bank Sta	



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

River = Bluestone Creek Reach = Upper RS = 12207.32

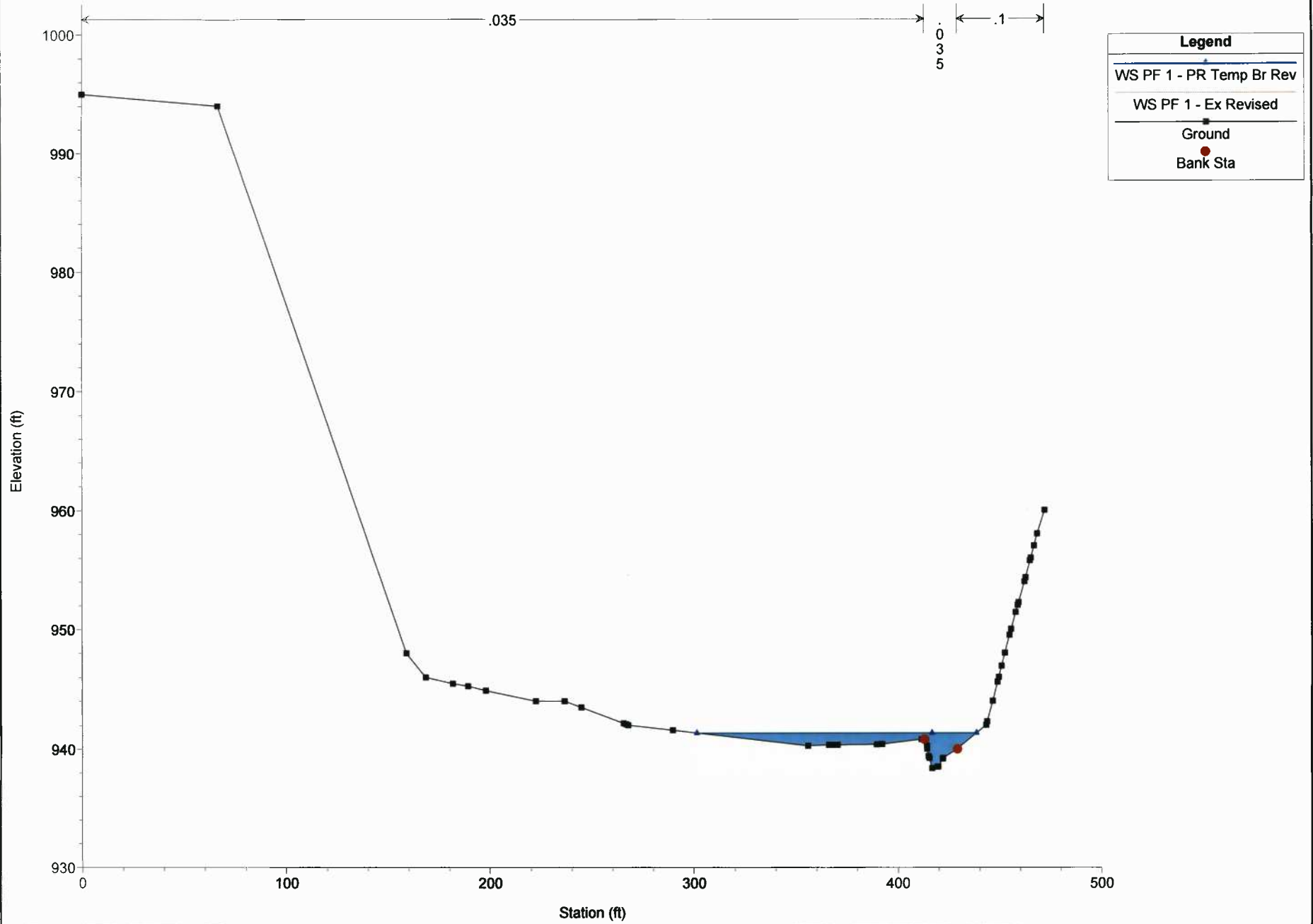


Legend	
	WS PF 1 - PR Temp Br Rev
	WS PF 1 - Ex Revised
	Ground
	Bank Sta

OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

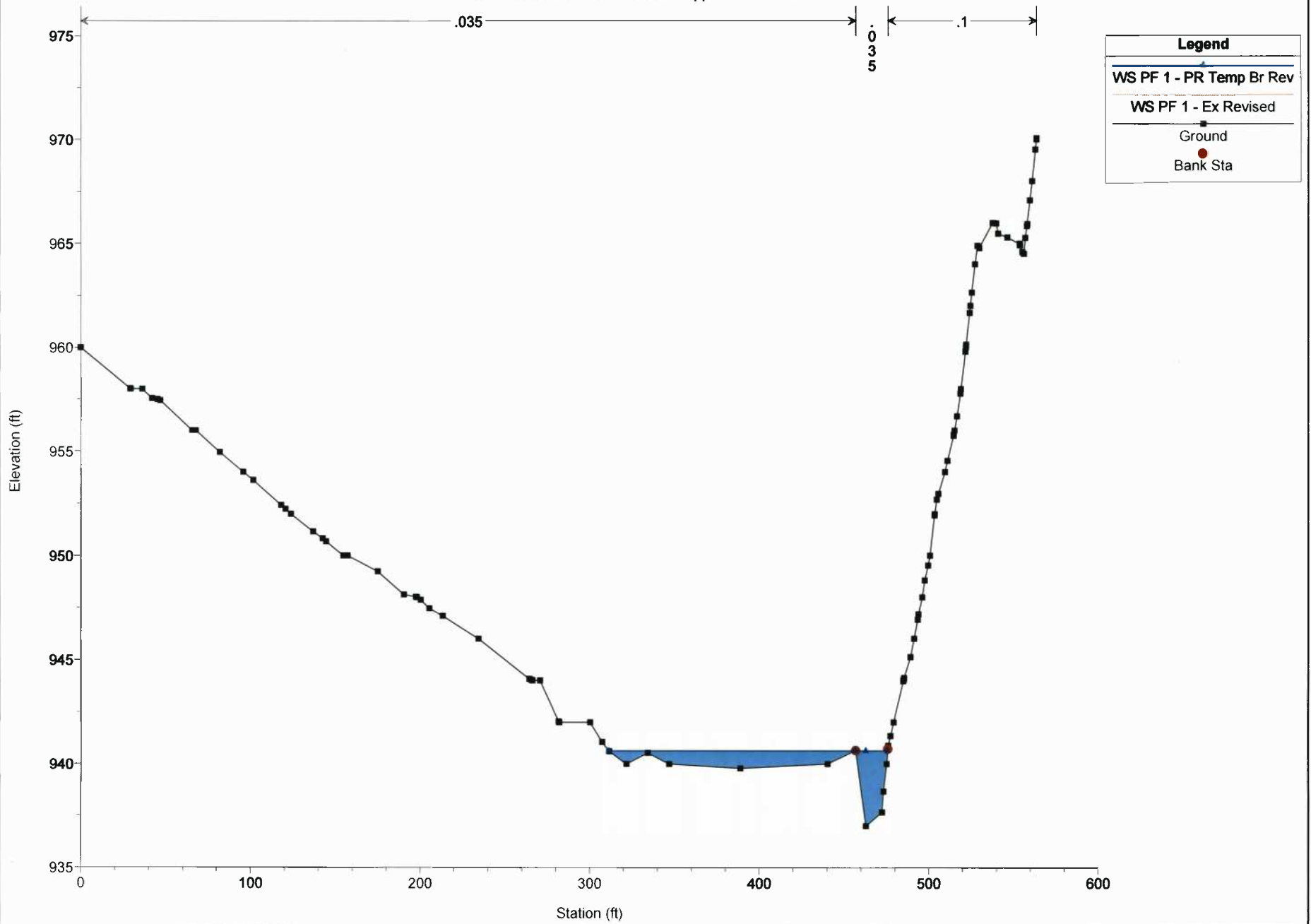
River = Bluestone Creek Reach = Upper RS = 12162.04



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

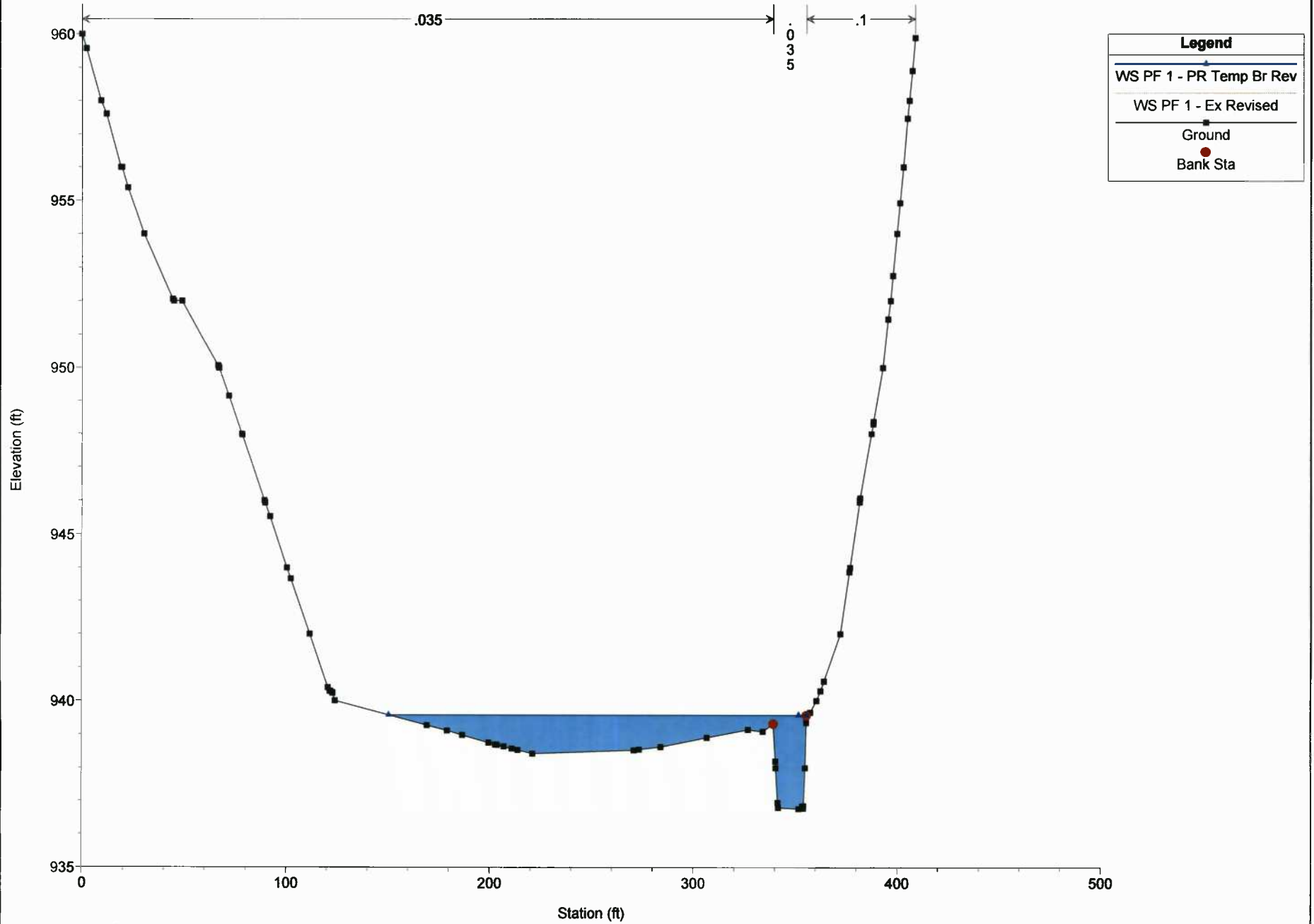
River = Bluestone Creek Reach = Upper RS = 12075.53



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

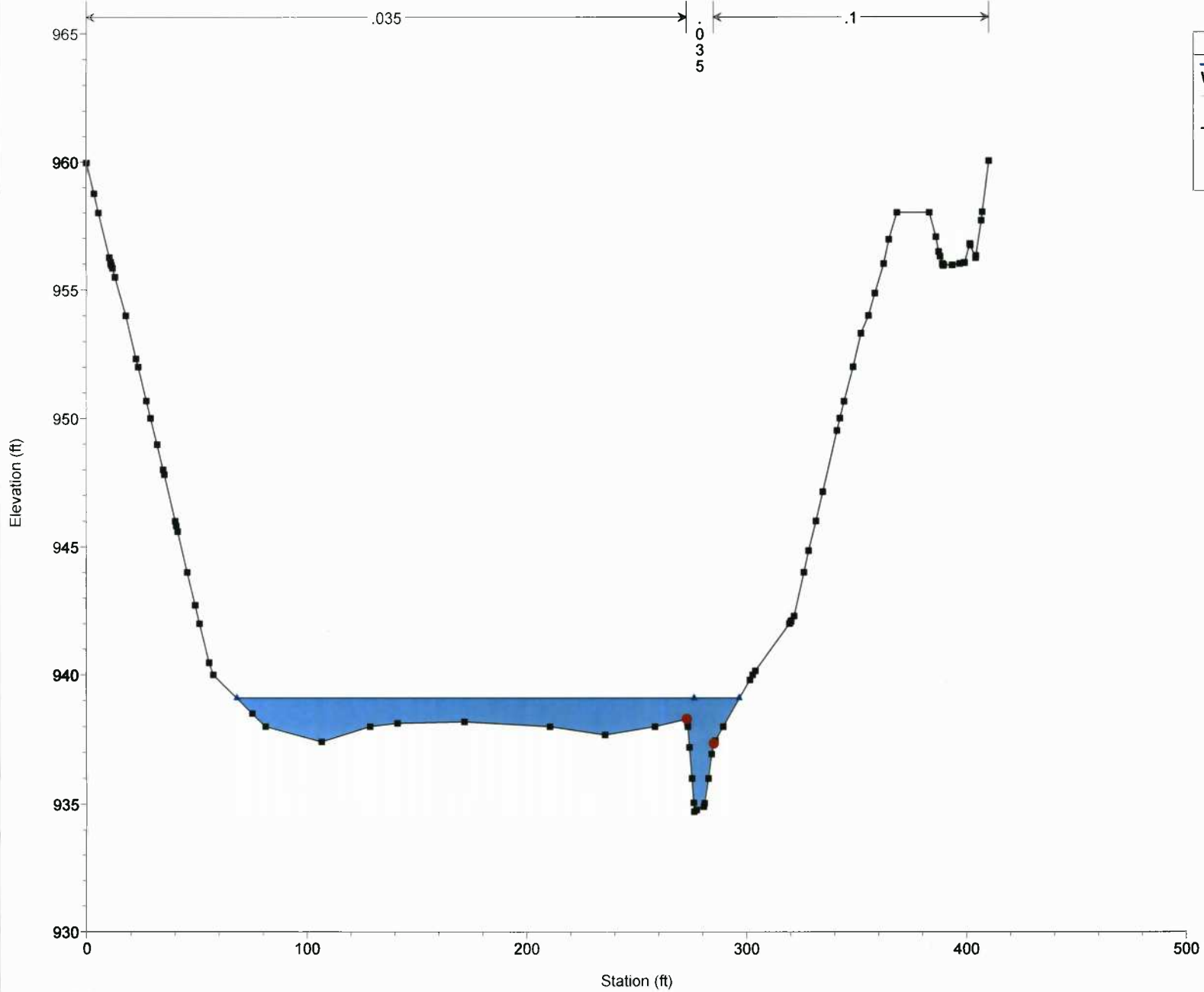
River = Bluestone Creek Reach = Upper RS = 11904.55



OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised

Geom: Proposed Temp Bridge Revised Flow: Structures Revised

River = Bluestone Creek Reach = Upper RS = 11770.60



**Legend**

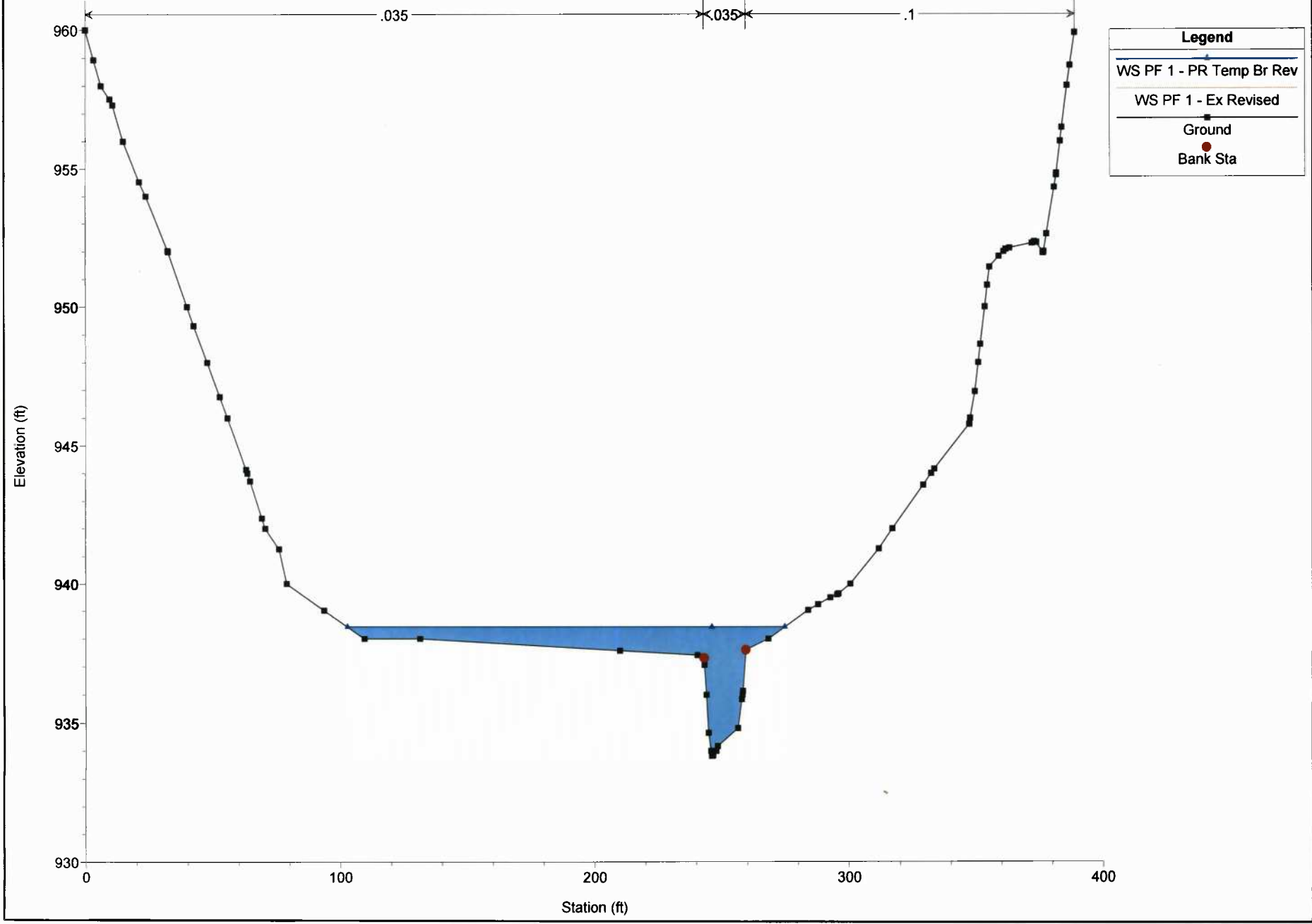
WS PF 1 - PR Temp Br Rev

WS PF 1 - Ex Revised

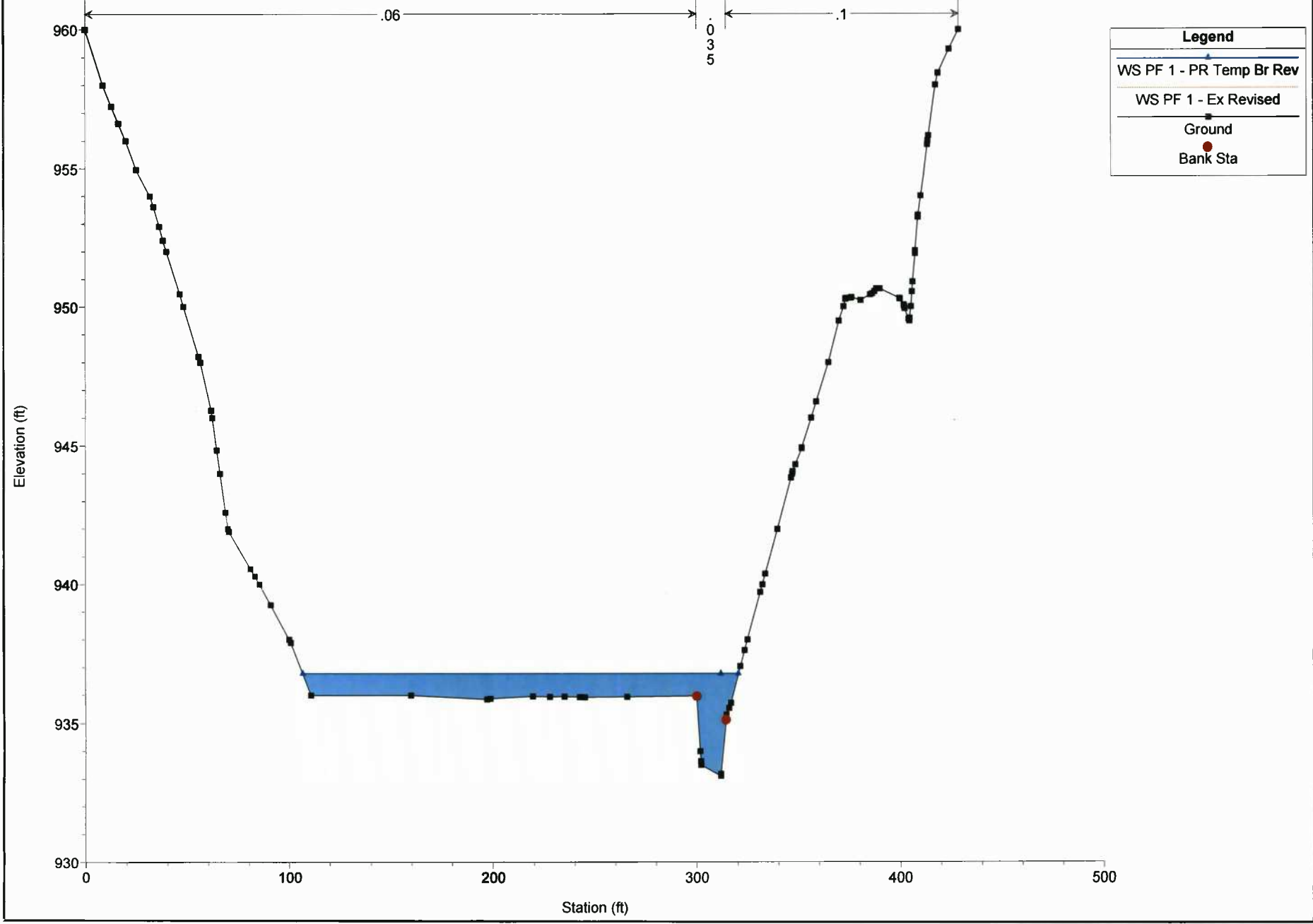
Ground

Bank Sta

OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
River = Bluestone Creek Reach = Upper RS = 11632.87

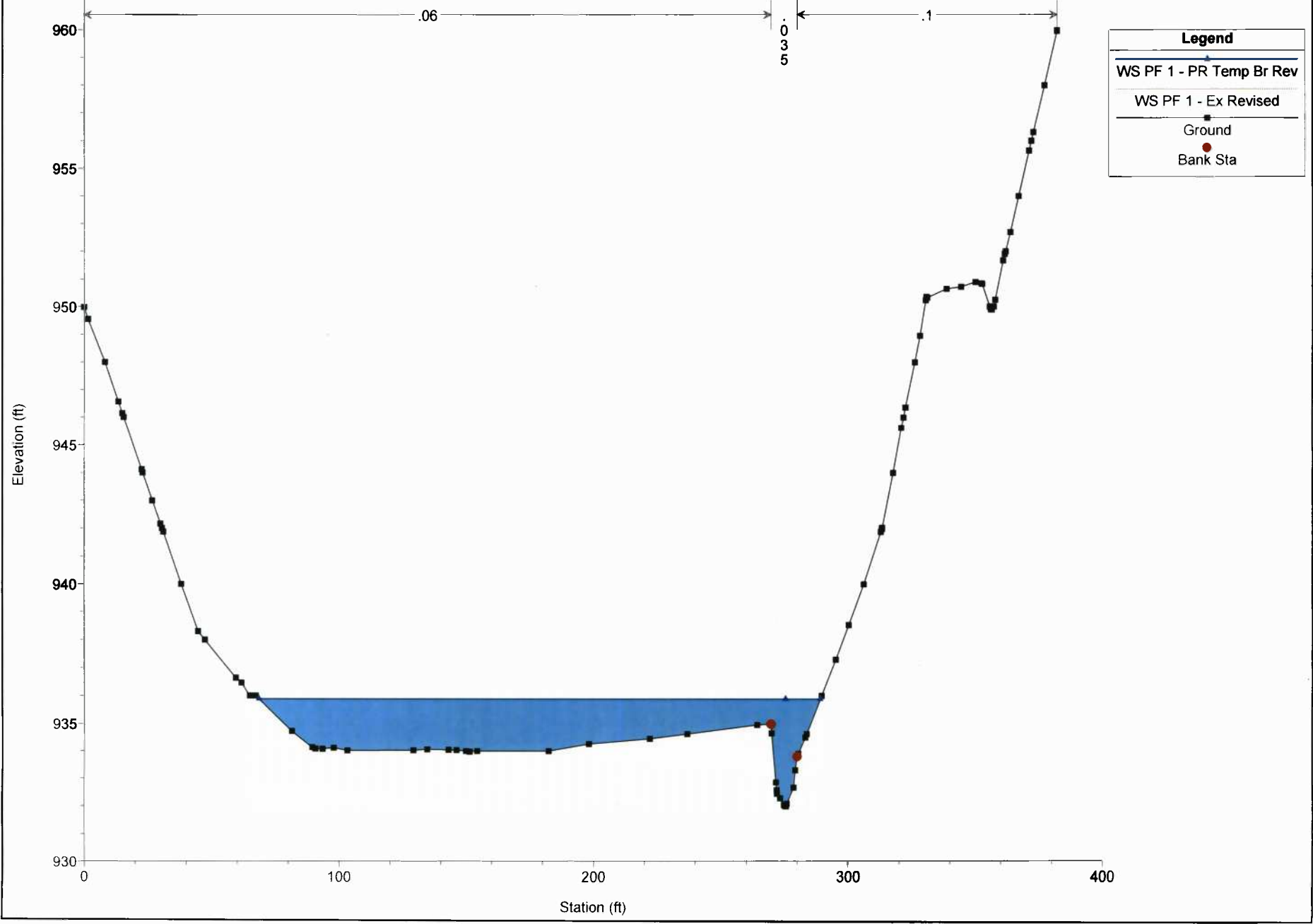


OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Upper RS = 11351.13



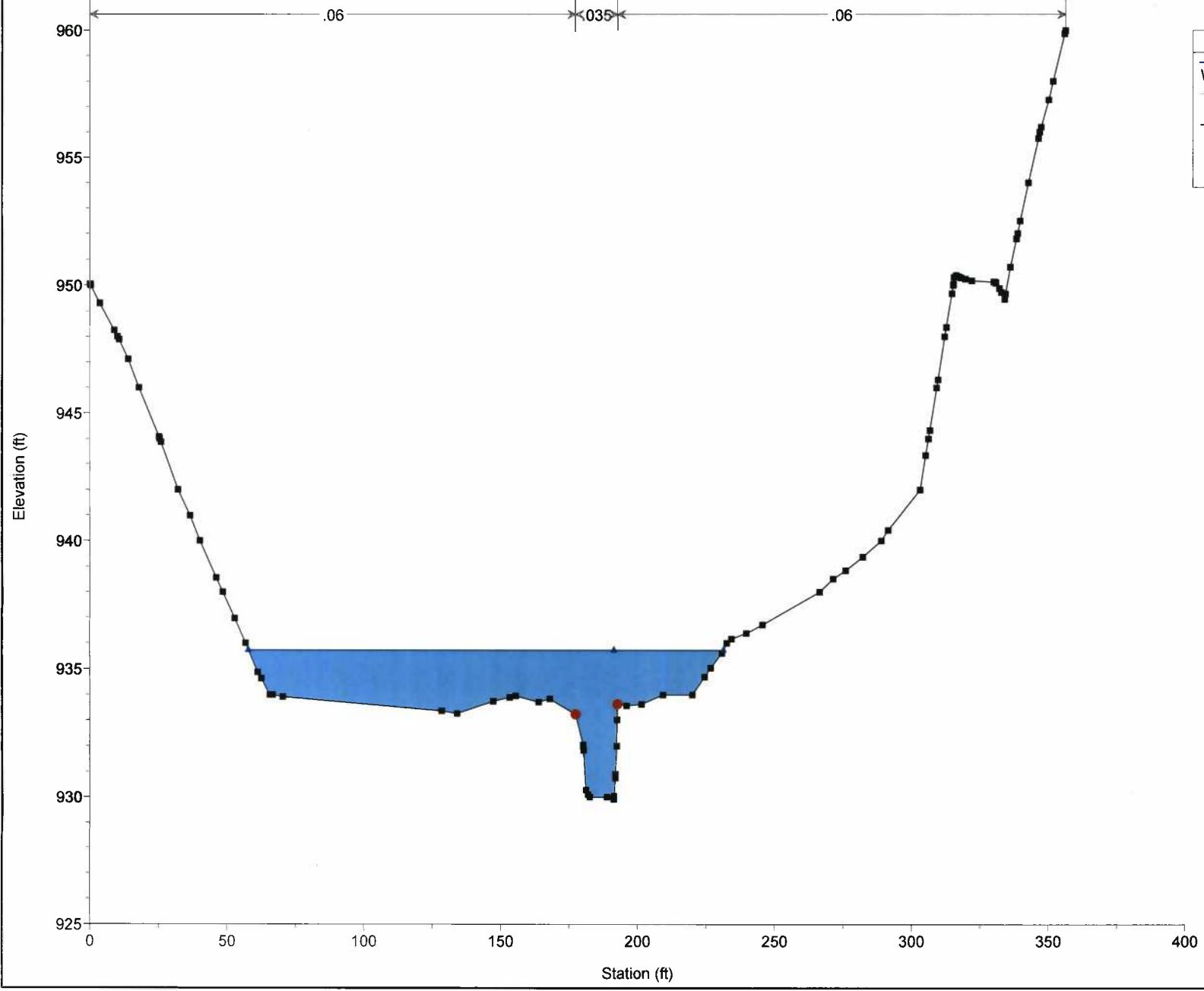
Legend	
WS PF 1 - PR Temp Br Rev	
WS PF 1 - Ex Revised	
Ground	
Bank Sta	

OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Upper RS = 11189.95





OXF 157-159 Bridges Plan: 1) PR Temp Br Rev 2) Ex Revised  
 Geom: Proposed Temp Bridge Revised Flow: Structures Revised  
 River = Bluestone Creek Reach = Upper RS = 10974.14



Legend	
—▲—	WS PF 1 - PR Temp Br Rev
- - -▲- - -	WS PF 1 - Ex Revised
■	Ground
●	Bank Sta