

**LYLE CREEK STREAM RESTORATION SITE**  
**DETAILED STREAM MITIGATION PLAN**  
**CATAWBA COUNTY, NORTH CAROLINA**

**Prepared for:**

**North Carolina Wetland Restoration Program**  
**Raleigh, North Carolina**

**Prepared by:**



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**LYLE CREEK STREAM RESTORATION SITE**  
**DETAILED STREAM MITIGATION PLAN**

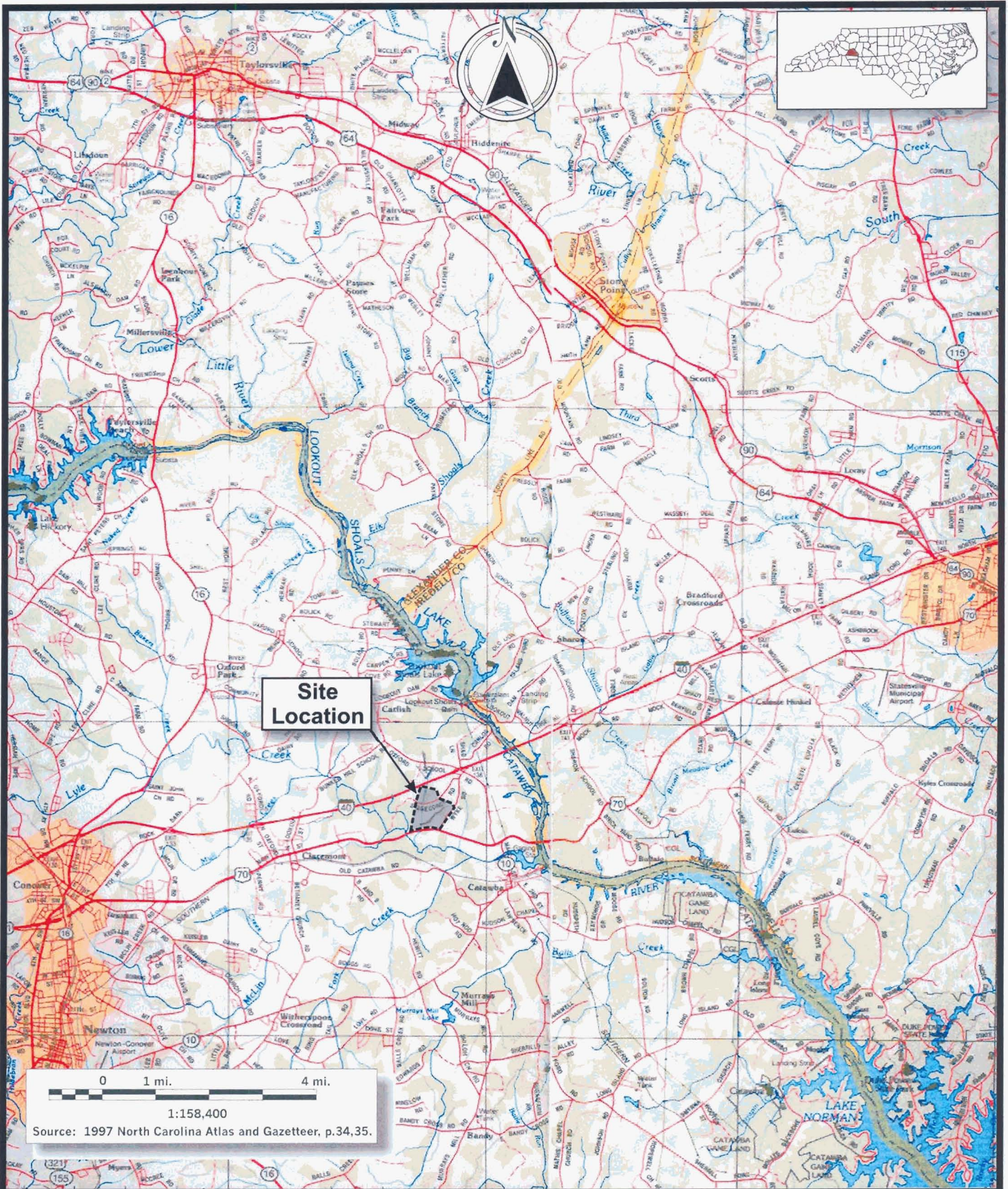
**1.0 INTRODUCTION**

The N. C. Wetland Restoration Program (WRP) is currently evaluating stream stabilization and/or restoration potential at two unnamed tributaries to Lyle Creek in Catawba County. The mitigation area is located between U.S. Interstate Route 40 (I-40) and U.S. Route 70 (Figure 1). The property encompasses approximately 2150 feet of an unnamed tributary to Lyle Creek and approximately 800 feet of an unnamed secondary tributary. These streams converge near the downstream site boundary, and will henceforth be referred to as the mainstem channel and secondary tributary. The mitigation area, hereafter referred to as the Site, has been degraded by past land management practices including land clearing, dredging/straightening of the channel, and livestock production.

The purpose of this study is to establish a detailed mitigation plan for stream restoration alternatives at the Site. The objectives of this study are as follows.

- 1) Classify the on-site streams based on fluvial geomorphic principles.
- 2) Identify a suitable reference forest and stream to model Site mitigation attributes.
- 3) Develop a detailed plan of stream restoration activities within the proposed conservation easement boundary.
- 4) Establish success criteria and a method of monitoring the Site upon completion of mitigation construction.
- 5) Estimate mitigation potential based on the detailed plan.

This document represents a detailed mitigation plan summarizing activities proposed within the Site. The plan includes: 1) descriptions of existing conditions; 2) reference stream reach studies; 3) restoration plans; and 4) Site monitoring and success criteria. Upon approval of this plan by regulatory agencies, engineering construction plans will be prepared and activities implemented as outlined in this mitigation plan. Proposed mitigation activities may be modified during the civil design stage due to constraints such as access issues, sediment-erosion control measures, drainage needs (floodway constraints), or other design considerations.



0 1 mi. 4 mi.  
 1:158,400  
 Source: 1997 North Carolina Atlas and Gazetteer, p.34,35.



**SITE LOCATION**  
**LYLE CREEK MITIGATION SITE**  
 Catawba County, North Carolina

Dwn. by:	MAF	FIGURE
Ckd by:	WGL	
Date:	JUL 2001	1
Project:	98-047.11	

## **2.0 METHODS**

Natural resource information was obtained from available sources. U.S. Geological Survey (USGS) 7.5 minute topographic mapping (Catawba, N.C.), U.S. Fish and Wildlife Service (USFWS) National Wetlands Inventory (NWI) mapping, and Natural Resource Conservation Service (NRCS [formerly the Soil Conservation Service]) county soil survey (SCS 1975) were utilized to evaluate existing landscape, stream, and soil information prior to on-site inspection. Corrected aerial photography and aerial topographic maps were prepared including topographic point and contour data (1-foot intervals). Topographic mapping served as base mapping for field efforts.

Site valley cross-sections were developed by land survey at 200-foot intervals to establish channel dimension, valley type/slope, and channel slope. The cross-sections were also used to track and evaluate differences in elevation between channel bed and the adjacent floodplain for both the mainstem and the secondary tributary. Reference stream geometry methods have been used to orient channel reconstruction design. Reference stream and floodplain systems were identified and measured in the field to quantify stream geometry, substrate, and hydrodynamics. Stream characteristics and reconstruction plans were developed according to constructs outlined in Rosgen (1996), Dunne and Leopold (1978), Harrelson *et al.* (1994), Chang (1988), and NCWRC (1996). Stream pattern, dimension, and profile under stable environmental conditions were measured along reference (relatively undisturbed) stream reaches and applied to the degraded system within the Site. Reconstructed stream channels and hydraulic geometry relationships are designed to mimic stable channels identified and evaluated at the Site and in the region.

Historical aerial photographs were utilized to identify land use patterns and floodplain dynamics at the Site and in the watershed. Disturbances to streams and wetlands during watershed development were tracked, where feasible. However, none of these historical photographs exhibits forest structure or historic stream pattern prior to significant disturbance. Current (2001) aerial photography was evaluated to determine primary hydrologic features and to map relevant environmental features (Figure 2).

Stream flows were modeled by interpreting USGS stream gauge data in the region and by hydrology models (HEC-1, HEC-RAS), which also determined stream geometry calculations and estimates of projected storm water flows. The projected flows were used to assist in-field identification of bankfull stage, dimensioning of on-site tributaries, and to assess potential for hydrologic trespass onto adjacent properties or structures.





**EcoScience Corporation**

Raleigh, North Carolina 27605

Client:

**NC WETLAND RESTORATION PROGRAM**

Project:

**LYLE CREEK MITIGATION SITE**

CATAWBA COUNTY, NORTH CAROLINA

Title:

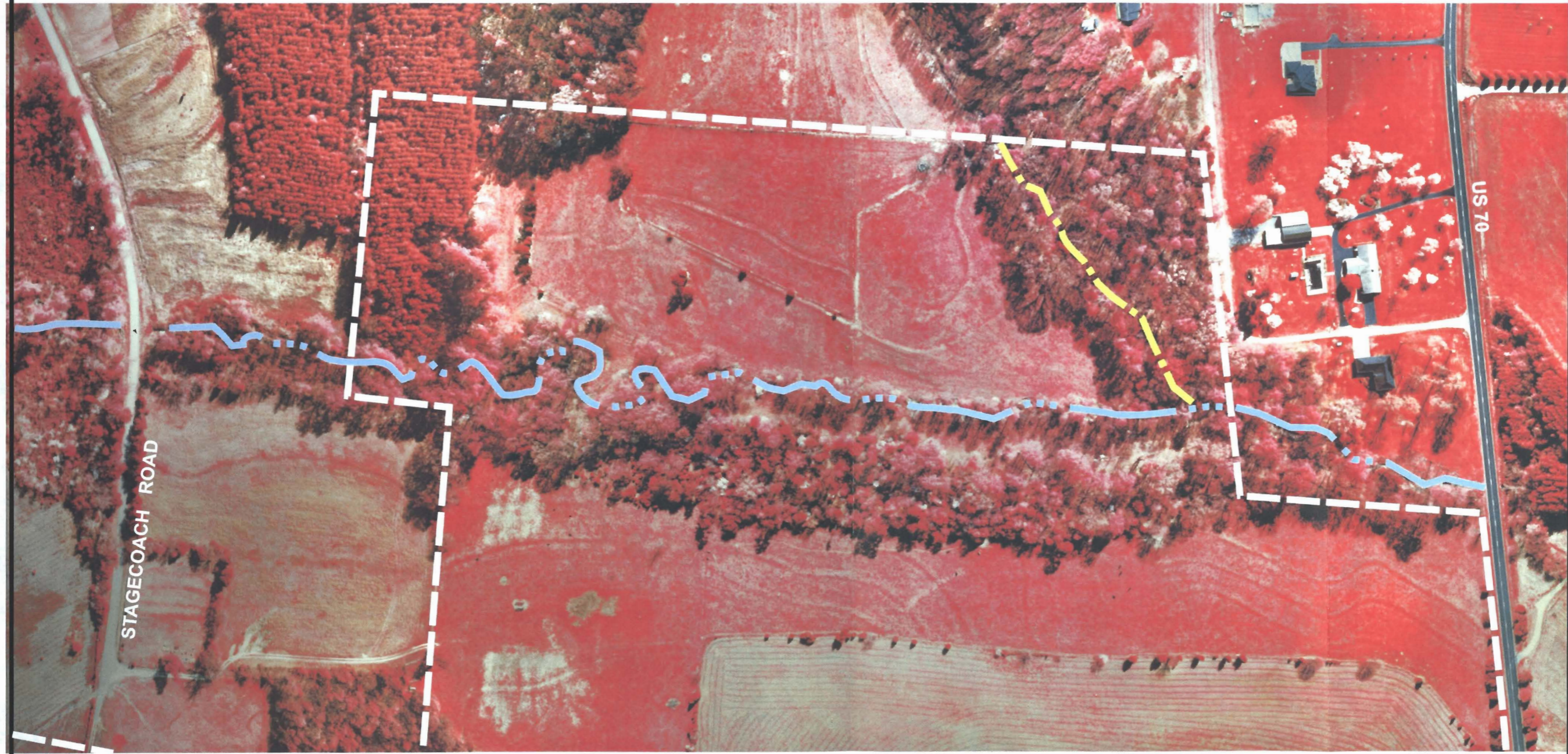
**AERIAL PHOTOGRAPH (2001)**

Dwn By:	Date:
MAF	OCT 2001
Ckd By:	Scale:
WGL	As Shown

ESC Project No.: 98-047.11

FIGURE

**2**



	APPROXIMATE PROPERTY BOUNDARY
	MAINSTEM CHANNEL
	SECONDARY TRIBUTARY



Information collected, reference ecosystem analyses, and drainage models were compiled in a database and incorporated with field observations to evaluate on-site streams under existing conditions. Subsequently, this stream mitigation plan was developed to facilitate restoration success and to provide for stream impacts in USGS Subbasin 03050101.

### **3.0 EXISTING CONDITIONS**

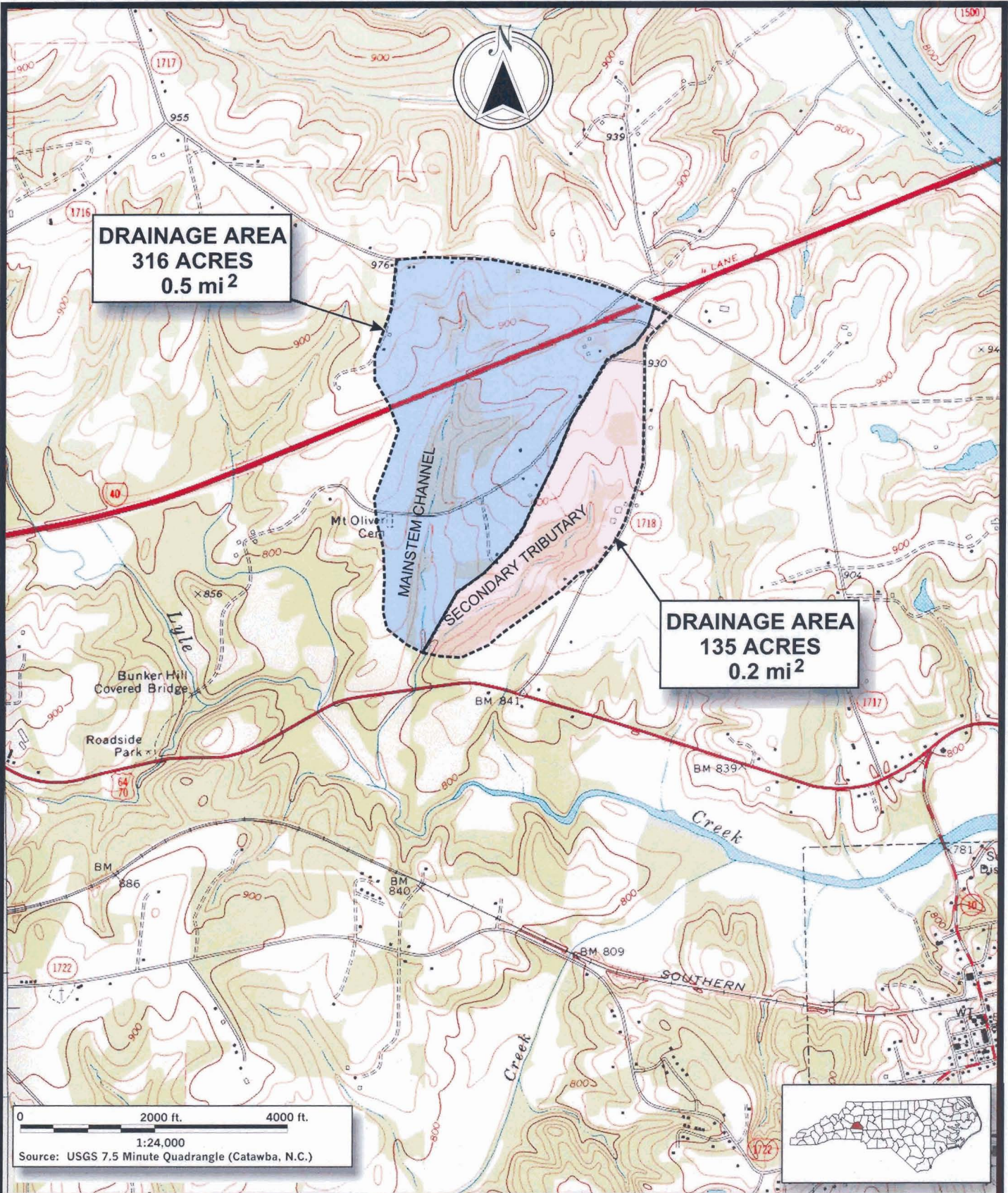
#### **3.1 PHYSIOGRAPHY AND LAND USE**

The Site is located in the Piedmont physiographic province of North Carolina within USGS subbasin 03050101 of the Catawba River Basin (USGS 1974). Regional physiography is characterized by hilly terrain with interstream divides exhibiting dendritic, moderately sloping drainage patterns. The Site is characterized by a relatively narrow, moderately steep floodplain and adjacent slopes which have been cleared in support of land use activities. Elevations within the floodplain do not vary significantly, averaging approximately 810 feet National Geodetic Vertical Datum (NGVD). Slopes east and west of the floodplain range to a height of approximately 850 feet NGVD. The westward ridge separates the mainstem floodplain with the floodplain of the secondary tributary (Figure 3). The secondary tributary has been straightened in an effort to maximize farmland acreage and is currently deeply entrenched.

Historically, the Site and surrounding areas primarily supported agricultural land; however, much of this land lies fallow with emerging successional habitats. Forest cover was cleared from a majority of the land area and streams were straightened for agricultural land uses. Both the mainstem and secondary tributary channels downcut into the valley floor with subsequent abandonment of adjacent floodplains. Surficial top soils appear to have been eroded during the agricultural period, as is considered common within the Piedmont physiographic province.

Currently, land use in the watershed consists primarily of agriculture (livestock and hay) and limited residential and commercial/highway development. I-40 crosses the basin headwaters and the mainstem channel has been routed through a culvert beneath the interstate. Along the northeastern, upstream basin rim a gas station is located at the I-40 off-ramp (Exit 138). The mainstem channel drains for approximately 0.5 mile downstream from I-40 and enters a culvert under Stagecoach Road, approximately 300 feet upstream from the site. Together, these structures cover a small fraction of the watershed area with imperious surfaces and offer very limited development-expansion potential.

Point-source and storm-water discharges along Lyle Creek, within subbasin 030832, include one major (Conover WWTP) and numerous minor permitted dischargers; however, based on preliminary studies it appears that no permitted dischargers occur in on-site segments of either the mainstem channel or the secondary tributary (NCDWQ 1999).



**TOPOGRAPHY and DRAINAGE AREA**  
**LYLE CREEK MITIGATION SITE**  
 Catawba County, North Carolina

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### 3.2 SOILS

On-site soils have been mapped by the NRCS and have been field verified by licensed soil scientists. Soil mapping units identified by the NRCS include Hiwassee/Cecil complex and Chewacla loam. Hiwassee-Cecil associations, occur on steep side slopes of the adjacent floodplain walls and have a subsoil of dominantly dark red, firm clay. These soils occur infrequently within the Site.

The floodplain portions of the Site are dominated by Chewacla loam which consists of nearly level, somewhat poorly drained soils. These soils are flooded frequently; however, flooding is only for brief periods. Permeability is moderate, available water capacity is high, and runoff is slow. The root zone within these soils is moderately deep and the depth to the seasonal high water table is nearly 1 foot (SCS 1975). Although Chewacla soils are considered non-hydric in Catawba County, inclusions of hydric Wehadkee clay loam are occasionally interspersed within this soil mapping unit (USDA 1996). Wehadkee soils occur in depressions and adjacent to stream channels and are poorly drained. Wehadkee soils were identified on-site in a few scattered pockets, occupying less than approximately 0.1 acre along both the mainstem and secondary tributary.

### 3.3 PLANT COMMUNITIES

Distribution and composition of plant communities reflect variations in topography, soils, hydrology, and past or present land use practices. Three plant communities have been identified on the Site: 1) fallow agricultural fields; 2) stream-side margin; and 3) hardwood forest.

Fallow agricultural fields account for over half of the Site area. This community is characterized by planted grasses such as alfalfa (*Medicago sativa*) and fescue (*Festuca octiflora*), with invasive species such as crown beard (*Verbesina occidentalis*) and spotted hemlock (*Cicuta maculata*) flourishing throughout. Woody stems occur infrequently within this community due to browsing by livestock; however, opportunistic species such as shortleaf pine (*Pinus echinata*) and eastern red cedar (*Juniperus virginiana*) were identified during field visits. Numerous, small, depressional features occur within the fallow field. These depressional features retained moisture and are characterized by hydrophytic vegetation such as sedges (*Carex spp.*) and Nepal microstegium (*Eulalia viminea*).

Stream-side margin occurs in a narrow band adjacent to the mainstem channel and secondary tributary and accounts for approximately 25 percent of the Site. This community occupies stream banks and a low-lying floodplain eroded by the channel and is dominated by a narrow fringe of mature, disturbance-adapted, hardwood forest. The stream-side community is characterized by American sycamore (*Platanus occidentalis*), black willow (*Salix nigra*), and

river birch (*Betula nigra*), with green briar (*Smilax rotundifolia*), blackberries (*Rubus* spp.), eastern red cedar, and American holly (*Ilex opaca*) filling the understory.

Hardwood forest occurs on upland slopes neighboring the floodplain and forested portions of the floodplain utilized by livestock for shade during hot summer days. This community occupies roughly 25 percent of the Site and is composed of American sycamore, tulip (*Liriodendron tulipifera*), and sweetgum (*Liquidambar styraciflua*), with American holly, flowering dogwood (*Cornus florida*), and poison ivy (*Toxicodendron radicans*) present in the understory.

### **3.4 HYDROLOGY**

Hydrology components evaluated under existing conditions include: 1) drainage area; 2) discharge; 3) flood elevations; and 4) channel geometry/substrate.

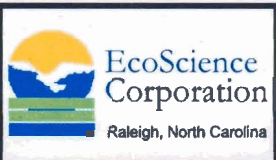
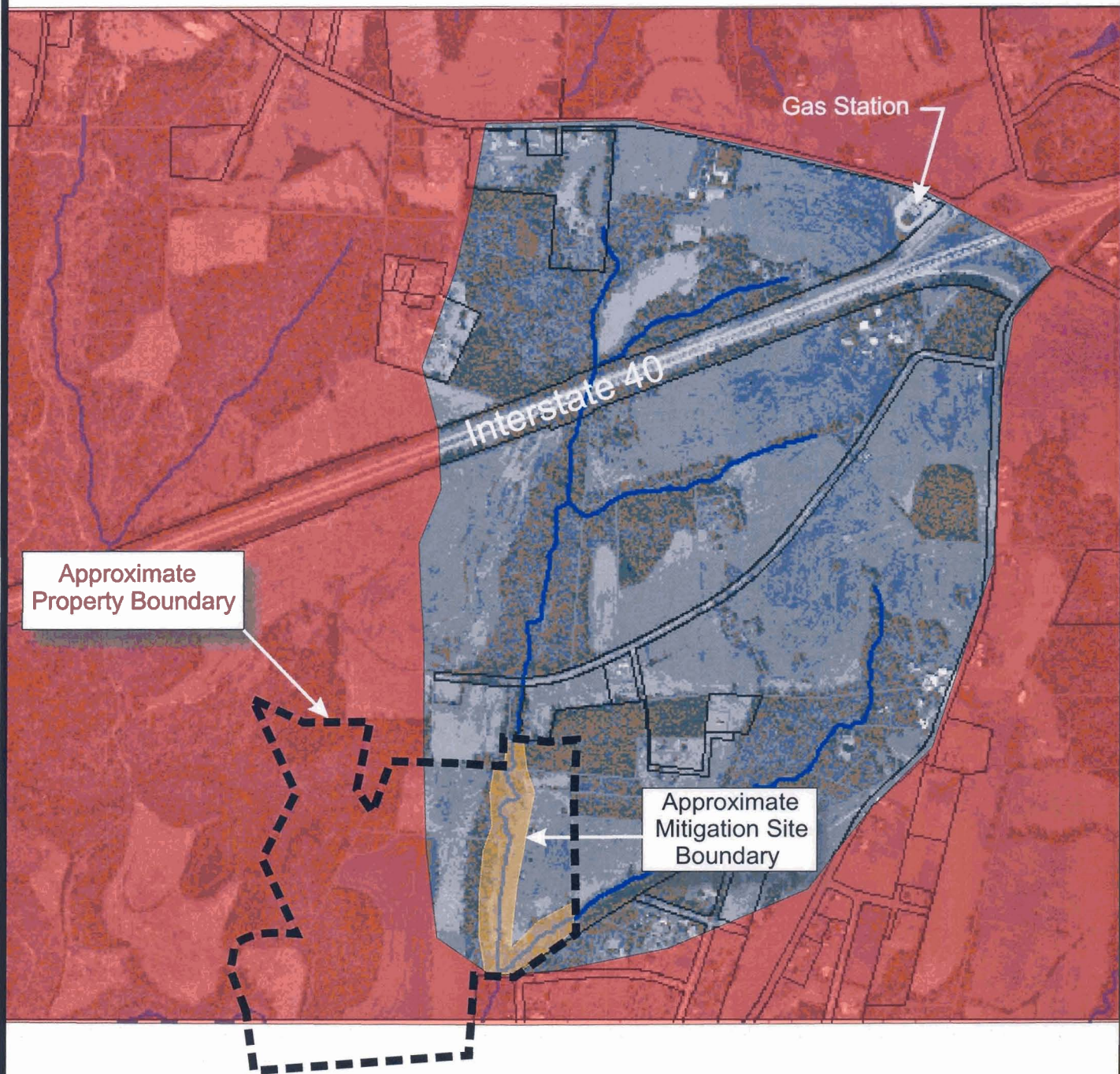
#### **3.3.1 Drainage Area**

This hydrophysiographic region is considered characteristic of the Piedmont physiographic province, which extends throughout the central portion of North Carolina. This region is characterized by moderate rainfall and moderately steep valley walls of similar parent material. In Catawba County, precipitation averages 49 inches per year distributed evenly throughout the year (SCS 1975).

The drainage area at the Site outfall encompasses approximately 450 acres (315 acres in the mainstem channel and 135 acres in the secondary tributary [Figure 3]). The drainage area is dominated by rural land uses including livestock production and rural residential housing (Figure 4). Although I-40 crosses the upper extent of the drainage basin and some commercial establishments, including a gas station, are located at an exit ramp in the vicinity of the Site, impervious surfaces have been estimated as occupying less than 10 percent of the watershed land area.

The mainstem channel originates in the upper watershed approximately 2000 linear feet north of I-40 and extends within approximately 6750 linear feet of valley prior to the confluence with Lyle Creek. The mainstem channel crosses under I-40 and extends through roadside ditches and culverts. The valley, in portions of the upper watershed, historically supported a relatively narrow floodplain with relatively steep valley slopes (approximately 0.015 rise/run). As the tributary descends towards Lyle Creek proper, the valley widens and flattens to an average slope of approximately 0.005 (rise/run).

The secondary tributary originates approximately 2500 linear feet upstream from the Site and traverses the Site for approximately 800 linear feet prior to converging with the mainstem channel near the Site outfall. Similar to the mainstem channel, the secondary tributary occurs



**DRAINAGE BASIN LAND USE  
LYLE CREEK MITIGATION SITE**  
Catawba County, North Carolina

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FIGURE  
**4**

within a relatively steep valley for the upper reaches and valley slope flattens upon descending towards the larger mainstem channel. Valley slope averages approximately 0.012 rise/run throughout the on-site reach.

### **3.4.2 Discharge**

Discharge estimates for the Site utilize an assumed definition of "bankfull" and the return interval associated with the bankfull discharge. For this study, the bankfull channel is defined as the channel dimensions designed to support the "channel forming" or "dominant" discharge (Gordon *et al.* 1992). Research indicates that a stable stream channel may support a return interval for bankfull discharge, or channel-forming discharge, of between 1 to 2 years (Gordon *et. al.* 1992, Dunne and Leopold 1978). The methods of Rosgen (1996) indicate calibration of bankfull dimensions based on a potential bankfull return interval of between 1.3 and 1.7 years for rural conditions.

Based on available regional curves, bankfull discharge for the mainstem channel (0.5 square mile watershed) averages approximately 54 cubic feet per second (Harman *et. al.* 1999). To verify regional curves, five gauged rivers in surrounding area (Long Creek, McClelland Creek, Norwood Creek, Long Creek, and Hagan Creek) were analyzed to determine a return interval for momentary peak discharges. Momentary peak discharges (return interval between 1.3 and 1.7 years) were calculated from the gauge data and plotted against the regional curve (Appendix A). Momentary peak discharges were accurately predicted at two of the five stream gauges. The other three stream gauges predicted a lower discharge (based on regional curve predictions of discharge) suggesting higher discharges than predicted by the regional curve.

Bankfull indicators in the field have also been utilized to predict bankfull discharge. The cross-sectional area associated with field indicators has been compared to regression equations that relate discharge to cross-sectional area in rural Piedmont streams. The average bankfull cross-sectional areas in the mainstem channel and secondary tributary have been estimated at approximately 16 and 9.5 square feet, respectively, suggesting a bankfull discharge of approximately 60 cubic feet per second (CFS) in the mainstem channel and 37 CFS in the secondary tributary (slightly larger than predicted by regional curves). For this project, the stable "design" channel is assumed to support a bankfull discharge (1.3-year return interval) of between 55 and 60 CFS for the mainstem channel and between 30 and 40 CFS for the secondary tributary under existing watershed conditions.

### **3.4.3 Flood Elevations**

Flood elevations have been approximated by use of a Hydraulic Engineering Center's (HEC-RAS) computer model. The purpose of the analysis is to predict flood extent for the 1-, 2-, 5-, 10-, 25, 50-, and 100-year storms under existing conditions. Subsequently, the model



was applied to proposed conditions after stream restoration to assess potential for impacts to adjacent properties or structures, and to assess potential for increased safety risk to the community associated with large floods. The existing flood elevations for each storm are depicted in Table 1 and Figure 5.

### **Existing Conditions**

In summary, the model suggests that mainstem channel flooding is confined within the existing channel for 1- and 2-year storm events. However, larger (10, 25, 50, and 100-year) storm events appear to top the existing banks and flow onto the adjacent floodplain (Figure 5). Flooding associated with these storms is confined by steep valley walls to the relatively narrow valley floor. No structures or state maintained roadways occur within the floodplain; therefore, flooding impacts are expected to be minimal including agricultural field inundation and potential crop loss. Secondary tributary flooding appears confined within the existing channel for all modeled storm events, including the 100-year storm.

### **Projected, Post-Restoration Conditions**

On-site, mainstem channel restoration is expected to raise water surface elevations by 1) increasing channel and floodplain roughness through vegetative planting, 2) decreasing cross-sectional area of the channel, 3) raising the channel bed, and 4) increasing channel sinuosity. Secondary tributary restoration is limited to expanding the channel with no installation of structures; therefore, water surface elevations are not expected to be raised. Elevation of water surfaces in the mainstem channel may potentially effect upstream properties; therefore, the effects of upstream, off-site, flooding have been evaluated.

Upstream, off-site, impacts are expected to be minimal due to steep valley slopes and initiation of stream restoration activities greater than 200 feet downstream from the property line. Increases in floodplain roughness through vegetation planting and decreases in channel slope may result in slight effects to water surface elevations; however, based on the HEC-RAS model the impacts are minimal (maximum 0.05 foot effect for the 50-year storm event) (Table 1). A raise in water surface of 0.005 foot is not considered significant and based on the flood frequency analysis the project is not expected to result in hydrologic trespass to the upstream landowner. On-site impacts associated with increased water surface elevations are expected to be negligible due to steep valley walls, the lack of maintained roads and/or structures, and the wide breadth of the conservation easement (Figure 5).

#### **3.4.4 Stream Geometry and Substrate**

Stream geometry and substrate data have been evaluated to orient stream restoration based on a classification utilizing fluvial geomorphic principles (Rosgen 1996). This classification stratifies streams into comparable groups based on pattern, dimension, profile, and substrate characteristics. Primary components of the classification include degree of entrenchment,

**TABLE 1  
WATER SURFACE ELEVATION ESTIMATES FOR VARIOUS FLOOD FREQUENCIES**

Station <sup>1</sup>	Return Interval (24-Hour Storm Event)														
	1-Year		2-Year		10-Year		25-Year		50-Year		100-Year				
	Existing	Post	Existing	Post	Existing	Post	Existing	Post	Existing	Post	Existing	Post			
	Projected Flood Elevation (feet above mean sea level)														
100	797.56	797.56	798.26	798.26	799.48	799.48	799.48	800.14	800.14	800.62	800.62	801.11	801.11	801.11	801.11
102	797.68	797.68	798.38	798.38	799.59	799.59	799.59	800.25	800.25	800.72	800.72	801.21	801.21	801.21	801.21
106	798.12	800.50	798.81	800.70	800.16	801.61	801.30	801.30	801.24	801.41	801.41	801.70	801.70	801.83	801.83
110	799.42	802.32	800.00	802.61	801.54	803.07	803.31	803.31	803.04	803.48	803.48	803.46	803.46	803.70	803.70
114	803.96	806.84	804.40	806.39	805.87	806.84	807.12	807.12	806.87	807.30	807.30	807.26	807.26	807.51	807.51
118	806.23	807.15	806.64	807.41	807.93	808.38	808.58	808.58	809.06	808.67	808.67	809.54	809.54	808.82	808.82
122	806.73	810.16	807.19	810.33	808.58	810.89	811.19	811.19	809.63	811.38	811.38	809.95	809.95	811.56	811.56
126	810.41	811.14	810.89	811.46	812.28	812.34	812.59	812.59	813.26	812.64	812.64	813.50	813.50	813.00	813.00
130	812.04	812.53	812.47	812.83	813.86	813.73	814.21	814.21	814.92	814.49	814.49	815.24	815.24	814.62	814.62
134	813.66	813.11	814.22	813.46	815.30	814.72	815.41	815.41	816.48	815.92	815.92	816.89	816.89	816.43	816.43
136	813.96	813.44	814.55	813.78	815.60	814.80	815.42	815.42	816.64	815.93	815.93	817.02	817.02	816.44	816.44
138	814.60	814.68	815.13	815.17	816.58	816.72	817.46	817.46	817.81	817.92	817.92	818.28	818.28	818.38	818.38
140	815.69	815.69	816.12	816.13	817.50	817.54	818.28	818.28	818.69	818.74	818.74	819.19	819.19	819.22	819.22
200	797.77	797.75	798.47	798.47	799.78	799.76	800.44	800.44	800.93	800.92	800.92	801.42	801.42	801.41	801.41
202	799.22	798.66	799.27	798.69	800.01	799.86	800.51	800.51	801.01	800.98	800.98	801.48	801.48	801.47	801.47
204	801.33	801.13	801.40	801.17	801.37	801.16	801.32	801.32	801.89	801.45	801.45	802.15	802.15	801.57	801.57
206	803.25	802.78	803.31	802.84	803.86	803.25	803.60	803.60	804.51	803.82	803.82	804.72	804.72	804.00	804.00

1: Stations begin with 100 downstream from the southern Site boundary (Figure 5). Station numbers increase in value in and upstream direction from the initiation of the HEC-RAS model.



REVISIONS

Client:  
**NC WETLAND RESTORATION PROGRAM**

Project:  
**LYLE CREEK MITIGATION SITE**  
CATAWBA COUNTY, NORTH CAROLINA

Title:  
**FLOOD FREQUENCY AND WATER SURFACE ELEVATIONS**

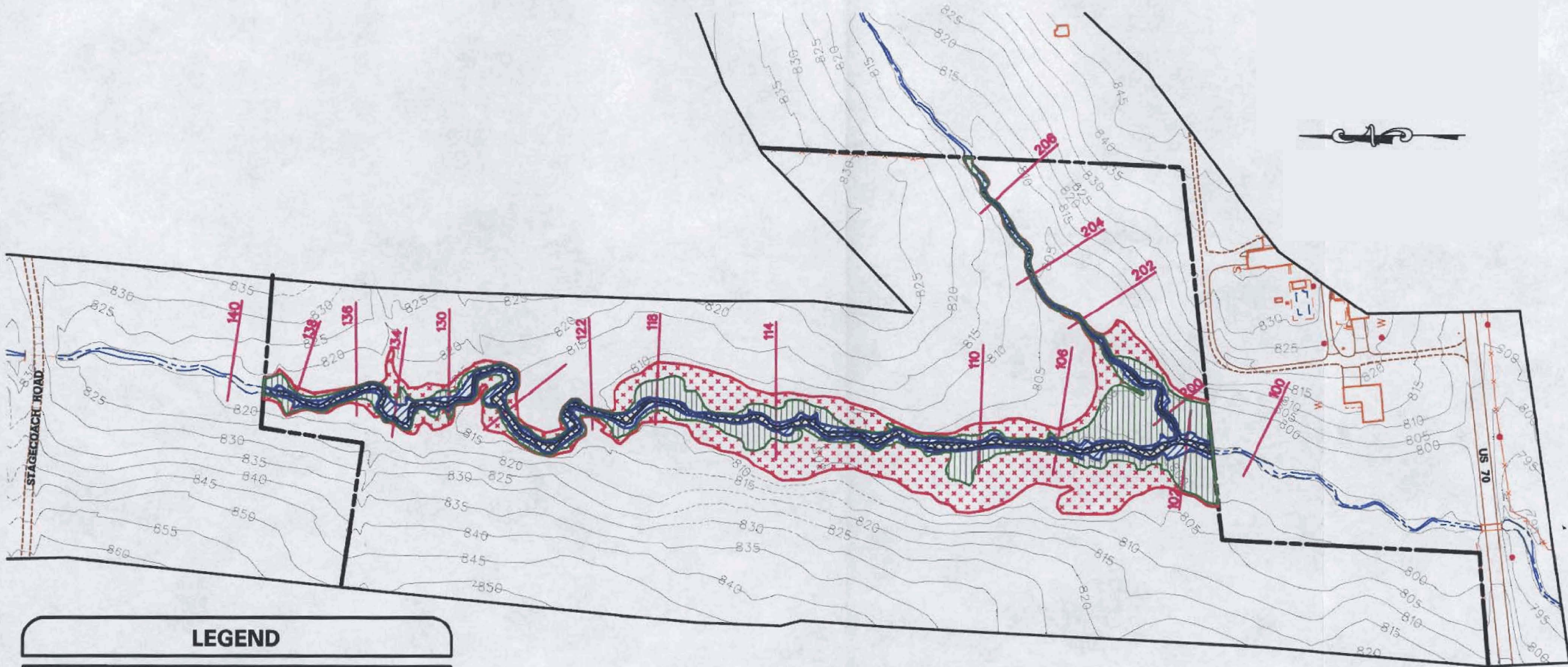
Dwn By: MAF Date: JUL 2001

Ckd By: WGL Scale: 1" = 200'

ESC Project No.: 98-047.11

FIGURE

**5**



**PLAN VIEW**  
SCALE: 1"=200'

**LEGEND**

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING STREAM
- MAJOR CONTOURS
- CROSS-SECTION

**Pre-project Approx. Flood Elevations**

	acres
1 YEAR FLOOD	0.5±
2 YEAR FLOOD	1.0±
25 YEAR FLOOD	2.4±
100 YEAR FLOOD	4.7±
<b>Total</b>	<b>8.6±</b>

width/depth ratio, sinuosity, channel slope, and stream substrate composition. The stream classes characterizing reaches within the Site include G, F, C, and E. Each stream type is modified by the number 1 through 6 (ex. E5) denoting a stream type which supports a substrate dominated by: 1) bedrock; 2) boulders; 3) cobble; 4) gravel; 5) sand; or 6) silt/clay. At the Site, the channel bed is dominated by gravel and sand (subclassification 4/5).

Stream geometry measurements under existing conditions are depicted in Figure 6 and summarized in Table 2. Both the mainstem channel and secondary tributary segments contain a transitional reach that supports characteristics of G (gully) and F (widened gully) type streams. G-type streams are characterized as highly entrenched streams with a low width/depth ratio ( $< 12$ ). Typically, G-type streams downcut and widen by eroding laterally into channel banks during peak flows. Over time, the widened gully develops into an F-type stream that supports a relatively high width/depth ratio ( $> 12$ ) and the presence of developing point and mid-channel bars. The increase in width/depth ratio in the bottom of the gully, due to bank erosion, will allow for development of a new floodplain at a lower elevation in the future. Subsequently, a meandering (C or E) channel would be expected to develop within the re-established floodplain.

The mainstem channel supports a flood-prone area ranging from 11 feet to 34 feet in width with an entrenchment ratio in degraded reaches ranging from 1.1 to 1.3. The channel is actively widening into bank materials with areas of previous bank collapse exhibiting entrenchment ratios of up to 3.5 (characteristic of F-type streams). Without bank vegetation to reduce erosion, the banks are expected to continue eroding into a broad, widened gully with intermittent point and mid-channel bars (F-type stream). The amount of eroded material and resultant sediment in the watershed required to reform a stable floodplain and meandering (C) stream has been estimated at approximately 14,500 cubic yards, including a 70- to 90-foot eroded belt width that abuts the adjacent channel.

The secondary tributary supports a flood-prone area ranging from 13 feet to 14 feet in width with an entrenchment ratio of approximately 1.3 to 1.6. The channel has severely down-cut into the channel bed and bank collapse is apparent along its entire reach. Downcutting may result from incision of the mainstem channel and headcut migration upstream into the secondary tributary. An estimated 8,800 cubic yards of material is expected to be eroded from the channel prior to stable C-or E-type channel formation.



EcoScience Corporation

Raleigh, North Carolina

REVISIONS

Client:

NC WETLAND RESTORATION PROGRAM

Project:

LYLE CREEK MITIGATION SITE

CATAWBA COUNTY, NORTH CAROLINA

Title:

EXISTING PLAN VIEW AND CROSS-SECTIONS

Dwn By:

Date:

MAF JUL 2001

Ckd By:

Scale:

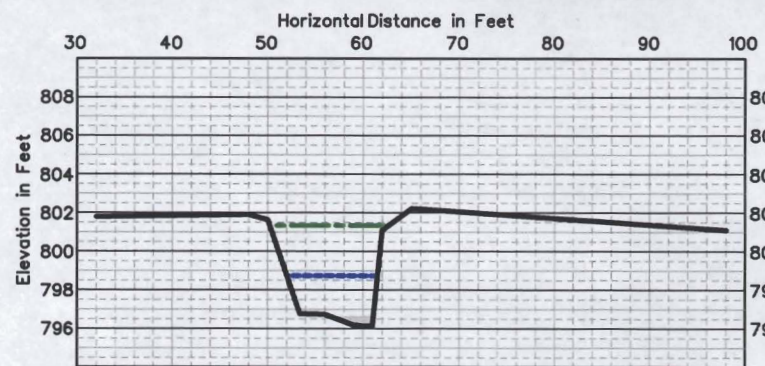
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ESC Project No.:

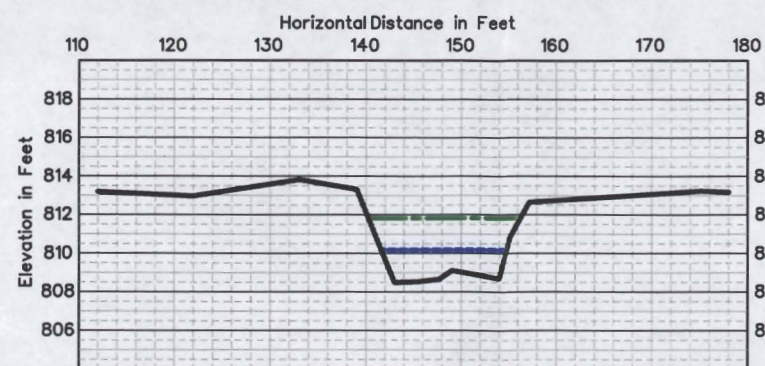
98-047.11

FIGURE

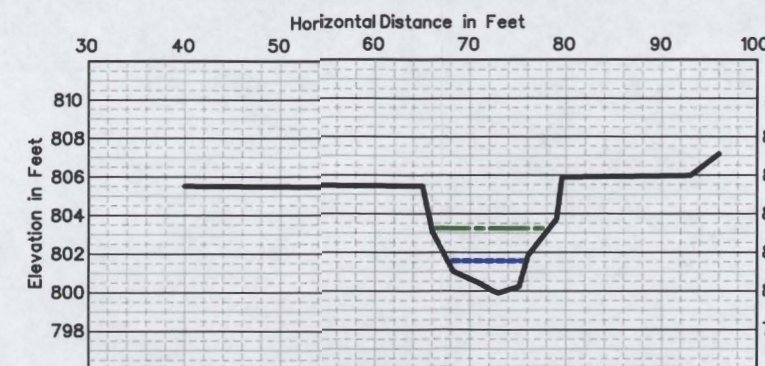
6



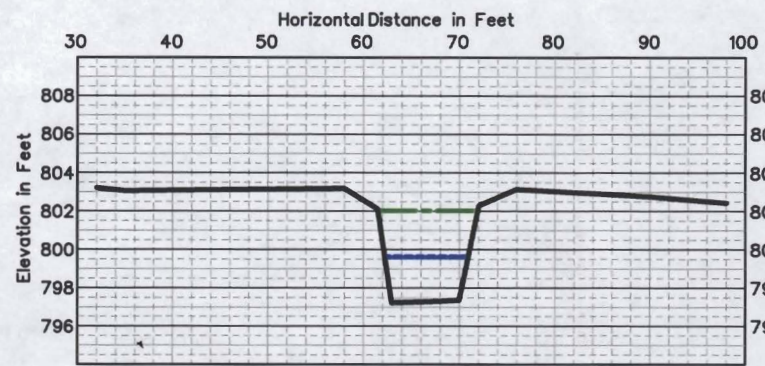
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 Bankfull Maximum Depth: 2.7'  
 Bankfull Average Depth: 2.1'  
 Bankfull Cross-sectional Area: 20.0 ft.sq.  
 Width of Flood Prone Area: 12.4'±



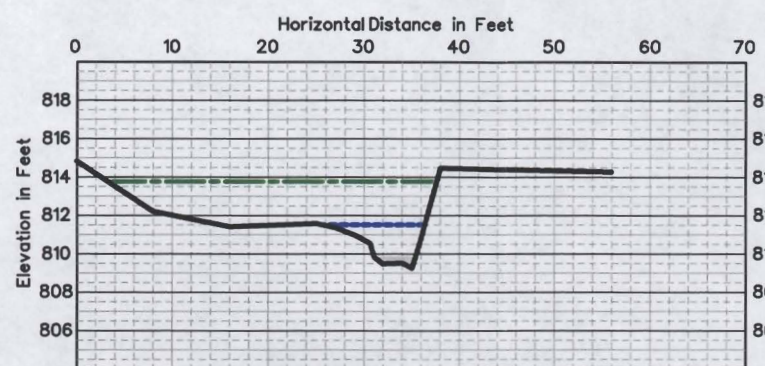
Bankfull Width: 13.3'  
 Bankfull Maximum Depth: 1.8'  
 Bankfull Average Depth: 1.4'  
 Bankfull Cross-sectional Area: 18.8 ft.sq.  
 Width of Flood Prone Area: 15.2'±



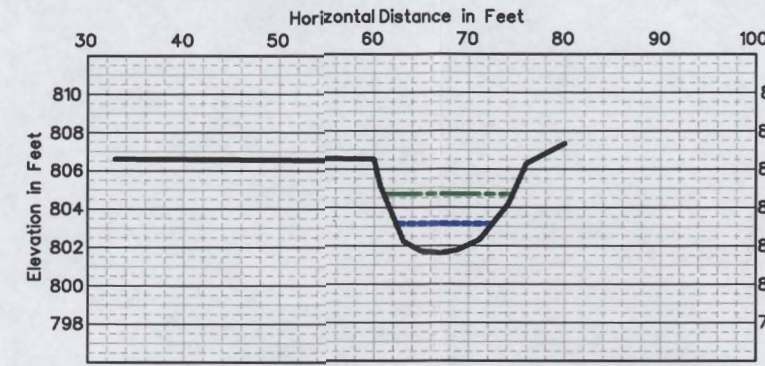
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 Bankfull Average Depth: 1.2'  
 Bankfull Cross-sectional Area: 9.6 ft.sq.  
 Width of Flood Prone Area: 12.9'±



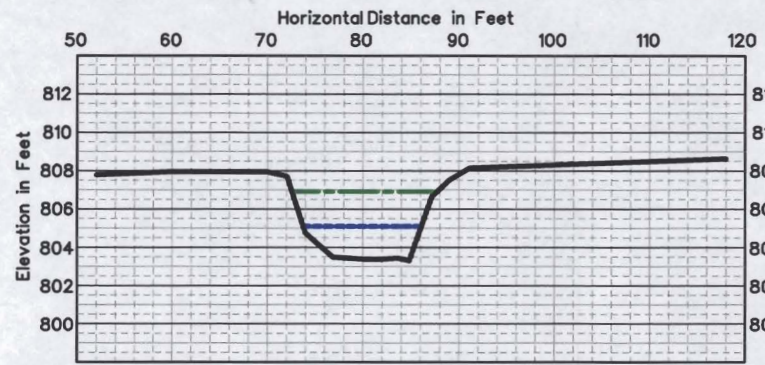
Bankfull Width: 8.5'  
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 Bankfull Average Depth: 2.0'  
 Bankfull Cross-sectional Area: 18.7 ft.sq.  
 Width of Flood Prone Area: 11.0'±



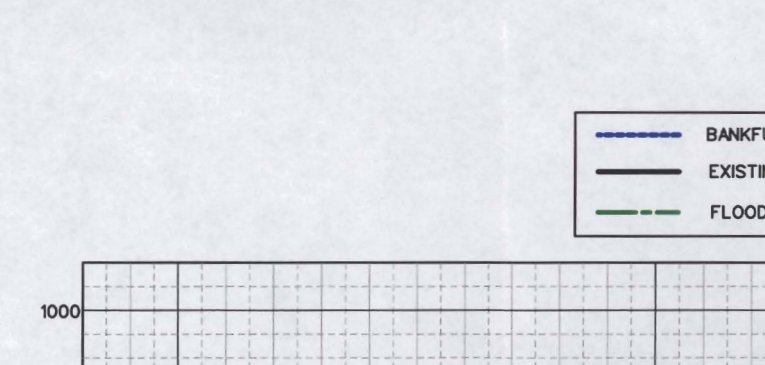
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 Bankfull Maximum Depth: 2.2'  
 Bankfull Average Depth: 1.2'  
 Bankfull Cross-sectional Area: 11.6 ft.sq.  
 Width of Flood Prone Area: 34.3'±



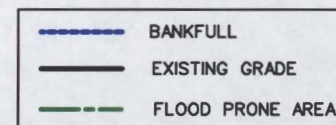
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 Bankfull Maximum Depth: 1.5'  
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 Bankfull Cross-sectional Area: 10.0 ft.sq.  
 Width of Flood Prone Area: 13.8'±



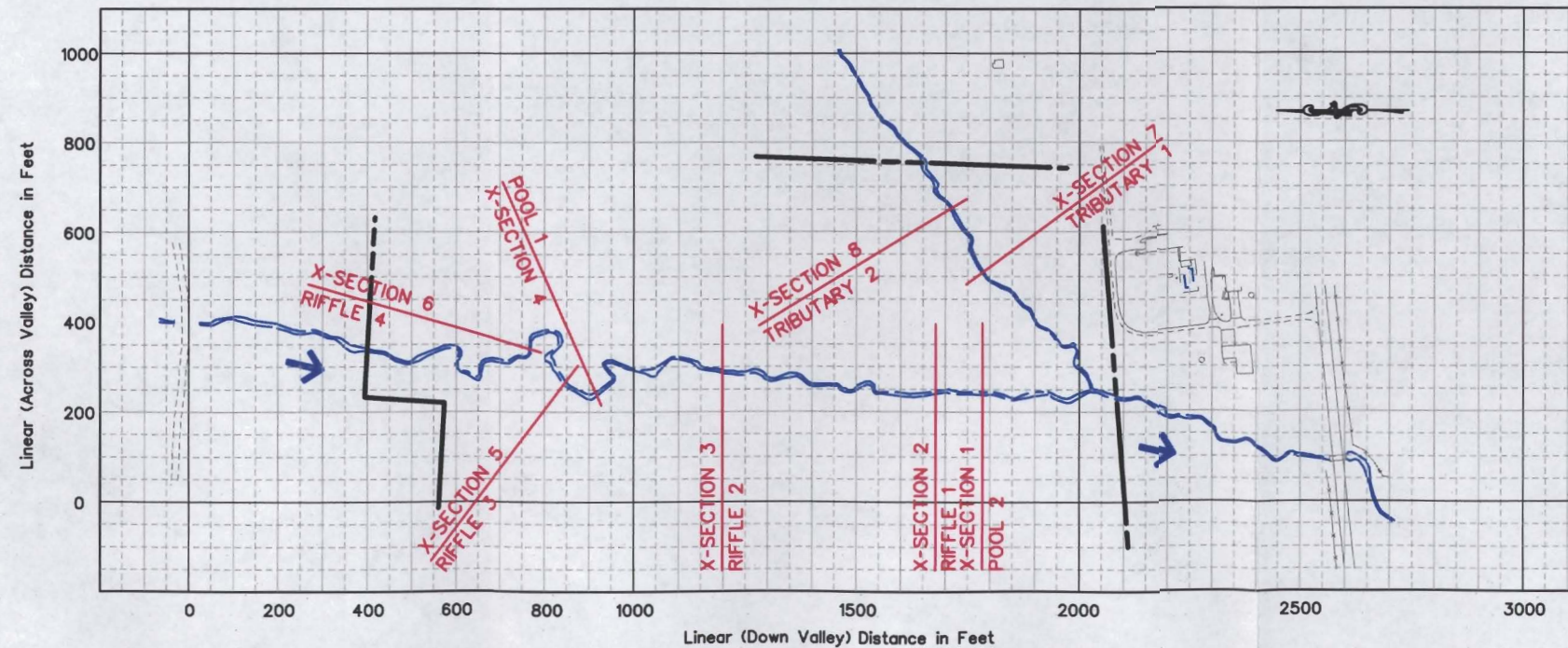
Bankfull Width: 12.0'  
 Bankfull Maximum Depth: 1.7'  
 Bankfull Average Depth: 1.3'  
 Bankfull Cross-sectional Area: 15.5 ft.sq.  
 Width of Flood Prone Area: 14.5'±



Bankfull Width: 14.0'  
 Bankfull Maximum Depth: 3.4'  
 Bankfull Average Depth: 1.9'  
 Bankfull Cross-sectional Area: 26.0 ft.sq.  
 Width of Flood Prone Area: 22.0'±



NOTE:  
 All Cross-sections Facing  
 the Upstream Direction



**TABLE 2**  
**EXISTING STREAM GEOMETRY AND CLASSIFICATION**  
**LYLE CREEK MITIGATION SITE**

Reach	A <sub>shed</sub> (mi <sup>2</sup> )	W <sub>bkfl</sub> (riffle) (ft)	D <sub>avg</sub> (riffle) (ft)	W <sub>pool</sub> (ft)	W <sub>belt</sub> (ft)	L <sub>m</sub> (ft)	L <sub>pool</sub> (ft)	R <sub>c</sub> (ft)	L <sub>p-p</sub> (ft)	W <sub>bkfl</sub> /D <sub>avg</sub> width-depth ratio	BHR Bank Height Ratio	D <sub>max</sub> (riffle) (ft)	D <sub>max</sub> (pool) (ft)	A <sub>bkfl</sub> (riffle) (ft <sup>2</sup> )	Sin valley/ channel	S <sub>ws</sub> (rise/run)	S <sub>valley</sub> (rise/run)	S <sub>riffle</sub> (rise/run)	S <sub>pool</sub> (rise/run)	Substr	Stream Type		
<b>Piedmont Region, Mainstem Channel (Downstream Straightened Reach) Existing Conditions</b>																					Rosgen 1998		
Average	0.5	10.3	1.8	9.4	No distinct repetitive pattern of riffles and pools within the degraded straightened channel						6.5	2.6	2.2	2.7	17.1	1.1	.0091	.01	No distinct repetitive pattern of riffles and pools within the degraded straightened channel			coarse sand/very fine gravel D 50: 2 mm	G4/5
Range		8.5 - 12	1.3 - 2.2	----							3.9 - 9	2.3 - 2.8	1.7 - 2.7	----		----	----						
Average X/W <sub>bkfl</sub>		----	----	0.9							Average X/D <sub>avg</sub>		1.2	1.5		Average X/S <sub>ws</sub>		1.1					
Range X/W <sub>bkfl</sub>		----	----	----							Range X/D <sub>avg</sub>		0.9-1.5	----		Range X/S <sub>ws</sub>		----					
<b>Piedmont Region, Mainstem Channel (Sinuous Reach) Existing Conditions</b>																							
Average	0.5	11.6	1.3	14	108	97.3	25	21.3	63	9.2	1.5	2.0	3.4	15.2	1.7	.009	.016	.0195	.0021	coarse sand/very fine gravel D 50: 2 mm	G/Fc 4/5		
Range		9.9-13.3	1.2-1.4	----	63-141	41-163	7-62	11-30	17-131	8.3-10	1.0-2.0	1.8-2.2	----		----	----	----	.004-.043	0.0 - .0019				
Average X/W <sub>bkfl</sub>		----	----	1.2	9.3	8.4	2.2	1.8	5.4	Average X/D <sub>avg</sub>		1.5	2.6		Average X/S <sub>ws</sub>		1.8	2.2	.122				
Range X/W <sub>bkfl</sub>		----	----	----	5.4-12.2	3.5-14	0.6-5.3	0.9-2.6	1.5-11.3	Range X/D <sub>avg</sub>		1.4 - 1.7	----		Range X/S <sub>ws</sub>		----	0.4 - 4.8	0.0 - .211				
<b>Piedmont Region, Secondary Tributary Existing Conditions</b>																					Rosgen 1998		
Average	0.2	9.4	1.1	----	No distinct repetitive pattern of riffles and pools within the degraded straightened channel						9	2.8	1.8	----	9.6	1.2	.01	.012	No distinct repetitive pattern of riffles and pools within the degraded straightened channel			coarse sand/very fine gravel D 50: 2 mm	G4/5
Range		8.3-10.5	1.0-1.2	----							8-9	2.6-3	1.8-1.9	----		----	----						
Average X/W <sub>bkfl</sub>		----	----	----							Average X/D <sub>avg</sub>		1.5	----		Average X/S <sub>ws</sub>		1.2					
Range X/W <sub>bkfl</sub>		----	----	----							Range X/D <sub>avg</sub>		1.5-1.6	----		Range X/S <sub>ws</sub>		----					

- |                                       |  |                               |   |
|---------------------------------------|--|-------------------------------|---|
| A <sub>shed</sub> :                   | Drainage area (mi <sup>2</sup> )   | S <sub>valley</sub> :         | Valley Slope (rise/run)   |
| W <sub>bkfl</sub> :                   | Bankfull width (riffle) (ft)   | S <sub>ws</sub> :             | Slope of the water surface or bankfull channel indicators (rise/run)  |
| D <sub>avg</sub> :                    | Bankfull average depth (riffle) (ft)   | Sin:                          | Sinuosity, calculated from the relationship S <sub>valley</sub> /S <sub>ws</sub>                                  |
| W <sub>pool</sub> :                   | Bankfull Pool depth (ft)   | S <sub>riffle</sub> :         | Slope of the riffle (rise/run)  |
| W <sub>belt</sub> :                   | Belt width (ft)  | S <sub>pool</sub> :           | Slope of the pool (rise/run)  |
| L <sub>m</sub> :                      | Meander wavelength (ft)  | Substr:                       | Predominant material in the channel substrate (D50: 50% of sampled particles smaller than the stated size.)       |
| L <sub>pool</sub> :                   | Individual Pool Length (ft) (measured from bottom of riffle to top of next riffle)<br>(used as construction surrogate for radius of curvature (R <sub>c</sub> )) | Average X/W <sub>bkfl</sub> : | Average ratio for the column variable divided by the width of the bankfull channel                                |
| L <sub>p-p</sub> :                    | Length from pool to pool (ft) (in-channel length from center of pool to center of pool)  | Range X/W <sub>bkfl</sub> :   | Range of the ratio for the column variable divided by the width of the bankfull channel                           |
| W <sub>bkfl</sub> /D <sub>avg</sub> : | Width/depth ratio of riffle  | Average X/D <sub>avg</sub> :  | Average ratio for the column variable divided by the average depth of the bankfull channel                        |
| A <sub>bkfl</sub> :                   | Bankfull cross-sectional area of riffle (ft <sup>2</sup> )   | Range X/D <sub>avg</sub> :    | Range of the ratio for the column variable divided by the average depth of the bankfull channel                   |
| D <sub>max</sub> :                    | Bankfull maximum depth of riffle (ft)  | Average X/S <sub>ws</sub> :   | Average ratio for the column variable divided by the slope of the water surface or bankfull channel features      |
| D <sub>pool</sub> :                   | Bankfull maximum depth of pool (ft)  | Range X/S <sub>ws</sub> :     | Range of the ratio for the column variable divided by the slope of the water surface or bankfull channel features |

## **4.0 REFERENCE STUDIES**

A fundamental concept of this stream classification entails the development and application of regional reference curves to stream reconstruction and enhancement. Regional reference curves can be utilized to predict bankfull stream geometry, discharge, and other parameters in altered systems. Development of regional reference curves for North Carolina was initiated in 1995. The curves characterize a broad range of streams within the Piedmont physiographic province. Small watersheds or deviations in valley slope, land use, or geologic substrates may not be accurately described by the curves. Therefore, verification of individual watersheds may be necessary. A reference site has been utilized in conjunction with regional curves for detailed planing and characterization of this mitigation project.

The primary reference reach is located approximately 1 mile north of the Site on an unnamed tributary to the Catawba River. The reference tributary occurs in the adjacent sub-basin, located due north of the Site. The reference stream is characterized by an E-type channel situated at the top of an alluvial fan where the unnamed tributary enters the Catawba River floodplain.

Table 3 provides a summary of three reference streams utilized to establish reconstruction parameters. The table includes reference stream geometry measurements as well as ratios of geometry relative to bankfull width, bankfull depth, and bankfull slope. Because the stream channels at these sites could not be adequately viewed from available aerial photography, plan views were developed through the use of laser technology. Subsequently, channel cross-sections were measured at systematic locations and stream profiles were developed via laser level. Stream substrates were quantified through systematic pebble counts along the reference reaches. In-field measurements of channel geometry were also performed along stream wavelengths located outside of the plan view area.

### **4.1 REFERENCE CHANNEL**

Initially, reference streams in the region were visited and classified by stream type (Rosgen 1996). This classification stratifies streams into comparable groups based on geometric characteristics. Reference reaches identified in the vicinity were characterized primarily as E-type (highly sinuous) channels with sand or gravel substrate. E-type streams are slightly entrenched, highly sinuous ( $> 1.5$ ) channels which exhibit high meander width ratios (belt width/bankfull width). In North Carolina, E-type streams occur in narrow to wide valleys with well-developed alluvial floodplains (Valley Type VIII). These streams exhibit a sequence of riffles and pools associated with a sinuous flow pattern.

**TABLE 3**  
**REFERENCE STREAM GEOMETRY AND CLASSIFICATION**  
**LYLE CREEK MITIGATION SITE**

Reach	A <sub>shed</sub> (mi <sup>2</sup> )	W <sub>bkfl</sub> (riffle) (ft)	D <sub>avg</sub> (riffle) (ft)	W <sub>pool</sub> (ft)	W <sub>belt</sub> (ft)	L <sub>m</sub> (ft)	L <sub>pool</sub> (ft)	R <sub>c</sub> (ft)	L <sub>p-p</sub> (ft)	W <sub>bkfl</sub> /D <sub>avg</sub> width-depth ratio	BHR Bank Height Ratio	D <sub>max</sub> (riffle) (ft)	D <sub>max</sub> (pool) (ft)	A <sub>bkfl</sub> (riffle) (ft <sup>2</sup> )	Sin valley/ channel	S <sub>ws</sub> (rise/run)	S <sub>valley</sub> (rise/run)	S <sub>riffle</sub> (rise/run)	S <sub>pool</sub> (rise/run)	Substr	Stream Type
<b>Piedmont Regional Reference, Unnamed Tributary of Catawba River, Catawba County</b>																					Rosgen 1998
Average	1.6	10.3	1.1	11.2	35	45	19	18	39	10	1.0	1.7	1.9	10.9	1.4	.0028	0.004	0.0034	0.0022	coarse sand/very fine gravel D 50: 2 mm	E4/5
Range		9.2-11.5	1.1-1.3	9.8-12.6	30-40	25-70	13-40	12.5-25	22-62	8-13	----	1.5-1.8	1.9-2.0		----	.0027-.0029	----	.003-.0036	.0017-.0028		
Average X/W <sub>bkfl</sub>		----	----	1.1	3.4	4.4	1.8	1.7	3.8	Average X/D <sub>avg</sub>		1.5	1.7		Average X/S <sub>ws</sub>		1.4	1.1	0.8		
Range X/W <sub>bkfl</sub>		----	----	1.0-1.2	2.9-3.9	2.4-6.8	1.3-3.9	1.2-2.4	2.1-6.0	Range X/D <sub>avg</sub>		1.4-1.6	1.7-1.8		Range X/S <sub>ws</sub>		----	1.1-1.3	0.6-1.0		
<b>Piedmont Regional Reference, Turkey Cock Creek, Stokes County</b>																					
Average	2.4	14.5	2.1	19	62	83	19	20	59	7	----	2.7	4.3	30	1.6	.0044	0.0079	0.0058	.0029	coarse sand/very fine gravel D 50: 2.5mm	E5/6
Range		13-16	1.8-2.2	17-21	25-88	50-118	14-24	7.5-35	25-103	7-8	----	2.3-3.1	3.8-4.8		----	.0042-.0049	----	.005-.007	.0025-.0037		
Average X/W <sub>bkfl</sub>		----	----	1.3	4.3	5.7	1.3	1.4	4.1	Average X/D <sub>avg</sub>		1.3	2.0		Average X/S <sub>ws</sub>		1.8	1.3	0.7		
Range X/W <sub>bkfl</sub>		----	----	1.2-1.5	1.7-6.1	3.4-8.1	1.0-1.7	0.5-2.4	1.7-7.1	Range X/D <sub>avg</sub>		1.1-1.5	1.8-2.3		Range X/S <sub>ws</sub>		----	1.1-1.5	0.6-0.8		
<b>Piedmont Regional Reference, Unnamed Tributary to Clarks Creek, Mecklenburg County</b>																					
Average	1.0	11	1.1	14	70	80	30	20	50	10	1.0	1.4	2.2	12	1.35	.0062	0.0084	0.0085	.004	coarse sand/very fine gravel D 50: 1.8 mm	E5/C5 trans- itions
Range		10-14	0.8-1.3	13-18	40-90	60-120	15-50	16-30	20-70	9-12	----	1.1-1.7	2-4.5		----	.004-.007	----	.008-.010	.003-.005		
Average X/W <sub>bkfl</sub>		----	----	1.3	6	7	2.7	1.9	4.5	Average X/D <sub>avg</sub>		1.3	2.0		Average X/S <sub>ws</sub>		1.4	1.4	0.6		
Range X/W <sub>bkfl</sub>		----	----	1.2-1.6	4-8	5-11	1.4-4.5	1.5-3	1.8-6.4	Range X/D <sub>avg</sub>		1.0-1.5	1.8-4.1		Range X/S <sub>ws</sub>		----	1.3-1.6	0.5-0.7		

A <sub>shed</sub> :	Drainage area (mi <sup>2</sup> )	S <sub>valley</sub> :	Valley Slope (rise/run)
W <sub>bkfl</sub> :	Bankfull width (riffle) (ft)	S <sub>ws</sub> :	Slope of the water surface or bankfull channel indicators (rise/run)
D <sub>avg</sub> :	Bankfull average depth (riffle) (ft)	Sin:	Sinuosity, calculated from the relationship S <sub>valley</sub> /S <sub>ws</sub>
W <sub>pool</sub> :	Bankfull Pool depth (ft)	S <sub>riffle</sub> :	Slope of the riffle (rise/run)
W <sub>belt</sub> :	Belt width (ft)	S <sub>pool</sub> :	Slope of the pool (rise/run)
L <sub>m</sub> :	Meander wavelength (ft)	Substr:	Predominant material in the channel substrate (D50: 50% of sampled particles smaller than the stated size.)
L <sub>pool</sub> :	Individual Pool Length (ft) (measured from bottom of riffle to top of next riffle) (used as construction surrogate for radius of curvature (R <sub>c</sub> ))	Average X/W <sub>bkfl</sub> :	Average ratio for the column variable divided by the width of the bankfull channel
L <sub>p-p</sub> :	Length from pool to pool (ft) (in-channel length from center of pool to center of pool)	Range X/W <sub>bkfl</sub> :	Range of the ratio for the column variable divided by the width of the bankfull channel
W <sub>bkfl</sub> /D <sub>avg</sub> :	Width/depth ratio of riffle	Average X/D <sub>avg</sub> :	Average ratio for the column variable divided by the average depth of the bankfull channel
A <sub>bkfl</sub> :	Bankfull cross-sectional area of riffle (ft <sup>2</sup> )	Range X/D <sub>avg</sub> :	Range of the ratio for the column variable divided by the average depth of the bankfull channel
D <sub>max</sub> :	Bankfull maximum depth of riffle (ft)	Average X/S <sub>ws</sub> :	Average ratio for the column variable divided by the slope of the water surface or bankfull channel features
D <sub>pool</sub> :	Bankfull maximum depth of pool (ft)	Range X/S <sub>ws</sub> :	Range of the ratio for the column variable divided by the slope of the water surface or bankfull channel features



### Dimension

Field indicators measured in the reference channel indicate a bankfull cross-sectional area of approximately 11 square feet, including widths of 9.2 to 11.5 feet, average depths of 1.1 to 1.3 feet, and width/depth ratios of 8 to 13 (Figure 7). Regional curves predict that the stream should exhibit a bankfull cross-sectional area of approximately 29 square feet, significantly more than measured in the field.

This discrepancy in cross-sectional area may result from the location of the reference channel adjacent to influence from the Catawba River. Alluvial deposition of coarse-grained sediments adjacent to the reference reach has two main implications with respect to channel cross-sectional area: 1) coalescing alluvial sediments may elevate the channel above the surrounding floodplain and 2) coarse-grained materials exhibit a larger than average hyporheic zone. As a channel elevates above its adjacent floodplain the water surface within the channel is elevated above the adjacent floodplain water table. Consequently, hydrology may drain from the elevated channel into the floodplain water table (a losing stream). In addition, the existing cross-sectional area is encompassed by the floodplain and an enlarged hyporheic zone.

Although the reference channel appears to be smaller than predicted by regional curves, the reference channel exhibits stable banks, no shoot cut-offs, and no transverse bar formation. In addition, dimensionless ratios measured within the channel appear to be within the modal concept for stable E- and C-type streams in the Piedmont region of the state. Therefore, the reference channel is expected to be suitable for design channel dimensionless ratio calculations. It is expected, however, that comparison of design channel cross-sectional area will be identified from other, on-site sources.

### Pattern

Based on field surveys the reference reach is characterized by an average sinuosity of approximately 1.4 (Table 3). This sinuosity supports a belt width which ranges between 30 and 40 feet, an average meander wavelength of 45 feet, and a radius of curvature ranging between 13 and 25 feet. Pattern values for the reference site appear suitable for E-type streams in the vicinity. Pattern variables surveyed in the reference channel are expected to be utilized in conjunction with on-site variables measured in reaches of the mainstem channel which have not been dredged/straightened and exhibit a meandering flow pattern. On-site sinuous reaches are expected to accurately depict channel morphology in straightened and dredged lower reaches. Sinuous reaches of the Site are expected to be incorporated with reference data to more accurately conceptualize channel design.



EcoScience Corporation

Raleigh, North Carolina

REVISIONS

Client: NC WETLAND RESTORATION PROGRAM

Project:

LYLE CREEK MITIGATION SITE

CATAWBA COUNTY, NORTH CAROLINA

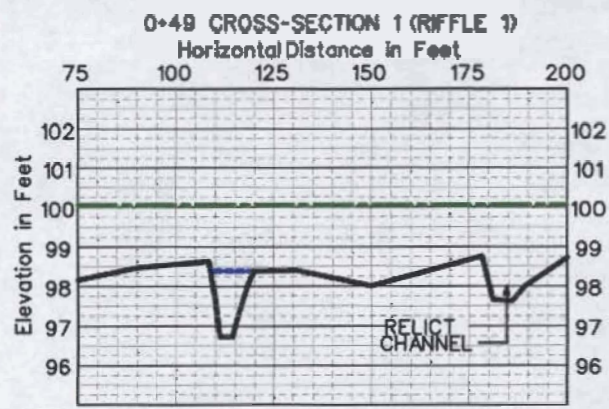
REFERENCE PLAN VIEW AND CROSS-SECTIONS

Drawn By: MAF Date: JUL 2001  
Checked By: JG Scale: As Shown

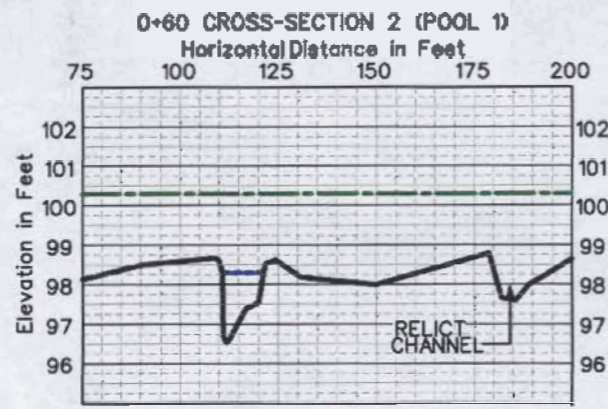
ESC Project No.: 98-047.11

FIGURE

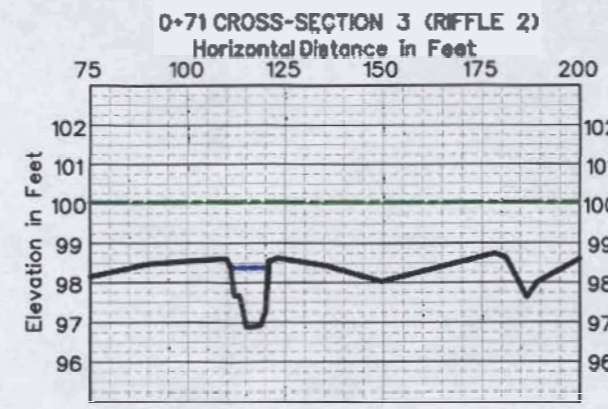
7



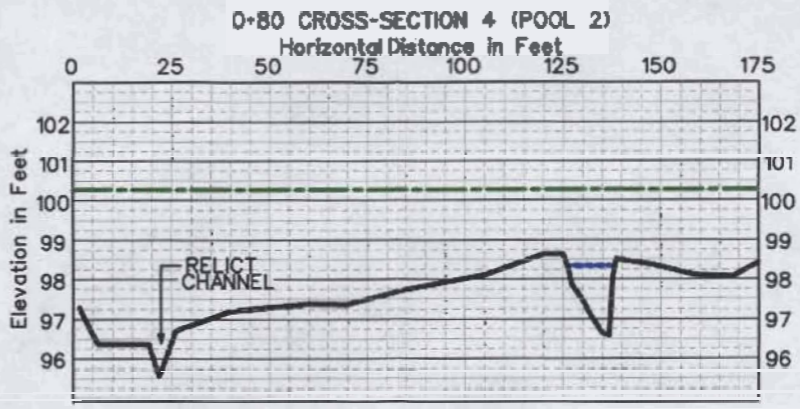
Bankfull Width: 11.5'  
Bankfull Maximum Depth: 1.7'  
Bankfull Average Depth: 0.9'  
Bankfull Cross-sectional Area: 10.6 ft.sq.  
Width of Flood Prone Area: 225'±



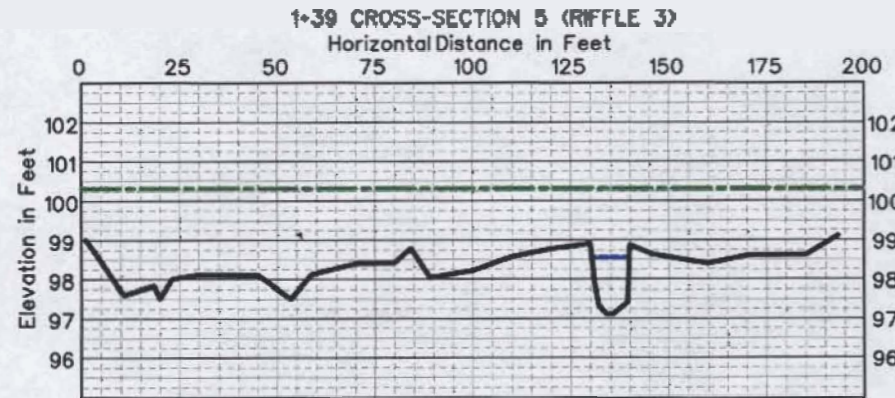
Bankfull Width: 11.1'  
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Bankfull Cross-sectional Area: 11.9 ft.sq.  
Width of Flood Prone Area: 225'±



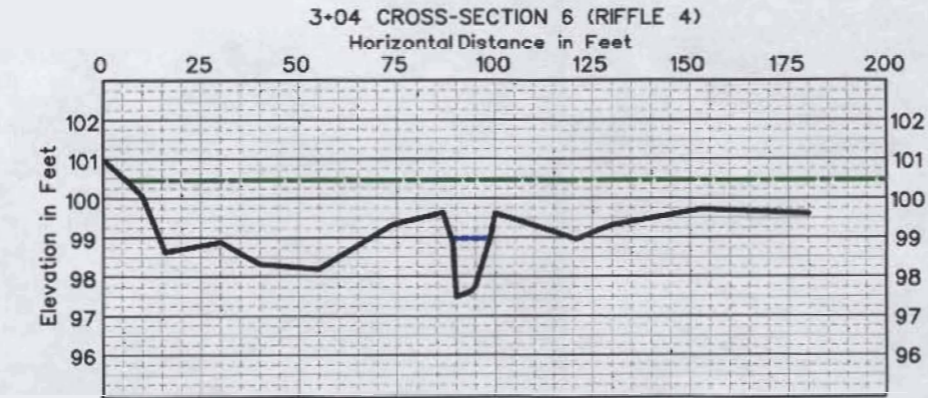
Bankfull Width: 10.4'  
Bankfull Maximum Depth: 1.6'  
Bankfull Average Depth: 1.1'  
Bankfull Cross-sectional Area: 11.1 ft.sq.  
Width of Flood Prone Area: 225'±



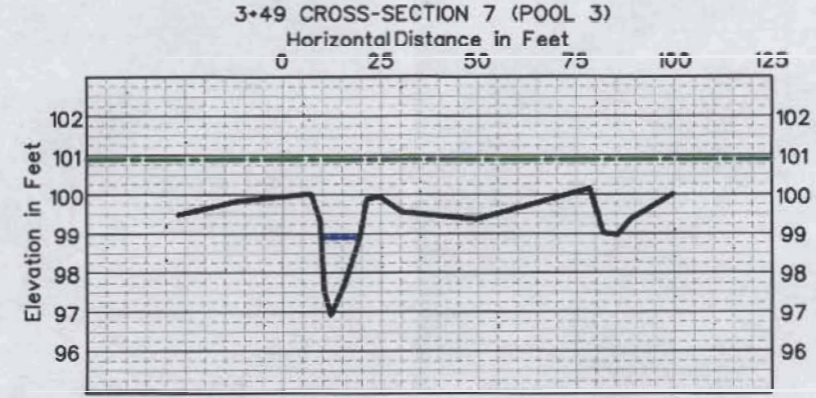
Bankfull Width: 12.6'  
Bankfull Maximum Depth: 1.9'  
Bankfull Average Depth: 1.0'  
Bankfull Cross-sectional Area: 13.1 ft.sq.  
Width of Flood Prone Area: 175'±



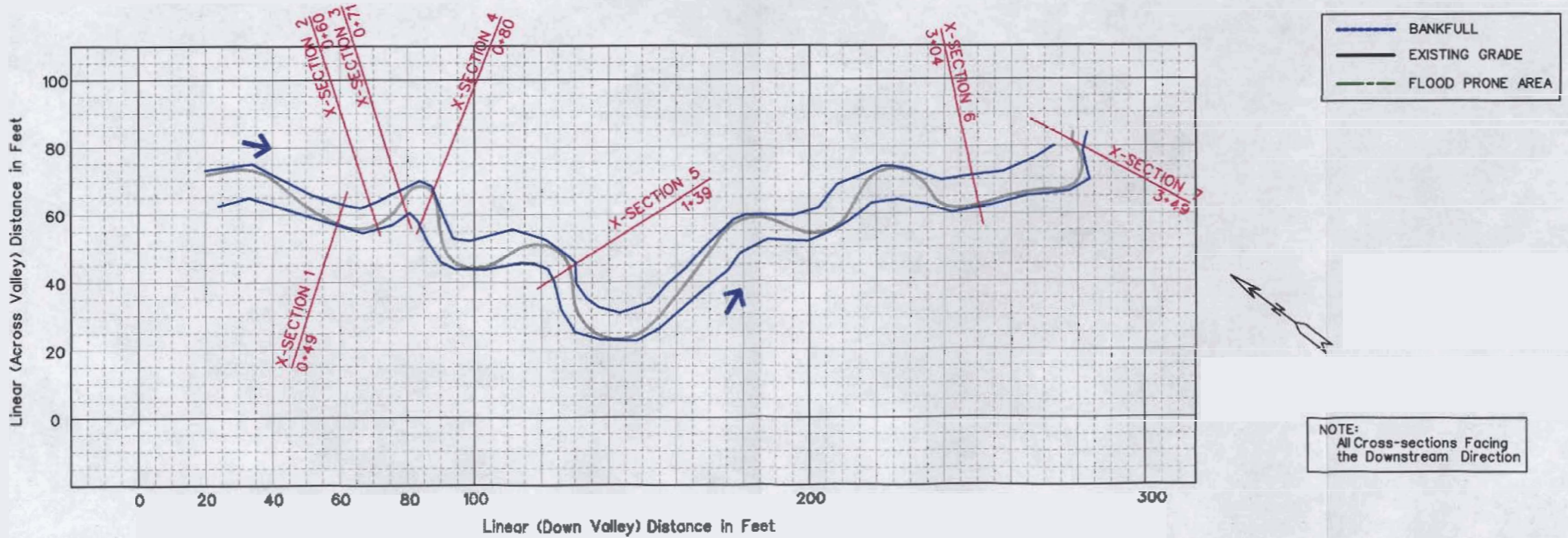
Bankfull Width: 9.9'  
Bankfull Maximum Depth: 1.8'  
Bankfull Average Depth: 1.3'  
Bankfull Cross-sectional Area: 12.5 ft.sq.  
Width of Flood Prone Area: 228'±



Bankfull Width: 9.2'  
Bankfull Maximum Depth: 1.5'  
Bankfull Average Depth: 1.0'  
Bankfull Cross-sectional Area: 9.3 ft.sq.  
Width of Flood Prone Area: 250'±



Bankfull Width: 9.8'  
Bankfull Maximum Depth: 2.0'  
Bankfull Average Depth: 1.3'  
Bankfull Cross-sectional Area: 12.2 ft.sq.  
Width of Flood Prone Area: 250'±



NOTE: All Cross-sections Facing the Downstream Direction

## Profile

Based on elevational profile surveys, the reference reach is characterized by a relatively flat valley slope (0.004 rise/run). Valley slope in upper portions of the reference stream watershed are significantly steeper, averaging approximately 0.0095 rise/run (based on USGS quadrangles). Typically, gradient decreases in a downstream direction as the watershed increases in size. This change in valley slope is matched by a change in stream pattern as the nature of the channel changes from a step-pool to riffle pool stream. As depicted in Table 3, the reference reach is characterized by moderately-high sinuosity resulting in moderate water surface slopes averaging approximately 0.0028 rise/run. Pool slopes ( $S_{pool}$ ) and riffle slopes ( $S_{riffle}$ ) reside, on average, within the range indicative of a stable stream system.

## **4.2 REFERENCE FOREST ECOSYSTEMS**

According to Mitigation Site Classification (MiST) guidelines (EPA 1990), Reference Forest Ecosystems (RFEs) must be established for mitigation sites. RFEs are forested areas on which to model restoration efforts of the mitigation site in terms of soils, hydrology, and vegetation. RFEs should be ecologically stable climax communities and should represent believed historical (pre-disturbance) conditions of the mitigation site. Quantitative data describing plant community composition and structure are collected at the RFE and subsequently applied as reference data for design of the mitigation site planting scheme.

There were two RFE areas chosen to guide plant community restoration along the mainstem channel and secondary tributary. The RFEs are both found within the Piedmont physiographic province, with one northeast and the other southeast of the Site. Both RFEs support plant community, landform, and hydrological characteristics that restoration efforts will attempt to emulate. Circular, 0.1-acre plots were randomly established within the selected RFEs. Data collected within each plot include 1) tree, shrub, and herb species composition; 2) number of stems for each tree and shrub species; and 3) diameter at breast height (DBH) for each tree and shrub species. Field data (Table 4a and 4b) indicate importance values (IV) of dominant tree species calculated based on relative density, dominance, and frequency of tree species composition (Smith 1980). Hydrology, surface topography, and habitat features were also evaluated.

The northeastern RFE is a segment of Turkey Cock Creek, located in Stokes County, North Carolina, that is underlain by similar soils and is comparable to the Site in floodplain width and slope. Within the RFE, vegetative sampling at four 0.1-acre plots indicate that forest tree vegetation was dominated by tulip tree (IV=19.6 percent), green ash (*Fraxinus pennsylvanica*) (IV = 16.8 percent), ironwood (*Carpinus caroliniana*) (IV = 14.9 percent), and red maple (*Acer rubrum*) (IV = 14.3 percent) (Table 4a). Other, less dominant tree species within the sample plots were northern red oak (*Quercus rubra*), black walnut (*Juglans nigra*), and American sycamore.

**TABLE 4 (a)**

**Reference Forest Ecosystem Plot Summary  
Bottomland Hardwood Forest (Canopy Species)  
Turkey Cock Creek**

Tree Species	Number of Individuals <sup>1</sup>	Relative Density (%)	Frequency <sup>1</sup> (%)	Relative Frequency (%)	Basal Area ft <sup>2</sup> / acre	Relative Basal Area (%)	Importance Value (%)
<i>Carpinus caroliniana</i>	19	23.7	100	14.8	8.4	6.3	14.9
<i>Fraxinus pennsylvanica</i>	15	18.8	75	11.1	27.5	20.4	16.8
<i>Liriodendron tulipifera</i>	15	18.8	100	14.8	33.9	25.2	19.6
<i>Acer rubrum</i>	11	13.8	75	11.1	24.2	17.9	14.3
<i>Quercus rubra</i>	5	6.3	75	11.1	5.8	4.3	7.2
<i>Juglans nigra</i>	3	3.8	25	3.7	11.2	8.3	5.3
<i>Platanus occidentalis</i>	2	2.5	25	3.7	12.7	9.5	5.2
<i>Cercis canadensis</i>	2	2.5	25	3.7	0.5	0.4	2.2
<i>Diospyros virginiana</i>	2	2.5	25	3.7	2.6	2.0	2.7
<i>Nyssa sylvatica</i>	1	1.3	25	3.7	0.7	0.5	1.8
<i>Carya tomentosa</i>	1	1.3	25	3.7	1.7	1.3	2.1
<i>Carya ovata</i>	1	1.3	25	3.7	1.4	1.1	2.0
<i>Viburnum prunifolium</i>	1	1.3	25	3.7	0.2	0.2	1.7
<i>Oxydendrum arboreum</i>	1	1.3	25	3.7	2.0	1.5	2.1
<i>Prunus serotina</i>	1	1.3	25	3.7	1.9	1.4	2.1
<b>TOTALS</b>	80	100	676	100	135	100	100

<sup>1</sup>Summary of four - 0.1-acre plots

**TABLE 4 (b)**

**Reference Forest Ecosystem Plot Summary  
Bottomland Hardwood Forest (Canopy Species)  
Rocky River**

<b>Tree Species</b>	<b>Number of Individuals<sup>1</sup></b>	<b>Relative Density (%)</b>	<b>Frequency<sup>1</sup></b>	<b>Relative Frequency (%)</b>	<b>Basal Area ft<sup>2</sup>/ acre</b>	<b>Relative Basal Area (%)</b>	<b>Importance Value (%)</b>
<i>Fraxinus pennsylvanica</i>	62	42	10	26	57.8	51	39
<i>Acer negundo</i>	41	28	9	23	17.0	15	22
<i>Ulmus americana</i>	15	10	7	18	10.7	9	12
<i>Quercus michauxii</i>	6	4	1	3	11.8	10	6
<i>Carpinus caroliniana</i>	8	5	3	8	1.1	1	5
<i>Quercus lyrata</i>	4	3	3	8	5.1	4	5
<i>Celtis laevigata</i>	6	4	2	5	7.0	6	5
<i>Platanus occidentalis</i>	1	1	1	3	1.8	2	2
<i>Ulmus alata</i>	3	1	1	3	0.1	0	2
<i>Fraxinus caroliniana</i>	2	1	1	3	0.3	0	1
<i>Ligustrum sinense</i>	1	1	1	3	0.1	0	1
<b>TOTALS</b>	<b>149</b>	<b>100</b>	<b>39</b>	<b>103</b>	<b>113</b>	<b>98</b>	<b>100</b>

\* Summary of ten - 0.1-acre plots

The southeastern RFE contained a section of hardwood forest within Cabarrus County, North Carolina along the Rocky River. Ten 0.1-acre plots were established which best characterize expected steady-state forest composition. Forest vegetation was dominated by green ash (IV = 39 percent), box elder (*Acer negundo*) (IV = 22 percent), and American elm (*Ulmus americana*) (IV = 12 percent) (Table 4b). Portions of the canopy were also dominated by swamp chestnut oak (*Quercus michauxii*), ironwood, overcup oak (*Quercus lyrata*), sugarberry (*Celtis laevigata*), sweetgum, red maple, black willow, slippery elm (*Ulmus alata*), water oak (*Quercus nigra*), and river birch.

## **5.0 STREAM RESTORATION PLAN**

The primary goals of this restoration plan include: 1) construction of a stable, riffle-pool stream channel; 2) enhancement of water quality functions in the on-site, upstream, and downstream segments of the mainstem channel and secondary tributary; 3) creation of a natural vegetation buffer along restored stream channels; and 4) restoration of wildlife functions associated with a riparian corridor/stable stream. Components of this plan may be modified based on construction or access constraints. Primary activities designed to restore the stream complex include: 1) stream restoration; 2) soil restoration; and 3) plant community restoration. Subsequently, a monitoring plan is outlined.

### **5.1 STREAM RESTORATION**

This stream restoration effort is designed to restore a stable, meandering stream that approximates hydrodynamics, stream geometry, and local microtopography relative to reference conditions. This effort consists of stream reconstruction on new location where feasible, stream reconstruction in-place in sinuous reaches with limited adjacent floodplain, and bank sloping/bench excavation in the secondary tributary. The location of each activity and detailed mitigation plan is depicted in Figure 8.

An erosion control plan and construction/transportation plan will be developed. Erosion control will be performed locally throughout the Site and will be incorporated into the construction sequencing. Exposed surficial soils at the Site are unconsolidated, alluvial sediments which do not re-vegetate rapidly after disturbance; therefore, seeding with appropriate grasses and immediate planting with disturbance-adapted shrubs will be employed following the earth-moving process. In addition, on-site root mats (seed banks) and vegetation will be stockpiled and redistributed after disturbance.

A transportation plan, including the location of access routes and staging areas, will be designed to avoid impacts to the proposed design channel corridor. In addition, the transportation plan and all construction activities will minimize disturbance to existing vegetation and soils to the extent feasible. The number of transportation access points into the floodplain will be maximized to avoid traversing long distances through the Site interior.

#### **5.1.1 Reconstruction on New Location**

The reach of Site stream proposed for reconstruction on new location include the downstream portion of the mainstem channel where dredging and straightening of the channel has occurred. This portion of the Site is characterized by an adjacent floodplain which is suitable for design channel excavation. Primary activities designed to restore the channel on new location include: 1) beltwidth preparation and grading; 2) channel excavation; 3) installation of channel plugs; and 4) channel backfilling.

### 1) Beltwidth Preparation and Grading

The stream beltwidth corridor identified in Figure 8 will be cleared to allow survey and equipment access. Care should be taken to avoid the removal of existing deeply rooted vegetation within the beltwidth corridor which may provide design channel stability. Minor grading may be necessary at convergence of the design channel with the existing channel at the downstream end of the Site (Figure 9). Material excavated during grading may be stockpiled immediately adjacent to the channel segments to be abandoned and backfilled. These segments will be backfilled after stream diversion is completed.

Spoil material may also be placed to stabilize temporary access roads and to minimize compaction of the underlying floodplain. However, all spoil will be removed from floodplain surfaces, as described below, upon completion of construction activities.

After preparation of the corridor, the design channel and updated profile survey will be developed and the location of each meander wavelength plotted and staked along the profile. Pool locations and relative frequency will be staked according to parameters outlined in Figure 8. These configurations may be modified in the field based on local variations in the floodplain profile. The stakes will be marked to denote the appropriate cross-section shape depicted in Figure 10 (top of riffle, bottom of riffle, and pool).

### 2) Channel Excavation

The channel will be constructed within the range of values depicted in Table 5. Figure 8 provides a plan form and pool elevations for the constructed channel. Pool elevations refer to water surface elevations within each pool and correspond to riffle elevations above and below the specified pool. The cross-sectional area upon excavation will measure approximately 16 to 17 square feet, with a bankfull width ranging between 10 and 14 feet, and an average bankfull depth ranging between 1 and 2 feet.

The stream banks and local belt width area of constructed channels will be immediately planted with shrub and herbaceous vegetation. Shrubs such as tag alder and black willow may be removed from the banks of the abandoned channel or stockpiled during clearing and replaced into the stream construction area. Deposition of shrub and woody debris into and/or overhanging the constructed channel is encouraged. Root mats may also be selectively removed from adjacent areas and placed as erosion control features on channel banks.

Particular attention will be directed toward providing vegetative cover and root growth along the outer bends of each stream meander. Live willow stake revetments will be constructed as conceptually depicted in Figure 11. Available root mats or biodegradable, erosion control matting may be embedded into the break-in-slope to promote more rapid development of an





**EcoScience Corporation**

Raleigh, North Carolina

REVISIONS

Client:  
**NC WETLAND RESTORATION PROGRAM**

Project:  
**LYLE CREEK MITIGATION SITE**  
  
CATAWBA COUNTY, NORTH CAROLINA

Title:  
**GRADING PLAN**

Dwn By: MAF Date: JUL 2001

Ckd By: WGL Scale: 1" = 200'

ESC Project No.: 98-047.11

FIGURE  
**9**



**LEGEND**

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING TREE LINE
- EXISTING STREAM
- MAJOR CONTOURS 850
- PROPOSED CONTOURS 800
- DESIGN CHANNEL EXCAVATION AREA
- SECONDARY TRIBUTARY BANK SLOPING AREA
- BANKFULL BENCH EXCAVATION AREAS
- SOIL STORAGE AREA
- CHANNEL BACKFILL AREA

**MAINSTEM CHANNEL**

ESTIMATED CUT	yards <sup>3</sup>
FLOOD PLAIN GRADING	1400±
CHANNEL EXCAVATION	800±
BANKFULL BENCH EXCAVATION	320±
<b>Total</b>	<b>2520±</b>
ESTIMATED FILL	
ABANDONED CHANNEL BACKFILL	2050±

**SECONDARY TRIBUTARY**

ESTIMATED CUT	yards <sup>3</sup>
ALTERNATIVE 1 SLOPE BANK	260±
ALTERNATIVE 1 BANKFULL FLOOD PLAIN BENCH	1100±

**PLAN VIEW**

SCALE: 1"=200'



EcoScience Corporation

Raleigh, North Carolina

REVISIONS

No.	Description

Client: NC WETLAND RESTORATION PROGRAM

Project: LYLE CREEK MITIGATION SITE  
CATAWBA COUNTY, NORTH CAROLINA

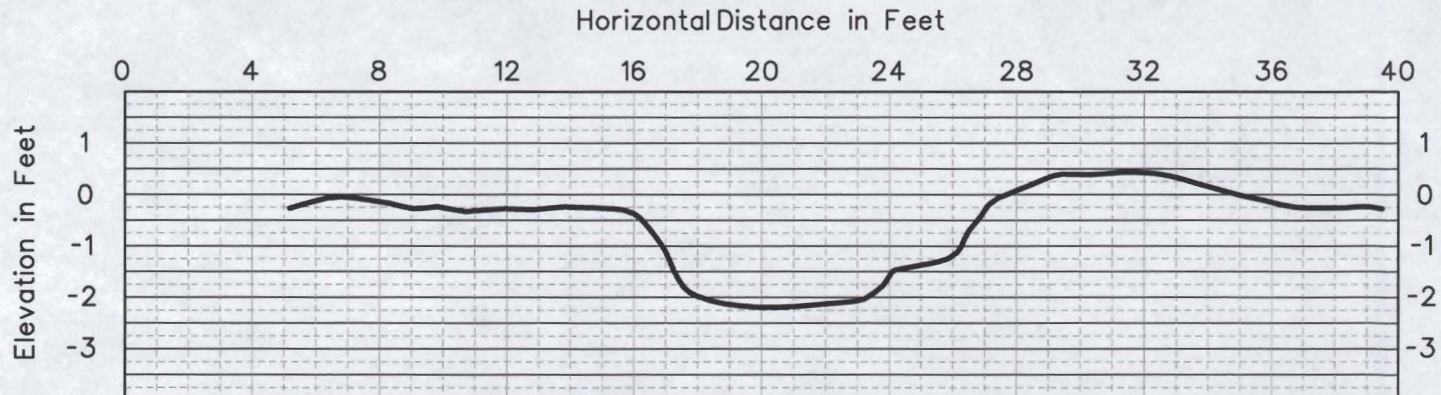
Title: PROPOSED CROSS-SECTIONS

Dwn By: MAF Date: JUL 2001

Ckd By: WGL Scale: 1" = 200'

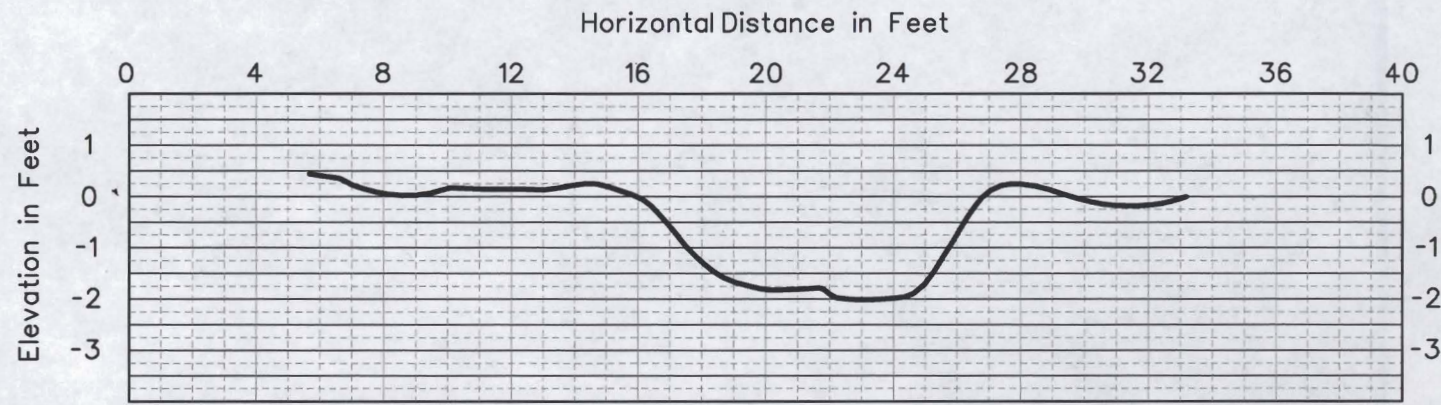
ESC Project No.: 98-047.11

FIGURE 10



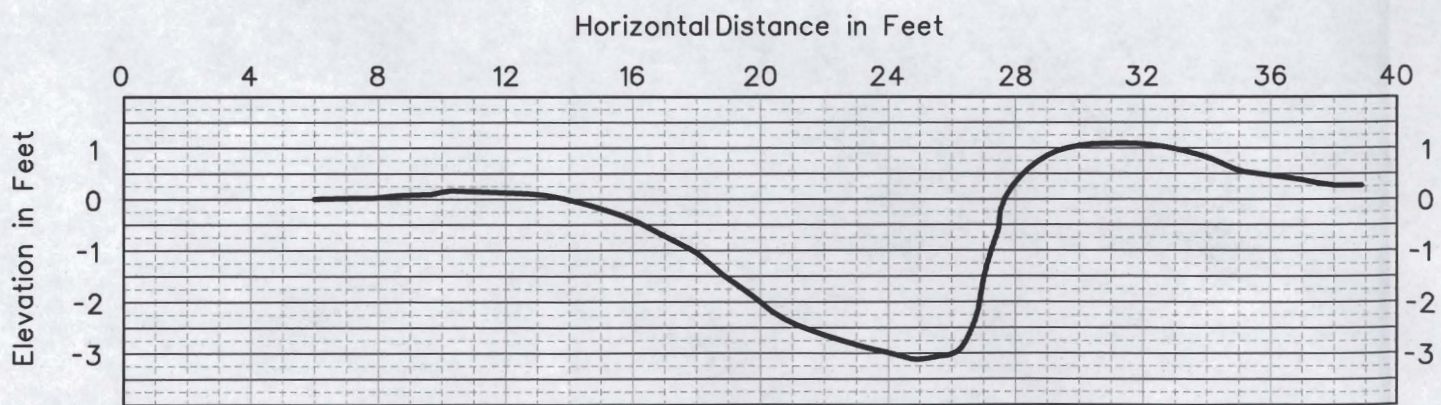
Cross-section 1  
Top of Riffle  
SCALE: NO SCALE

Bankfull Cross-sectional Area: 16.4 ft.sq.  
Bankfull Width: 11.3'  
Bankfull Average Depth: 1.5'  
Bankfull Maximum Depth: 2.0'



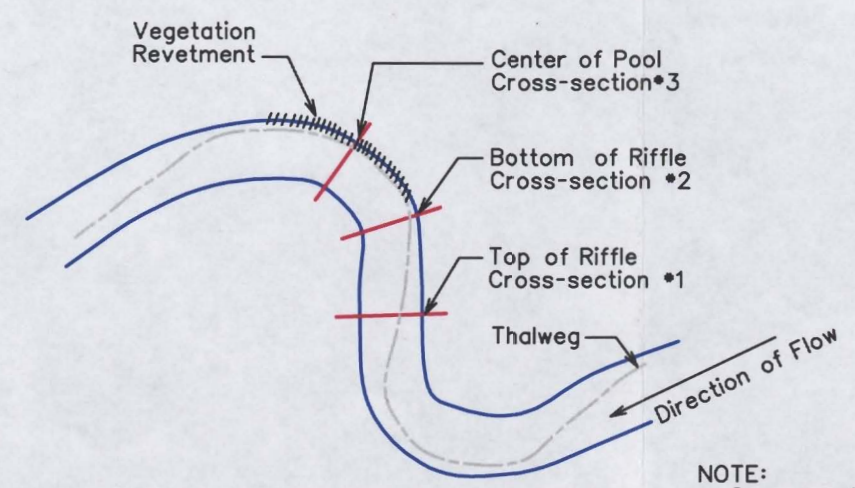
Cross-section 2  
Bottom of Riffle  
SCALE: NO SCALE

Bankfull Cross-sectional Area: 16.2 ft.sq.  
Bankfull Width: 11.1'  
Bankfull Average Depth: 1.4'  
Bankfull Maximum Depth: 2.0'



Cross-section 3  
Pool  
SCALE: NO SCALE

Bankfull Cross-sectional Area: 24.8 ft.sq.  
Bankfull Width: 14.6'  
Bankfull Average Depth: 1.7'  
Bankfull Maximum Depth: 3.0'



NOTE: Cross-section Facing the Downstream Direction

**TABLE 5  
PROPOSED STREAM GEOMETRY AND CLASSIFICATION  
LYLE CREEK MITIGATION SITE**

Reach	A <sub>shed</sub> (mi <sup>2</sup> )	W <sub>bkfl</sub> (riffle) (ft)	D <sub>avg</sub> (riffle) (ft)	W <sub>pool</sub> (ft)	W <sub>belt</sub> (ft)	L <sub>m</sub> (ft)	L <sub>pool</sub> (ft)	R <sub>c</sub> (ft)	L <sub>p-p</sub> (ft)	W <sub>bkfl</sub> /D <sub>avg</sub> width-depth ratio	BHR Bank Height Ratio	D <sub>max</sub> (riffle) (ft)	D <sub>max</sub> (pool) (ft)	A <sub>bkfl</sub> (riffle) (ft <sup>2</sup> )	Sin <sub>valley/ channel</sub>	S <sub>ws</sub> (rise/run)	S <sub>valley</sub> (rise/run)	S <sub>rifle</sub> (rise/run)	S <sub>pool</sub> (rise/run)	Substr	Stream Type	
<b>Piedmont Region, Mainstem Channel Proposed Conditions</b>																					Rosgen 1998	
Average	0.5	11.2	1.5	14.6	88.0	71.9	20.2	23.5	49	8	1.0	2.0	3.0	16.8	1.7	.007	.012	.010	.0049	coarse sand/very fine gravel D 50: 2 mm	E4/5	
Range		9.9-13.3	1.0-2.0	11-17	33-141	41-163	15-43	11-38	17-131	5-12	-----	1.5-2.3	2.6-3.5		-----	-----	-----	.004-.015**	.0042-.0056			
Average X/W <sub>bkfl</sub>		-----	-----	1.3	7.8	6.4	1.8	2.1	4.3	Average X/D <sub>avg</sub>		1.3	2.0		Average X/S <sub>ws</sub>		1.7	1.4	.7			
Range X/W <sub>bkfl</sub>		-----	-----	1.0-1.5	2.9-12.5	3.5-14	1.3-3.9	1.0-3.4	1.5-11.6	Range X/D <sub>avg</sub>		1.0-1.5	1.7-2.3		Range X/S <sub>ws</sub>		-----	.6-2.1**	.6-.8			
<b>Piedmont Region, Secondary Tributary Proposed Conditions *</b>																					Rosgen 1998	
Average	0.2	11.3	.9	14.5	No proposed changes to pattern variables					13	1.0	1.3	-----	9.6	1.2	.01	.012	No Proposed changes to profile variables			coarse sand/very fine gravel D 50: 2 mm	B4/5
Range		10.6-12	.8-.9	11-17						12-16	-----	.8-1.5	-----		-----	-----						
Average X/W <sub>bkfl</sub>		-----	-----	1.3						Average X/D <sub>avg</sub>		1.4	-----		Average X/S <sub>ws</sub>		1.2					
Range X/W <sub>bkfl</sub>		-----	-----	1.0-1.5						Range X/D <sub>avg</sub>		.9-1.7	-----		Range X/S <sub>ws</sub>		-----					

\* Secondary tributary proposed conditions calculated assuming bankfull bench excavation.

\*\* Extreme water surface values arise due to manipulation of riffle slope at upper and lower reaches of the mitigation site. Shallow water surface slopes in upper reaches result from intrenchment of the existing channel and proposed raising of bankfull water surface to the existing floodplain. Steep water surface slopes at downstream reach of site arise due to efforts to lower water surface elevations from design channel to the existing channel bed at the Site outfall.

- |                                       |  |                               |   |
|---------------------------------------|--|-------------------------------|---|
| A <sub>shed</sub> :                   | Drainage area (mi <sup>2</sup> )   | S <sub>valley</sub> :         | Valley Slope (rise/run)   |
| W <sub>bkfl</sub> :                   | Bankfull width (riffle) (ft)   | S <sub>ws</sub> :             | Slope of the water surface or bankfull channel indicators (rise/run)  |
| D <sub>avg</sub> :                    | Bankfull average depth (riffle) (ft)   | Sin:                          | Sinuosity, calculated from the relationship S <sub>valley</sub> /S <sub>ws</sub>                                  |
| W <sub>pool</sub> :                   | Bankfull Pool depth (ft)   | S <sub>rifle</sub> :          | Slope of the riffle (rise/run)  |
| W <sub>belt</sub> :                   | Belt width (ft)  | S <sub>pool</sub> :           | Slope of the pool (rise/run)  |
| L <sub>m</sub> :                      | Meander wavelength (ft)  | Substr:                       | Predominant material in the channel substrate (D50: 50% of sampled particles smaller than the stated size.)       |
| L <sub>pool</sub> :                   | Individual Pool Length (ft) (measured from bottom of riffle to top of next riffle)<br>(used as construction surrogate for radius of curvature (R <sub>c</sub> )) | Average X/W <sub>bkfl</sub> : | Average ratio for the column variable divided by the width of the bankfull channel                                |
| L <sub>p-p</sub> :                    | Length from pool to pool (ft) (in-channel length from center of pool to center of pool)  | Range X/W <sub>bkfl</sub> :   | Range of the ratio for the column variable divided by the width of the bankfull channel                           |
| W <sub>bkfl</sub> /D <sub>avg</sub> : | Width/depth ratio of riffle  | Average X/D <sub>avg</sub> :  | Average ratio for the column variable divided by the average depth of the bankfull channel                        |
| A <sub>bkfl</sub> :                   | Bankfull cross-sectional area of riffle (ft <sup>2</sup> )   | Range X/D <sub>avg</sub> :    | Range of the ratio for the column variable divided by the average depth of the bankfull channel                   |
| D <sub>max</sub> :                    | Bankfull maximum depth of riffle (ft)  | Average X/S <sub>ws</sub> :   | Average ratio for the column variable divided by the slope of the water surface or bankfull channel features      |
| D <sub>pool</sub> :                   | Bankfull maximum depth of pool (ft)  | Range X/S <sub>ws</sub> :     | Range of the ratio for the column variable divided by the slope of the water surface or bankfull channel features |

Transplanted  
Tag Alder / Willow

Erosion  
Control Mat

Floodplain

Bankfull Flow

Baseflow

~ 4-foot stake length  
~ 2-inch diameter stake

~ 3-foot stake spacing

Not To Scale



EcoScience  
Corporation

**Live Willow Stake Embankment with Erosion Control Matting**  
**LYLE CREEK MITIGATION SITE**  
Catawba County, North Carolina

Project: 98-047.11

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overhanging bank. Willow stakes will be purchased and/or collected on-site and inserted through the root/erosion mat into the underlying soil.

The reconstructed channel and vegetation will be allowed to stabilize for a minimum of 4 months during the growing season prior to diversion of flow. Flow will be diverted incrementally to allow for adaption within the reconstructed channel.

#### 4) Channel Plugs

Impermeable plugs will be installed along abandoned channel segments at locations identified in Figure 8. The plugs will consist of low-permeability materials or hardened structures designed to be of sufficient strength to withstand the erosive energy of surface flow events across the site. Dense clays may be imported from off-site or existing material, compacted within the channel, may be suitable for plug construction. The plug will be sufficiently wide and deep to form an imbedded overlap in the existing banks and channel bed.

The plug situated at the upstream terminus of the design channel, located below the stream diversion point, may sustain high-energy flows. Therefore a hardened structure, additional armoring, or incorporation of a root wad structure into the plug (Section 5.1.2) may be considered at this location.

#### 5) Channel Backfilling

After impermeable plugs are installed, abandoned channels will be back-filled. Backfilling will be performed primarily by pushing stockpiled materials into the channel. Based on initial grading plan estimates (Figure 9), sufficient backfill material is expected from channel excavation and floodplain grading. The channels will be filled to the extent that on-site material is available and compacted to maximize microtopographic variability, including ruts, ephemeral pools, and hummocks in the vicinity of the backfilled channel.

A deficit of fill material for channel back-fill may occur. If so, a series of closed linear depressions may be left along confined channel segments. Additional fill material for critical areas may be obtained by excavating shallow depressions along the banks of these planned, open channel segments. These excavated areas will represent closed linear, elliptical, or oval depressions. In essence, the channel may be converted to a sequence of shallow, ephemeral pools adjacent to effectively plugged and back-filled channel sections. These pools would be expected to stabilize and fill in with organic material over time. Vegetation debris (root mats, root wads, top soils, shrubs, woody debris, *etc.*) will be redistributed across the backfill area upon completion.

### **5.1.2 Reconstruction In-Place**

The reach of Site stream expected to be reconstructed in-place include upstream reaches of the mainstem tributary where the channel retains a sinuous flow pattern and is confined within a narrow, relatively steep floodplain. The main objective of restoration in this reach is to raise the water surface to within approximately 1.5 feet of the floodplain surface and to reduce channel size to approximately 17 square feet. Primary activities designed to achieve these objectives may include: 1) installation of cross-vane weirs; 2) creation of a bankfull bench; 3) installation of root wads; and 4) hay bale bank stabilization revetments.

#### **1) Cross-vane Weirs**

Cross-vanes may be installed in the channel as conceptually depicted in Figure 8. The purpose of the vane is to: 1) direct high velocity flows during bankfull events toward the center of the channel; 2) increase the average pool depth throughout the reach; 3) increase the water surface elevations and reconnect the adjacent floodplain to flooding dynamics from the stream; and 4) modify energy distributions through increases in channel roughness and local energy slopes during peak flows.

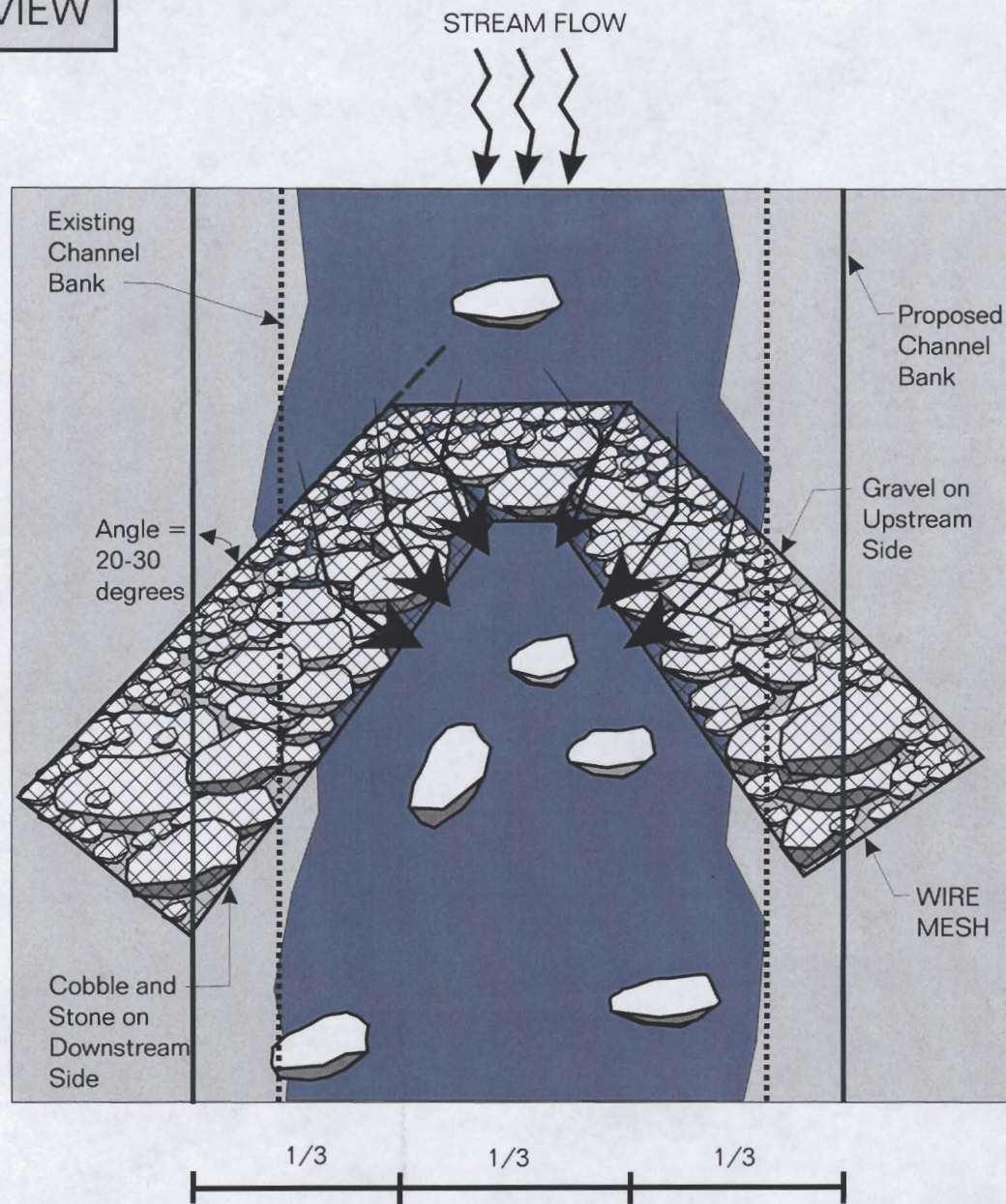
The cross-vane will be constructed of permeable materials. A permeable structure has been proposed for this project due to course grained floodplain sediments which may be subject to lateral migration of the stream around the structure. Cross-vanes are expected to be constructed utilizing wire mesh material and filled with cobble and gravel as conceptually depicted in Figure 12. The vane will extend from the flood prone area into the bankfull channel at a 3 to 4 percent slope extending in the upstream direction. The vane will reside at an approximately 21-degree angle from the channel bank. Approximately 11 of these structures are anticipated at appropriate locations to increase surface water elevations along the reach. The location and elevation of each structure is depicted in Figure 8. Modifications to the location and elevation of each structure may be necessary during construction activities.

#### **2) Bankfull Bench Creation**

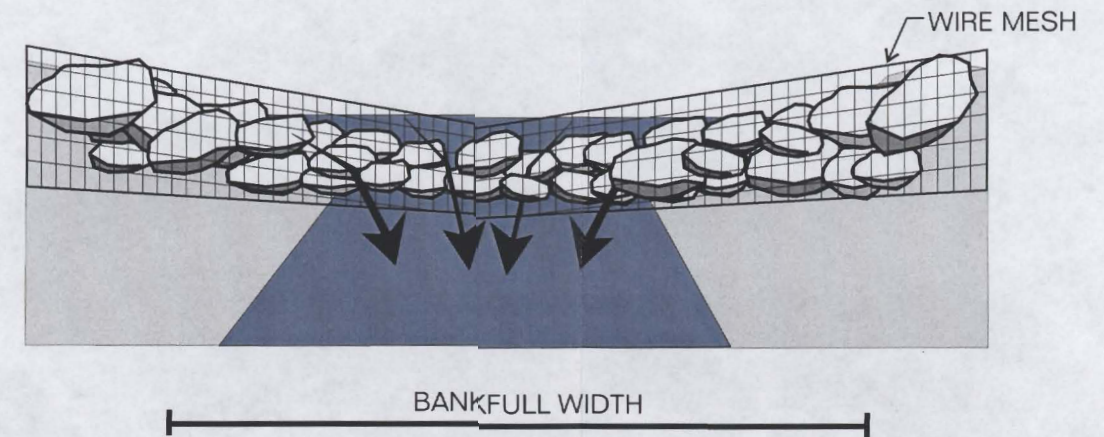
The creation of a bankfull, floodplain bench is expected to: 1) remove the eroding material and collapsing banks; 2) promote overbank flooding during bankfull flood events; 3) reduce the erosive potential of flood waters; and 4) increase the width of the active floodplain. The location of bankfull bench creation areas are depicted in Figure 8. Bankfull benches may be created by excavating the adjacent floodplain to bankfull elevations or filling eroded/abandoned channel areas with suitable material.

After excavation, or filling of the bench, a relatively level floodplain surface is expected to be stabilized with suitable erosion control measures. Planting of the bench with native floodplain

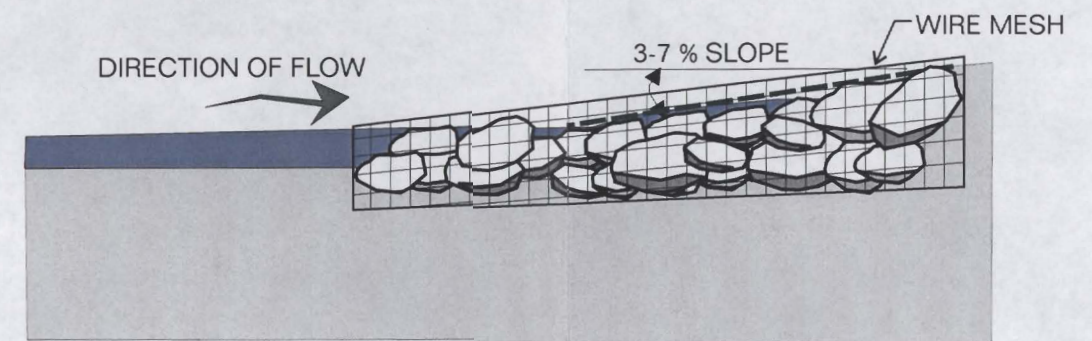
PLAN VIEW



CROSS SECTION



LONGITUDINAL PROFILE



vegetation is expected to reduce erosion of bench sediments, reduce flow velocities in flood waters, filter pollutants, and provide wildlife habitat.

### 3) Root Wad Installation

Root wads may be installed in high energy areas or in reaches of the mainstem channel which are characterized by excessive bank collapse. Several locations which may be suitable for root wad installation are depicted in Figure 8; however, availability and necessity for root wads is expected to be determined during mitigation construction. The purpose of the root wads are to: 1) stabilize stream banks and reduce erosion/sedimentation of the stream; 2) reduce shear stress in the near bank region; 3) reduce stream width to design parameters; and 4) provide diverse in-stream habitat including shade, detritus, and bank overhang.

A conceptual model of root wad construction is provided in Figure 13. Root wads are expected to be collected on-site. Upon uprooting of a tree, approximately 10 to 15 feet of trunk is expected to be left intact. This 10- to 15-foot section of trunk will be used to anchor the root wad in the bank by pushing the trunk into bank materials with heavy equipment. Prior to the installation of each root wad, toe protection, consisting of a footer log or boulder, is expected to be placed within the channel. The root wad should be placed within the channel on top of the footer log. If backfilling is necessary behind the root wad, stabilization efforts described in previous sections should be applied.

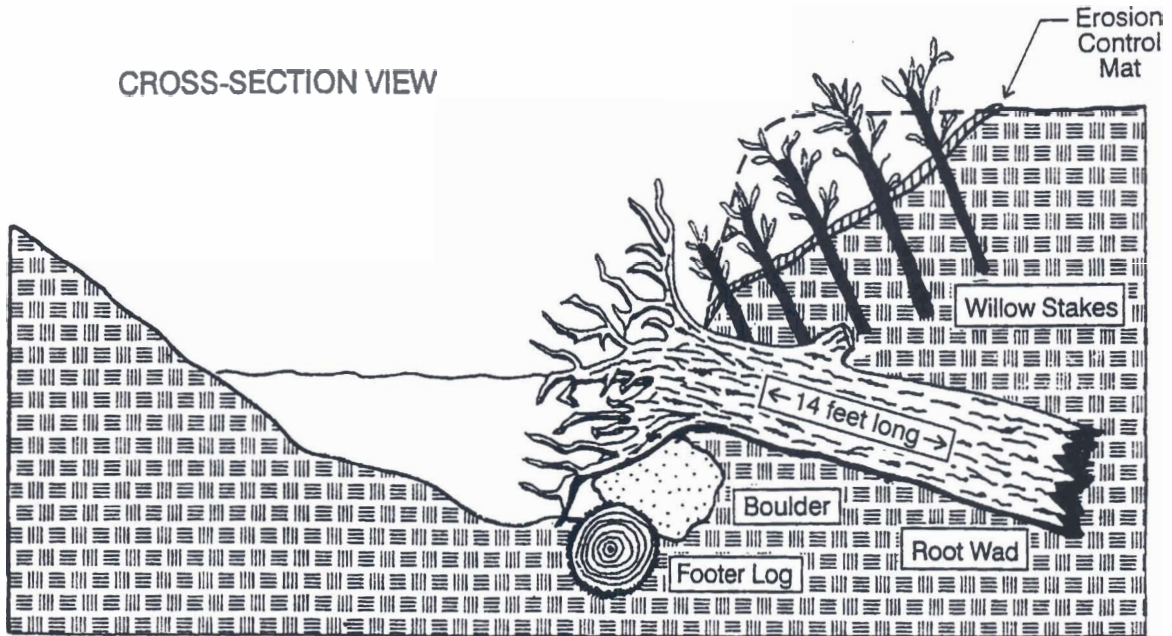
### 4) Hay Bale Bank Stabilization Revetment

Hay bales may be utilized in severe erosion areas where the channel has widened significantly and/or appears to be threatening to bypass a meander bend. The primary hay bale revetment location is depicted in Figure 8. The hay bale revetment is expected to: 1) narrow the width of the existing channel to approximately 11 feet; 2) stabilize stream banks and reduce erosion/sedimentation of the stream; 3) inhibit shoot cut-offs and abandoned meander bends; and 4) provide diverse in-stream habitat including shade and detritus.

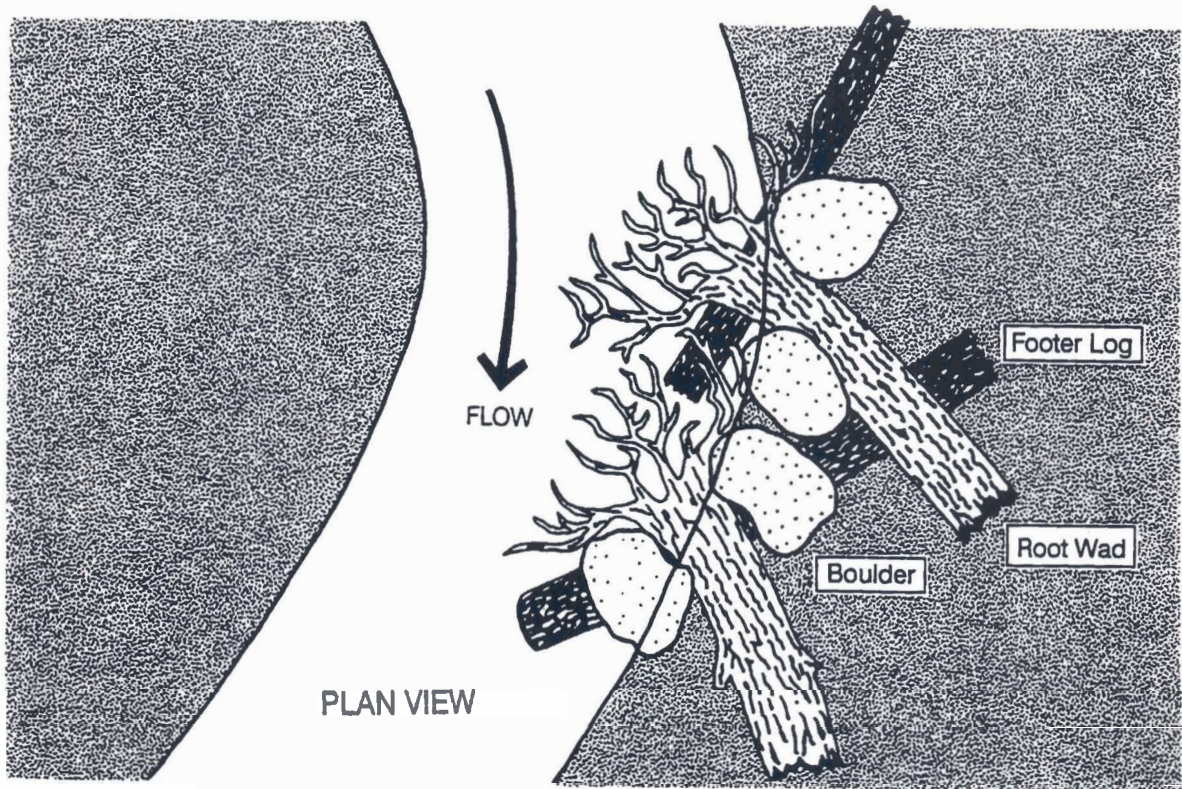
A conceptual model of a hay bale revetment is provided in Figure 14. Hay bales are expected to provide a cost effective, non-erosive channel fill material. In addition, hay bales are expected to be an exceptional rooting substrate for willow stakes. Once wetted, the bales are expected to weigh enough to sustain storm water flows within the stream. Upon placement of hay bales within the stream, backfilling behind the bales to the floodplain surface and stabilization of fill material is expected. Some additional bank stabilization may be necessary immediately upstream and downstream from the hay bales to reduce lateral scour behind the revetment structure. The use of root wads or other suitable material is expected to provide suitable stabilization in these areas.



CROSS-SECTION VIEW



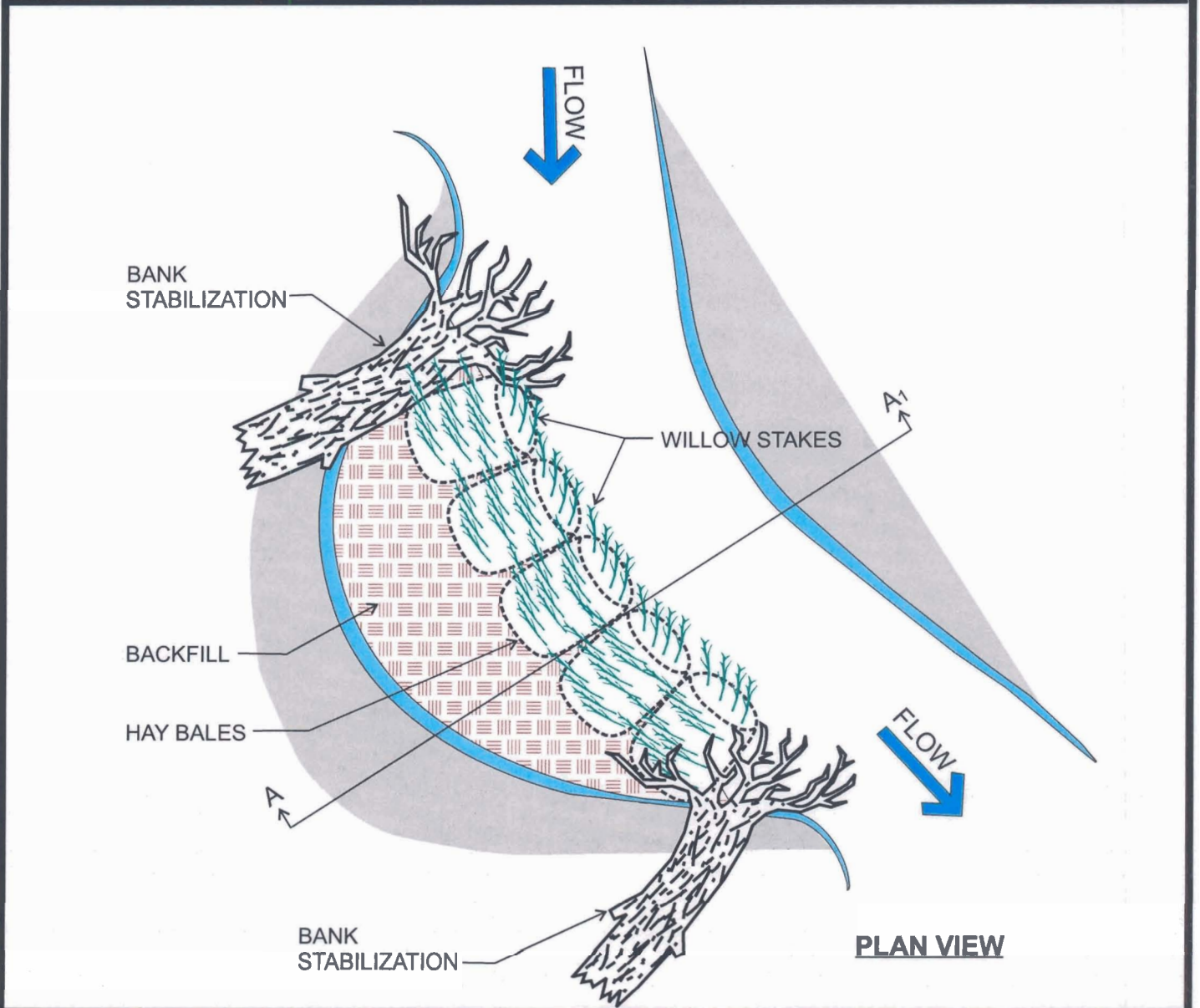
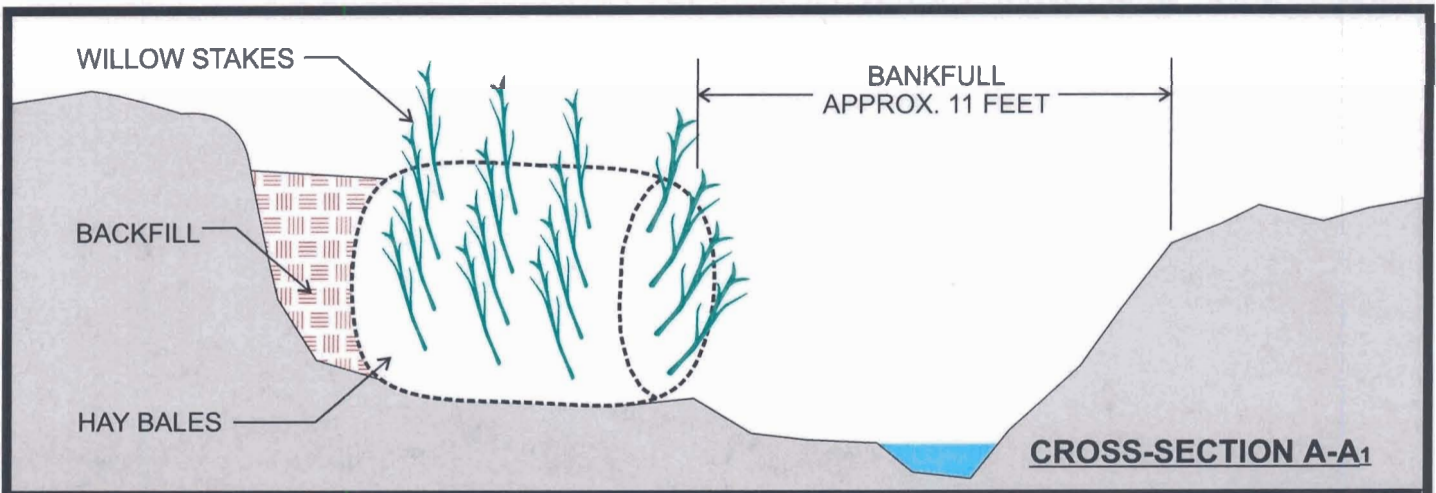
PLAN VIEW



**ROOT WAD REVETMENT**  
 (Modified from Rosgen 1996)  
**LYLE CREEK MITIGATION SITE**  
 Catawba County, North Carolina

Dwn. by: MAF  
 Ckd by: WGL  
 Date: JUL 2001  
 Project: 98-047.11

FIGURE  
**13**



**HAY BALE REVETMENT**  
**LYLE CREEK MITIGATION SITE**  
 Catawba County, North Carolina

Dwn. by:	MAF
Ckd by:	WGL
Date:	JUL 2001
Project:	98-047.11

FIGURE  
 14

### **5.1.3 Secondary Tributary Bank Sloping/Bench Excavation**

Several alternatives are proposed for mitigation of the secondary tributary. The secondary tributary is severely entrenched (bank height ratio averaging 2.6) and mitigation options proposed for the mainstem channel are not suitable in the tributary due to potential flooding of upstream landowners. Therefore, three mitigation options are proposed for the secondary tributary: 1) no action; 2) bank sloping; and 3) floodplain bench excavation.

#### **1) No Action**

Actions designed to elevate the water surface in the secondary tributary are expected to impact adjacent property owners immediately upstream of the Site. The two alternatives described below are designed to reduce potential for off-site impacts. However, if off-site impacts appear to be unavoidable with these two alternatives, a no-action alternative is recommended for the secondary tributary.

No action is expected to represent a preservation-based mitigation effort. Planting of the stream banks and removal of livestock access may be recommended to reduce bank degradation and sedimentation of adjacent and downstream reaches. In addition, continued communication with the upstream landowner is recommended.

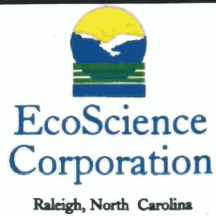
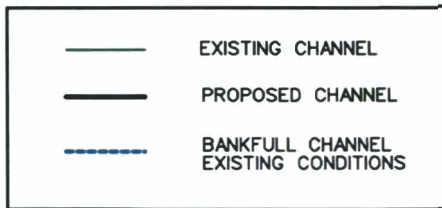
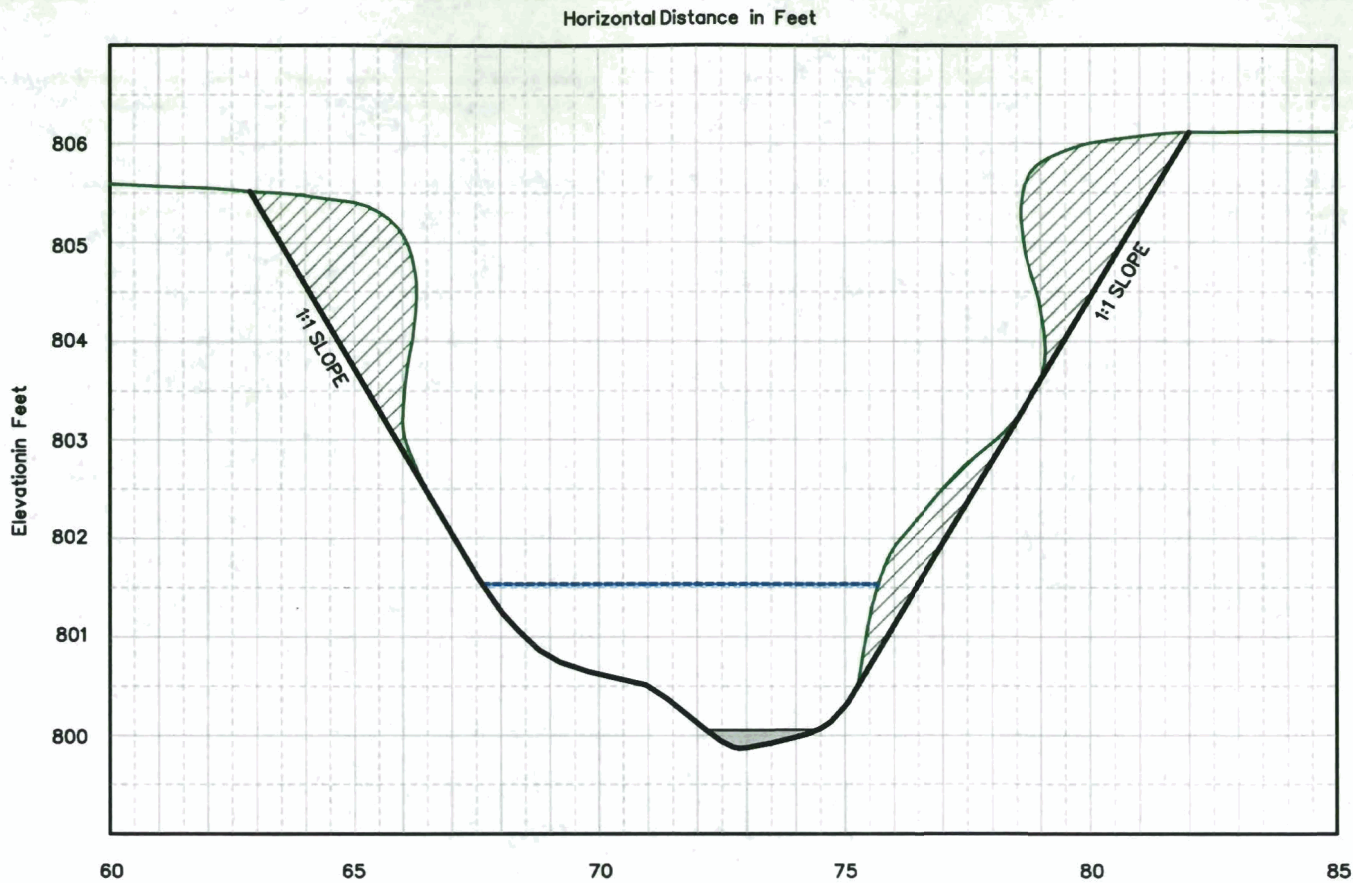
#### **2) Bank Sloping**

Secondary tributary banks will be excavated as conceptually depicted in Figure 15. The objective of bank sloping is to remove the eroding material and collapsing banks. After excavation, the slopes will exhibit a gentle gradient (minimum 1:1 slope) prior to tie in with the existing land surface. The excavated surface will be immediately stabilized using erosion-control matting, mulching, brush mattresses, or other structures. Toe protection may also be used along reaches impinged upon by steep valley slopes. Shrubs and vegetation that develop dense root mats will be inserted through the short-term erosion control materials. The bank sloping effort will be locally adjusted to maximize the use of knick points (geologic control features) and existing deep rooted vegetation.

Bank sloping is not expected to alter channel dimension from a G-type channel; therefore, this effort is expected to represent stream enhancement. Based on preliminary estimates, it appears that approximately 260 cubic yards of material may be removed from the channel to accomplish this alternative.

#### **3) Floodplain Bench Excavation**

The floodplain bench will be excavated as conceptually depicted in Figure 16. The objective of bench excavation is to: 1) remove the eroding material and collapsing banks; 2) enlarge the bankfull channel width from approximately 9 feet to 11 feet; and 3) increase the width of the flood-prone area from an average of 13 feet to greater than 16 feet. After excavation, the



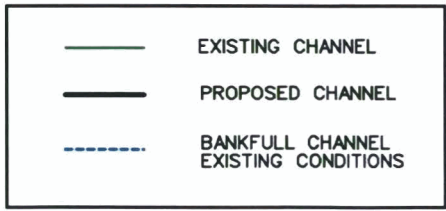
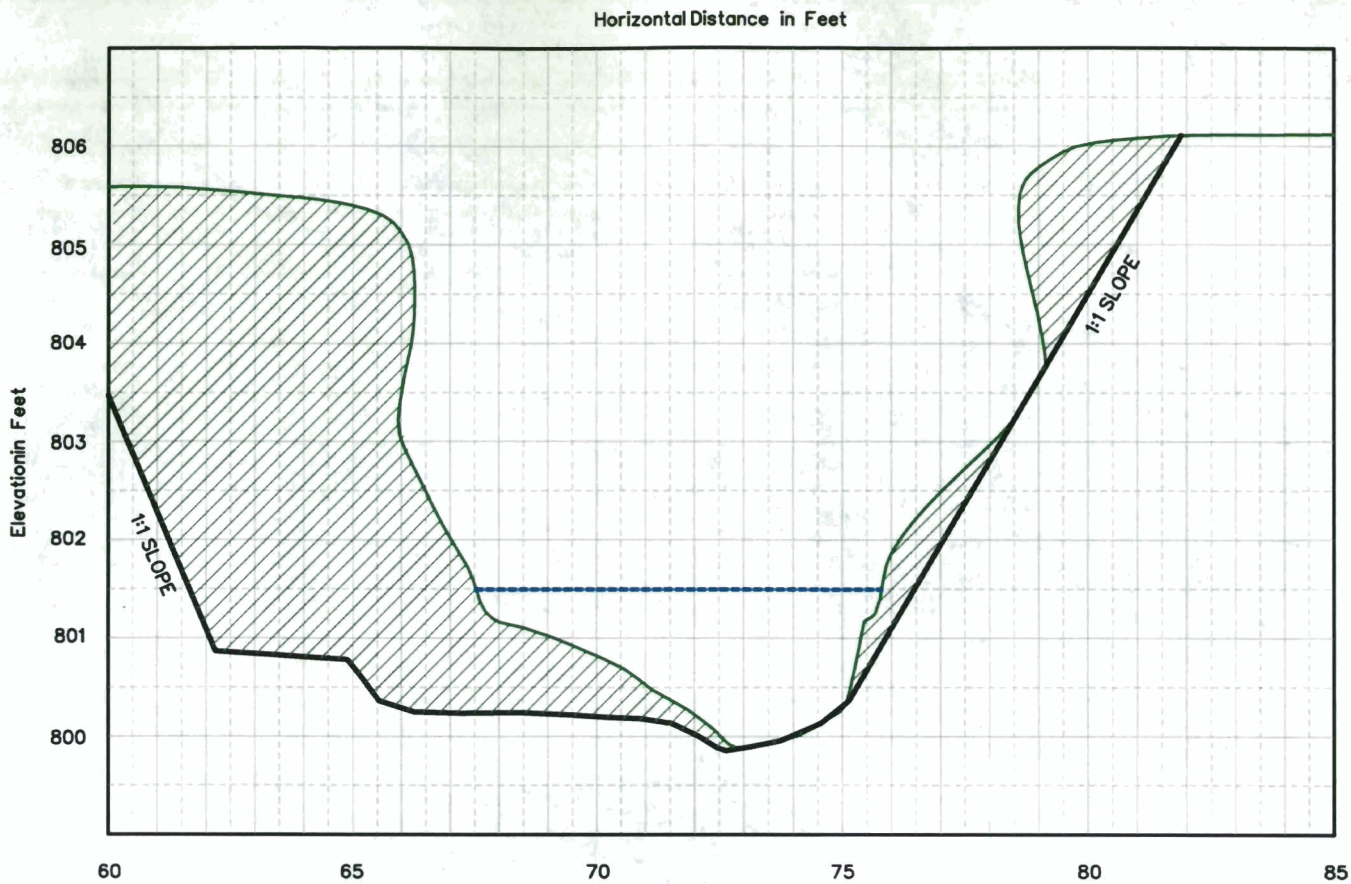
Client:  
**NC WETLAND RESTORATION PROGRAM**

Project:  
**CONCEPTUAL DESIGN:  
BANK SLOPING  
LYLE CREEK MITIGATION SITE**  
Catawba County, North Carolina

Drawn By:	MAF	Checked By:	WGL
Date:	JUL 2001		
Scale:	NO SCALE		
ESC Project No.:	98-047.11		

FIGURE

**15**



Client:  
**NC WETLAND RESTORATION PROGRAM**

Project:  
**CONCEPTUAL DESIGN:  
 BANKFULL BENCH EXCAVATION  
 LYLE CREEK MITIGATION SITE**  
 Catawba County, North Carolina

Drawn By:	MAF	Checked By:	WGL
Date:	JUL 2001		
Scale:	NO SCALE		
ESC Project No.:	98-047.11		

FIGURE

**16**

bench will provide a relatively level floodplain surface which is expected to be stabilized with suitable erosion-control measures. Planting of the bench with native floodplain vegetation is expected to reduce erosion of bench sediments, reduce flow velocities in flood waters, filter pollutants, and provide wildlife habitat.

Floodplain bench excavation is expected to modify the existing G-type channel with a B-type channel; therefore, this effort is expected to represent stream restoration. To successfully modify the secondary tributary from a G-type channel to a B-type channel, the design channel must exhibit a bankfull width of approximately 11 feet, a bankfull depth of approximately 0.9 foot, with a floodprone area averaging approximately 15 feet. Based on preliminary estimates, it appears that approximately 1100 cubic yards of material may be removed from the channel to achieve design parameters. Efforts to reduce the amount of cut material may include limiting bench excavation to pools and sloping banks through riffles; however, design channel morphology may not conform to a B-type channel under this scenario.

## **5.2 FLOODPLAIN SOIL SCARIFICATION**

Microtopography and differential drainage rates within localized floodplain areas represent important components of floodplain functions. Reference forests in the region exhibit complex surface microtopography. Small concavities, swales, exposed root systems, seasonal pools, oxbows, and hummocks associated with vegetative growth and hydrological patterns are scattered throughout the system. As discussed in the stream reconstruction section, efforts to advance the development of characteristic surface microtopography will be implemented.

In areas where soil surfaces have been compacted, ripping or scarification will be performed. Mixing of vegetation debris in surface soils and tip mounds will also promote future complexity across the landscape. After construction, the soil surface should exhibit complex microtopography ranging to 1 foot in vertical asymmetry across local reaches of the landscape. Subsequently, community restoration will be initiated on complex floodplain surfaces.

## **5.3 PLANT COMMUNITY RESTORATION**

Restoration of floodplain forest and stream-side habitat allows for development and expansion of characteristic species across the landscape. Ecotonal changes between community types contribute to diversity and provide secondary benefits, such as enhanced feeding and nesting opportunities for mammals, birds, amphibians, and other wildlife.

RFE data, on-site observations, and community descriptions from *Classification of the Natural Communities of North Carolina* (Schafale and Weakley 1990) were used to develop the primary plant community associations that will be promoted during community restoration

activities. These community associations include 1) Piedmont/Mountain bottomland forest and 2) stream-side assemblage (Figure 17). Figure 18 identifies the location, based on elevation and position relative to the restored stream, of each target community to be planted. Planting elements within each map unit are listed below.

#### **Piedmont/Mountain Bottomland Forest**

1. Green Ash (*Fraxinus pennsylvanica*)
2. Northern Red Oak (*Quercus rubra*)
3. American Sycamore (*Platanus occidentalis*)
4. American Elm (*Ulmus americana*)
5. Ironwood (*Carpinus caroliniana*)
6. Black Cherry (*Prunus serotina*)
7. Smooth Black Haw (*Virburnum prunifolium*)
8. Black Gum (*Nyssa Sylvatica*)

#### **Stream-Side Forest Assemblage**

1. Black Willow (*Salix nigra*)
2. Box Elder (*Acer negundo*)
3. Ironwood (*Carpinus caroliniana*)
4. River Birch (*Betula nigra*)
5. American Sycamore (*Platanus occidentalis*)

#### **Stream-Side Shrub Assemblage**

1. Tag Alder (*Alnus serrulata*)
2. Buttonbush (*Cephalanthus occidentalis*)
3. Elderberry (*Sambucus canadensis*)
4. Arrow-wood Viburnum (*Viburnum dentatum*)
5. Possumhaw Viburnum (*Viburnum nudum*)
6. Bankers Dwarf Willow (*Salix cotteli*)
7. Black Willow (*Salix nigra*)

Piedmont/Mountain bottomland hardwood forests are targeted for outer portions of the floodplain. The stream-side trees and shrubs include species with high value for sediment stabilization, rapid growth rate, and the ability to withstand hydraulic forces associated with bankfull flow and overbank flood events. Stream-side trees will be planted within 10 to 15 feet of the channel throughout the meander belt width. Shrub elements will be planted along the banks of the reconstructed stream, concentrated along outer bends.

Certain opportunistic species which may dominate the early successional forests have been excluded from wetland community restoration efforts. Opportunistic species consist primarily

DISTANCE IN FEET



**EcoScience Corporation**

Raleigh, North Carolina

REVISIONS

Client:

**NC WETLAND RESTORATION PROGRAM**

Project:

**LYLE CREEK MITIGATION SITE**

CATAWBA COUNTY, NORTH CAROLINA

Title:

**PLANTING PLAN**

Dwn By:

MAF JUL 2001

Ckd By:

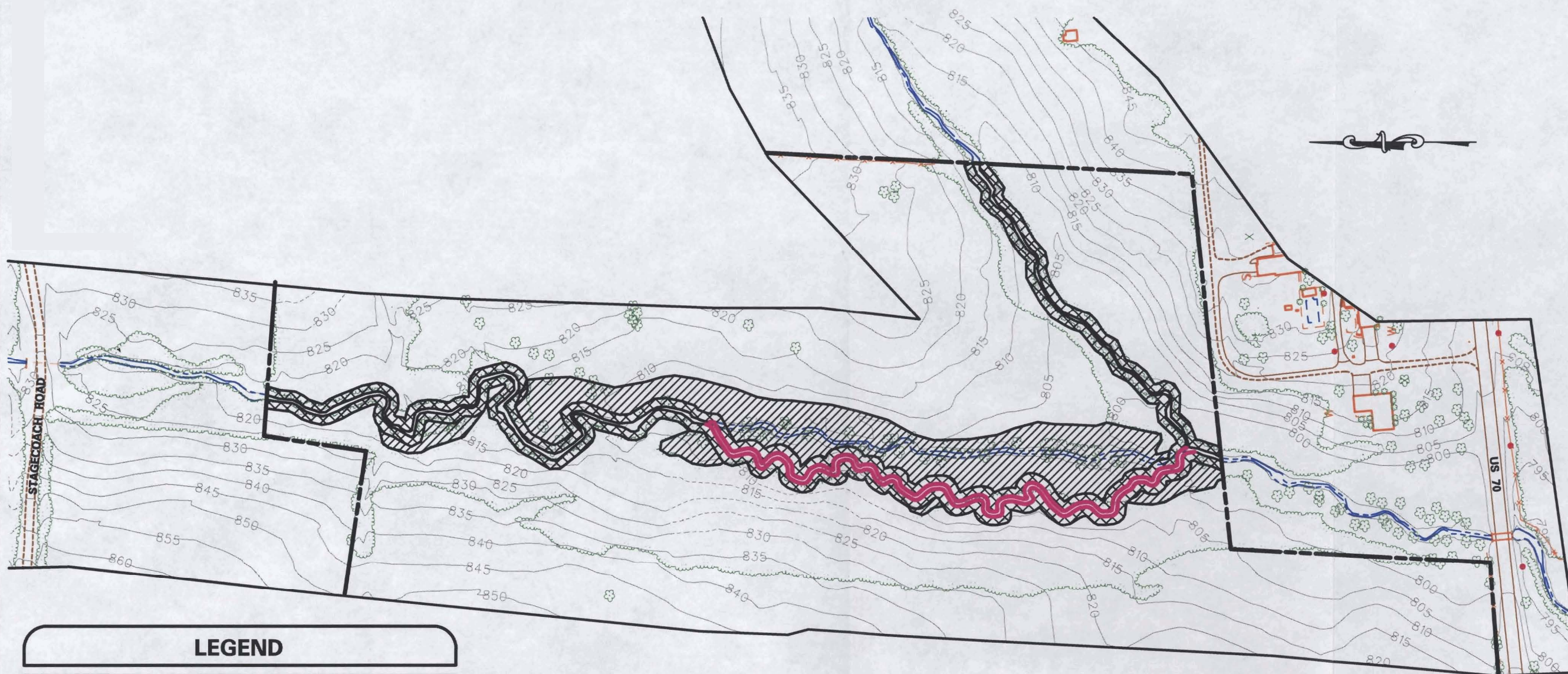
WGL 1" = 200'

ESC Project No.:

98-047.11

FIGURE

**17**



**LEGEND**

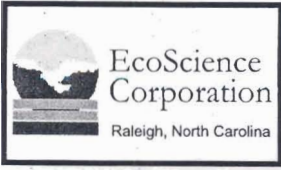
- APPROXIMATE PROPERTY BOUNDARY
- EXISTING TREE LINE
- EXISTING STREAM
- MAJOR CONTOURS
- DESIGN CHANNEL ON NEW LOCATION
- STREAMSIDE ASSEMBLAGE (15' EACH SIDE OF CHANNEL) acres  
2.7±
- PIEDMONT / MOUNTAIN BOTTOMLAND FOREST acres  
2.0±

**PLAN VIEW**

SCALE: 1"=200'



COMMUNITY ASSEMBLAGE	STREAMSIDE ASSEMBLAGE	PIEDMONT/MOUNTAIN BOTTOMLAND FOREST
<p style="text-align: center;"><b>CANOPY VEGETATION</b></p>	<p style="text-align: center;"><u>Streamside Forest</u></p> <p style="text-align: center;">Black Willow Box Elder Ironwood River Birch American Sycamore</p> <p style="text-align: center;"><u>Streamside Shrub</u></p> <p style="text-align: center;">Tag Alder Buttonbush Elderberry Arrow-wood Viburnum Possumhaw Viburnum Bankers Dwarf Willow Black Willow</p>	<p style="text-align: center;">Green Ash Northern Red Oak American Sycamore American Elm Ironwood Black Cherry Smooth Black Haw Black Gum</p>
<p style="text-align: center;"><b>LAND FORM</b></p>	<p style="text-align: center;">Stream Banks and Adjacent Flood Plain</p>	<p style="text-align: center;">Flood Plain</p>



**CONCEPTUAL MODEL OF  
TARGET COMMUNITY PATTERNS  
LYLE CREEK MITIGATION SITE**  
Catawba County, North Carolina

Dwn. by: MAF  
Ckd by: WGL  
Date: JUL 2001  
Project: 98-047.11

FIGURE  
**18**

of red maple, tulip tree, and sweetgum. These species should also be considered important components of bottomland forests where species diversity has not been jeopardized.

The following planting plan is the blueprint for community restoration. The anticipated results stated in the Success Criteria (Section 6.4) are expected to reflect potential vegetative conditions achieved after steady-state conditions prevail over time.

### **5.3.1 Planting Plan**

The purpose of a planting plan is to re-establish vegetative community patterns across the landscape. The plan consists of 1) acquisition of available plant species, 2) implementation of proposed site preparation, and 3) planting of selected species.

Species selected for planting will be dependent upon availability of local seedling sources. Advance notification to nurseries (1 year) will facilitate availability of various non-commercial elements.

Bare-root seedlings of tree species will be planted within specified map areas at a density of 435 stems per acre on 10-foot centers. Table 6 depicts the total number of stems and species distribution within each vegetation association. Planting will be performed between December 1 and March 15 to allow plants to stabilize during the dormant period and set root during the spring season. A total of 3223 diagnostic tree and shrub seedlings will be planted in the floodplain during restoration (Table 6).

**TABLE 6**

**Planting Plan  
Lyle Creek Mitigation Site**

<b>Vegetation Association (Planting Area)</b>	<b>Piedmont/Mountain Bottomland Hardwood Forest</b>	<b>Stream-Side Forest Assemblage</b>	<b>Stream-Side Shrub Assemblage</b>	<b>TOTAL</b>
<b>Area (acres)</b>	2.0	2.7		4.7
<b>SPECIES</b>	<b># planted<sup>1</sup> (% total)<sup>2</sup></b>	<b># planted (% total)</b>	<b># planted (% total)</b>	<b># planted</b>
Green Ash	174 (20)			174
Northern Red Oak	131 (15)			131
American Sycamore	131 (15)	235 (20)		366
Black Gum	87 (10)			87
American Elm	87 (10)			87
Ironwood	131 (15)	294 (25)		425
Black Cherry	87 (10)			87
Black Willow		235 (20)	235 (20)	470
Box Elder		176 (15)		176
River Birch		235 (20)		235
Tag Alder			235 (20)	235
Buttonbush			117 (10)	117
Elderberry			117 (10)	117
Smooth Black Haw	44 (5)			44
Arrow-wood Viburnum			117 (10)	117
Possumhaw Viburnum			117 (10)	117
Bankers Dwarf Willow			235 (20)	235
<b>TOTAL</b>	872	1175	1173	3,220

<sup>1</sup> Planting densities comprise 435 trees and/or shrubs per acre within each specified planting area.

<sup>2</sup> Some non-commercial elements may not be locally available at the time of planting. The stem count for unavailable species should be distributed among other target elements based on the percent (%) distribution. One year of advance notice to forest nurseries will promote availability of some non-commercial elements. However, reproductive failure in the nursery may occur.

<sup>3</sup> Scientific names for each species, required for nursery inventory, are listed in the mitigation plan.

## **6.0 MONITORING PLAN**

Monitoring of Site restoration efforts will be performed until success criteria are fulfilled. Monitoring is proposed for streams and vegetation.

### **6.1 STREAM MONITORING**

Two stream reaches of the mainstem channel will be monitored for geometric and biological activity as depicted in Figure 19. Each stream reach will extend for a minimum of 150 feet along the restored channel. Annual fall monitoring will include development of a channel plan view, channel cross-sections on riffles and pools, pebble counts, and a water surface profile of the channel. The data will be presented in graphic and tabular format. Data to be presented will include: 1) cross-sectional area; 2) bankfull width; 3) average depth; 4) maximum depth; 5) width/depth ratio; 6) meander wavelength; 7) belt width; 8) water surface slope; 9) sinuosity; and 10) stream substrate composition. The stream will subsequently be classified according to stream geometry and substrate (Rosgen 1996). Significant changes in channel morphology will be tracked and reported by comparing data in each successive monitoring year.

### **6.2 STREAM SUCCESS CRITERIA**

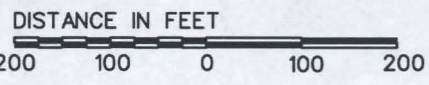
Success criteria for stream restoration will include: 1) successful classification of the reach as a functioning stream system (Rosgen 1996); 2) channel stability indicative of a stable stream system; and 3) development of diagnostic biological communities over time.

The channel configuration will be measured on an annual basis to track changes in channel geometry, profile, or substrate. These data will be utilized to determine the success in restoring stream channel stability. Specifically, the width/depth ratio should remain at or below a value of 15 in each monitoring year. In addition, the maximum depth of the channel must not exceed 3.0 feet relative to the adjacent floodplain. Modifications to the channel will be performed to increase or decrease the sediment transport capacity, or other unstable attributes, as needed. If the stream channel is down-cutting or the channel width is enlarging due to bank erosion, additional bank or slope stabilization methods will be employed.

### **6.3 VEGETATION MONITORING**

Restoration monitoring procedures for vegetation are designed in accordance with EPA guidelines enumerated in MiST documentation (EPA 1990) and COE Compensatory Hardwood Mitigation Guidelines (DOA 1994). A general discussion of the restoration monitoring program is provided.

After planting has been completed in winter or early spring, an initial evaluation will be performed to verify planting methods and to determine initial species composition and



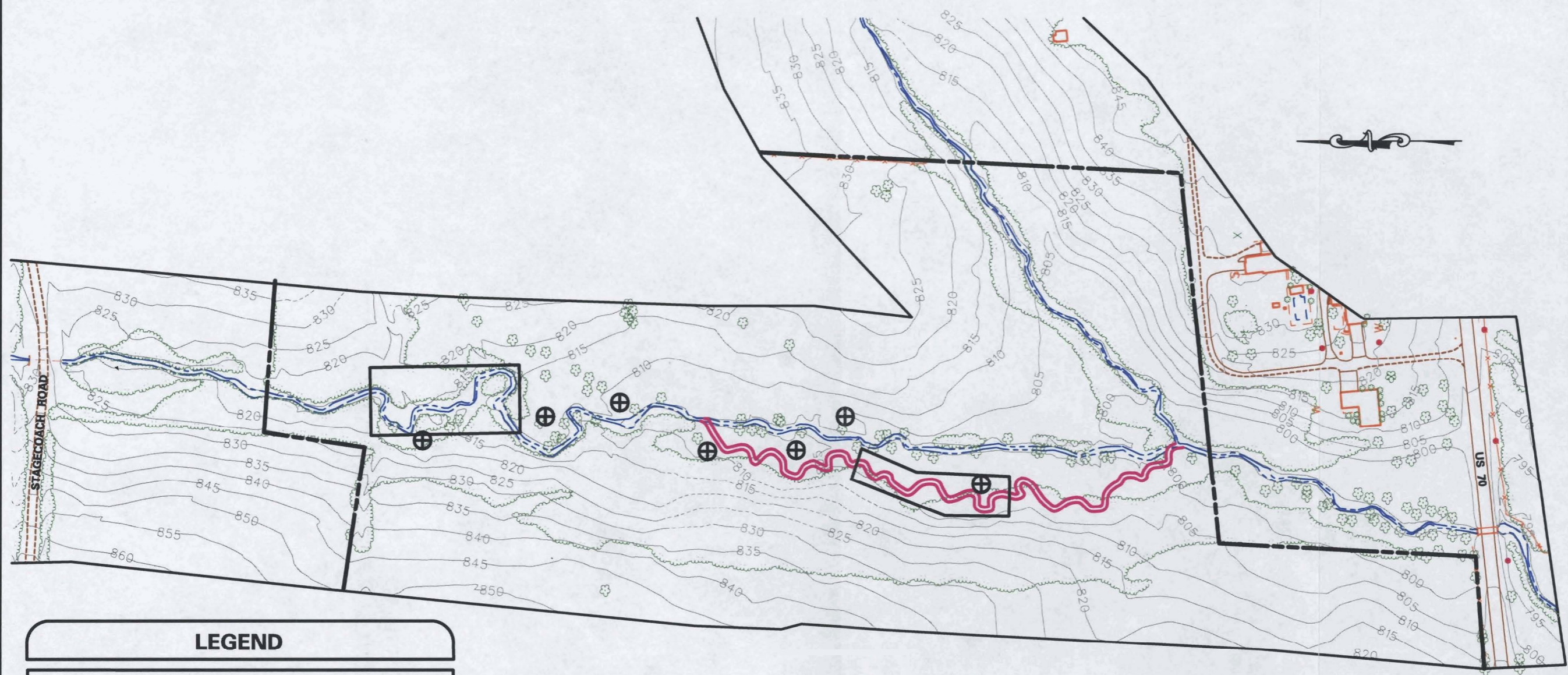
REVISIONS


Client:  
**NC WETLAND RESTORATION PROGRAM**

Project:  
**LYLE CREEK MITIGATION SITE**  
CATAWBA COUNTY, NORTH CAROLINA

Title:  
**MONITORING PLAN**

Dwn By: MAF	Date: JUL 2001
Ckd By: WGL	Scale: 1" = 200'
ESC Project No.: 98-047.11	



**LEGEND**

- APPROXIMATE PROPERTY BOUNDARY
- EXISTING TREE LINE
- EXISTING STREAM
- MAJOR CONTOURS
- STREAM REACH FOR GEOMETRIC/ BIOLOGICAL MONITORING
- DESIGN CHANNEL ON NEW LOCATION
- APPROXIMATE LOCATION OF VEGETATIVE MONITORING PLOT

**PLAN VIEW**  
SCALE: 1"=200'

density. Supplemental planting and additional site modifications will be implemented, if necessary.

During the first year, vegetation will receive cursory, visual evaluation on a periodic basis to ascertain the degree of overtopping of planted elements by nuisance species. Subsequently, quantitative sampling of vegetation will be performed between September 1 and October 30 after each growing season until the vegetation success criterion is achieved.

During quantitative vegetation sampling in early fall of the first year, approximately seven sample plots will be randomly placed within the Site. Sample-plot distributions are expected to resemble locations depicted in Figure 19; however, best professional judgement may be necessary to establish vegetative monitoring plots upon completion of construction activities. In each sample plot, vegetation parameters to be monitored include species composition and species density. Visual observations of the percent cover of shrub and herbaceous species will also be recorded.

#### **6.4 VEGETATIVE SUCCESS CRITERIA**

Success criteria have been established to verify that the vegetation component supports community elements necessary for floodplain forest development. Success criteria are dependent upon the density and growth of characteristic forest species. Additional success criteria are dependent upon density and growth of "Character Tree Species". Character Tree Species include planted species along with species identified through visual inventory of an approved reference (relatively undisturbed) bottomland forest community used to orient the project design. All canopy tree species planted and identified in the reference forest will be utilized to define "Character Tree Species" as termed in the success criteria.

An average density of 320 stems per acre of Character Tree Species must be surviving in the first three monitoring years. Subsequently, 290 character tree species per acre must be surviving in year 4, and 260 character tree species per acre in year 5. Planted species must represent a minimum of 30 percent of the required stem per acre total (96 stems/acre). Each naturally recruited character species may represent up to 10 percent of the required stem per acre total. In essence, 7 naturally recruited character species may represent a maximum of 70 percent of the required stem/acre total. Additional stems of naturally recruited species above the 10 percent - 70 percent thresholds are discarded from the statistical analysis. The remaining 30 percent is reserved for planted character species (oaks, etc.) as a seed source for species maintenance during mid-successional phases of forest development.

If vegetation success criteria are not achieved based on average density calculations from combined plots over the entire restoration area, supplemental planting will be performed with

tree species approved by regulatory agencies. Supplemental planting will be performed as needed until achievement of vegetation success criteria.

No quantitative sampling requirements are proposed for herb assemblages as part of the vegetation success criteria. Development of floodplain forests over several decades will dictate the success in migration and establishment of desired understory and groundcover populations. Visual estimates of the percent cover of herbaceous species and photographic evidence will be reported for information purposes.

## **6.5 CONTINGENCY**

In the event that vegetation or stream success criteria are not fulfilled, a mechanism for contingency will be implemented. For vegetation contingency, replanting and extended monitoring periods will be implemented if community restoration does not fulfill minimum species density and distribution requirements.

Stream reconstruction failure may occur due to increased sediment and discharge during development within the upper watershed. Stream contingency will likely include identification and modification of upstream sediment sources, additional stabilization of stream banks, and re-establishment of stream substrates required to support target aquatic communities. Recommendations for stream contingency will also be solicited, implemented, and monitored until the Stream Success Criteria are achieved.

## **7.0 FINAL DISPENSATION OF THE PROPERTY**

WRP will maintain the Site conservation easement until all mitigation activities are completed and the Site is determined to be successful. Mr. Wyke is expected to retain ownership of the property. The conservation easement is expected to be transferred perpetually with property upon sale of the property. Covenants and/or restrictions on the deed will be included that will ensure adequate management and protection of the site in perpetuity.



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# **Appendix A**

□

STATION	02144000	LONG CREEK NEAR BESSEMER CITY, NC		
AGENCY:	USGS	STATION LOCATOR	DRAINAGE AREA:	31.80 SQ M
STATE:	37	LAT. LONG.	CONTRIBUTING	
COUNTY:	071		DRAINAGE AREA:	SQ M
DISTRICT:	37	351823 0811405	GAGE DATUM:	706.
			BASE DISCHARGE:	800.00 CFS

WATER YEAR	DATE	TIME	PEAK DISCHARGE (CFS)	DISCHARGE CODES	GAGE HEIGHT (FT)	GAGE HEIGHT CODES	HIGHEST SINCE	MAX GAGE HEIGHT (FT)	DATE	TIME
1954	02/21/1954		980		5.35					
	01/22/1954		898		5.13					
1955	05/21/1955		1040		5.33					
	02/06/1955		970		5.18					
1956	04/16/1956		1020		5.30					
	10/01/1955		832		4.90					
	03/16/1956		924		5.12					
1957	01/31/1957		722		4.66					
1958	11/19/1957		5290		8.26					
	11/25/1957		950		5.11					
	04/06/1958		1070		5.30					
	04/28/1958		2170		6.52					
	07/21/1958		1100		5.34					
1959	09/30/1959		1180		5.67					
	12/28/1958		1180		5.47					
	03/06/1959		1070		5.29					
	04/21/1959		950		5.12					
1960	02/05/1960		1660		6.46					
	01/31/1960		1040		5.26					
	02/18/1960		1040		5.25					
1961	08/27/1961		2120		7.12					
	04/09/1961		925		5.13					
1962	04/11/1962		1430		6.10					
	12/12/1961		950		5.21					
	01/06/1962		1050		5.39					
	02/26/1962		925		5.15					
	06/13/1962		1020		5.34					
1963	03/06/1963		2620		7.76					
	03/13/1963		1460		6.14					
1964	04/07/1964		1650		6.43					
	02/06/1964		830		4.96					
	02/18/1964		975		5.25					
	07/22/1964		1100		5.49					

1965	10/16/1964	2680	7.83
	10/04/1964	995	5.29
	03/17/1965	1040	5.38
	04/27/1965	1160	5.62
	08/16/1965	1120	5.54
1966	03/04/1966	1240	5.79
1967	08/23/1967	1010	5.32
1968	03/12/1968	1140	5.58
	12/28/1967	960	5.22
1969	02/02/1969	837	4.97
1970	06/04/1970	774	4.82
1971	09/22/1971	1830	6.67
	05/15/1971	1010	5.30
	07/01/1971	970	5.23
1972	10/16/1971	6500	9.10
	01/13/1972	1040	5.39
	05/14/1972	1260	5.80
	06/21/1972	1230	5.75
1973	02/02/1973	2110	7.06
	12/15/1972	985	5.27
	12/21/1972	865	5.03
	03/17/1973	1420	6.09
	04/01/1973	1030	5.36
	04/07/1973	865	5.03
1974	06/28/1974	1160	5.61
	12/31/1973	837	4.97
	01/21/1974	945	5.19
	04/03/1974	1130	5.56
	04/04/1974	1130	5.56
1975	05/30/1975	1390	6.04
	01/11/1975	1380	6.01
	03/14/1975	1230	5.74
	06/01/1975	1080	5.47
	07/25/1975	1270	5.82
	08/27/1975	1240	5.77
1976	05/15/1976	1330	5.92
	06/22/1976	1280	5.84
1977	10/09/1976	3890	8.46
	12/07/1976	1030	5.45
	12/15/1976	829	4.95
	03/30/1977	2750	7.85
1978	11/06/1977	4930	8.77
	10/26/1977	854	5.01
	01/08/1978	1090	5.62
	01/26/1978	1490	6.47
	03/26/1978	1050	5.52
	05/04/1978	1140	5.74

1979	03/05/1979	2410	7.60
	01/21/1979	1010	5.43
	02/24/1979	1080	5.59
	02/25/1979	1130	5.72
1980	03/28/1980	990	5.37
	01/18/1980	940	5.24
	03/21/1980	854	5.01
	06/25/1980	947	5.26
1981	09/07/1981	932	5.22
1982	01/04/1982	1230	5.96
	12/31/1981	1110	5.67
1983	03/27/1983	982	5.35
	02/14/1983	917	5.18
1984	05/29/1984	2460	7.64
	12/06/1983	837	4.97
	01/10/1984	824	4.94
	02/13/1984	1160	5.78
	02/27/1984	1090	5.62
1985	08/17/1985	2920	7.97
	02/01/1985	833	4.96
1986	11/21/1985	824	4.94
1987	03/01/1987	2230	7.42
	12/24/1986	891	5.11
1988	12/15/1987	384	3.77
1989	09/22/1989	850	5.00
1990	10/01/1989	1870	7.01
1991	10/13/1990	1500	6.48
1992	02/25/1992	533	4.17
1993	01/21/1993	1040	5.50
1994	08/17/1994	993	5.38
1995	06/22/1995	1300	6.11
1996	11/07/1995	1010	5.41
1997	04/29/1997	2070	7.25

□

U. S. GEOLOGICAL SURVEY  
ANNUAL PEAK FLOW FREQUENCY ANALYSIS  
Following Bulletin 17-B Guidelines  
Program peakfq  
(Version 2.3, Jan, 1997)

Station - 02144000 LONG CREEK NEAR BESSEMER CITY, N. C.  
1998 OCT 7 15:13:25

## INPUT DATA SUMMARY

Number of peaks in record	=	43
Peaks not used in analysis	=	0
Systematic peaks in analysis	=	43
Historic peaks in analysis	=	0
Years of historic record	=	0
Generalized skew	=	0.195
Standard error of generalized skew	=	0.038
Skew option	=	WEIGHTED
Gage base discharge	=	0.0
User supplied high outlier threshold	=	--
User supplied low outlier criterion	=	--
Plotting position parameter	=	0.00

\*\*\*\*\* NOTICE -- Preliminary machine computations. \*\*\*\*\*  
 \*\*\*\*\* User responsible for assessment and interpretation. \*\*\*\*\*

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.	0.0
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE.	7243.5
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.	285.6

Station - 02144000 LONG CREEK NEAR BESSEMER CITY, N. C.  
 1998 OCT 7 15:13:25

## ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.1578	0.2591	0.586
BULL.17B ESTIMATE	0.0	1.0000	3.1578	0.2591	0.198

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL 'EXPECTED 95-PCT CONFIDENCE LIMITS

EXCEEDANCE PROBABILITY	BULL. 17B ESTIMATE	SYSTEMATIC RECORD	PROBABILITY' ESTIMATE	FOR BULL. 17B LOWER	ESTIMATES UPPER
0.9950	345.7	428.6	320.5	243.0	447.3
0.9900	391.9	465.5	368.8	282.2	499.1
0.9500	558.2	601.1	541.5	428.7	682.3
0.9000	678.9	701.9	665.9	538.7	813.8
0.8000	866.3	862.5	857.6	712.3	1019.0
0.5000	1410.0	1357.0	1410.0	1210.0	1641.0
0.2000	2361.0	2319.0	2388.0	2009.0	2867.0
0.1000	3125.0	3176.0	3200.0	2601.0	3954.0
0.0400	4252.0	4562.0	4441.0	3426.0	5673.0
0.0200	5213.0	5852.0	5548.0	4099.0	7222.0
0.0100	6281.0	7398.0	6832.0	4825.0	9021.0
0.0050	7470.0	9248.0	8331.0	5609.0	11100.0
0.0020	9249.0	12260.0	10700.0	6748.0	14350.0

□

Station - 02144000 LONG CREEK NEAR BESSEMER CITY, N. C.  
1998 OCT 7 15:13:25

## INPUT DATA LISTING

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1954	980.0		1976	1330.0	
1955	1040.0		1977	3890.0	
1956	1020.0		1978	4930.0	
1957	722.0		1979	2410.0	
1958	5290.0		1980	990.0	
1959	1180.0		1981	932.0	
1960	1660.0		1982	1230.0	
1961	2120.0		1983	982.0	
1962	1430.0		1984	2460.0	
1963	2620.0		1985	2920.0	
1964	1650.0		1986	824.0	
1965	2680.0		1987	2230.0	
1966	1240.0		1988	384.0	
1967	1010.0		1989	850.0	
1968	1140.0		1990	1870.0	
1969	837.0		1991	1500.0	
1970	774.0		1992	533.0	
1971	1830.0		1993	1040.0	
1972	6500.0		1994	993.0	



1973	2110.0	1995	1300.0
1974	1160.0	1996	1010.0
1975	1390.0		

## Explanation of peak discharge qualification codes

PEAKFQ	WATSTORE	CODE	DEFINITION
D		3	Dam failure, non-recurrent flow anomaly
G		8	Discharge greater than stated value
X		3+8	Both of the above
L		4	Discharge less than stated value
K		6 OR C	Known effect of regulation or urbanization
H		7	Historic peak

□

Station - 02144000 LONG CREEK NEAR BESSEMER CITY, N. C.  
1998 OCT 7 15:13:25

## EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	BULL. 17B ESTIMATE
1972	6500.0	0.0227	0.0227
1958	5290.0	0.0455	0.0455
1978	4930.0	0.0682	0.0682
1977	3890.0	0.0909	0.0909
1985	2920.0	0.1136	0.1136
1965	2680.0	0.1364	0.1364
1963	2620.0	0.1591	0.1591
1984	2460.0	0.1818	0.1818
1979	2410.0	0.2045	0.2045
1987	2230.0	0.2273	0.2273
1961	2120.0	0.2500	0.2500
1973	2110.0	0.2727	0.2727
1990	1870.0	0.2955	0.2955
1971	1830.0	0.3182	0.3182
1960	1660.0	0.3409	0.3409
1964	1650.0	0.3636	0.3636

Return  
Interval

Regional Curves  
Harman et. al. 1999

Q estimated at  
1083 cfs

2.8 years

Regional Curves  
Harman et al. 1999

Q estimated at  
1083 cfs

1991	1500.0	0.3864	0.3864	
1962	1430.0	0.4091	0.4091	
1975	1390.0	0.4318	0.4318	2.3 years
1976	1330.0	0.4545	0.4545	
1995	1300.0	0.4773	0.4773	
1966	1240.0	0.5000	0.5000	2 years
1982	1230.0	0.5227	0.5227	
1959	1180.0	0.5455	0.5455	
1974	1160.0	0.5682	0.5682	1.8 years
1968	1140.0	0.5909	0.5909	1.7 years
1955	1040.0	0.6136	0.6136	
1993	1040.0	0.6364	0.6364	1.6 years
1956	1020.0	0.6591	0.6591	
1967	1010.0	0.6818	0.6818	
1996	1010.0	0.7045	0.7045	1.4 years
1994	993.0	0.7273	0.7273	
1980	990.0	0.7500	0.7500	1.3 years
1983	982.0	0.7727	0.7727	1.3 years
1954	980.0	0.7955	0.7955	
1981	932.0	0.8182	0.8182	
1989	850.0	0.8409	0.8409	
1969	837.0	0.8636	0.8636	
1986	824.0	0.8864	0.8864	
1970	774.0	0.9091	0.9091	
1957	722.0	0.9318	0.9318	
1992	533.0	0.9545	0.9545	
1988	384.0	0.9773	0.9773	

} Bank full

STATION 0214253830 NORWOOD CREEK NR TROUTMAN, NC  
 AGENCY: USGS STATION LOCATOR  
 STATE: 37 LAT. LONG. DRAINAGE AREA: 7.18 SQ M  
 COUNTY: 097 CONTRIBUTING DRAINAGE AREA: SQ M  
 DISTRICT: 37 354048 0805644 GAGE DATUM:  
 BASE DISCHARGE: CFS

WATER YEAR	DATE	TIME	PEAK DISCHARGE (CFS)	DISCHARGE CODES	GAGE HEIGHT (FT)	GAGE HEIGHT CODES	HIGHEST SINCE	MAX GAGE HEIGHT (FT)	DATE	TIME
1984	04/10/1984		567		6.34					
1985	08/17/1985		271		4.86					
1986	08/12/1986		191		4.20					
1987	03/01/1987		1200		7.96					
1988	11/27/1987		263		4.80					
1989	07/07/1989		1050		7.66					
1990	10/01/1989		1320		8.22					
1991	10/22/1990		978		7.50					
1992	06/04/1992		1320		7.69					
1993	03/24/1993		447		7.18					
1994	08/17/1994		333		7.42					
1995	02/16/1995		690		6.95					
1996	02/02/1996		470		6.68					
1997	04/28/1997		1480		9.20					

U. S. GEOLOGICAL SURVEY  
 ANNUAL PEAK FLOW FREQUENCY ANALYSIS  
 Following Bulletin 17-B Guidelines  
 Program peakfq  
 (Version 2.3, Jan, 1997)

Station - 0214253830 NORWOOD CREEK NR TROUTMAN, NC  
 1998 OCT 7 15:13:25

INPUT DATA SUMMARY

Number of peaks in record = 13

```

Peaks not used in analysis      =      0
Systematic peaks in analysis    =     13
Historic peaks in analysis      =      0
Years of historic record       =      0
Generalized skew                =     0.195
Standard error of generalized skew = 0.038
Skew option                     =  WEIGHTED
Gage base discharge             =      0.0
User supplied high outlier threshold =  --
User supplied low outlier criterion =  --
Plotting position parameter     =     0.00
    
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***** NOTICE -- Preliminary machine computations. *****
***** User responsible for assessment and interpretation. *****
    
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WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.           0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.     134.4
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 2483.9
    
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Station - 0214253830 NORWOOD CREEK NR TROUTMAN, NC  
1998 OCT 7 15:13:25

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.7618	0.2912	-0.192
BULL.17B ESTIMATE	0.0	1.0000	2.7618	0.2912	0.194

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES	
				LOWER	UPPER
0.9950	116.0	91.0	83.7	47.5	188.5
0.9900	133.7	110.5	103.4	58.4	210.9

0.9500	199.2	185.1	176.3	103.7	292.0
0.9000	248.4	241.6	230.1	141.5	351.9
0.8000	326.9	331.0	314.1	205.9	449.0
0.5000	565.5	590.3	565.5	407.5	780.4
0.2000	1009.0	1021.0	1056.0	735.0	1595.0
0.1000	1382.0	1344.0	1516.0	971.6	2453.0
0.0400	1952.0	1786.0	2329.0	1297.0	4004.0
0.0200	2453.0	2135.0	3178.0	1560.0	5569.0
0.0100	3022.0	2499.0	4324.0	1842.0	7552.0
0.0050	3670.0	2879.0	5900.0	2146.0	10040.0
0.0020	4662.0	3407.0	9006.0	2587.0	14280.0

Station - 0214253830 NORWOOD CREEK NR TROUTMAN, NC  
1998 OCT 7 15:13:25

I N P U T   D A T A   L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1984	567.0		1991	978.0	
1985	271.0		1992	1320.0	
1986	191.0		1993	447.0	
1987	1200.0		1994	333.0	
1988	263.0		1995	690.0	
1989	1050.0		1996	470.0	
1990	1320.0				

Explanation of peak discharge qualification codes

PEAKFQ CODE	WATSTORE CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

Station - 0214253830 NORWOOD CREEK NR TROUTMAN, NC  
 1998 OCT 7 15:13:25

Regional Curves  
 Harman et al. 1999

Q estimated at

369.8 cfs

EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	BULL.17B ESTIMATE	Return Interval
1990	1320.0	0.0714	0.0714	
1992	1320.0	0.1429	0.1429	
1987	1200.0	0.2143	0.2143	
1989	1050.0	0.2857	0.2857	
1991	978.0	0.3571	0.3571	
1995	690.0	0.4286	0.4286	2.3 years
1984	567.0	0.5000	0.5000	
1996	470.0	0.5714	0.5714	1.8 years
1993	447.0	0.6429	0.6429	1.6 years
1994	333.0	0.7143	0.7143	1.4 years
1985	271.0	0.7857	0.7857	1.3 years
1988	263.0	0.8571	0.8571	
1986	191.0	0.9286	0.9286	

} Bankfull

□

STATION 02142480

HAGAN CREEK NEAR CATAWBA, N. C.

AGENCY: USGS  
 STATE: 37  
 COUNTY: 035  
 DISTRICT: 37

STATION LOCATOR  
 LAT. LONG.  
 354020 0810812

DRAINAGE AREA: 7.80 SQ M  
 CONTRIBUTING  
 DRAINAGE AREA: SQ M  
 GAGE DATUM:  
 BASE DISCHARGE: CFS

WATER YEAR	DATE	TIME	PEAK DISCHARGE (CFS)	DISCHARGE CODES	GAGE HEIGHT (FT)	GAGE HEIGHT CODES	HIGHEST SINCE	MAX GAGE HEIGHT (FT)	DATE	TIME
1954	01/	/1954	760		20.67					
1955	04/14/	1955	366		18.42					
1956	09/26/	1956	448		18.74					
1957	06/26/	1957	1840		24.26					
1958	11/20/	1957	2060		25.00					
1959	08/04/	1959	875		21.27					
1960	09/12/	1960	1230		23.69					
1961	02/23/	1961	610		19.54					
1962	12/12/	1961	505		19.02					
1963	03/12/	1963	700		20.22					
1964	08/10/	1964	660		19.96					
1965	10/16/	1964	1170		22.55					
1966	02/13/	1966	495		18.97					
1970	08/10/	1970	2780		26.04					
15 yrs 1971	09/20/	1971	1100		22.30					

□

U. S. GEOLOGICAL SURVEY  
 ANNUAL PEAK FLOW FREQUENCY ANALYSIS  
 Following Bulletin 17-B Guidelines  
 Program peakfq  
 (Version 2.3, Jan, 1997)

Station - 02142480 HAGAN CREEK NEAR CATAWBA, N. C.  
 1998 OCT 7 15:13:25

I N P U T D A T A S U M M A R Y

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Number of peaks in record      =      15
Peaks not used in analysis     =       0
Systematic peaks in analysis   =      15
Historic peaks in analysis     =       0
Years of historic record       =       0
Generalized skew                =     0.195
Standard error of generalized skew =    0.038
Skew option                     =  WEIGHTED
Gage base discharge             =     0.0
User supplied high outlier threshold =  --
User supplied low outlier criterion =  --
Plotting position parameter     =     0.00
    
```

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***** NOTICE -- Preliminary machine computations. *****
***** User responsible for assessment and interpretation. *****
    
```

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WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.           0.0
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 3334.4
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.     228.0
    
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Station - 02142480 HAGAN CREEK NEAR CATAWBA, N. C.  
 1998 OCT 7 15:13:25

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.9405	0.2592	0.509
BULL.17B ESTIMATE	0.0	1.0000	2.9405	0.2592	0.196

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES	
				LOWER	UPPER
0.9950	209.2	249.0	163.8	102.7	314.1



0.9900	237.2	272.6	195.7	122.5	347.6
0.9500	338.1	358.7	308.2	200.5	465.6
0.9000	411.3	422.3	388.0	261.8	550.4
0.8000	525.1	522.9	509.4	361.6	684.1
0.5000	855.2	829.1	855.2	653.5	1114.0
0.2000	1432.0	1412.0	1482.0	1100.0	2072.0
0.1000	1895.0	1922.0	2034.0	1412.0	3005.0
0.0400	2579.0	2732.0	2947.0	1830.0	4581.0
0.0200	3161.0	3473.0	3842.0	2163.0	6086.0
0.0100	3808.0	4350.0	4983.0	2513.0	7910.0
0.0050	4528.0	5384.0	6455.0	2886.0	10110.0
0.0020	5605.0	7039.0	9145.0	3418.0	13690.0

Station - 02142480 HAGAN CREEK NEAR CATAWBA, N. C.  
1998 OCT 7 15:13:25

I N P U T   D A T A   L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1954	760.0		1962	505.0	
1955	366.0		1963	700.0	
1956	448.0		1964	660.0	
1957	1840.0		1965	1170.0	
1958	2060.0		1966	495.0	
1959	875.0		1970	2780.0	
1960	1230.0		1971	1100.0	
1961	610.0				

Explanation of peak discharge qualification codes

PEAKFQ CODE	WATSTORE CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

Station - 02142480 HAGAN CREEK NEAR CATAWBA, N. C.  
 1998 OCT 7 15:13:25

Regional Curves  
 Harman et al. 1999

Q estimated at  
 393 cfs

EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	BULL.17B ESTIMATE	Return Interval
1970	2780.0	0.0625	0.0625	
1958	2060.0	0.1250	0.1250	
1957	1840.0	0.1875	0.1875	
1960	1230.0	0.2500	0.2500	
1965	1170.0	0.3125	0.3125	
1971	1100.0	0.3750	0.3750	
1959	875.0	0.4375	0.4375	2.3 years
1954	760.0	0.5000	0.5000	
1963	700.0	0.5625	0.5625	1.8 years
1964	660.0	0.6250	0.6250	1.6 years
1961	610.0	0.6875	0.6875	1.5 years
1962	505.0	0.7500	0.7500	1.3 years
1966	495.0	0.8125	0.8125	} bank full
1956	448.0	0.8750	0.8750	
1955	366.0	0.9375	0.9375	

Regional curve prediction of bankfull

□ STATION 02117410 MCCLELLAND CREEK NEAR STATESVILLE, N. C.

AGENCY: USGS STATION LOCATOR DRAINAGE AREA: 1.60 SQ M  
 STATE: 37 LAT. LONG. CONTRIBUTING  
 COUNTY: 097 DRAINAGE AREA: SQ M  
 DISTRICT: 37 355704 0805646 GAGE DATUM:  
 BASE DISCHARGE: CFS

WATER YEAR	DATE	TIME	PEAK DISCHARGE (CFS)	DISCHARGE CODES	GAGE HEIGHT (FT)	GAGE HEIGHT CODES	HIGHEST SINCE	MAX GAGE HEIGHT (FT)	DATE	TIME
1954	01/	/1954	262		18.16					
1955	06/11/	1955	226		17.81					
1956	09/27/	1956	226		17.81					
1957	09/07/	1957	435		20.10					
1958	04/	/1958	250		18.06					
1959	09/30/	1959	156		17.17					
1960	02/02/	1960	226		17.76					
1961	08/05/	1961	315		18.74					
1962	01/28/	1962	170		17.31					
1963	03/12/	1963	110		16.78					
1964	04/07/	1964	170		17.30					
1965	10/16/	1964	275		18.32					
1966	02/13/	1966	167		17.27					
1968	05/14/	1968	290		18.44					
1969	09/16/	1969	300		18.59					
1970	08/10/	1970	134		16.98					
1971	02/22/	1971	380		19.49					
1972	12/07/	1971	330		18.92					
1973	04/26/	1973	300		18.60					
1974	06/16/	1974	100		16.74					
1975	03/14/	1975	315		18.73					
1976	06/27/	1976	230		17.89					

22 yrs

□

U. S. GEOLOGICAL SURVEY  
 ANNUAL PEAK FLOW FREQUENCY ANALYSIS  
 Following Bulletin 17-B Guidelines  
 Program peakfq  
 (Version 2.3, Jan, 1997)

Station - 02117410 MCCLELLAND CREEK NEAR STATESVILLE, N. C.  
 1998 OCT 7 15:11:10

I N P U T   D A T A   S U M M A R Y

```

Number of peaks in record      =      22
Peaks not used in analysis     =      0
Systematic peaks in analysis   =      22
Historic peaks in analysis     =      0
Years of historic record      =      0
Generalized skew               =     0.195
Standard error of generalized skew =     0.038
Skew option                    =    WEIGHTED
Gage base discharge           =      0.0
User supplied high outlier threshold =  --
User supplied low outlier criterion =  --
Plotting position parameter    =     0.00
    
```

```

***** NOTICE -- Preliminary machine computations. *****
***** User responsible for assessment and interpretation. *****
    
```

```

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.           0.0
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.     88.3
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 588.7
    
```

Station - 02117410 MCCLELLAND CREEK NEAR STATESVILLE, N. C.  
 1998 OCT 7 15:11:10

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	2.3580	0.1696	-0.569
BULL.17B ESTIMATE	0.0	1.0000	2.3580	0.1696	0.191

## ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE PROBABILITY	BULL.17B ESTIMATE	SYSTEMATIC RECORD	'EXPECTED PROBABILITY' ESTIMATE	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES	
				LOWER	UPPER
0.9950	89.4	67.9	80.6	62.7	112.2
0.9900	97.1	78.4	89.5	69.8	120.2
0.9500	122.6	113.3	117.8	94.3	146.4
0.9000	139.4	135.8	135.9	111.0	163.7
0.8000	163.6	166.7	161.5	135.2	189.2
0.5000	225.2	236.6	225.2	195.3	259.2
0.2000	315.4	318.6	320.2	273.0	381.1
0.1000	378.8	365.0	390.6	322.0	478.0
0.0400	463.1	416.1	490.4	383.0	617.4
0.0200	528.9	449.5	574.5	428.4	733.2
0.0100	597.2	479.4	668.3	474.1	859.0
0.0050	668.5	506.7	774.6	520.5	995.9
0.0020	768.2	539.2	938.6	583.5	1196.0

Station - 02117410 MCCLELLAND CREEK NEAR STATESVILLE, N. C.  
1998 OCT 7 15:11:10

## INPUT DATA LISTING

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1954	262.0		1965	275.0	
1955	226.0		1966	167.0	
1956	226.0		1968	290.0	
1957	435.0		1969	300.0	
1958	250.0		1970	134.0	
1959	156.0		1971	380.0	
1960	226.0		1972	330.0	
1961	315.0		1973	300.0	
1962	170.0		1974	100.0	
1963	110.0		1975	315.0	
1964	170.0		1976	230.0	

Explanation of peak discharge qualification codes

PEAKFQ WATSTORE

CODE	CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

Regional Curves  
 Harman et. al. 1999  
 Q estimated at  
 125 CFS

Station - 02117410 MCCLELLAND CREEK NEAR STATESVILLE, N. C.  
 1998 OCT 7 15:11:10

EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS

WATER YEAR	RANKED DISCHARGE	SYSTEMATIC RECORD	BULL.17B ESTIMATE	Return Interval
1957	435.0	0.0435	0.0435	
1971	380.0	0.0870	0.0870	
1972	330.0	0.1304	0.1304	
1961	315.0	0.1739	0.1739	
1975	315.0	0.2174	0.2174	
1969	300.0	0.2609	0.2609	
1973	300.0	0.3043	0.3043	
1968	290.0	0.3478	0.3478	
1965	275.0	0.3913	0.3913	
1954	262.0	0.4348	0.4348	2.3 year
1958	250.0	0.4783	0.4783	2.1 year
1976	230.0	0.5217	0.5217	
1955	226.0	0.5652	0.5652	1.8 year
1956	226.0	0.6087	0.6087	1.6 year
1960	226.0	0.6522	0.6522	
1962	170.0	0.6957	0.6957	1.4 year
1964	170.0	0.7391	0.7391	
1966	167.0	0.7826	0.7826	1.3 year
1959	156.0	0.8261	0.8261	
1970	134.0	0.8696	0.8696	
1963	110.0	0.9130	0.9130	
1974	100.0	0.9565	0.9565	

} Bank full

Regional Curve prediction of Bank full

□ STATION 02142900 LONG CREEK NEAR PAW CREEK, N. C.  
 AGENCY: USGS STATION LOCATOR  
 STATE: 37 LAT. LONG. DRAINAGE AREA: 16.40 SQ M  
 COUNTY: 119 CONTRIBUTING DRAINAGE AREA: SQ M  
 DISTRICT: 37 351942 0805435 GAGE DATUM: 648.  
 BASE DISCHARGE: 500.00 CFS

WATER YEAR	DATE	TIME	PEAK DISCHARGE (CFS)	DISCHARGE CODES	GAGE HEIGHT (FT)	GAGE HEIGHT CODES	HIGHEST SINCE	MAX GAGE HEIGHT (FT)	DATE	TIME
1966	03/04/1966		1260		10.15					
	02/13/1966		541		6.53					
	02/28/1966		738		7.97					
1967	08/23/1967		1350		10.38					
1968	03/12/1968		830		8.45					
	12/28/1967		560		6.68					
	01/10/1968		533		6.62					
1969	03/19/1969		874		8.67					
	02/02/1969		644		7.30					
	03/24/1969		568		6.74					
1970	07/06/1970		543		7.29					
1971	08/02/1971		972		10.71					
	02/07/1971		836		9.38					
	03/03/1971		578		8.05					
	05/13/1971		786		9.59					
	05/16/1971		868		10.12					
	06/24/1971		554		7.85					
1972	01/13/1972		774		9.51					
	01/10/1972		684		8.86					
	02/03/1972		511		7.49					
	05/14/1972		660		8.68					
	06/20/1972		599		8.21					
1973	02/02/1973		2250		11.20					
	12/15/1972		844		9.98					
	12/21/1972		503		7.42					
	03/17/1973		614		7.87					
	04/01/1973		1500		10.45					
	04/07/1973		838		8.95					
1974	09/06/1974		1180		9.86					
	01/21/1974		886		9.12					
1975	05/30/1975		3720		11.46					
	01/11/1975		1560		9.27					
	02/04/1975		502		5.68					

	03/13/1975	1030	8.11
	05/03/1975	920	7.72
	05/18/1975	1060	8.19
	08/28/1975	536	5.91
	09/02/1975	1420	9.04
	09/07/1975	602	6.26
	09/23/1975	2580	10.50
1976	10/08/1975	1180	8.49
	12/31/1975	736	6.93
1977	10/09/1976	3480	11.30
	12/07/1976	1260	8.70
	12/12/1976	508	5.72
	12/15/1976	612	6.31
	02/27/1977	520	5.80
	03/30/1977	1300	8.79
1978	01/26/1978	1550	9.25
	10/26/1977	1080	8.23
	11/06/1977	1100	8.26
	03/10/1978	712	6.82
	03/26/1978	888	7.57
	04/25/1978	1250	8.65
	05/08/1978	921	7.70
1979	02/24/1979	1360	9.73
	01/21/1979	800	7.83
	03/24/1979	760	7.60
	04/26/1979	690	7.21
	06/16/1979	840	7.95
	09/30/1979	1200	9.39
1980	03/28/1980	814	7.83
1981	09/07/1981	530	6.19
1982	06/18/1982	4300	11.70
	12/31/1981	1290	9.16
	01/04/1982	1590	9.64
	02/03/1982	802	7.75
	05/17/1982	651	6.92
	05/25/1982	850	8.00
	05/26/1982	511	6.07
	06/01/1982	542	6.27
	06/10/1982	1310	9.19
1983	03/18/1983	1650	9.73
	12/12/1982	1320	9.21
	02/02/1983	1290	9.16
	02/14/1983	869	8.06
	03/06/1983	546	6.29
	03/27/1983	1110	8.75
	06/22/1983	633	6.82
1984	12/06/1983	1890	10.04



	12/04/1983	1030	8.53
	12/12/1983	807	7.78
	01/10/1984	794	7.71
	02/13/1984	563	6.40
	02/23/1984	530	6.19
	02/28/1984	777	7.62
	03/28/1984	787	7.67
	04/10/1984	608	6.67
	05/29/1984	631	7.90
1985	05/16/1985	1390	9.33
	01/04/1985	625	6.77
	02/01/1985	888	8.12
	02/02/1985	924	8.23
1986	11/21/1985	2790	11.67
	11/30/1985	705	7.23
1987	04/15/1987	1760	10.50
	01/01/1987	530	6.13
	01/19/1987	635	6.82
	03/01/1987	1430	9.92
	05/13/1987	575	6.43
	09/07/1987	1180	9.32
	09/11/1987	638	8.03
	09/12/1987	589	7.63
1988	08/30/1988	954	9.32
1989	05/02/1989	1320	10.19
1990	02/16/1990	1160	11.09
1991	10/23/1990	1480	11.31
1992	06/04/1992	1360	10.23
1993	10/04/1992	1550	11.21
1994	08/17/1994	1280	10.14
1995	08/27/1995	1140	11.35
1996	10/04/1995	1020	10.74

□

U. S. GEOLOGICAL SURVEY  
ANNUAL PEAK FLOW FREQUENCY ANALYSIS  
Following Bulletin 17-B Guidelines  
Program peakfq  
(Version 2.3, Jan, 1997)

Station - 02142900 LONG CREEK NEAR PAW CREEK, N. C.  
1998 OCT 7 15:13:25

I N P U T   D A T A   S U M M A R Y

```

Number of peaks in record      =      31
Peaks not used in analysis     =      0
Systematic peaks in analysis   =      31
Historic peaks in analysis     =      0
Years of historic record       =      0
Generalized skew                =     0.195
Standard error of generalized skew =     0.038
Skew option                     =  WEIGHTED
Gage base discharge            =      0.0
User supplied high outlier threshold =  --
User supplied low outlier criterion =  --
Plotting position parameter     =     0.00
    
```

```

***** NOTICE -- Preliminary machine computations. *****
***** User responsible for assessment and interpretation. *****
    
```

```

WCF134I-NO SYSTEMATIC PEAKS WERE BELOW GAGE BASE.           0.0
WCF163I-NO HIGH OUTLIERS OR HISTORIC PEAKS EXCEEDED HHBASE. 4872.5
WCF195I-NO LOW OUTLIERS WERE DETECTED BELOW CRITERION.      375.3
    
```

□

Station - 02142900 LONG CREEK NEAR PAW CREEK, N. C.  
 1998 OCT 7 15:13:25

ANNUAL FREQUENCY CURVE PARAMETERS -- LOG-PEARSON TYPE III

	FLOOD BASE		LOGARITHMIC		
	DISCHARGE	EXCEEDANCE PROBABILITY	MEAN	STANDARD DEVIATION	SKEW
SYSTEMATIC RECORD	0.0	1.0000	3.1310	0.2160	0.524
BULL.17B ESTIMATE	0.0	1.0000	3.1310	0.2160	0.197

ANNUAL FREQUENCY CURVE -- DISCHARGES AT SELECTED EXCEEDANCE PROBABILITIES

ANNUAL EXCEEDANCE	BULL.17B	'EXPECTED SYSTEMATIC PROBABILITY'	95-PCT CONFIDENCE LIMITS FOR BULL. 17B ESTIMATES
-------------------	----------	-----------------------------------	--

PROBABILITY	ESTIMATE	RECORD	ESTIMATE	LOWER	UPPER
0.9950	411.7	479.1	376.3	287.1	527.7
0.9900	457.1	516.0	425.5	326.8	577.1
0.9500	614.1	646.7	592.6	469.5	745.5
0.9000	723.0	739.8	706.9	571.8	861.6
0.8000	886.1	883.0	875.7	727.4	1037.0
0.5000	1330.0	1295.0	1330.0	1144.0	1545.0
0.2000	2044.0	2019.0	2072.0	1747.0	2486.0
0.1000	2583.0	2613.0	2654.0	2162.0	3279.0
0.0400	3338.0	3510.0	3513.0	2710.0	4478.0
0.0200	3956.0	4294.0	4256.0	3138.0	5518.0
0.0100	4621.0	5187.0	5102.0	3585.0	6690.0
0.0050	5339.0	6206.0	6073.0	4053.0	8007.0
0.0020	6378.0	7777.0	7590.0	4711.0	10000.0

□

Station - 02142900 LONG CREEK NEAR PAW CREEK, N. C.  
1998 OCT 7 15:13:25

## I N P U T   D A T A   L I S T I N G

WATER YEAR	DISCHARGE	CODES	WATER YEAR	DISCHARGE	CODES
1966	1260.0		1982	4300.0	
1967	1350.0		1983	1650.0	
1968	830.0		1984	1890.0	
1969	874.0		1985	1390.0	
1970	543.0		1986	2790.0	
1971	972.0		1987	1760.0	
1972	774.0		1988	954.0	
1973	2250.0		1989	1320.0	
1974	1180.0		1990	1160.0	
1975	3720.0		1991	1480.0	
1976	1180.0		1992	1360.0	
1977	3480.0		1993	1550.0	
1978	1550.0		1994	1280.0	
1979	1360.0		1995	1140.0	
1980	814.0		1996	1020.0	
1981	530.0				

Explanation of peak discharge qualification codes

PEAKFQ CODE	WATSTORE CODE	DEFINITION
D	3	Dam failure, non-recurrent flow anomaly
G	8	Discharge greater than stated value
X	3+8	Both of the above
L	4	Discharge less than stated value
K	6 OR C	Known effect of regulation or urbanization
H	7	Historic peak

Regional Curves  
Harman et. al. 1999

Q estimated at  
672 cfs

Station - 02142900 LONG CREEK NEAR PAW CREEK, N. C.  
1998 OCT 7 15:13:25

EMPIRICAL FREQUENCY CURVES -- WEIBULL PLOTTING POSITIONS.

WATER YEAR	<sup>Q</sup> RANKED DISCHARGE	SYSTEMATIC RECORD	BULL.17B ESTIMATE	Return Interval
1982	4300.0	0.0313	0.0313	
1975	3720.0	0.0625	0.0625	
1977	3480.0	0.0938	0.0938	
1986	2790.0	0.1250	0.1250	
1973	2250.0	0.1563	0.1563	
1984	1890.0	0.1875	0.1875	
1987	1760.0	0.2188	0.2188	
1983	1650.0	0.2500	0.2500	
1978	1550.0	0.2813	0.2813	
1993	1550.0	0.3125	0.3125	
1991	1480.0	0.3438	0.3438	
1985	1390.0	0.3750	0.3750	
1979	1360.0	0.4063	0.4063	
1992	1360.0	0.4375	0.4375	
1967	1350.0	0.4688	0.4688	
1989	1320.0	0.5000	0.5000	
1994	1280.0	0.5313	0.5313	1.9 years
1966	1260.0	0.5625	0.5625	
1974	1180.0	0.5938	0.5938	1.7 years
1976	1180.0	0.6250	0.6250	1.6 years
1990	1160.0	0.6563	0.6563	} Bank full
1995	1140.0	0.6875	0.6875	
1996	1020.0	0.7188	0.7188	

1971	972.0	0.7500	0.7500
1988	954.0	0.7813	0.7813
1969	874.0	0.8125	0.8125
1968	830.0	0.8438	0.8438
1980	814.0	0.8750	0.8750
1972	774.0	0.9063	0.9063
1970	543.0	0.9375	0.9375
1981	530.0	0.9688	0.9688

1.3 years

} Bank full

Regional curve prediction of Bankfull

# Appendix B

# **Hydraulic Analysis**

## **Lyle Creek Tributary Stream Restoration**

### **Catawba County, North Carolina**

**Prepared For:** **EcoScience, Inc.**  
**1101 Haynes Street, Ste.101**  
**Raleigh, NC 27604**  
**(919) 828-3433**

**Prepared By:** **Parsons Brinckerhoff Quade & Douglas, Inc.**  
**909 Aviation Parkway**  
**Suite 1500**  
**Morrisville, NC 27560**  
**(919) 467-7272**

**Date:** **July 2001**



# Introduction

The purpose of this study is to estimate water surface elevations for the Lyle Creek Tributary Stream Restoration Project for the 1, 1.4, 2, 10, 25, 50, and 100-year flood events. These flood elevations were estimated for both existing conditions and the proposed stream restoration. These estimates, along with other data, will be used to determine a final stream restoration plan at the project site.

The project site is located near Catawba, North Carolina in the northeast corner of Catawba County, just south of Interstate 40, near the Iredell County line. The terrain in the area is mostly rolling pasture with patches of dense trees located on the floodplain and along the creek. The project drainage area is rural and is comprised of agricultural and forest land cover types. A location map for the project is provided in Figure 1.

## Assumptions and Methodology

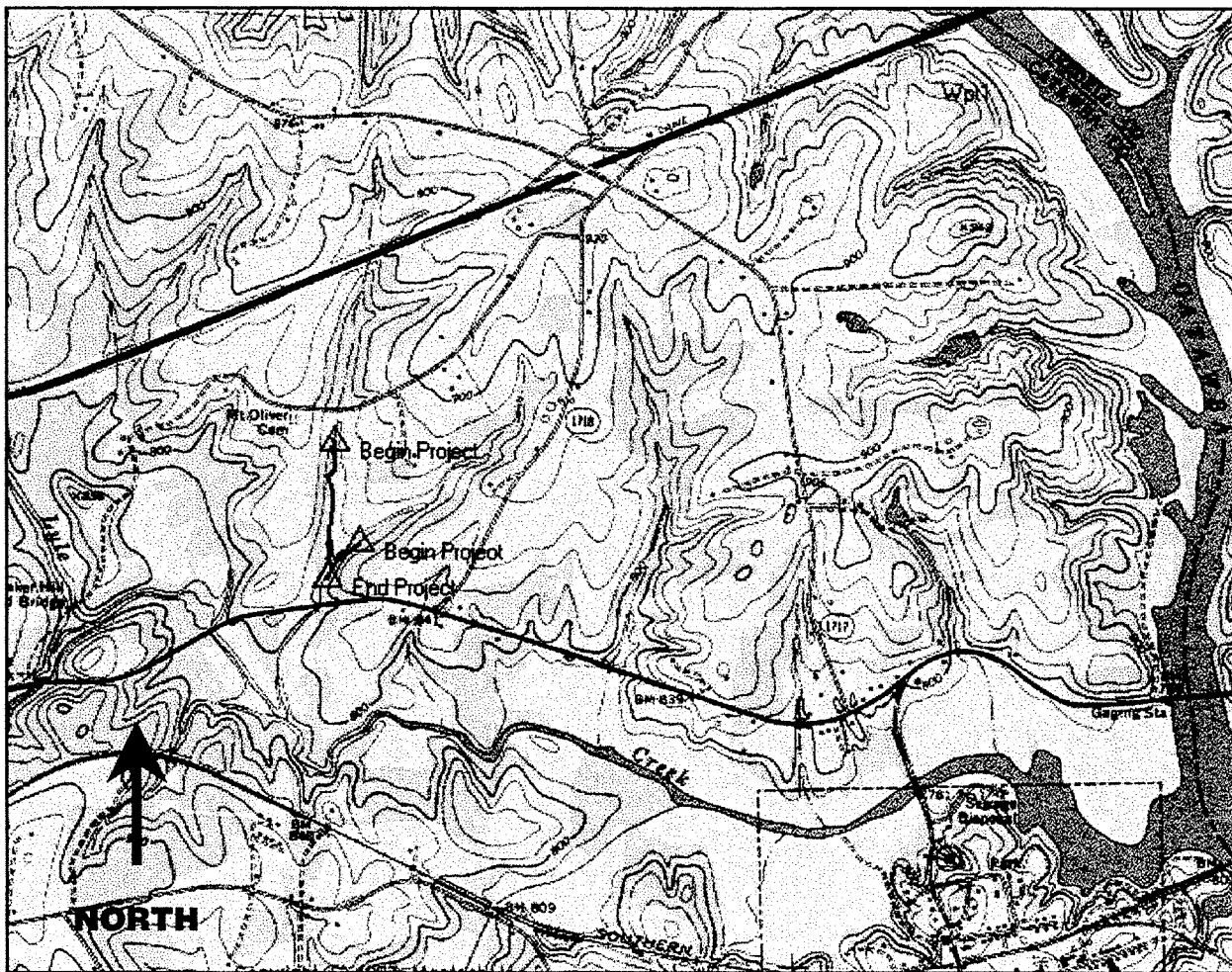
Flood discharges for the project site were determined using the regression equations for the Blue Ridge – Piedmont region presented in the United States Geological Survey Water Resources Investigation Report 99-4114 "Estimating the Magnitude and Frequency of Floods in Rural Basins of North Carolina". Drainage areas for the project site were determined from United States Geologic Survey 7.5 minute quadrangles. The drainage area for the project was determined to be three hundred fourteen (314) acres at the main channel just upstream of the confluence with the tributary. The drainage area of the tributary is one hundred thirty one (131) acres. A summary of estimated flood discharges is provided in Table 1. Water surface elevations were estimated using the United States Army Corps of Engineers computer program HEC-RAS version 3.0.1. Input data for the stream geometry at the site was taken from electronic base mapping and field cross sections supplied to PB by EcoScience Corporation. Detailed geometry information for the existing conditions and the proposed stream restoration can be found in the HEC-RAS output reports, which are included as Appendices.

**Table 1.**  
**Summary of Estimated Flood Discharges**

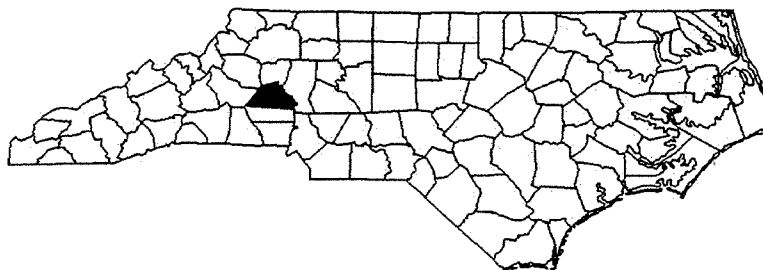
Return Period (years)	Discharge (cfs)	
	Main Channel	Tributary
1	65	26
1.4	85	36
2	110	50
10	280	120
25	420	180
50	540	230
100	680	290



**Figure 1.**  
**Project Location Map**  
**Not To Scale**



**CATAWBA COUNTY, NC**



# Alternatives Considered

**Existing Conditions:** Water surface profiles for existing site conditions were estimated for the project. There is a main channel, which is joined by a small tributary at the downstream portion of the project site. Cross sections for the area were taken from electronic base mapping provided by EcoScience Corporation. Supplemental field cross sections were also provided by EcoScience. A detailed description of the geometry input data for the existing conditions can be found in Appendix B HEC-RAS Report for Existing Conditions. Appendix A. shows the location of the cross sections used in the HEC-RAS model for the existing site conditions.

**Proposed Alternative:** The proposed alignment was designed and provided by EcoScience Corporation. The proposed alternative requires a section of the main channel to be reconstructed within the existing floodplain as a shallower, more sinuous channel and also requires fill of the existing channel in the relocation region. The proposed alternative channel is approximately twenty three hundred (2,300) feet in length. Proposed typical channel cross sections, also provided by EcoScience, can be found in Figure 3. Also included in analysis of the alternative is proposed grading of the floodplain at, and just upstream of the main channel and tributary junction, as well as flattening of the tributary side slopes on one side. In addition, the alternative includes installation of step cross-vane structures constructed of cobble and gravel contained in wire mesh. These structures are located in the upstream portion of the main channel. A detailed description of the geometry input data for this alternative can be found in Appendix D HEC-RAS Report for Proposed Alternative. Included in Appendix C are the proposed channel, cross section, and cross vane locations.

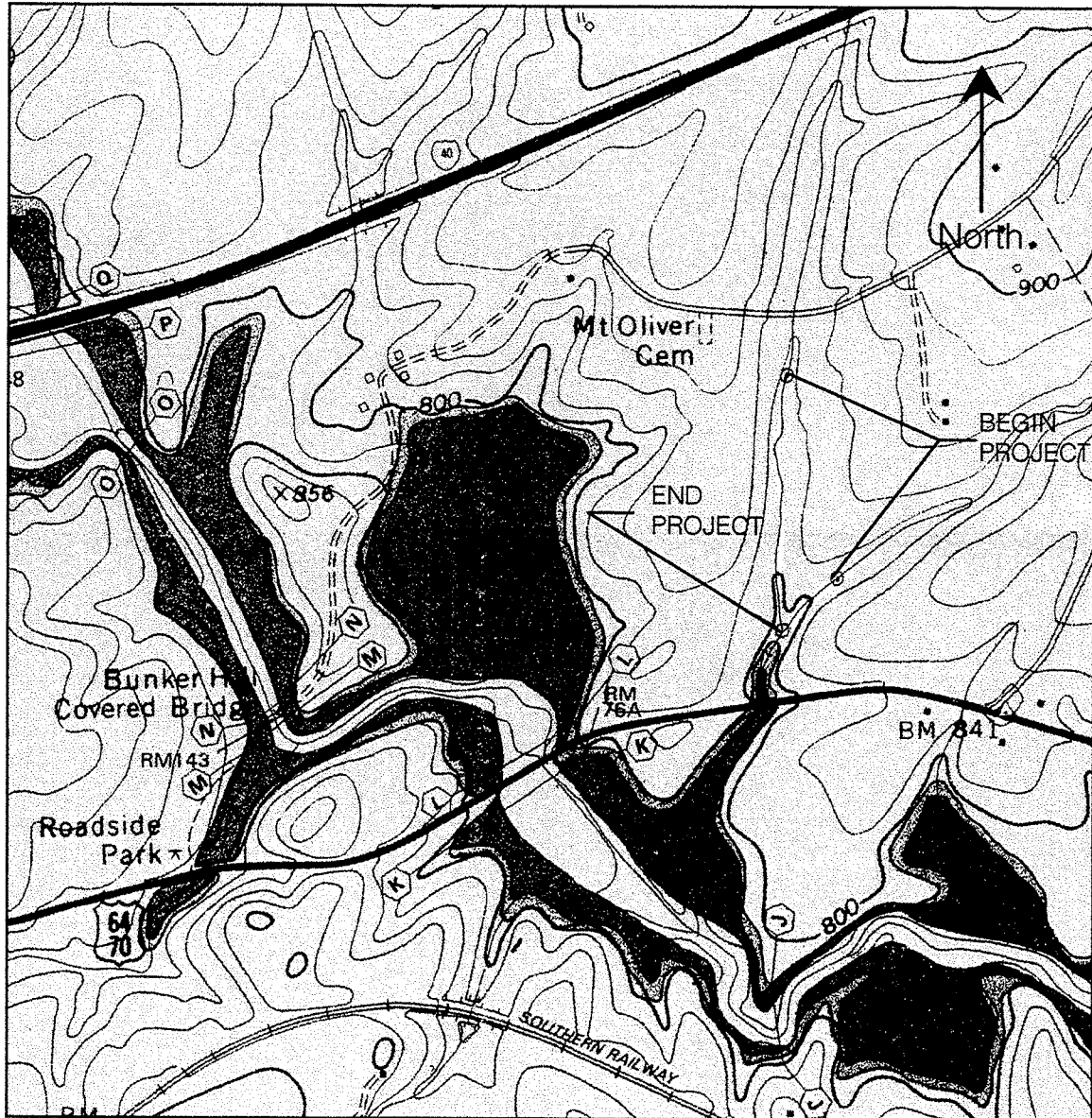
## Flood Impacts

The HEC-RAS modeling performed on the project site indicates that the existing stream system will overflow into the floodplain during floods at two-year and greater flood levels. The objective for this study is to model and analyze the provided alternative channel design that will contain the 1.4 year storm within the channel banks, but will overflow in the two-year storm. Given this objective, the proposed alternative is the recommended channel design option. A summary of water surface elevations for various flood events for the existing and proposed channels can be found in Table 2.

The project site was studied in the September 1998 Federal Emergency Management Agency (FEMA) Flood Insurance Study for Catawba County. The stream was not included in the study and as has not had flood elevations determined for use in Federal Flood Insurance programs. The FEMA flood map for the project is shown in Figure 2.

Based on the results of the HEC-RAS modeling the surrounding properties will not experience increased flood risk as a result of the proposed stream restoration project. The increase in water surface elevation for all of the flood events studied at cross section 140 (cross section located on upstream property) is less than or equal to 0.05 feet. This increase is well below the increase allowed by the National Flood Insurance Program (1.00 foot for the 100 year flood event) and well below what is considered to be the reasonable accuracy of the HEC-RAS model. The North Carolina Department of Transportation Hydraulics Unit generally uses a rule of thumb of 0.30 feet for the accuracy of the HEC-RAS model.

**Figure 2.**  
**FEMA Flood Insurance Map**  
**Panel Number 370050 0155 B**  
**(Not to Scale)**

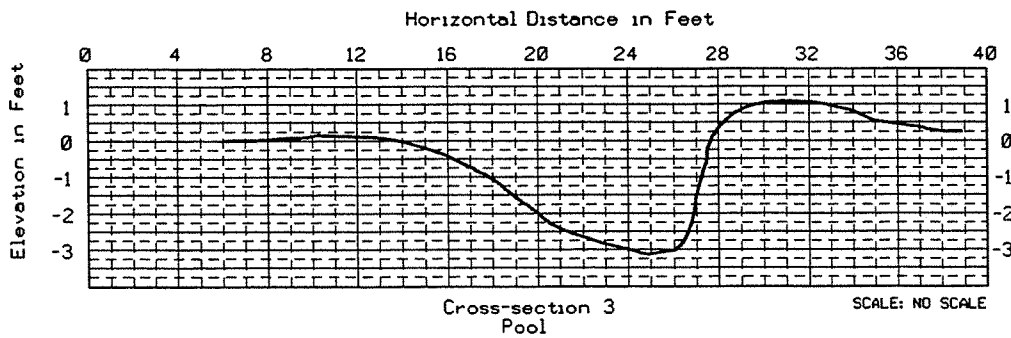
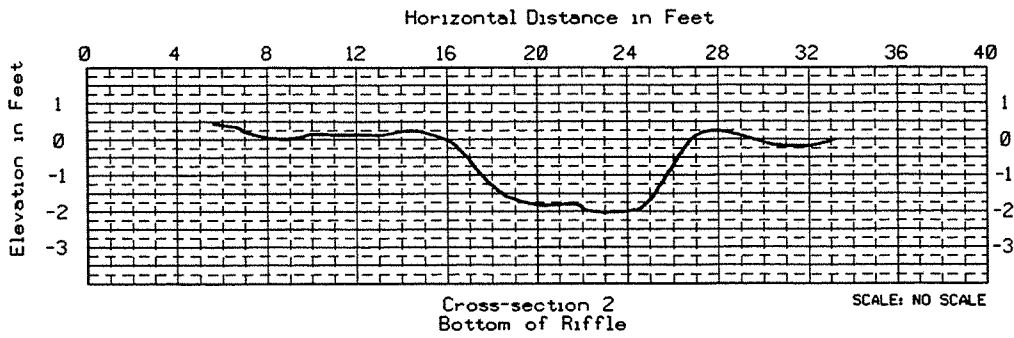
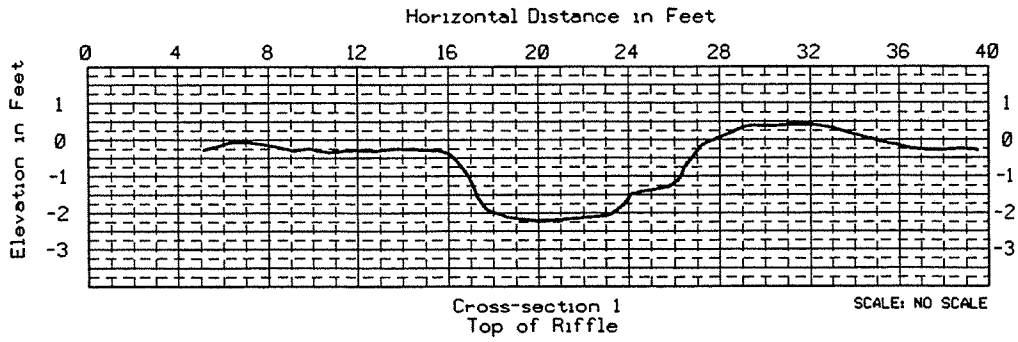


**Table 2.**  
**Water Surface Elevations**

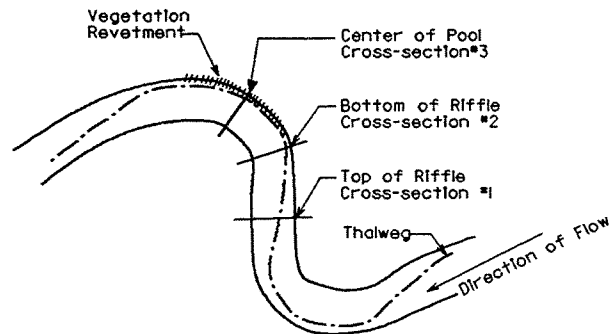
Projected Flood Elevation (feet above mean sea level)

Location	1 Year			1.4 Year			2 Year			10 Year			25 Year			50 Year			100 Year		
	Existing	Proposed	Δ	Existing	Proposed	Δ	Existing	Proposed	Δ	Existing	Proposed	Δ	Existing	Proposed	Δ	Existing	Proposed	Δ	Existing	Proposed	Δ
100	797.56	797.56	0.00	797.92	797.92	0.00	798.26	798.26	0.00	799.48	799.48	0.00	800.14	800.14	0.00	800.62	800.62	0.00	801.11	801.11	0.00
102	797.68	797.68	0.00	798.04	798.04	0.00	798.38	798.38	0.00	799.59	799.59	0.00	800.25	800.25	0.00	800.72	800.72	0.00	801.21	801.21	0.00
104	797.78	797.76	-0.02	798.14	798.12	-0.02	798.48	798.46	-0.02	799.71	799.76	0.05	800.39	800.45	0.06	800.86	800.94	0.08	801.35	801.43	0.08
106	798.12	800.50	2.38	798.46	800.60	2.14	798.81	800.70	1.89	800.16	801.16	1.00	800.81	801.30	0.49	801.24	801.41	0.17	801.70	801.83	0.13
108	798.51	801.90	3.39	798.79	802.07	3.28	799.13	802.20	3.07	800.41	802.60	2.19	800.91	802.85	1.94	801.29	803.01	1.72	802.65	803.00	0.35
110	799.42	802.32	2.90	799.68	802.49	2.81	800.00	802.61	2.61	801.54	803.07	1.53	802.41	803.31	0.90	803.04	803.48	0.44	803.46	803.70	0.24
112	800.75	803.29	2.54	800.98	803.50	2.52	801.25	803.75	2.50	802.46	804.69	2.23	803.07	804.90	1.83	803.29	805.07	1.78	803.48	805.22	1.74
114	803.96	806.08	2.12	804.19	806.23	2.04	804.40	806.39	1.99	805.87	806.84	0.97	806.49	807.12	0.63	806.87	807.30	0.43	807.26	807.51	0.25
116	805.24	806.32	1.08	805.45	806.48	1.03	805.63	806.62	0.99	807.04	807.25	0.21	807.56	807.50	-0.06	807.74	807.61	-0.13	807.78	807.57	-0.21
118	806.23	807.15	0.92	806.45	807.34	0.89	806.64	807.41	0.77	807.93	808.38	0.45	808.58	808.55	-0.03	809.06	808.67	-0.39	809.54	808.92	-0.62
120	806.57	808.92	2.35	806.81	809.02	2.21	807.02	809.12	2.10	808.44	809.67	1.23	809.15	809.97	0.82	809.49	810.15	0.66	809.83	810.33	0.50
122	806.73	810.16	3.43	806.98	810.25	3.27	807.19	810.33	3.14	808.58	810.89	2.31	809.29	811.19	1.90	809.63	811.38	1.75	809.95	811.56	1.61
124	809.25	810.82	1.57	809.33	810.98	1.65	809.39	811.10	1.71	810.10	811.61	1.51	810.73	811.67	0.94	811.20	811.38	0.18	811.92	811.92	0.00
126	810.41	811.14	0.73	810.66	811.30	0.64	810.89	811.46	0.57	812.28	812.34	0.06	812.90	812.59	-0.31	813.26	812.64	-0.62	813.50	813.00	-0.50
128	811.45	812.07	0.62	811.67	812.19	0.52	811.88	812.46	0.58	813.27	813.32	0.05	813.82	813.81	-0.01	814.09	813.93	-0.16	814.37	813.78	-0.59
130	812.04	812.53	0.49	812.24	812.67	0.43	812.47	812.83	0.36	813.86	813.73	-0.13	814.53	814.21	-0.32	814.92	814.49	-0.43	815.24	814.82	-0.42
132	812.70	813.01	0.31	812.83	813.16	0.33	812.99	813.32	0.33	814.22	814.27	0.05	814.82	814.50	-0.32	815.17	814.91	-0.26	815.71	815.71	0.00
134	813.66	813.11	-0.55	814.05	813.28	-0.77	814.22	813.46	-0.76	815.30	814.72	-0.58	816.01	815.41	-0.60	816.48	815.92	-0.56	816.89	816.43	-0.46
136	813.96	813.44	-0.52	814.37	813.61	-0.76	814.55	813.78	-0.77	815.60	814.80	-0.80	816.23	815.42	-0.81	816.64	815.93	-0.71	817.02	816.44	-0.58
138	814.60	814.68	0.08	814.87	814.90	0.03	815.13	815.17	0.04	816.58	816.72	0.14	817.34	817.46	0.12	817.81	817.92	0.11	818.28	818.38	0.10
140	815.69	815.69	0.00	815.89	815.89	0.00	816.12	816.13	0.01	817.50	817.54	0.04	818.24	818.28	0.04	818.69	818.74	0.05	819.19	819.22	0.03
142	816.67	816.67	0.00	816.83	816.83	0.00	817.00	817.01	0.01	817.94	817.94	0.00	818.47	818.49	0.02	818.85	818.85	0.00	819.27	819.27	0.00
200	797.77	797.75	-0.02	798.13	798.12	-0.01	798.47	798.47	0.00	799.78	799.76	-0.02	800.46	800.44	-0.02	800.93	800.92	-0.01	801.42	801.41	-0.01
202	799.22	798.66	-0.56	799.22	798.66	-0.56	799.27	798.69	-0.58	800.01	799.86	-0.15	800.57	800.51	-0.06	801.01	800.98	-0.03	801.48	801.47	-0.01
204	801.33	801.13	-0.20	801.33	801.13	-0.20	801.40	801.17	-0.23	801.37	801.16	-0.21	801.62	801.32	-0.30	801.89	801.45	-0.44	802.15	801.57	-0.58
206	803.25	802.78	-0.47	803.25	802.78	-0.47	803.31	802.84	-0.47	803.86	803.25	-0.61	804.25	803.60	-0.65	804.51	803.82	-0.69	804.72	804.00	-0.72

# FIGURE 3 PROPOSED CHANNEL SECTIONS



NOTE:  
Cross-section Facing the  
Downstream Direction



# APPENDIX A

## CROSS SECTION LOCATIONS FOR EXISTING CONDITIONS

# LEGEND

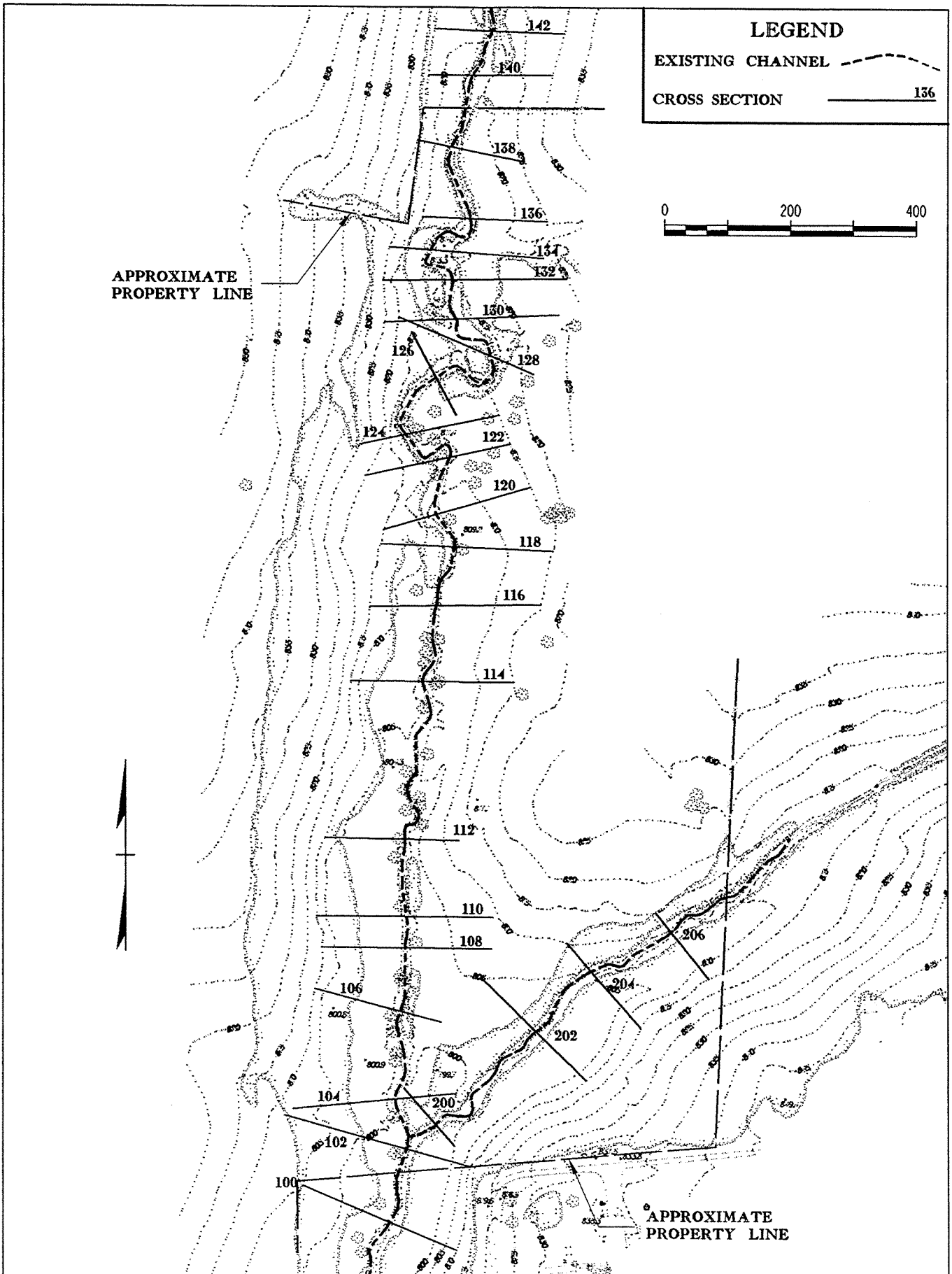
EXISTING CHANNEL 

CROSS SECTION  136



APPROXIMATE  
PROPERTY LINE

APPROXIMATE  
PROPERTY LINE



# APPENDIX B

## HEC-RAS REPORT FOR EXISTING CONDITIONS



HEC-RAS Version 3.0.1 Mar 2001  
 U.S. Army Corp of Engineers  
 Hydrologic Engineering Center  
 609 Second Street, Suite D  
 Davis, California 95616-4687  
 (916) 756-1104

```

X      X  XXXXXX      XXXX      XXXX      XX      XXXX
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  XXXXXX      XXXX      X      X      X      X      XXXXX
  
```

PROJECT DATA

Project Title: Lyle Creek Stream Restoration  
 Project File : LyleCreek.prj  
 Run Date and Time: 7/30/01 8:18:05 AM

Project in English units

Project Description:

Lyle Creek Stream Restoration - Catawaba County North Carolina

PLAN DATA

Plan Title: exist

Plan File : g:\PROJECTS\EcoScience\LyleCreek\Hydraulics\LyleCreek.p01

Geometry Title: existing

Geometry File : g:\PROJECTS\EcoScience\LyleCreek\Hydraulics\LyleCreek.g01

Flow Title : flow

Flow File : g:\PROJECTS\EcoScience\LyleCreek\Hydraulics\LyleCreek.f01

Plan Description:

existing conditions

Plan Summary Information:

Number of: Cross Sections =	26	Multitple Openings =	0
Culverts =	0	Inline Weirs =	0
Bridges =	0		

Computational Information

Water surface calculation tolerance =	0.01
Critical depth calculaton tolerance =	0.01
Maximum number of interations =	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: flow

Flow File : g:\PROJECTS\EcoScience\LyleCreek\Hydrualics\LyleCreek.f01

Flow Data (cfs)

River	Reach	RS	1	1.4	2	5	10	25	50	100
Tribuatory	Reach 1	206	3	3	4	9	10	20	30	40
Tribuatory	Reach 1	200	25	35	50	90	120	180	230	290
Main Channel	Upper	142	45	56	70	130	180	270	340	430
Main Channel	Upper	126	52	66	80	150	210	320	410	520
Main Channel	Upper	112	59	76	100	180	250	370	470	600
Main Channel	Lower	102	66	85	110	200	280	420	540	680

River	Reach	RS	200	500
Tribuatory	Reach 1	206	50	60
Tribuatory	Reach 1	200	370	480
Main Channel	Upper	142	530	690
Main Channel	Upper	126	640	830
Main Channel	Upper	112	740	980
Main Channel	Lower	102	850	1120

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Tribuatory	Reach 1	1	Normal S = .001	
Tribuatory	Reach 1	1.4	Normal S = .001	
Tribuatory	Reach 1	2	Normal S = .001	
Tribuatory	Reach 1	5	Normal S = .001	
Tribuatory	Reach 1	10	Normal S = .001	
Tribuatory	Reach 1	25	Normal S = .001	
Tribuatory	Reach 1	50	Normal S = .001	
Tribuatory	Reach 1	100	Normal S = .001	
Tribuatory	Reach 1	200	Normal S = .001	
Tribuatory	Reach 1	500	Normal S = .001	
Main Channel	Upper	1	Normal S = .001	
Main Channel	Upper	1.4	Normal S = .001	
Main Channel	Upper	2	Normal S = .001	
Main Channel	Upper	5	Normal S = .001	
Main Channel	Upper	10	Normal S = .001	
Main Channel	Upper	25	Normal S = .001	
Main Channel	Upper	50	Normal S = .001	
Main Channel	Upper	100	Normal S = .001	
Main Channel	Upper	200	Normal S = .001	
Main Channel	Upper	500	Normal S = .001	
Main Channel	Lower	1	Normal S = .001	
Main Channel	Lower	1.4	Normal S = .001	
Main Channel	Lower	2	Normal S = .001	
Main Channel	Lower	5	Normal S = .001	
Main Channel	Lower	10	Normal S = .001	
Main Channel	Lower	25	Normal S = .001	
Main Channel	Lower	50	Normal S = .001	
Main Channel	Lower	100	Normal S = .001	
Main Channel	Lower	200	Normal S = .001	
Main Channel	Lower	500	Normal S = .001	

GEOMETRY DATA

Geometry Title: existing

Geometry File : g:\PROJECTS\EcoScience\LyleCreek\Hydrualics\LyleCreek.g01

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Tributary	Reach 1		J1
Main Channel	Upper		J1
Main Channel	Lower	J1	

**JUNCTION INFORMATION**

Name: J1  
 Description: Junction of Main Channel and Tributary  
 Energy computation Method

Length across Junction		Tributary		Length	Angle
River	Reach	River	Reach		
Main Channel	Upper	to Main Channel	Lower	82.5	
Tributary	Reach 1	to Main Channel	Lower	85	

CROSS SECTION RIVER: Tributary  
 REACH: Reach 1 RS: 206

**INPUT**

Description:

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	40	807	86	807	88	806	89	805
90	804	91	803	94	803	96	803	97	804
98	805	99	806	100	807	111	810	132	815

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	86	.05	111	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	86	100		137 146.15	145	.1	.3

**CROSS SECTION OUTPUT Profile #1**

E.G. Elev (ft)	803.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.25	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	803.22	Flow Area (sq ft)		1.33	
E.G. Slope (ft/ft)	0.040550	Area (sq ft)		1.33	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	5.51	Top Width (ft)		5.51	
Vel Total (ft/s)	2.26	Avg. Vel. (ft/s)		2.26	
Max Chl Dpth (ft)	0.25	Hydr. Depth (ft)		0.24	
Conv. Total (cfs)	14.9	Conv. (cfs)		14.9	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		5.71	
Min Ch El (ft)	803.00	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		1.33	
Frctn Loss (ft)	1.96	Cum Volume (acre-ft)		0.13	
C & E Loss (ft)	0.02	Cum SA (acres)		0.09	

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

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

**CROSS SECTION OUTPUT Profile #1.4**

E.G. Elev (ft)	803.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.25	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	803.22	Flow Area (sq ft)		1.33	
E.G. Slope (ft/ft)	0.040616	Area (sq ft)		1.33	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	5.51	Top Width (ft)		5.51	
Vel Total (ft/s)	2.26	Avg. Vel. (ft/s)		2.26	

Max Chl Dpth (ft)	0.25	Hydr. Depth (ft)	0.24
Conv. Total (cfs)	14.9	Conv. (cfs)	14.9
Length Wtd. (ft)	146.15	Wetted Per. (ft)	5.71
Min Ch El (ft)	803.00	Shear (lb/sq ft)	0.59
Alpha	1.00	Stream Power (lb/ft s)	1.33
Frctn Loss (ft)	1.96	Cum Volume (acre-ft)	0.00
C & E Loss (ft)	0.02	Cum SA (acres)	0.09

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	803.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.31	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	803.27	Flow Area (sq ft)		1.62	
E.G. Slope (ft/ft)	0.038081	Area (sq ft)		1.62	
Q Total (cfs)	4.00	Flow (cfs)		4.00	
Top Width (ft)	5.61	Top Width (ft)		5.61	
Vel Total (ft/s)	2.46	Avg. Vel. (ft/s)		2.46	
Max Chl Dpth (ft)	0.31	Hydr. Depth (ft)		0.29	
Conv. Total (cfs)	20.5	Conv. (cfs)		20.5	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		5.87	
Min Ch El (ft)	803.00	Shear (lb/sq ft)		0.66	
Alpha	1.00	Stream Power (lb/ft s)		1.62	
Frctn Loss (ft)	1.95	Cum Volume (acre-ft)	0.00	0.18	
C & E Loss (ft)	0.02	Cum SA (acres)		0.09	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	803.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.73	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)		Flow Area (sq ft)		4.19	
E.G. Slope (ft/ft)	0.010482	Area (sq ft)		4.19	
Q Total (cfs)	9.00	Flow (cfs)		9.00	
Top Width (ft)	6.46	Top Width (ft)		6.46	
Vel Total (ft/s)	2.15	Avg. Vel. (ft/s)		2.15	
Max Chl Dpth (ft)	0.73	Hydr. Depth (ft)		0.65	
Conv. Total (cfs)	87.9	Conv. (cfs)		87.9	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		7.07	
Min Ch El (ft)	803.00	Shear (lb/sq ft)		0.39	
Alpha	1.00	Stream Power (lb/ft s)		0.83	
Frctn Loss (ft)	2.23	Cum Volume (acre-ft)	0.01	0.27	0.03
C & E Loss (ft)	0.00	Cum SA (acres)	0.02	0.10	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	803.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.86	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)		Flow Area (sq ft)		5.02	
E.G. Slope (ft/ft)	0.007586	Area (sq ft)		5.02	
Q Total (cfs)	10.00	Flow (cfs)		10.00	
Top Width (ft)	6.71	Top Width (ft)		6.71	

Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)	1.99		
Max Chl Dpth (ft)	0.86	Hydr. Depth (ft)	0.75		
Conv. Total (cfs)	114.8	Conv. (cfs)	114.8		
Length Wtd. (ft)	146.15	Wetted Per. (ft)	7.42		
Min Ch El (ft)	803.00	Shear (lb/sq ft)	0.32		
Alpha	1.00	Stream Power (lb/ft s)	0.64		
Frctn Loss (ft)	2.32	Cum Volume (acre-ft)	0.06	0.31	0.16
C & E Loss (ft)	0.01	Cum SA (acres)	0.07	0.10	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	804.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.050	
W.S. Elev (ft)	804.25	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	803.75	Flow Area (sq ft)		7.83	
E.G. Slope (ft/ft)	0.008300	Area (sq ft)		7.83	
Q Total (cfs)	20.00	Flow (cfs)		20.00	
Top Width (ft)	7.50	Top Width (ft)		7.50	
Vel Total (ft/s)	2.55	Avg. Vel. (ft/s)		2.55	
Max Chl Dpth (ft)	1.25	Hydr. Depth (ft)		1.04	
Conv. Total (cfs)	219.5	Conv. (cfs)		219.5	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		8.54	
Min Ch El (ft)	803.00	Shear (lb/sq ft)		0.47	
Alpha	1.00	Stream Power (lb/ft s)		1.21	
Frctn Loss (ft)	2.40	Cum Volume (acre-ft)	0.18	0.40	0.35
C & E Loss (ft)	0.02	Cum SA (acres)	0.09	0.11	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	804.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.050	
W.S. Elev (ft)	804.51	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	803.97	Flow Area (sq ft)		9.82	
E.G. Slope (ft/ft)	0.009778	Area (sq ft)		9.82	
Q Total (cfs)	30.00	Flow (cfs)		30.00	
Top Width (ft)	8.02	Top Width (ft)		8.02	
Vel Total (ft/s)	3.05	Avg. Vel. (ft/s)		3.05	
Max Chl Dpth (ft)	1.51	Hydr. Depth (ft)		1.22	
Conv. Total (cfs)	303.4	Conv. (cfs)		303.4	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		9.27	
Min Ch El (ft)	803.00	Shear (lb/sq ft)		0.65	
Alpha	1.00	Stream Power (lb/ft s)		1.98	
Frctn Loss (ft)	2.42	Cum Volume (acre-ft)	0.27	0.46	0.48
C & E Loss (ft)	0.02	Cum SA (acres)	0.09	0.12	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	804.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.050	
W.S. Elev (ft)	804.72	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	804.15	Flow Area (sq ft)		11.54	
E.G. Slope (ft/ft)	0.011033	Area (sq ft)		11.54	
Q Total (cfs)	40.00	Flow (cfs)		40.00	

Top Width (ft)	8.44	Top Width (ft)	8.44		
Vel Total (ft/s)	3.47	Avg. Vel. (ft/s)	3.47		
Max Chl Dpth (ft)	1.72	Hydr. Depth (ft)	1.37		
Conv. Total (cfs)	380.8	Conv. (cfs)	380.8		
Length Wtd. (ft)	146.15	Wetted Per. (ft)	9.86		
Min Ch El (ft)	803.00	Shear (lb/sq ft)	0.81		
Alpha	1.00	Stream Power (lb/ft s)	2.79		
Frctn Loss (ft)	2.39	Cum Volume (acre-ft)	0.36	0.54	0.63
C & E Loss (ft)	0.01	Cum SA (acres)	0.09	0.13	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	805.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.050	
W.S. Elev (ft)	804.86	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	804.32	Flow Area (sq ft)		12.78	
E.G. Slope (ft/ft)	0.012957	Area (sq ft)		12.78	
Q Total (cfs)	50.00	Flow (cfs)		50.00	
Top Width (ft)	8.72	Top Width (ft)		8.72	
Vel Total (ft/s)	3.91	Avg. Vel. (ft/s)		3.91	
Max Chl Dpth (ft)	1.86	Hydr. Depth (ft)		1.46	
Conv. Total (cfs)	439.3	Conv. (cfs)		439.3	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		10.27	
Min Ch El (ft)	803.00	Shear (lb/sq ft)		1.01	
Alpha	1.00	Stream Power (lb/ft s)		3.94	
Frctn Loss (ft)	2.33	Cum Volume (acre-ft)	0.46	0.62	0.79
C & E Loss (ft)	0.01	Cum SA (acres)	0.09	0.14	0.17

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	805.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.		0.050	
W.S. Elev (ft)	804.91	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	804.48	Flow Area (sq ft)		13.23	
E.G. Slope (ft/ft)	0.016908	Area (sq ft)		13.23	
Q Total (cfs)	60.00	Flow (cfs)		60.00	
Top Width (ft)	8.83	Top Width (ft)		8.83	
Vel Total (ft/s)	4.53	Avg. Vel. (ft/s)		4.53	
Max Chl Dpth (ft)	1.91	Hydr. Depth (ft)		1.50	
Conv. Total (cfs)	461.4	Conv. (cfs)		461.4	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		10.41	
Min Ch El (ft)	803.00	Shear (lb/sq ft)		1.34	
Alpha	1.00	Stream Power (lb/ft s)		6.08	
Frctn Loss (ft)	2.12	Cum Volume (acre-ft)	0.69	0.74	1.05
C & E Loss (ft)	0.02	Cum SA (acres)	0.32	0.14	0.28

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: Tributary  
REACH: Reach 1 RS: 204

INPUT

Description:

Station Elevation Data		num=	18						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	25	810	47	805	93	805	110	805
111	804	113	803	114	802	115	801	118	800.87
121	801	122	802	123	803	124	804	126	805
145	806	164	809	177	810				

Manning's n Values            num=            3  
 Sta   n Val        Sta   n Val        Sta   n Val  
   0     .12        110    .05        126    .12

Bank Sta: Left    Right        Lengths: Left Channel    Right        Coeff Contr.    Expan.  
           110     126            125 133.28     133            .1            .3

CROSS SECTION OUTPUT    Profile #1

E.G. Elev (ft)	801.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.33	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.13	Flow Area (sq ft)		2.47	
E.G. Slope (ft/ft)	0.006609	Area (sq ft)		2.47	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	6.66	Top Width (ft)		6.66	
Vel Total (ft/s)	1.21	Avg. Vel. (ft/s)		1.21	
Max Chl Dpth (ft)	0.46	Hydr. Depth (ft)		0.37	
Conv. Total (cfs)	36.9	Conv. (cfs)		36.9	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		6.94	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.18	
Frctn Loss (ft)	2.02	Cum Volume (acre-ft)		0.12	
C & E Loss (ft)	0.01	Cum SA (acres)		0.06	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT    Profile #1.4

E.G. Elev (ft)	801.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.33	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.13	Flow Area (sq ft)		2.47	
E.G. Slope (ft/ft)	0.006605	Area (sq ft)		2.47	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	6.66	Top Width (ft)		6.66	
Vel Total (ft/s)	1.21	Avg. Vel. (ft/s)		1.21	
Max Chl Dpth (ft)	0.46	Hydr. Depth (ft)		0.37	
Conv. Total (cfs)	36.9	Conv. (cfs)		36.9	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		6.94	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.18	
Frctn Loss (ft)	2.02	Cum Volume (acre-ft)	0.00	0.15	
C & E Loss (ft)	0.01	Cum SA (acres)		0.07	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT    Profile #2

E.G. Elev (ft)	801.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.40	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.17	Flow Area (sq ft)		2.96	
E.G. Slope (ft/ft)	0.006725	Area (sq ft)		2.96	
Q Total (cfs)	4.00	Flow (cfs)		4.00	
Top Width (ft)	6.80	Top Width (ft)		6.80	
Vel Total (ft/s)	1.35	Avg. Vel. (ft/s)		1.35	
Max Chl Dpth (ft)	0.53	Hydr. Depth (ft)		0.43	
Conv. Total (cfs)	48.8	Conv. (cfs)		48.8	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		7.14	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.17	
Alpha	1.00	Stream Power (lb/ft s)		0.24	

Frctn Loss (ft)	2.02	Cum Volume (acre-ft)	0.00	0.18
C & E Loss (ft)	0.01	Cum SA (acres)		0.07

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	801.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.45	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.34	Flow Area (sq ft)		3.30	
E.G. Slope (ft/ft)	0.024274	Area (sq ft)		3.30	
Q Total (cfs)	9.00	Flow (cfs)		9.00	
Top Width (ft)	6.90	Top Width (ft)		6.90	
Vel Total (ft/s)	2.73	Avg. Vel. (ft/s)		2.73	
Max Chl Dpth (ft)	0.58	Hydr. Depth (ft)		0.48	
Conv. Total (cfs)	57.8	Conv. (cfs)		57.8	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		7.28	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.69	
Alpha	1.00	Stream Power (lb/ft s)		1.87	
Frctn Loss (ft)	1.69	Cum Volume (acre-ft)	0.01	0.25	0.03
C & E Loss (ft)	0.02	Cum SA (acres)	0.02	0.08	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	801.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.37	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.37	Flow Area (sq ft)		2.76	
E.G. Slope (ft/ft)	0.052118	Area (sq ft)		2.76	
Q Total (cfs)	10.00	Flow (cfs)		10.00	
Top Width (ft)	6.74	Top Width (ft)		6.74	
Vel Total (ft/s)	3.63	Avg. Vel. (ft/s)		3.63	
Max Chl Dpth (ft)	0.50	Hydr. Depth (ft)		0.41	
Conv. Total (cfs)	43.8	Conv. (cfs)		43.8	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		7.06	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		1.27	
Alpha	1.00	Stream Power (lb/ft s)		4.61	
Frctn Loss (ft)	1.38	Cum Volume (acre-ft)	0.06	0.30	0.16
C & E Loss (ft)	0.05	Cum SA (acres)	0.07	0.08	0.17

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.  
 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 OUTPUT Profile #25

E.G. Elev (ft)	801.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.62	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.61	Flow Area (sq ft)		4.48	
E.G. Slope (ft/ft)	0.046827	Area (sq ft)		4.48	



Q Total (cfs)	20.00	Flow (cfs)		20.00		
Top Width (ft)	7.24	Top Width (ft)		7.24		
Vel Total (ft/s)	4.46	Avg. Vel. (ft/s)		4.46		
Max Chl Dpth (ft)	0.75	Hydr. Depth (ft)		0.62		
Conv. Total (cfs)	92.4	Conv. (cfs)		92.4		
Length Wtd. (ft)	133.28	Wetted Per. (ft)		7.75		
Min Ch El (ft)	800.87	Shear (lb/sq ft)		1.69		
Alpha	1.00	Stream Power (lb/ft s)		7.54		
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	0.18	0.38		0.35
C & E Loss (ft)	0.08	Cum SA (acres)	0.09	0.09		0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	802.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.89	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.82	Flow Area (sq ft)		6.55	
E.G. Slope (ft/ft)	0.033850	Area (sq ft)		6.55	
Q Total (cfs)	30.00	Flow (cfs)		30.00	
Top Width (ft)	7.79	Top Width (ft)		7.79	
Vel Total (ft/s)	4.58	Avg. Vel. (ft/s)		4.58	
Max Chl Dpth (ft)	1.02	Hydr. Depth (ft)		0.84	
Conv. Total (cfs)	163.1	Conv. (cfs)		163.1	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		8.53	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		1.62	
Alpha	1.00	Stream Power (lb/ft s)		7.43	
Frctn Loss (ft)	1.07	Cum Volume (acre-ft)	0.27	0.44	0.48
C & E Loss (ft)	0.08	Cum SA (acres)	0.09	0.09	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	802.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.050	
W.S. Elev (ft)	802.15	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.99	Flow Area (sq ft)		8.62	
E.G. Slope (ft/ft)	0.026829	Area (sq ft)		8.62	
Q Total (cfs)	40.00	Flow (cfs)		40.00	
Top Width (ft)	8.30	Top Width (ft)		8.30	
Vel Total (ft/s)	4.64	Avg. Vel. (ft/s)		4.64	
Max Chl Dpth (ft)	1.28	Hydr. Depth (ft)		1.04	
Conv. Total (cfs)	244.2	Conv. (cfs)		244.2	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		9.26	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		1.56	
Alpha	1.00	Stream Power (lb/ft s)		7.23	
Frctn Loss (ft)	0.86	Cum Volume (acre-ft)	0.36	0.50	0.63
C & E Loss (ft)	0.08	Cum SA (acres)	0.09	0.10	0.17

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	802.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.050	
W.S. Elev (ft)	802.44	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	802.15	Flow Area (sq ft)		11.12	
E.G. Slope (ft/ft)	0.020116	Area (sq ft)		11.12	
Q Total (cfs)	50.00	Flow (cfs)		50.00	

Top Width (ft)	8.88	Top Width (ft)	8.88		
Vel Total (ft/s)	4.50	Avg. Vel. (ft/s)	4.50		
Max Chl Dpth (ft)	1.57	Hydr. Depth (ft)	1.25		
Conv. Total (cfs)	352.5	Conv. (cfs)	352.5		
Length Wtd. (ft)	133.28	Wetted Per. (ft)	10.08		
Min Ch El (ft)	800.87	Shear (lb/sq ft)	1.38		
Alpha	1.00	Stream Power (lb/ft s)	6.23		
Frctn Loss (ft)	0.63	Cum Volume (acre-ft)	0.46	0.58	0.79
C & E Loss (ft)	0.08	Cum SA (acres)	0.09	0.11	0.17

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	803.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.050	
W.S. Elev (ft)	802.85	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)		Flow Area (sq ft)		14.92	
E.G. Slope (ft/ft)	0.012541	Area (sq ft)		14.92	
Q Total (cfs)	60.00	Flow (cfs)		60.00	
Top Width (ft)	9.70	Top Width (ft)		9.70	
Vel Total (ft/s)	4.02	Avg. Vel. (ft/s)		4.02	
Max Chl Dpth (ft)	1.98	Hydr. Depth (ft)		1.54	
Conv. Total (cfs)	535.8	Conv. (cfs)		535.8	
Length Wtd. (ft)	133.01	Wetted Per. (ft)		11.24	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		1.04	
Alpha	1.00	Stream Power (lb/ft s)		4.18	
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	0.69	0.69	1.05
C & E Loss (ft)	0.07	Cum SA (acres)	0.32	0.11	0.28

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: Tributary  
REACH: Reach 1 RS: 202

INPUT

Description:

Station Elevation Data	num=	15
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
0 810 24 803 104 802 106 801 107 800		
108 799 110 799 113 799 114 800 116 801		
118 802 145 802.72 169 803 210 804 230 805		

Manning's n Values	num=	4
Sta n Val Sta n Val Sta n Val Sta n Val		
0 .12 104 .05 118 .12 145 .03		

Bank Sta: Left Right Lengths: Left Channel Right	Coeff Contr.	Expan.
104 118 219 240.43 214	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	799.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.050	
W.S. Elev (ft)	799.22	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)	799.22	Flow Area (sq ft)		1.15	
E.G. Slope (ft/ft)	0.063849	Area (sq ft)		1.15	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	5.44	Top Width (ft)		5.44	
Vel Total (ft/s)	2.61	Avg. Vel. (ft/s)		2.61	
Max Chl Dpth (ft)	0.22	Hydr. Depth (ft)		0.21	
Conv. Total (cfs)	11.9	Conv. (cfs)		11.9	
Length Wtd. (ft)	240.43	Wetted Per. (ft)		5.62	
Min Ch El (ft)	799.00	Shear (lb/sq ft)		0.82	
Alpha	1.00	Stream Power (lb/ft s)		2.13	
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)		0.12	
C & E Loss (ft)	0.02	Cum SA (acres)		0.05	

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 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 OUTPUT Profile #1.4

E.G. Elev (ft)	799.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.050	
W.S. Elev (ft)	799.22	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)	799.22	Flow Area (sq ft)		1.15	
E.G. Slope (ft/ft)	0.063966	Area (sq ft)		1.15	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	5.44	Top Width (ft)		5.44	
Vel Total (ft/s)	2.61	Avg. Vel. (ft/s)		2.61	
Max Chl Dpth (ft)	0.22	Hydr. Depth (ft)		0.21	
Conv. Total (cfs)	11.9	Conv. (cfs)		11.9	
Length Wtd. (ft)	240.43	Wetted Per. (ft)		5.62	
Min Ch El (ft)	799.00	Shear (lb/sq ft)		0.82	
Alpha	1.00	Stream Power (lb/ft s)		2.13	
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	0.00	0.14	
C & E Loss (ft)	0.02	Cum SA (acres)		0.05	

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 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 OUTPUT Profile #2

E.G. Elev (ft)	799.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.050	
W.S. Elev (ft)	799.27	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)	799.27	Flow Area (sq ft)		1.40	
E.G. Slope (ft/ft)	0.061098	Area (sq ft)		1.40	
Q Total (cfs)	4.00	Flow (cfs)		4.00	
Top Width (ft)	5.53	Top Width (ft)		5.53	
Vel Total (ft/s)	2.86	Avg. Vel. (ft/s)		2.86	
Max Chl Dpth (ft)	0.27	Hydr. Depth (ft)		0.25	
Conv. Total (cfs)	16.2	Conv. (cfs)		16.2	
Length Wtd. (ft)	240.43	Wetted Per. (ft)		5.75	
Min Ch El (ft)	799.00	Shear (lb/sq ft)		0.93	
Alpha	1.00	Stream Power (lb/ft s)		2.65	
Frctn Loss (ft)	0.50	Cum Volume (acre-ft)	0.00	0.17	
C & E Loss (ft)	0.02	Cum SA (acres)		0.05	

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 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 OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.86	Wt. n-Val.		0.050	
Vel Head (ft)	0.06	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	799.80	Flow Area (sq ft)		4.63	
Crit W.S. (ft)	799.45	Area (sq ft)		4.63	
E.G. Slope (ft/ft)	0.007786	Flow (cfs)		9.00	
Q Total (cfs)	9.00	Top Width (ft)		6.60	
Top Width (ft)	6.60	Avg. Vel. (ft/s)		1.94	
Vel Total (ft/s)	1.94	Hydr. Depth (ft)		0.70	
Max Chl Dpth (ft)	0.80	Conv. (cfs)		102.0	
Conv. Total (cfs)	102.0	Wetted Per. (ft)		7.26	
Length Wtd. (ft)	239.23	Shear (lb/sq ft)		0.31	
Min Ch El (ft)	799.00	Stream Power (lb/ft s)		0.60	
Alpha	1.00	Cum Volume (acre-ft)	0.01	0.24	0.03
Frctn Loss (ft)	0.52	Cum SA (acres)	0.02	0.06	0.17
C & E Loss (ft)	0.00				

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.06	Wt. n-Val.		0.050	
Vel Head (ft)	0.04	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	800.01	Flow Area (sq ft)		6.10	
Crit W.S. (ft)		Area (sq ft)		6.10	
E.G. Slope (ft/ft)	0.004283	Flow (cfs)		10.00	
Q Total (cfs)	10.00	Top Width (ft)		7.04	
Top Width (ft)	7.04	Avg. Vel. (ft/s)		1.64	
Vel Total (ft/s)	1.64	Hydr. Depth (ft)		0.87	
Max Chl Dpth (ft)	1.01	Conv. (cfs)		152.8	
Conv. Total (cfs)	152.8	Wetted Per. (ft)		7.88	
Length Wtd. (ft)	232.38	Shear (lb/sq ft)		0.21	
Min Ch El (ft)	799.00	Stream Power (lb/ft s)		0.34	
Alpha	1.00	Cum Volume (acre-ft)	0.06	0.29	0.16
Frctn Loss (ft)	0.24	Cum SA (acres)	0.07	0.06	0.17
C & E Loss (ft)	0.00				

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

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.63	Wt. n-Val.		0.050	
Vel Head (ft)	0.06	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	800.57	Flow Area (sq ft)		10.49	
Crit W.S. (ft)		Area (sq ft)		10.49	
E.G. Slope (ft/ft)	0.003822	Flow (cfs)		20.00	
Q Total (cfs)	20.00	Top Width (ft)		8.71	
Top Width (ft)	8.71	Avg. Vel. (ft/s)		1.91	
Vel Total (ft/s)	1.91	Hydr. Depth (ft)		1.20	
Max Chl Dpth (ft)	1.57	Conv. (cfs)		323.5	
Conv. Total (cfs)	323.5	Wetted Per. (ft)		9.91	
Length Wtd. (ft)	227.61	Shear (lb/sq ft)		0.25	
Min Ch El (ft)	799.00	Stream Power (lb/ft s)		0.48	
Alpha	1.00	Cum Volume (acre-ft)	0.18	0.35	0.35
Frctn Loss (ft)	0.13	Cum SA (acres)	0.09	0.06	0.17
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.07	Wt. n-Val.		0.050	
Vel Head (ft)	0.07	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	801.01				

Crit W.S. (ft)		Flow Area (sq ft)		14.56	
E.G. Slope (ft/ft)	0.003513	Area (sq ft)		14.56	
Q Total (cfs)	30.00	Flow (cfs)		30.00	
Top Width (ft)	10.02	Top Width (ft)		10.02	
Vel Total (ft/s)	2.06	Avg. Vel. (ft/s)		2.06	
Max Chl Dpth (ft)	2.01	Hydr. Depth (ft)		1.45	
Conv. Total (cfs)	506.2	Conv. (cfs)		506.2	
Length Wtd. (ft)	226.10	Wetted Per. (ft)		11.50	
Min Ch El (ft)	799.00	Shear (lb/sq ft)		0.28	
Alpha	1.00	Stream Power (lb/ft s)		0.57	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	0.27	0.40	0.48
C & E Loss (ft)	0.01	Cum SA (acres)	0.09	0.07	0.17

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

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	801.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.48	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)		Flow Area (sq ft)		19.76	
E.G. Slope (ft/ft)	0.002827	Area (sq ft)		19.76	
Q Total (cfs)	40.00	Flow (cfs)		40.00	
Top Width (ft)	11.92	Top Width (ft)		11.92	
Vel Total (ft/s)	2.02	Avg. Vel. (ft/s)		2.02	
Max Chl Dpth (ft)	2.48	Hydr. Depth (ft)		1.66	
Conv. Total (cfs)	752.3	Conv. (cfs)		752.3	
Length Wtd. (ft)	225.07	Wetted Per. (ft)		13.62	
Min Ch El (ft)	799.00	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		0.52	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.36	0.46	0.63
C & E Loss (ft)	0.01	Cum SA (acres)	0.09	0.07	0.17

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	802.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.050	
W.S. Elev (ft)	802.00	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)		Flow Area (sq ft)		26.47	
E.G. Slope (ft/ft)	0.002054	Area (sq ft)		26.47	
Q Total (cfs)	50.00	Flow (cfs)		50.00	
Top Width (ft)	13.99	Top Width (ft)		13.99	
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)		1.89	
Max Chl Dpth (ft)	3.00	Hydr. Depth (ft)		1.89	
Conv. Total (cfs)	1103.3	Conv. (cfs)		1103.3	
Length Wtd. (ft)	224.24	Wetted Per. (ft)		15.94	
Min Ch El (ft)	799.00	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.40	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.46	0.52	0.79
C & E Loss (ft)	0.01	Cum SA (acres)	0.09	0.08	0.17

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	802.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	802.73	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)		Flow Area (sq ft)	21.26	36.71	9.97
E.G. Slope (ft/ft)	0.000817	Area (sq ft)	21.26	36.71	9.97
Q Total (cfs)	60.00	Flow (cfs)	3.84	54.35	1.81
Top Width (ft)	100.10	Top Width (ft)	58.33	14.00	27.78
Vel Total (ft/s)	0.88	Avg. Vel. (ft/s)	0.18	1.48	0.18

Max Chl Dpth (ft)	3.73	Hydr. Depth (ft)	0.36	2.62	0.36
Conv. Total (cfs)	2099.3	Conv. (cfs)	134.3	1901.4	63.5
Length Wtd. (ft)	223.12	Wetted Per. (ft)	58.33	15.95	27.79
Min Ch El (ft)	799.00	Shear (lb/sq ft)	0.02	0.12	0.02
Alpha	2.55	Stream Power (lb/ft s)	0.00	0.17	0.00
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.66	0.61	1.04
C & E Loss (ft)	0.00	Cum SA (acres)	0.24	0.08	0.24

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: Tributary  
 REACH: Reach 1 RS: 200

INPUT

Description:

Station Elevation Data	num=	13
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
0 800 37 799 38 798 39 797 40 796		
43 795.34 47 796 48 797 50 798 51 799		
54 799 79 799.23 120 799		

Manning's n Values	num=	4
Sta n Val Sta n Val Sta n Val Sta n Val		
0 .12 37 .05 54 .12 79 .03		

Bank Sta: Left Right	Coeff Contr.	Expan.
37 51	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	797.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
W.S. Elev (ft)	797.77	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)		18.09	
E.G. Slope (ft/ft)	0.001356	Area (sq ft)		18.09	
Q Total (cfs)	25.00	Flow (cfs)		25.00	
Top Width (ft)	11.30	Top Width (ft)		11.30	
Vel Total (ft/s)	1.38	Avg. Vel. (ft/s)		1.38	
Max Chl Dpth (ft)	2.43	Hydr. Depth (ft)		1.60	
Conv. Total (cfs)	678.9	Conv. (cfs)		678.9	
Length Wtd. (ft)	85.00	Wetted Per. (ft)		12.75	
Min Ch El (ft)	795.34	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.17	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.00	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	798.17	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.13	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)		22.36	
E.G. Slope (ft/ft)	0.001481	Area (sq ft)		22.36	
Q Total (cfs)	35.00	Flow (cfs)		35.00	
Top Width (ft)	12.26	Top Width (ft)		12.26	
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)		1.57	
Max Chl Dpth (ft)	2.79	Hydr. Depth (ft)		1.82	
Conv. Total (cfs)	909.3	Conv. (cfs)		909.3	
Length Wtd. (ft)	85.00	Wetted Per. (ft)		13.97	
Min Ch El (ft)	795.34	Shear (lb/sq ft)		0.15	
Alpha	1.00	Stream Power (lb/ft s)		0.23	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.00	0.08	
C & E Loss (ft)	0.00	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	798.52				
Vel Head (ft)	0.05	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.47	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)		26.64	
E.G. Slope (ft/ft)	0.001842	Area (sq ft)		26.64	
Q Total (cfs)	50.00	Flow (cfs)		50.00	
Top Width (ft)	12.94	Top Width (ft)		12.94	
Vel Total (ft/s)	1.88	Avg. Vel. (ft/s)		1.88	
Max Chl Dpth (ft)	3.13	Hydr. Depth (ft)		2.06	
Conv. Total (cfs)	1165.1	Conv. (cfs)		1165.1	
Length Wtd. (ft)	85.00	Wetted Per. (ft)		14.93	
Min Ch El (ft)	795.34	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.39	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	0.00	0.09	
C & E Loss (ft)	0.00	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.33				
Vel Head (ft)	0.08	Wt. n-Val.	0.120	0.050	0.043
W.S. Elev (ft)	799.26	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)	1.21	37.39	10.07
E.G. Slope (ft/ft)	0.001976	Area (sq ft)	1.21	37.39	10.07
Q Total (cfs)	90.00	Flow (cfs)	0.17	85.46	4.37
Top Width (ft)	92.47	Top Width (ft)	9.47	14.00	69.00
Vel Total (ft/s)	1.85	Avg. Vel. (ft/s)	0.14	2.29	0.43
Max Chl Dpth (ft)	3.92	Hydr. Depth (ft)	0.13	2.67	0.15
Conv. Total (cfs)	2024.6	Conv. (cfs)	3.8	1922.6	98.3
Length Wtd. (ft)	85.00	Wetted Per. (ft)	9.47	16.43	69.26
Min Ch El (ft)	795.34	Shear (lb/sq ft)	0.02	0.28	0.02
Alpha	1.45	Stream Power (lb/ft s)	0.00	0.64	0.01
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.01	0.13	0.01
C & E Loss (ft)	0.00	Cum SA (acres)			

Warning: The cross-section end points had to be extended vertically for the computed water surface.  
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.81				
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.050	0.042
W.S. Elev (ft)	799.78	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)	11.14	44.68	45.96
E.G. Slope (ft/ft)	0.000957	Area (sq ft)	11.14	44.68	45.96
Q Total (cfs)	120.00	Flow (cfs)	2.27	79.99	37.74
Top Width (ft)	111.72	Top Width (ft)	28.72	14.00	69.00
Vel Total (ft/s)	1.18	Avg. Vel. (ft/s)	0.20	1.79	0.82
Max Chl Dpth (ft)	4.44	Hydr. Depth (ft)	0.39	3.19	0.67
Conv. Total (cfs)	3879.6	Conv. (cfs)	73.4	2586.2	1220.0
Length Wtd. (ft)	85.00	Wetted Per. (ft)	28.73	16.43	69.78
Min Ch El (ft)	795.34	Shear (lb/sq ft)	0.02	0.16	0.04
Alpha	1.69	Stream Power (lb/ft s)	0.00	0.29	0.03
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.03	0.15	0.05
C & E Loss (ft)	0.01	Cum SA (acres)			

Warning: The cross-section end points had to be extended vertically for the computed water surface.  
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.48	Wt. n-Val.	0.120	0.050	0.042
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	800.46	Flow Area (sq ft)	35.55	54.26	93.20
Crit W.S. (ft)		Area (sq ft)	35.55	54.26	93.20
E.G. Slope (ft/ft)	0.000515	Flow (cfs)	9.65	81.16	89.19
Q Total (cfs)	180.00	Top Width (ft)	37.00	14.00	69.00
Top Width (ft)	120.00	Avg. Vel. (ft/s)	0.27	1.50	0.96
Vel Total (ft/s)	0.98	Hydr. Depth (ft)	0.96	3.88	1.35
Max Chl Dpth (ft)	5.12	Conv. (cfs)	424.9	3575.5	3929.5
Conv. Total (cfs)	7930.0	Wetted Per. (ft)	37.47	16.43	70.46
Length Wtd. (ft)	85.00	Shear (lb/sq ft)	0.03	0.11	0.04
Min Ch El (ft)	795.34	Stream Power (lb/ft s)	0.01	0.16	0.04
Alpha	1.52	Cum Volume (acre-ft)	0.09	0.18	0.12
Frctn Loss (ft)	0.09	Cum SA (acres)			
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.95	Wt. n-Val.	0.120	0.050	0.043
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	800.93	Flow Area (sq ft)	53.01	60.87	125.77
Crit W.S. (ft)		Area (sq ft)	53.01	60.87	125.77
E.G. Slope (ft/ft)	0.000394	Flow (cfs)	16.28	85.95	127.77
Q Total (cfs)	230.00	Top Width (ft)	37.00	14.00	69.00
Top Width (ft)	120.00	Avg. Vel. (ft/s)	0.31	1.41	1.02
Vel Total (ft/s)	0.96	Hydr. Depth (ft)	1.43	4.35	1.82
Max Chl Dpth (ft)	5.59	Conv. (cfs)	820.4	4330.6	6437.6
Conv. Total (cfs)	11588.5	Wetted Per. (ft)	37.95	16.43	70.93
Length Wtd. (ft)	85.00	Shear (lb/sq ft)	0.03	0.09	0.04
Min Ch El (ft)	795.34	Stream Power (lb/ft s)	0.01	0.13	0.04
Alpha	1.44	Cum Volume (acre-ft)	0.14	0.20	0.17
Frctn Loss (ft)	0.08	Cum SA (acres)			
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.44	Wt. n-Val.	0.120	0.050	0.043
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	801.42	Flow Area (sq ft)	71.13	67.72	159.56
Crit W.S. (ft)		Area (sq ft)	71.13	67.72	159.56
E.G. Slope (ft/ft)	0.000328	Flow (cfs)	24.04	93.69	172.26
Q Total (cfs)	290.00	Top Width (ft)	37.00	14.00	69.00
Top Width (ft)	120.00	Avg. Vel. (ft/s)	0.34	1.38	1.08
Vel Total (ft/s)	0.97	Hydr. Depth (ft)	1.92	4.84	2.31
Max Chl Dpth (ft)	6.08	Conv. (cfs)	1327.7	5173.6	9512.2
Conv. Total (cfs)	16013.5	Wetted Per. (ft)	38.44	16.43	71.42
Length Wtd. (ft)	85.00	Shear (lb/sq ft)	0.04	0.08	0.05
Min Ch El (ft)	795.34	Stream Power (lb/ft s)	0.01	0.12	0.05
Alpha	1.40	Cum Volume (acre-ft)	0.18	0.22	0.24
Frctn Loss (ft)	0.07	Cum SA (acres)			
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.97	Wt. n-Val.	0.120	0.050	0.043
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	801.94	Flow Area (sq ft)	90.37	75.01	195.45
Crit W.S. (ft)		Area (sq ft)	90.37	75.01	195.45
E.G. Slope (ft/ft)	0.000300	Flow (cfs)	33.99	106.31	229.70
Q Total (cfs)	370.00				



Top Width (ft)	120.00	Top Width (ft)	37.00	14.00	69.00
Vel Total (ft/s)	1.03	Avg. Vel. (ft/s)	0.38	1.42	1.18
Max Chl Dpth (ft)	6.60	Hydr. Depth (ft)	2.44	5.36	2.83
Conv. Total (cfs)	21346.9	Conv. (cfs)	1961.1	6133.5	13252.3
Length Wtd. (ft)	85.00	Wetted Per. (ft)	38.96	16.43	71.94
Min Ch El (ft)	795.34	Shear (lb/sq ft)	0.04	0.09	0.05
Alpha	1.38	Stream Power (lb/ft s)	0.02	0.12	0.06
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	0.24	0.24	0.31
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	802.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.120	0.050	0.043
W.S. Elev (ft)	802.67	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)	117.28	85.18	245.61
E.G. Slope (ft/ft)	0.000260	Area (sq ft)	117.28	85.18	245.61
Q Total (cfs)	480.00	Flow (cfs)	48.18	122.16	309.66
Top Width (ft)	120.00	Top Width (ft)	37.00	14.00	69.00
Vel Total (ft/s)	1.07	Avg. Vel. (ft/s)	0.41	1.43	1.26
Max Chl Dpth (ft)	7.33	Hydr. Depth (ft)	3.17	6.08	3.56
Conv. Total (cfs)	29793.5	Conv. (cfs)	2990.6	7582.6	19220.3
Length Wtd. (ft)	85.00	Wetted Per. (ft)	39.68	16.43	72.67
Min Ch El (ft)	795.34	Shear (lb/sq ft)	0.05	0.08	0.05
Alpha	1.36	Stream Power (lb/ft s)	0.02	0.12	0.07
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.31	0.27	0.41
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 142

INPUT

Description:

Station Elevation Data		num= 22							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830	18	828	44	826	62	825	79	824
86	823	93	822	99	821	103	820	105	819
107	818	109	817	112	816	116	814.6	117	816
121	817	123	818	125	819	129	820	190	821
198	822	206	825						

Manning's n Values

num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	93	.12	107	.05	125	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	105	129		73	77.35	71	.1
							.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	817.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.		0.050	
W.S. Elev (ft)	816.67	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	816.67	Flow Area (sq ft)		8.38	
E.G. Slope (ft/ft)	0.045779	Area (sq ft)		8.38	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	9.66	Top Width (ft)		9.66	
Vel Total (ft/s)	5.37	Avg. Vel. (ft/s)		5.37	
Max Chl Dpth (ft)	2.07	Hydr. Depth (ft)		0.87	
Conv. Total (cfs)	210.3	Conv. (cfs)		210.3	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		10.81	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		2.22	
Alpha	1.00	Stream Power (lb/ft s)		11.90	
Frctn Loss (ft)	0.86	Cum Volume (acre-ft)		0.96	
C & E Loss (ft)	0.11	Cum SA (acres)		0.71	

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.31				
Vel Head (ft)	0.48	Wt. n-Val.		0.050	
W.S. Elev (ft)	816.83	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	816.83	Flow Area (sq ft)		10.07	
E.G. Slope (ft/ft)	0.044257	Area (sq ft)		10.07	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	10.82	Top Width (ft)		10.82	
Vel Total (ft/s)	5.56	Avg. Vel. (ft/s)		5.56	
Max Chl Dpth (ft)	2.23	Hydr. Depth (ft)		0.93	
Conv. Total (cfs)	266.2	Conv. (cfs)		266.2	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		12.01	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		2.32	
Alpha	1.00	Stream Power (lb/ft s)		12.88	
Frctn Loss (ft)	0.84	Cum Volume (acre-ft)	0.00	1.16	
C & E Loss (ft)	0.12	Cum SA (acres)		0.79	

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.53				
Vel Head (ft)	0.52	Wt. n-Val.		0.050	
W.S. Elev (ft)	817.00	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	817.00	Flow Area (sq ft)		12.05	
E.G. Slope (ft/ft)	0.043413	Area (sq ft)		12.05	
Q Total (cfs)	70.00	Flow (cfs)		70.00	
Top Width (ft)	12.02	Top Width (ft)		12.02	
Vel Total (ft/s)	5.81	Avg. Vel. (ft/s)		5.81	
Max Chl Dpth (ft)	2.40	Hydr. Depth (ft)		1.00	
Conv. Total (cfs)	336.0	Conv. (cfs)		336.0	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		13.26	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		2.46	
Alpha	1.00	Stream Power (lb/ft s)		14.30	
Frctn Loss (ft)	0.80	Cum Volume (acre-ft)	0.00	1.37	
C & E Loss (ft)	0.13	Cum SA (acres)		0.84	

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.26				
Vel Head (ft)	0.69	Wt. n-Val.		0.050	
W.S. Elev (ft)	817.58	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	817.58	Flow Area (sq ft)		19.56	
E.G. Slope (ft/ft)	0.037660	Area (sq ft)		19.56	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	14.30	Top Width (ft)		14.30	
Vel Total (ft/s)	6.65	Avg. Vel. (ft/s)		6.65	
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)		1.37	
Conv. Total (cfs)	669.9	Conv. (cfs)		669.9	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		15.82	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		2.91	
Alpha	1.00	Stream Power (lb/ft s)		19.33	
Frctn Loss (ft)	0.64	Cum Volume (acre-ft)	0.01	2.10	0.00
C & E Loss (ft)	0.17	Cum SA (acres)	0.03	0.98	0.00

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.74				
Vel Head (ft)	0.80	Wt. n-Val.		0.050	
W.S. Elev (ft)	817.94	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	817.94	Flow Area (sq ft)		25.05	
E.G. Slope (ft/ft)	0.036112	Area (sq ft)		25.05	
Q Total (cfs)	180.00	Flow (cfs)		180.00	
Top Width (ft)	15.76	Top Width (ft)		15.76	
Vel Total (ft/s)	7.19	Avg. Vel. (ft/s)		7.19	
Max Chl Dpth (ft)	3.34	Hydr. Depth (ft)		1.59	
Conv. Total (cfs)	947.2	Conv. (cfs)		947.2	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		17.45	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		3.24	
Alpha	1.00	Stream Power (lb/ft s)		23.26	
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	0.08	2.68	0.01
C & E Loss (ft)	0.20	Cum SA (acres)	0.13	1.08	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 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. Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	819.45				
Vel Head (ft)	0.98	Wt. n-Val.		0.055	
W.S. Elev (ft)	818.47	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	818.47	Flow Area (sq ft)		34.02	
E.G. Slope (ft/ft)	0.041602	Area (sq ft)		34.02	
Q Total (cfs)	270.00	Flow (cfs)		270.00	
Top Width (ft)	17.89	Top Width (ft)		17.89	
Vel Total (ft/s)	7.94	Avg. Vel. (ft/s)		7.94	
Max Chl Dpth (ft)	3.87	Hydr. Depth (ft)		1.90	
Conv. Total (cfs)	1323.8	Conv. (cfs)		1323.8	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		19.83	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		4.46	
Alpha	1.00	Stream Power (lb/ft s)		35.36	
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)	0.34	3.45	0.25
C & E Loss (ft)	0.25	Cum SA (acres)	0.50	1.16	0.55

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	819.92				
Vel Head (ft)	1.06	Wt. n-Val.		0.058	
W.S. Elev (ft)	818.85	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	818.85	Flow Area (sq ft)		41.06	
E.G. Slope (ft/ft)	0.043714	Area (sq ft)		41.06	
Q Total (cfs)	340.00	Flow (cfs)		340.00	
Top Width (ft)	19.40	Top Width (ft)		19.40	
Vel Total (ft/s)	8.28	Avg. Vel. (ft/s)		8.28	
Max Chl Dpth (ft)	4.25	Hydr. Depth (ft)		2.12	
Conv. Total (cfs)	1626.2	Conv. (cfs)		1626.2	
Length Wtd. (ft)	77.33	Wetted Per. (ft)		21.52	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		5.21	
Alpha	1.00	Stream Power (lb/ft s)		43.11	
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)	0.69	3.93	0.63
C & E Loss (ft)	0.27	Cum SA (acres)	0.81	1.18	0.94

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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. Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	820.44				
Vel Head (ft)	1.17	Wt. n-Val.	0.120	0.062	
W.S. Elev (ft)	819.27	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	819.27	Flow Area (sq ft)	0.07	49.45	
E.G. Slope (ft/ft)	0.048582	Area (sq ft)	0.07	49.45	
Q Total (cfs)	430.00	Flow (cfs)	0.05	429.95	
Top Width (ft)	21.59	Top Width (ft)	0.53	21.06	
Vel Total (ft/s)	8.68	Avg. Vel. (ft/s)	0.66	8.69	
Max Chl Dpth (ft)	4.67	Hydr. Depth (ft)	0.13	2.35	
Conv. Total (cfs)	1950.9	Conv. (cfs)	0.2	1950.7	
Length Wtd. (ft)	77.30	Wetted Per. (ft)	0.59	23.28	
Min Ch El (ft)	814.60	Shear (lb/sq ft)	0.36	6.44	
Alpha	1.00	Stream Power (lb/ft s)	0.24	56.01	
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)	1.19	4.44	1.23
C & E Loss (ft)	0.29	Cum SA (acres)	1.18	1.20	1.42

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	820.95				
Vel Head (ft)	1.29	Wt. n-Val.	0.120	0.067	
W.S. Elev (ft)	819.66	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	819.66	Flow Area (sq ft)	0.43	58.01	
E.G. Slope (ft/ft)	0.054308	Area (sq ft)	0.43	58.01	
Q Total (cfs)	530.00	Flow (cfs)	0.55	529.45	
Top Width (ft)	23.94	Top Width (ft)	1.31	22.63	
Vel Total (ft/s)	9.07	Avg. Vel. (ft/s)	1.28	9.13	
Max Chl Dpth (ft)	5.06	Hydr. Depth (ft)	0.33	2.56	
Conv. Total (cfs)	2274.3	Conv. (cfs)	2.4	2271.9	
Length Wtd. (ft)	77.25	Wetted Per. (ft)	1.47	24.90	
Min Ch El (ft)	814.60	Shear (lb/sq ft)	1.00	7.90	
Alpha	1.01	Stream Power (lb/ft s)	1.27	72.10	
Frctn Loss (ft)	0.58	Cum Volume (acre-ft)	1.77	4.85	1.86
C & E Loss (ft)	0.32	Cum SA (acres)	1.55	1.20	1.72

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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. Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	821.65				
Vel Head (ft)	1.32	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	820.33	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	820.33	Flow Area (sq ft)	1.89	73.99	3.38
E.G. Slope (ft/ft)	0.047778	Area (sq ft)	1.89	73.99	3.38
Q Total (cfs)	690.00	Flow (cfs)	3.32	683.91	2.77
Top Width (ft)	47.65	Top Width (ft)	3.33	24.00	20.32
Vel Total (ft/s)	8.70	Avg. Vel. (ft/s)	1.76	9.24	0.82
Max Chl Dpth (ft)	5.73	Hydr. Depth (ft)	0.57	3.08	0.17
Conv. Total (cfs)	3156.7	Conv. (cfs)	15.2	3128.9	12.7
Length Wtd. (ft)	77.11	Wetted Per. (ft)	3.61	26.31	20.32
Min Ch El (ft)	814.60	Shear (lb/sq ft)	1.56	8.39	0.50
Alpha	1.12	Stream Power (lb/ft s)	2.74	77.53	0.41
Frctn Loss (ft)	0.56	Cum Volume (acre-ft)	2.51	5.45	2.96
C & E Loss (ft)	0.31	Cum SA (acres)	1.75	1.21	2.35

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 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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 140

INPUT

Description:

Station Elevation Data		num= 20									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830	23	827	51	825	58	824	68	823		
78	821	92	820	105	819	109	818	117	816		
123	815	127	813.5	136	815	138	816	139	817		
140	818	150	819	173	820	184	821	197	825		

Manning's n Values		num= 3					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	109	.05	140	.12		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	109	140		122 117.16	112	.1	.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.76				
Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	815.69	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)		20.63	
E.G. Slope (ft/ft)	0.004873	Area (sq ft)		20.63	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	18.52	Top Width (ft)		18.52	
Vel Total (ft/s)	2.18	Avg. Vel. (ft/s)		2.18	
Max Chl Dpth (ft)	2.19	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	644.6	Conv. (cfs)		644.6	
Length Wtd. (ft)	117.16	Wetted Per. (ft)		19.14	

Min Ch El (ft)	813.50	Shear (lb/sq ft)	0.33
Alpha	1.00	Stream Power (lb/ft s)	0.72
Frctn Loss (ft)	0.93	Cum Volume (acre-ft)	0.93
C & E Loss (ft)	0.01	Cum SA (acres)	0.69

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

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	815.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.050	
W.S. Elev (ft)	815.89	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)		24.42	
E.G. Slope (ft/ft)	0.004800	Area (sq ft)		24.42	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	20.09	Top Width (ft)		20.09	
Vel Total (ft/s)	2.29	Avg. Vel. (ft/s)		2.29	
Max Chl Dpth (ft)	2.39	Hydr. Depth (ft)		1.22	
Conv. Total (cfs)	808.3	Conv. (cfs)		808.3	
Length Wtd. (ft)	117.16	Wetted Per. (ft)		20.77	
Min Ch El (ft)	813.50	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		0.81	
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.00	1.13	
C & E Loss (ft)	0.01	Cum SA (acres)		0.77	

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

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	816.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.050	
W.S. Elev (ft)	816.12	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)		29.30	
E.G. Slope (ft/ft)	0.004513	Area (sq ft)		29.30	
Q Total (cfs)	70.00	Flow (cfs)		70.00	
Top Width (ft)	21.60	Top Width (ft)		21.60	
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)		2.39	
Max Chl Dpth (ft)	2.62	Hydr. Depth (ft)		1.36	
Conv. Total (cfs)	1042.0	Conv. (cfs)		1042.0	
Length Wtd. (ft)	117.16	Wetted Per. (ft)		22.38	
Min Ch El (ft)	813.50	Shear (lb/sq ft)		0.37	
Alpha	1.00	Stream Power (lb/ft s)		0.88	
Frctn Loss (ft)	0.83	Cum Volume (acre-ft)	0.00	1.33	
C & E Loss (ft)	0.01	Cum SA (acres)		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 OUTPUT Profile #5

E.G. Elev (ft)	817.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.050	
W.S. Elev (ft)	816.96	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)		49.19	
E.G. Slope (ft/ft)	0.003558	Area (sq ft)		49.19	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	25.80	Top Width (ft)		25.80	
Vel Total (ft/s)	2.64	Avg. Vel. (ft/s)		2.64	
Max Chl Dpth (ft)	3.46	Hydr. Depth (ft)		1.91	
Conv. Total (cfs)	2179.4	Conv. (cfs)		2179.4	
Length Wtd. (ft)	117.16	Wetted Per. (ft)		27.03	
Min Ch El (ft)	813.50	Shear (lb/sq ft)		0.40	
Alpha	1.00	Stream Power (lb/ft s)		1.07	
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)	0.01	2.04	0.00
C & E Loss (ft)	0.02	Cum SA (acres)	0.03	0.95	0.00

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.62	Wt. n-Val.		0.050	
Vel Head (ft)	0.12	Reach Len. (ft)	122.00	117.16	112.00
W.S. Elev (ft)	817.50	Flow Area (sq ft)		63.79	
Crit W.S. (ft)		Area (sq ft)		63.79	
E.G. Slope (ft/ft)	0.003298	Flow (cfs)		180.00	
Q Total (cfs)	180.00	Top Width (ft)		28.48	
Top Width (ft)	28.48	Avg. Vel. (ft/s)		2.82	
Vel Total (ft/s)	2.82	Hydr. Depth (ft)		2.24	
Max Chl Dpth (ft)	4.00	Conv. (cfs)		3134.2	
Conv. Total (cfs)	3134.2	Wetted Per. (ft)		30.00	
Length Wtd. (ft)	117.16	Shear (lb/sq ft)		0.44	
Min Ch El (ft)	813.50	Stream Power (lb/ft s)		1.24	
Alpha	1.00	Cum Volume (acre-ft)	0.08	2.60	0.01
Frctn Loss (ft)	0.72	Cum SA (acres)	0.13	1.04	0.01
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.39	Wt. n-Val.	0.030	0.050	0.120
Vel Head (ft)	0.15	Reach Len. (ft)	122.00	117.16	112.00
W.S. Elev (ft)	818.24	Flow Area (sq ft)	0.12	86.23	0.29
Crit W.S. (ft)		Area (sq ft)	0.12	86.23	0.29
E.G. Slope (ft/ft)	0.003056	Flow (cfs)	0.08	269.88	0.05
Q Total (cfs)	270.00	Top Width (ft)	0.96	31.00	2.41
Top Width (ft)	34.38	Avg. Vel. (ft/s)	0.65	3.13	0.17
Vel Total (ft/s)	3.12	Hydr. Depth (ft)	0.12	2.78	0.12
Max Chl Dpth (ft)	4.74	Conv. (cfs)	1.4	4882.0	0.9
Conv. Total (cfs)	4884.2	Wetted Per. (ft)	0.99	32.79	2.42
Length Wtd. (ft)	117.16	Shear (lb/sq ft)	0.02	0.50	0.02
Min Ch El (ft)	813.50	Stream Power (lb/ft s)	0.01	1.57	0.00
Alpha	1.01	Cum Volume (acre-ft)	0.34	3.35	0.25
Frctn Loss (ft)	0.68	Cum SA (acres)	0.50	1.12	0.55
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.87	Wt. n-Val.	0.030	0.050	0.120
Vel Head (ft)	0.18	Reach Len. (ft)	122.00	117.16	112.00
W.S. Elev (ft)	818.69	Flow Area (sq ft)	0.96	100.26	2.41
Crit W.S. (ft)		Area (sq ft)	0.96	100.26	2.41
E.G. Slope (ft/ft)	0.002899	Flow (cfs)	1.24	337.97	0.79
Q Total (cfs)	340.00	Top Width (ft)	2.78	31.00	6.94
Top Width (ft)	40.71	Avg. Vel. (ft/s)	1.29	3.37	0.33
Vel Total (ft/s)	3.28	Hydr. Depth (ft)	0.35	3.23	0.35
Max Chl Dpth (ft)	5.19	Conv. (cfs)	23.1	6277.0	14.7
Conv. Total (cfs)	6314.8	Wetted Per. (ft)	2.86	32.79	6.97
Length Wtd. (ft)	117.18	Shear (lb/sq ft)	0.06	0.55	0.06
Min Ch El (ft)	813.50	Stream Power (lb/ft s)	0.08	1.87	0.02
Alpha	1.05	Cum Volume (acre-ft)	0.69	3.81	0.63
Frctn Loss (ft)	0.66	Cum SA (acres)	0.81	1.14	0.94
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #100



		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	819.39	Wt. n-Val.	0.030	0.050	0.120
Vel Head (ft)	0.20	Reach Len. (ft)	122.00	117.16	112.00
W.S. Elev (ft)	819.19	Flow Area (sq ft)	2.96	115.49	7.25
Crit W.S. (ft)		Area (sq ft)	2.96	115.49	7.25
E.G. Slope (ft/ft)	0.002826	Flow (cfs)	4.60	422.37	3.03
Q Total (cfs)	430.00	Top Width (ft)	6.41	31.00	14.26
Top Width (ft)	51.67	Avg. Vel. (ft/s)	1.55	3.66	0.42
Vel Total (ft/s)	3.42	Hydr. Depth (ft)	0.46	3.73	0.51
Max Chl Dpth (ft)	5.69	Conv. (cfs)	86.6	7945.3	57.0
Conv. Total (cfs)	8089.0	Wetted Per. (ft)	6.54	32.79	14.31
Length Wtd. (ft)	117.20	Shear (lb/sq ft)	0.08	0.62	0.09
Min Ch El (ft)	813.50	Stream Power (lb/ft s)	0.12	2.27	0.04
Alpha	1.12	Cum Volume (acre-ft)	1.19	4.29	1.23
Frctn Loss (ft)	0.64	Cum SA (acres)	1.17	1.15	1.41
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	819.87	Wt. n-Val.	0.030	0.050	0.120
Vel Head (ft)	0.23	Reach Len. (ft)	122.00	117.16	112.00
W.S. Elev (ft)	819.63	Flow Area (sq ft)	7.13	129.36	15.93
Crit W.S. (ft)		Area (sq ft)	7.13	129.36	15.93
E.G. Slope (ft/ft)	0.002814	Flow (cfs)	12.98	509.19	7.83
Q Total (cfs)	530.00	Top Width (ft)	12.22	31.00	24.55
Top Width (ft)	67.77	Avg. Vel. (ft/s)	1.82	3.94	0.49
Vel Total (ft/s)	3.48	Hydr. Depth (ft)	0.58	4.17	0.65
Max Chl Dpth (ft)	6.13	Conv. (cfs)	244.7	9598.4	147.6
Conv. Total (cfs)	9990.6	Wetted Per. (ft)	12.37	32.79	24.61
Length Wtd. (ft)	117.26	Shear (lb/sq ft)	0.10	0.69	0.11
Min Ch El (ft)	813.50	Stream Power (lb/ft s)	0.18	2.73	0.06
Alpha	1.24	Cum Volume (acre-ft)	1.76	4.68	1.84
Frctn Loss (ft)	0.64	Cum SA (acres)	1.54	1.15	1.70
C & E Loss (ft)	0.03				

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

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	820.47	Wt. n-Val.	0.030	0.050	0.120
Vel Head (ft)	0.27	Reach Len. (ft)	122.00	117.16	112.00
W.S. Elev (ft)	820.20	Flow Area (sq ft)	16.23	147.03	33.42
Crit W.S. (ft)		Area (sq ft)	16.23	147.03	33.42
E.G. Slope (ft/ft)	0.002826	Flow (cfs)	37.18	631.62	21.20
Q Total (cfs)	690.00	Top Width (ft)	19.84	31.00	35.23
Top Width (ft)	86.07	Avg. Vel. (ft/s)	2.29	4.30	0.63
Vel Total (ft/s)	3.51	Hydr. Depth (ft)	0.82	4.74	0.95
Max Chl Dpth (ft)	6.70	Conv. (cfs)	699.5	11882.2	398.8
Conv. Total (cfs)	12980.5	Wetted Per. (ft)	20.01	32.79	35.31
Length Wtd. (ft)	117.38	Shear (lb/sq ft)	0.14	0.79	0.17
Min Ch El (ft)	813.50	Stream Power (lb/ft s)	0.33	3.40	0.11
Alpha	1.40	Cum Volume (acre-ft)	2.50	5.26	2.93
Frctn Loss (ft)	0.63	Cum SA (acres)	1.73	1.16	2.31
C & E Loss (ft)	0.03				

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: Main Channel  
 REACH: Upper RS: 138

INPUT

Description:  
 Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	47	820	61	819	96	818	103	817
107	816	109	815	111	814	115	812.4	119	814
121	815	123	816	125	817	127	818	132	819
141	820	149	821	169	825				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	103	.05	121	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	103	127		119 119.41	117	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	814.82	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.050	
W.S. Elev (ft)	814.60	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)		Flow Area (sq ft)		11.91	
E.G. Slope (ft/ft)	0.015057	Area (sq ft)		11.91	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	10.40	Top Width (ft)		10.40	
Vel Total (ft/s)	3.78	Avg. Vel. (ft/s)		3.78	
Max Chl Dpth (ft)	2.20	Hydr. Depth (ft)		1.15	
Conv. Total (cfs)	366.7	Conv. (cfs)		366.7	
Length Wtd. (ft)	119.41	Wetted Per. (ft)		11.30	
Min Ch El (ft)	812.40	Shear (lb/sq ft)		0.99	
Alpha	1.00	Stream Power (lb/ft s)		3.74	
Frctn Loss (ft)	0.73	Cum Volume (acre-ft)		0.89	
C & E Loss (ft)	0.04	Cum SA (acres)		0.65	

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: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	815.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.050	
W.S. Elev (ft)	814.87	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)		Flow Area (sq ft)		14.83	
E.G. Slope (ft/ft)	0.012850	Area (sq ft)		14.83	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	11.46	Top Width (ft)		11.46	
Vel Total (ft/s)	3.78	Avg. Vel. (ft/s)		3.78	
Max Chl Dpth (ft)	2.47	Hydr. Depth (ft)		1.29	
Conv. Total (cfs)	494.0	Conv. (cfs)		494.0	
Length Wtd. (ft)	119.41	Wetted Per. (ft)		12.49	
Min Ch El (ft)	812.40	Shear (lb/sq ft)		0.95	
Alpha	1.00	Stream Power (lb/ft s)		3.60	
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	0.00	1.00	
C & E Loss (ft)	0.04	Cum SA (acres)		0.73	

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: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	815.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.052	
W.S. Elev (ft)	815.13	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)		Flow Area (sq ft)		17.97	
E.G. Slope (ft/ft)	0.012841	Area (sq ft)		17.97	
Q Total (cfs)	70.00	Flow (cfs)		70.00	
Top Width (ft)	12.51	Top Width (ft)		12.51	
Vel Total (ft/s)	3.90	Avg. Vel. (ft/s)		3.90	
Max Chl Dpth (ft)	2.73	Hydr. Depth (ft)		1.44	
Conv. Total (cfs)	617.7	Conv. (cfs)		617.7	

Length Wtd. (ft)	119.41	Wetted Per. (ft)	13.66
Min Ch El (ft)	812.40	Shear (lb/sq ft)	1.05
Alpha	1.00	Stream Power (lb/ft s)	4.11
Frctn Loss (ft)	0.68	Cum Volume (acre-ft)	0.00
C & E Loss (ft)	0.04	Cum SA (acres)	0.76

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: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.31	Wt. n-Val.		0.061	
Vel Head (ft)	0.27	Reach Len. (ft)	119.00	119.41	117.00
W.S. Elev (ft)	816.04	Flow Area (sq ft)		30.98	
Crit W.S. (ft)		Area (sq ft)		30.98	
E.G. Slope (ft/ft)	0.014250	Flow (cfs)		130.00	
Q Total (cfs)	130.00	Top Width (ft)		16.22	
Top Width (ft)	16.22	Avg. Vel. (ft/s)		4.20	
Vel Total (ft/s)	4.20	Hydr. Depth (ft)		1.91	
Max Chl Dpth (ft)	3.64	Conv. (cfs)		1089.0	
Conv. Total (cfs)	1089.0	Wetted Per. (ft)		17.79	
Length Wtd. (ft)	119.41	Shear (lb/sq ft)		1.55	
Min Ch El (ft)	812.40	Stream Power (lb/ft s)		6.50	
Alpha	1.00	Cum Volume (acre-ft)	0.01	1.94	0.00
Frctn Loss (ft)	0.93	Cum SA (acres)	0.03	0.89	0.00
C & E Loss (ft)	0.03				

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: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.89	Wt. n-Val.		0.064	
Vel Head (ft)	0.30	Reach Len. (ft)	119.00	119.41	117.00
W.S. Elev (ft)	816.58	Flow Area (sq ft)		40.72	
Crit W.S. (ft)		Area (sq ft)		40.72	
E.G. Slope (ft/ft)	0.015294	Flow (cfs)		180.00	
Q Total (cfs)	180.00	Top Width (ft)		19.49	
Top Width (ft)	19.49	Avg. Vel. (ft/s)		4.42	
Vel Total (ft/s)	4.42	Hydr. Depth (ft)		2.09	
Max Chl Dpth (ft)	4.18	Conv. (cfs)		1455.5	
Conv. Total (cfs)	1455.5	Wetted Per. (ft)		21.26	
Length Wtd. (ft)	119.41	Shear (lb/sq ft)		1.83	
Min Ch El (ft)	812.40	Stream Power (lb/ft s)		8.08	
Alpha	1.00	Cum Volume (acre-ft)	0.08	2.46	0.01
Frctn Loss (ft)	1.03	Cum SA (acres)	0.13	0.98	0.01
C & E Loss (ft)	0.02				

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

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.69	Wt. n-Val.	0.120	0.068	
Vel Head (ft)	0.35	Reach Len. (ft)	119.00	119.41	117.00
W.S. Elev (ft)	817.34	Flow Area (sq ft)	0.40	56.93	
Crit W.S. (ft)		Area (sq ft)	0.40	56.93	
E.G. Slope (ft/ft)	0.015293	Flow (cfs)	0.18	269.82	
Q Total (cfs)	270.00	Top Width (ft)	2.36	22.67	
Top Width (ft)	25.03	Avg. Vel. (ft/s)	0.46	4.74	
Vel Total (ft/s)	4.71	Hydr. Depth (ft)	0.17	2.51	
Max Chl Dpth (ft)	4.94	Conv. (cfs)	1.5	2181.8	
Conv. Total (cfs)	2183.3				

Length Wtd. (ft)	119.38	Wetted Per. (ft)	2.38	24.67	
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.16	2.20	
Alpha	1.01	Stream Power (lb/ft s)	0.07	10.44	
Frctn Loss (ft)	1.12	Cum Volume (acre-ft)	0.34	3.15	0.25
C & E Loss (ft)	0.00	Cum SA (acres)	0.50	1.04	0.55

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.

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	818.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.	0.120	0.070	
W.S. Elev (ft)	817.81	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)		Flow Area (sq ft)	2.27	67.77	
E.G. Slope (ft/ft)	0.015259	Area (sq ft)	2.27	67.77	
Q Total (cfs)	340.00	Flow (cfs)	1.88	338.12	
Top Width (ft)	29.25	Top Width (ft)	5.64	23.61	
Vel Total (ft/s)	4.85	Avg. Vel. (ft/s)	0.83	4.99	
Max Chl Dpth (ft)	5.41	Hydr. Depth (ft)	0.40	2.87	
Conv. Total (cfs)	2752.4	Conv. (cfs)	15.2	2737.2	
Length Wtd. (ft)	119.36	Wetted Per. (ft)	5.70	25.72	
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.38	2.51	
Alpha	1.05	Stream Power (lb/ft s)	0.31	12.52	
Frctn Loss (ft)	1.15	Cum Volume (acre-ft)	0.69	3.58	0.62
C & E Loss (ft)	0.00	Cum SA (acres)	0.80	1.06	0.93

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

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	818.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.	0.120	0.071	0.120
W.S. Elev (ft)	818.28	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)		Flow Area (sq ft)	6.86	79.16	0.20
E.G. Slope (ft/ft)	0.015036	Area (sq ft)	6.86	79.16	0.20
Q Total (cfs)	430.00	Flow (cfs)	5.70	424.22	0.08
Top Width (ft)	42.27	Top Width (ft)	16.86	24.00	1.41
Vel Total (ft/s)	4.99	Avg. Vel. (ft/s)	0.83	5.36	0.41
Max Chl Dpth (ft)	5.88	Hydr. Depth (ft)	0.41	3.30	0.14
Conv. Total (cfs)	3506.7	Conv. (cfs)	46.5	3459.5	0.7
Length Wtd. (ft)	119.32	Wetted Per. (ft)	16.93	26.16	1.44
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.38	2.84	0.13
Alpha	1.14	Stream Power (lb/ft s)	0.32	15.22	0.05
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)	1.18	4.03	1.22
C & E Loss (ft)	0.00	Cum SA (acres)	1.14	1.07	1.39

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	819.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.	0.120	0.071	0.120
W.S. Elev (ft)	818.71	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	817.42	Flow Area (sq ft)	17.34	89.47	1.27
E.G. Slope (ft/ft)	0.014553	Area (sq ft)	17.34	89.47	1.27
Q Total (cfs)	530.00	Flow (cfs)	17.22	511.85	0.94
Top Width (ft)	59.45	Top Width (ft)	31.90	24.00	3.56
Vel Total (ft/s)	4.90	Avg. Vel. (ft/s)	0.99	5.72	0.74

Max Chl Dpth (ft)	6.31	Hydr. Depth (ft)	0.54	3.73	0.36
Conv. Total (cfs)	4393.3	Conv. (cfs)	142.7	4242.9	7.8
Length Wtd. (ft)	119.29	Wetted Per. (ft)	31.98	26.16	3.63
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.49	3.11	0.32
Alpha	1.32	Stream Power (lb/ft s)	0.49	17.78	0.23
Frctn Loss (ft)	1.30	Cum Volume (acre-ft)	1.73	4.39	1.82
C & E Loss (ft)	0.01	Cum SA (acres)	1.47	1.08	1.66

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	819.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.54	Wt. n-Val.	0.120	0.071	0.120
W.S. Elev (ft)	819.27	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	817.94	Flow Area (sq ft)	39.89	102.90	4.18
E.G. Slope (ft/ft)	0.013954	Area (sq ft)	39.89	102.90	4.18
Q Total (cfs)	690.00	Flow (cfs)	53.14	632.73	4.13
Top Width (ft)	77.23	Top Width (ft)	45.79	24.00	7.44
Vel Total (ft/s)	4.69	Avg. Vel. (ft/s)	1.33	6.15	0.99
Max Chl Dpth (ft)	6.87	Hydr. Depth (ft)	0.87	4.29	0.56
Conv. Total (cfs)	5841.1	Conv. (cfs)	449.9	5356.3	35.0
Length Wtd. (ft)	119.23	Wetted Per. (ft)	45.89	26.16	7.55
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.76	3.43	0.48
Alpha	1.58	Stream Power (lb/ft s)	1.01	21.07	0.48
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	2.42	4.92	2.89
C & E Loss (ft)	0.02	Cum SA (acres)	1.64	1.08	2.25

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 136

INPUT

Description:

Station Elevation Data	num=	19
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
0 825 20 823 41 821 81 818 113 817		
114 816 115 815 116 814 117 813 118 812		
122 811.7 125 812 127 813 129 814 131 815		
135 816 161 817 182 818 196 820		

Manning's n Values	num=	3
Sta n Val Sta n Val Sta n Val		
0 .12 113 .05 135 .12		

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.		
113 131 63 102.79 80 .1 .3		

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	814.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.96	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)		Flow Area (sq ft)		20.54	
E.G. Slope (ft/ft)	0.003318	Area (sq ft)		20.54	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	12.88	Top Width (ft)		12.88	
Vel Total (ft/s)	2.19	Avg. Vel. (ft/s)		2.19	
Max Chl Dpth (ft)	2.26	Hydr. Depth (ft)		1.59	
Conv. Total (cfs)	781.2	Conv. (cfs)		781.2	
Length Wtd. (ft)	102.79	Wetted Per. (ft)		14.18	
Min Ch El (ft)	811.70	Shear (lb/sq ft)		0.30	
Alpha	1.00	Stream Power (lb/ft s)		0.66	
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)		0.85	

C & E Loss (ft) 0.01 Cum SA (acres) 0.62

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.44	Wt. n-Val.		0.050	
Vel Head (ft)	0.07	Reach Len. (ft)	63.00	102.79	80.00
W.S. Elev (ft)	814.37	Flow Area (sq ft)		26.07	
Crit W.S. (ft)		Area (sq ft)		26.07	
E.G. Slope (ft/ft)	0.002653	Flow (cfs)		56.00	
Q Total (cfs)	56.00	Top Width (ft)		14.11	
Top Width (ft)	14.11	Avg. Vel. (ft/s)		2.15	
Vel Total (ft/s)	2.15	Hydr. Depth (ft)		1.85	
Max Chl Dpth (ft)	2.67	Conv. (cfs)		1087.2	
Conv. Total (cfs)	1087.2	Wetted Per. (ft)		15.68	
Length Wtd. (ft)	102.79	Shear (lb/sq ft)		0.28	
Min Ch El (ft)	811.70	Stream Power (lb/ft s)		0.59	
Alpha	1.00	Cum Volume (acre-ft)	0.00	1.02	
Frctn Loss (ft)	0.34	Cum SA (acres)		0.69	
C & E Loss (ft)	0.01				

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.64	Wt. n-Val.		0.050	
Vel Head (ft)	0.09	Reach Len. (ft)	63.00	102.79	80.00
W.S. Elev (ft)	814.55	Flow Area (sq ft)		28.68	
Crit W.S. (ft)		Area (sq ft)		28.68	
E.G. Slope (ft/ft)	0.003187	Flow (cfs)		70.00	
Q Total (cfs)	70.00	Top Width (ft)		14.65	
Top Width (ft)	14.65	Avg. Vel. (ft/s)		2.44	
Vel Total (ft/s)	2.44	Hydr. Depth (ft)		1.96	
Max Chl Dpth (ft)	2.85	Conv. (cfs)		1240.0	
Conv. Total (cfs)	1240.0	Wetted Per. (ft)		16.34	
Length Wtd. (ft)	102.79	Shear (lb/sq ft)		0.35	
Min Ch El (ft)	811.70	Stream Power (lb/ft s)		0.85	
Alpha	1.00	Cum Volume (acre-ft)	0.00	1.20	
Frctn Loss (ft)	0.36	Cum SA (acres)		0.73	
C & E Loss (ft)	0.01				

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.35	Wt. n-Val.		0.050	0.050
Vel Head (ft)	0.18	Reach Len. (ft)	63.00	102.79	80.00
W.S. Elev (ft)	815.17	Flow Area (sq ft)		38.24	0.06
Crit W.S. (ft)		Area (sq ft)		38.24	0.06
E.G. Slope (ft/ft)	0.004867	Flow (cfs)		129.98	0.02
Q Total (cfs)	130.00	Top Width (ft)		16.17	0.67
Top Width (ft)	16.84	Avg. Vel. (ft/s)		3.40	0.39
Vel Total (ft/s)	3.39	Hydr. Depth (ft)		2.37	0.08
Max Chl Dpth (ft)	3.47	Conv. (cfs)		1863.2	0.3
Conv. Total (cfs)	1863.5	Wetted Per. (ft)		18.21	0.69
Length Wtd. (ft)	102.79	Shear (lb/sq ft)		0.64	0.02
Min Ch El (ft)	811.70	Stream Power (lb/ft s)		2.17	0.01
Alpha	1.00	Cum Volume (acre-ft)	0.01	1.84	0.00
Frctn Loss (ft)	0.41	Cum SA (acres)	0.03	0.84	0.00
C & E Loss (ft)	0.03				

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.84	Wt. n-Val.		0.050	0.050
Vel Head (ft)	0.24	Reach Len. (ft)	63.00	102.79	80.00
W.S. Elev (ft)	815.60	Flow Area (sq ft)		45.27	0.71
Crit W.S. (ft)		Area (sq ft)		45.27	0.71
E.G. Slope (ft/ft)	0.005513	Flow (cfs)		179.31	0.69
Q Total (cfs)	180.00	Top Width (ft)		16.60	2.39
Top Width (ft)	18.98	Avg. Vel. (ft/s)		3.96	0.97
Vel Total (ft/s)	3.91	Hydr. Depth (ft)		2.73	0.30
Max Chl Dpth (ft)	3.90				

Conv. Total (cfs)	2424.4	Conv. (cfs)	2415.1	9.2
Length Wtd. (ft)	102.74	Wetted Per. (ft)	18.82	2.46
Min Ch El (ft)	811.70	Shear (lb/sq ft)	0.83	0.10
Alpha	1.02	Stream Power (lb/ft s)	3.28	0.10
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)	0.08	2.34
C & E Loss (ft)	0.05	Cum SA (acres)	0.13	0.93
				0.01

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	816.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.		0.050	0.052
W.S. Elev (ft)	816.23	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)		Flow Area (sq ft)		55.93	3.57
E.G. Slope (ft/ft)	0.006301	Area (sq ft)		55.93	3.57
Q Total (cfs)	270.00	Flow (cfs)		264.42	5.58
Top Width (ft)	27.12	Top Width (ft)		17.23	9.89
Vel Total (ft/s)	4.54	Avg. Vel. (ft/s)		4.73	1.56
Max Chl Dpth (ft)	4.53	Hydr. Depth (ft)		3.25	0.36
Conv. Total (cfs)	3401.3	Conv. (cfs)		3331.0	70.3
Length Wtd. (ft)	102.49	Wetted Per. (ft)		19.71	10.02
Min Ch El (ft)	811.70	Shear (lb/sq ft)		1.12	0.14
Alpha	1.07	Stream Power (lb/ft s)		5.28	0.22
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)	0.34	3.00	0.25
C & E Loss (ft)	0.07	Cum SA (acres)	0.49	0.99	0.53

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 OUTPUT Profile #50

E.G. Elev (ft)	817.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.050	0.062
W.S. Elev (ft)	816.64	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)		Flow Area (sq ft)		63.06	9.79
E.G. Slope (ft/ft)	0.006664	Area (sq ft)		63.06	9.79
Q Total (cfs)	340.00	Flow (cfs)		325.78	14.22
Top Width (ft)	38.16	Top Width (ft)		17.64	20.52
Vel Total (ft/s)	4.67	Avg. Vel. (ft/s)		5.17	1.45
Max Chl Dpth (ft)	4.94	Hydr. Depth (ft)		3.58	0.48
Conv. Total (cfs)	4164.9	Conv. (cfs)		3990.6	174.2
Length Wtd. (ft)	101.73	Wetted Per. (ft)		20.29	20.66
Min Ch El (ft)	811.70	Shear (lb/sq ft)		1.29	0.20
Alpha	1.18	Stream Power (lb/ft s)		6.68	0.29
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)	0.68	3.40	0.61
C & E Loss (ft)	0.08	Cum SA (acres)	0.79	1.01	0.90

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

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	817.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.	0.000	0.050	0.072
W.S. Elev (ft)	817.02	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)		Flow Area (sq ft)	0.01	69.90	19.59
E.G. Slope (ft/ft)	0.007394	Area (sq ft)	0.01	69.90	19.59
Q Total (cfs)	430.00	Flow (cfs)	0.00	400.69	29.31
Top Width (ft)	49.03	Top Width (ft)	0.62	18.00	30.41
Vel Total (ft/s)	4.80	Avg. Vel. (ft/s)	0.05	5.73	1.50
Max Chl Dpth (ft)	5.32	Hydr. Depth (ft)	0.01	3.88	0.64
Conv. Total (cfs)	5000.6	Conv. (cfs)	0.0	4659.7	340.9
Length Wtd. (ft)	100.87	Wetted Per. (ft)	0.62	20.81	30.55
Min Ch El (ft)	811.70	Shear (lb/sq ft)		1.55	0.30
Alpha	1.33	Stream Power (lb/ft s)		8.89	0.44
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)	1.17	3.82	1.19
C & E Loss (ft)	0.10	Cum SA (acres)	1.12	1.02	1.35

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	817.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.	0.120	0.050	0.078
W.S. Elev (ft)	817.30	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)		Flow Area (sq ft)	1.47	75.00	29.05
E.G. Slope (ft/ft)	0.008454	Area (sq ft)	1.47	75.00	29.05
Q Total (cfs)	530.00	Flow (cfs)	0.47	481.81	47.72
Top Width (ft)	64.05	Top Width (ft)	9.69	18.00	36.36
Vel Total (ft/s)	5.02	Avg. Vel. (ft/s)	0.32	6.42	1.64
Max Chl Dpth (ft)	5.60	Hydr. Depth (ft)	0.15	4.17	0.80
Conv. Total (cfs)	5764.3	Conv. (cfs)	5.2	5240.2	519.0
Length Wtd. (ft)	100.24	Wetted Per. (ft)	9.69	20.81	36.51
Min Ch El (ft)	811.70	Shear (lb/sq ft)	0.08	1.90	0.42
Alpha	1.50	Stream Power (lb/ft s)	0.03	12.22	0.69
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	1.70	4.16	1.78
C & E Loss (ft)	0.13	Cum SA (acres)	1.42	1.02	1.61

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 OUTPUT Profile #500

E.G. Elev (ft)	818.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.70	Wt. n-Val.	0.120	0.050	0.085
W.S. Elev (ft)	817.75	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)		Flow Area (sq ft)	9.05	83.09	47.50
E.G. Slope (ft/ft)	0.009248	Area (sq ft)	9.05	83.09	47.50
Q Total (cfs)	690.00	Flow (cfs)	5.61	597.69	86.70
Top Width (ft)	87.85	Top Width (ft)	24.06	18.00	45.79
Vel Total (ft/s)	4.94	Avg. Vel. (ft/s)	0.62	7.19	1.83
Max Chl Dpth (ft)	6.05	Hydr. Depth (ft)	0.38	4.62	1.04
Conv. Total (cfs)	7175.0	Conv. (cfs)	58.3	6215.1	901.6
Length Wtd. (ft)	99.15	Wetted Per. (ft)	24.07	20.81	45.95
Min Ch El (ft)	811.70	Shear (lb/sq ft)	0.22	2.31	0.60
Alpha	1.85	Stream Power (lb/ft s)	0.13	16.59	1.09
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	2.35	4.67	2.82
C & E Loss (ft)	0.15	Cum SA (acres)	1.54	1.03	2.18

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: Main Channel  
 REACH: Upper RS: 134

INPUT

Description:

Station Elevation Data		num=	22							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	823	8	822	57	821	99	817	105	816	
136	816	146	815	150	814	164	814	168	813	
173	812	179	811.4	181	812	182	813	182	814	
182	815	183	816	187	817	196	818	210	819	
219	820	244	825							

Manning's n Values		num=	4			
Sta	n Val	Sta	n Val	Sta	n Val	
0	.12	146	.05	183	.09	
				219	.12	

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	146	183		42 77.12	53	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	813.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.050	



W.S. Elev (ft)	813.66	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)		23.54	
E.G. Slope (ft/ft)	0.002897	Area (sq ft)		23.54	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	16.65	Top Width (ft)		16.65	
Vel Total (ft/s)	1.91	Avg. Vel. (ft/s)		1.91	
Max Chl Dpth (ft)	2.26	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	836.1	Conv. (cfs)		836.1	
Length Wtd. (ft)	77.12	Wetted Per. (ft)		18.02	
Min Ch El (ft)	811.40	Shear (lb/sq ft)		0.24	
Alpha	1.00	Stream Power (lb/ft s)		0.45	
Frctn Loss (ft)	0.58	Cum Volume (acre-ft)		0.79	
C & E Loss (ft)	0.04	Cum SA (acres)		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 OUTPUT Profile #1.4

E.G. Elev (ft)	814.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.050	
W.S. Elev (ft)	814.05	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)		31.06	
E.G. Slope (ft/ft)	0.004156	Area (sq ft)		31.06	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	32.21	Top Width (ft)		32.21	
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)		1.80	
Max Chl Dpth (ft)	2.65	Hydr. Depth (ft)		0.96	
Conv. Total (cfs)	868.6	Conv. (cfs)		868.6	
Length Wtd. (ft)	77.12	Wetted Per. (ft)		34.02	
Min Ch El (ft)	811.40	Shear (lb/sq ft)		0.24	
Alpha	1.00	Stream Power (lb/ft s)		0.43	
Frctn Loss (ft)	0.76	Cum Volume (acre-ft)	0.00	0.96	
C & E Loss (ft)	0.04	Cum SA (acres)		0.64	

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

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	814.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.050	
W.S. Elev (ft)	814.22	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)		36.63	
E.G. Slope (ft/ft)	0.003876	Area (sq ft)		36.63	
Q Total (cfs)	70.00	Flow (cfs)		70.00	
Top Width (ft)	32.89	Top Width (ft)		32.89	
Vel Total (ft/s)	1.91	Avg. Vel. (ft/s)		1.91	
Max Chl Dpth (ft)	2.82	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	1124.4	Conv. (cfs)		1124.4	
Length Wtd. (ft)	77.12	Wetted Per. (ft)		34.90	
Min Ch El (ft)	811.40	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		0.49	
Frctn Loss (ft)	0.71	Cum Volume (acre-ft)	0.00	1.13	
C & E Loss (ft)	0.05	Cum SA (acres)		0.67	

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

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	814.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.050	
W.S. Elev (ft)	814.84	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)		57.57	
E.G. Slope (ft/ft)	0.003323	Area (sq ft)		57.57	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	35.35	Top Width (ft)		35.35	

Vel Total (ft/s)	2.26	Avg. Vel. (ft/s)	2.26		
Max Chl Dpth (ft)	3.44	Hydr. Depth (ft)	1.63		
Conv. Total (cfs)	2255.3	Conv. (cfs)	2255.3		
Length Wtd. (ft)	77.12	Wetted Per. (ft)	38.04		
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.31		
Alpha	1.00	Stream Power (lb/ft s)	0.71		
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)	0.01	1.73	0.00
C & E Loss (ft)	0.05	Cum SA (acres)	0.03	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 OUTPUT Profile #10

E.G. Elev (ft)	815.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	815.30	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)	0.44	74.11	
E.G. Slope (ft/ft)	0.002864	Area (sq ft)	0.44	74.11	
Q Total (cfs)	180.00	Flow (cfs)	0.08	179.92	
Top Width (ft)	39.26	Top Width (ft)	2.96	36.30	
Vel Total (ft/s)	2.41	Avg. Vel. (ft/s)	0.18	2.43	
Max Chl Dpth (ft)	3.90	Hydr. Depth (ft)	0.15	2.04	
Conv. Total (cfs)	3363.5	Conv. (cfs)	1.5	3362.0	
Length Wtd. (ft)	77.11	Wetted Per. (ft)	2.98	39.30	
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.03	0.34	
Alpha	1.01	Stream Power (lb/ft s)	0.00	0.82	
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)	0.08	2.20	0.01
C & E Loss (ft)	0.05	Cum SA (acres)	0.13	0.87	0.00

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 OUTPUT Profile #25

E.G. Elev (ft)	816.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	816.01	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)	5.33	100.20	
E.G. Slope (ft/ft)	0.002425	Area (sq ft)	5.33	100.20	0.00
Q Total (cfs)	270.00	Flow (cfs)	0.83	269.17	
Top Width (ft)	78.08	Top Width (ft)	41.05	37.00	0.03
Vel Total (ft/s)	2.56	Avg. Vel. (ft/s)	0.16	2.69	
Max Chl Dpth (ft)	4.61	Hydr. Depth (ft)	0.13	2.71	
Conv. Total (cfs)	5482.6	Conv. (cfs)	16.9	5465.7	
Length Wtd. (ft)	77.07	Wetted Per. (ft)	41.10	40.29	
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.02	0.38	
Alpha	1.10	Stream Power (lb/ft s)	0.00	1.01	
Frctn Loss (ft)	0.43	Cum Volume (acre-ft)	0.34	2.81	0.24
C & E Loss (ft)	0.07	Cum SA (acres)	0.47	0.93	0.53

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

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

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	816.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	816.48	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)	25.19	117.51	0.45
E.G. Slope (ft/ft)	0.002142	Area (sq ft)	25.19	117.51	0.45
Q Total (cfs)	340.00	Flow (cfs)	9.96	329.91	0.13

Top Width (ft)	82.76	Top Width (ft)	43.85	37.00	1.90
Vel Total (ft/s)	2.38	Avg. Vel. (ft/s)	0.40	2.81	0.29
Max Chl Dpth (ft)	5.08	Hydr. Depth (ft)	0.57	3.18	0.24
Conv. Total (cfs)	7346.2	Conv. (cfs)	215.2	7128.2	2.8
Length Wtd. (ft)	76.58	Wetted Per. (ft)	43.94	40.29	1.96
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.08	0.39	0.03
Alpha	1.36	Stream Power (lb/ft s)	0.03	1.09	0.01
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	0.67	3.19	0.60
C & E Loss (ft)	0.08	Cum SA (acres)	0.76	0.94	0.88

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.

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	817.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	816.89	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)	43.99	132.93	1.59
E.G. Slope (ft/ft)	0.002140	Area (sq ft)	43.99	132.93	1.59
Q Total (cfs)	430.00	Flow (cfs)	24.29	405.01	0.70
Top Width (ft)	86.93	Top Width (ft)	46.36	37.00	3.57
Vel Total (ft/s)	2.41	Avg. Vel. (ft/s)	0.55	3.05	0.44
Max Chl Dpth (ft)	5.49	Hydr. Depth (ft)	0.95	3.59	0.45
Conv. Total (cfs)	9295.4	Conv. (cfs)	525.2	8755.2	15.1
Length Wtd. (ft)	75.44	Wetted Per. (ft)	46.48	40.29	3.68
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.13	0.44	0.06
Alpha	1.51	Stream Power (lb/ft s)	0.07	1.34	0.03
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	1.13	3.58	1.17
C & E Loss (ft)	0.07	Cum SA (acres)	1.08	0.95	1.32

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

additional cross sections.

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	817.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	817.19	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)	57.88	143.75	2.89
E.G. Slope (ft/ft)	0.002406	Area (sq ft)	57.88	143.75	2.89
Q Total (cfs)	530.00	Flow (cfs)	39.24	489.29	1.47
Top Width (ft)	91.61	Top Width (ft)	48.94	37.00	5.67
Vel Total (ft/s)	2.59	Avg. Vel. (ft/s)	0.68	3.40	0.51
Max Chl Dpth (ft)	5.79	Hydr. Depth (ft)	1.18	3.89	0.51
Conv. Total (cfs)	10804.2	Conv. (cfs)	799.9	9974.2	30.1
Length Wtd. (ft)	73.91	Wetted Per. (ft)	49.08	40.29	5.80
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.18	0.54	0.07
Alpha	1.60	Stream Power (lb/ft s)	0.12	1.82	0.04
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	1.66	3.91	1.75
C & E Loss (ft)	0.06	Cum SA (acres)	1.37	0.96	1.57

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 OUTPUT Profile #500

E.G. Elev (ft)	817.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.120	0.050	0.090

W.S. Elev (ft)	817.66	Reach Len. (ft)	42.00	77.12	53.00
Crit W.S. (ft)		Flow Area (sq ft)	82.11	161.18	6.56
E.G. Slope (ft/ft)	0.002614	Area (sq ft)	82.11	161.18	6.56
Q Total (cfs)	690.00	Flow (cfs)	68.69	617.15	4.17
Top Width (ft)	100.80	Top Width (ft)	53.89	37.00	9.91
Vel Total (ft/s)	2.76	Avg. Vel. (ft/s)	0.84	3.83	0.63
Max Chl Dpth (ft)	6.26	Hydr. Depth (ft)	1.52	4.36	0.66
Conv. Total (cfs)	13496.1	Conv. (cfs)	1343.5	12071.2	81.5
Length Wtd. (ft)	72.93	Wetted Per. (ft)	54.06	40.29	10.07
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.25	0.65	0.11
Alpha	1.73	Stream Power (lb/ft s)	0.21	2.50	0.07
Frctn Loss (ft)	0.41	Cum Volume (acre-ft)	2.29	4.38	2.77
C & E Loss (ft)	0.08	Cum SA (acres)	1.49	0.96	2.13

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: Main Channel  
REACH: Upper RS: 132

INPUT

Description:

Station Elevation Data	num=	20
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
0 825 72 822 96 821 107 820 134 817		
152 816 176 815 177 814 177 813 178 810.9		
181 812 186 812 189 813 191 814 193 815		
224 815.48 253 816 267 817 274 818 290 825		

Manning's n Values	num=	6
Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val		
0 .03 107 .12 176 .05 193 .12 224 .09		
253 .12		

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
176	193	59 64.73	67	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	813.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.		0.050	
W.S. Elev (ft)	812.70	Reach Len. (ft)	59.00	64.73	67.00
Crit W.S. (ft)	812.70	Flow Area (sq ft)		8.74	
E.G. Slope (ft/ft)	0.047770	Area (sq ft)		8.74	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	10.95	Top Width (ft)		10.95	
Vel Total (ft/s)	5.15	Avg. Vel. (ft/s)		5.15	
Max Chl Dpth (ft)	1.80	Hydr. Depth (ft)		0.80	
Conv. Total (cfs)	205.9	Conv. (cfs)		205.9	
Length Wtd. (ft)	64.73	Wetted Per. (ft)		12.40	
Min Ch El (ft)	810.90	Shear (lb/sq ft)		2.10	
Alpha	1.00	Stream Power (lb/ft s)		10.82	
Frctn Loss (ft)	0.80	Cum Volume (acre-ft)		0.77	
C & E Loss (ft)	0.09	Cum SA (acres)		0.56	

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.30	Wt. n-Val.		0.050	
Vel Head (ft)	0.47	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	812.83	Flow Area (sq ft)		10.23	
Crit W.S. (ft)	812.83	Area (sq ft)		10.23	
E.G. Slope (ft/ft)	0.046592	Flow (cfs)		56.00	
Q Total (cfs)	56.00	Top Width (ft)		11.41	
Top Width (ft)	11.41	Avg. Vel. (ft/s)		5.48	
Vel Total (ft/s)	5.48	Hydr. Depth (ft)		0.90	
Max Chl Dpth (ft)	1.93	Conv. (cfs)		259.4	
Conv. Total (cfs)	259.4	Wetted Per. (ft)		12.96	
Length Wtd. (ft)	64.73	Shear (lb/sq ft)		2.29	
Min Ch El (ft)	810.90	Stream Power (lb/ft s)		12.57	
Alpha	1.00	Cum Volume (acre-ft)	0.00	0.92	
Frctn Loss (ft)	0.80	Cum SA (acres)		0.60	
C & E Loss (ft)	0.11				

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.51	Wt. n-Val.		0.050	
Vel Head (ft)	0.52	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	812.99	Flow Area (sq ft)		12.10	
Crit W.S. (ft)	812.99	Area (sq ft)		12.10	
E.G. Slope (ft/ft)	0.044518	Flow (cfs)		70.00	
Q Total (cfs)	70.00	Top Width (ft)		11.97	
Top Width (ft)	11.97	Avg. Vel. (ft/s)		5.79	
Vel Total (ft/s)	5.79	Hydr. Depth (ft)		1.01	
Max Chl Dpth (ft)	2.09	Conv. (cfs)		331.8	
Conv. Total (cfs)	331.8	Wetted Per. (ft)		13.65	
Length Wtd. (ft)	64.73	Shear (lb/sq ft)		2.46	
Min Ch El (ft)	810.90	Stream Power (lb/ft s)		14.26	
Alpha	1.00	Cum Volume (acre-ft)	0.00	1.08	
Frctn Loss (ft)	0.80	Cum SA (acres)		0.63	
C & E Loss (ft)	0.12				

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

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.29	Wt. n-Val.		0.050	
Vel Head (ft)	0.58	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	813.72	Flow Area (sq ft)		21.34	
Crit W.S. (ft)		Area (sq ft)		21.34	
E.G. Slope (ft/ft)	0.028636	Flow (cfs)		130.00	
Q Total (cfs)	130.00	Top Width (ft)		13.44	
Top Width (ft)	13.44	Avg. Vel. (ft/s)		6.09	
Vel Total (ft/s)	6.09	Hydr. Depth (ft)		1.59	
Max Chl Dpth (ft)	2.82	Conv. (cfs)		768.2	
Conv. Total (cfs)	768.2	Wetted Per. (ft)		16.01	
Length Wtd. (ft)	64.73	Shear (lb/sq ft)		2.38	
Min Ch El (ft)	810.90	Stream Power (lb/ft s)		14.52	
Alpha	1.00	Cum Volume (acre-ft)	0.01	1.66	0.00
Frctn Loss (ft)	0.69	Cum SA (acres)	0.03	0.74	
C & E Loss (ft)	0.12				

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.85	Wt. n-Val.		0.050	
Vel Head (ft)	0.62	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	814.22	Flow Area (sq ft)		28.39	
Crit W.S. (ft)		Area (sq ft)		28.39	
E.G. Slope (ft/ft)	0.024304	Flow (cfs)		180.00	
Q Total (cfs)	180.00	Top Width (ft)		14.67	
Top Width (ft)	14.67	Avg. Vel. (ft/s)		6.34	
Vel Total (ft/s)	6.34	Hydr. Depth (ft)		1.94	
Max Chl Dpth (ft)	3.32	Conv. (cfs)		1154.6	
Conv. Total (cfs)	1154.6	Wetted Per. (ft)		17.73	
Length Wtd. (ft)	64.73	Shear (lb/sq ft)		2.43	
Min Ch El (ft)	810.90	Stream Power (lb/ft s)		15.40	
Alpha	1.00	Cum Volume (acre-ft)	0.08	2.11	0.01
Frctn Loss (ft)	0.65	Cum SA (acres)	0.12	0.82	0.00
C & E Loss (ft)	0.13				

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 OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.62	Wt. n-Val.		0.050	
Vel Head (ft)	0.79	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	814.82	Flow Area (sq ft)		37.76	
Crit W.S. (ft)	814.50	Area (sq ft)		37.76	
E.G. Slope (ft/ft)	0.024693	Flow (cfs)		270.00	
Q Total (cfs)	270.00	Top Width (ft)		16.47	
Top Width (ft)	16.47	Avg. Vel. (ft/s)		7.15	
Vel Total (ft/s)	7.15	Hydr. Depth (ft)		2.29	
Max Chl Dpth (ft)	3.92	Conv. (cfs)		1718.2	
Conv. Total (cfs)	1718.2	Wetted Per. (ft)		19.93	
Length Wtd. (ft)	64.72	Shear (lb/sq ft)		2.92	
Min Ch El (ft)	810.90	Stream Power (lb/ft s)		20.89	
Alpha	1.00	Cum Volume (acre-ft)	0.34	2.69	0.24
Frctn Loss (ft)	0.66	Cum SA (acres)	0.45	0.88	0.53
C & E Loss (ft)	0.16				

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

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

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.11	Wt. n-Val.	0.120	0.050	0.120
Vel Head (ft)	0.94	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	815.17	Flow Area (sq ft)	0.35	43.61	0.94
Crit W.S. (ft)	814.89	Area (sq ft)	0.35	43.61	0.94
E.G. Slope (ft/ft)	0.025201	Flow (cfs)	0.13	339.51	0.36
Q Total (cfs)	340.00	Top Width (ft)	4.10	17.00	11.05
Top Width (ft)	32.15	Avg. Vel. (ft/s)	0.38	7.79	0.38
Vel Total (ft/s)	7.57	Hydr. Depth (ft)	0.09	2.57	0.09
Max Chl Dpth (ft)	4.27	Conv. (cfs)	0.8	2138.6	2.3
Conv. Total (cfs)	2141.7	Wetted Per. (ft)	4.11	20.57	11.05
Length Wtd. (ft)	64.69	Shear (lb/sq ft)	0.13	3.34	0.13
Min Ch El (ft)	810.90	Stream Power (lb/ft s)	0.05	25.97	0.05
Alpha	1.06	Cum Volume (acre-ft)	0.65	3.05	0.60
Frctn Loss (ft)	0.69	Cum SA (acres)	0.74	0.90	0.87
C & E Loss (ft)	0.18				

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

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

than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.60	Wt. n-Val.	0.120	0.050	0.118
Vel Head (ft)	0.88	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	815.71	Flow Area (sq ft)	6.10	52.82	16.18
Crit W.S. (ft)	815.71	Area (sq ft)	6.10	52.82	16.18
E.G. Slope (ft/ft)	0.019266	Flow (cfs)	5.27	408.60	16.13
Q Total (cfs)	430.00	Top Width (ft)	17.11	17.00	44.00
Top Width (ft)	78.11	Avg. Vel. (ft/s)	0.86	7.74	1.00
Vel Total (ft/s)	5.73	Hydr. Depth (ft)	0.36	3.11	0.37
Max Chl Dpth (ft)	4.81	Conv. (cfs)	38.0	2943.7	116.2
Conv. Total (cfs)	3097.9	Wetted Per. (ft)	17.13	20.57	44.00
Length Wtd. (ft)	64.68	Shear (lb/sq ft)	0.43	3.09	0.44
Min Ch El (ft)	810.90	Stream Power (lb/ft s)	0.37	23.89	0.44
Alpha	1.74	Cum Volume (acre-ft)	1.11	3.42	1.16
Frctn Loss (ft)	0.67	Cum SA (acres)	1.05	0.90	1.29
C & E Loss (ft)	0.15				

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.93	Wt. n-Val.	0.120	0.050	0.112
Vel Head (ft)	0.76	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	816.17	Flow Area (sq ft)	16.36	60.60	41.55
Crit W.S. (ft)	816.17	Area (sq ft)	16.36	60.60	41.55
E.G. Slope (ft/ft)	0.015159	Flow (cfs)	17.82	455.71	56.47
Q Total (cfs)	530.00	Top Width (ft)	27.07	17.00	62.39
Top Width (ft)	106.46	Avg. Vel. (ft/s)	1.09	7.52	1.36
Vel Total (ft/s)	4.47	Hydr. Depth (ft)	0.60	3.56	0.67
Max Chl Dpth (ft)	5.27	Conv. (cfs)	144.7	3701.3	458.6
Conv. Total (cfs)	4304.6	Wetted Per. (ft)	27.10	20.57	62.40
Length Wtd. (ft)	64.70	Shear (lb/sq ft)	0.57	2.79	0.63
Min Ch El (ft)	810.90	Stream Power (lb/ft s)	0.62	20.97	0.86
Alpha	2.44	Cum Volume (acre-ft)	1.63	3.73	1.72
Frctn Loss (ft)	0.69	Cum SA (acres)	1.34	0.91	1.53
C & E Loss (ft)	0.07				

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.37	Wt. n-Val.	0.120	0.050	0.111
Vel Head (ft)	1.03	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	816.34	Flow Area (sq ft)	21.11	63.43	52.11
Crit W.S. (ft)		Area (sq ft)	21.11	63.43	52.11
E.G. Slope (ft/ft)	0.020213	Flow (cfs)	29.34	567.75	92.91
Q Total (cfs)	690.00	Top Width (ft)	30.07	17.00	64.72
Top Width (ft)	111.78	Avg. Vel. (ft/s)	1.39	8.95	1.78
Vel Total (ft/s)	5.05	Hydr. Depth (ft)	0.70	3.73	0.81
Max Chl Dpth (ft)	5.44	Conv. (cfs)	206.3	3993.4	653.5
Conv. Total (cfs)	4853.3	Wetted Per. (ft)	30.10	20.57	64.74
Length Wtd. (ft)	64.70				

Min Ch El (ft)	810.90	Shear (lb/sq ft)	0.89	3.89	1.02
Alpha	2.61	Stream Power (lb/ft s)	1.23	34.83	1.81
Frctn Loss (ft)	0.96	Cum Volume (acre-ft)	2.24	4.18	2.73
C & E Loss (ft)	0.08	Cum SA (acres)	1.44	0.91	2.09

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: Main Channel  
 REACH: Upper RS: 130

INPUT

Description:

Station Elevation Data		num=		19					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	823	42	821	71	820	102	819	120	816
132	815	150	814	153	813	155	812	158	811
163	809.7	167	811	169	812	170	813	172	814
173	815	215	815.03	227	816	254	820		

Manning's n Values		num=		5					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	102	.12	150	.05	173	.09	215	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	150	173		94	96.36	30	.1
							.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	812.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.		0.050	
W.S. Elev (ft)	812.04	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)		Flow Area (sq ft)		17.94	
E.G. Slope (ft/ft)	0.005577	Area (sq ft)		17.94	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	14.13	Top Width (ft)		14.13	
Vel Total (ft/s)	2.51	Avg. Vel. (ft/s)		2.51	
Max Chl Dpth (ft)	2.34	Hydr. Depth (ft)		1.27	
Conv. Total (cfs)	602.6	Conv. (cfs)		602.6	
Length Wtd. (ft)	96.36	Wetted Per. (ft)		14.92	
Min Ch El (ft)	809.70	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)		1.05	
Frctn Loss (ft)	0.58	Cum Volume (acre-ft)		0.75	
C & E Loss (ft)	0.00	Cum SA (acres)		0.54	

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	812.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.050	
W.S. Elev (ft)	812.24	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)		Flow Area (sq ft)		20.83	
E.G. Slope (ft/ft)	0.005590	Area (sq ft)		20.83	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	14.73	Top Width (ft)		14.73	
Vel Total (ft/s)	2.69	Avg. Vel. (ft/s)		2.69	
Max Chl Dpth (ft)	2.54	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	749.0	Conv. (cfs)		749.0	
Length Wtd. (ft)	96.36	Wetted Per. (ft)		15.66	
Min Ch El (ft)	809.70	Shear (lb/sq ft)		0.46	
Alpha	1.00	Stream Power (lb/ft s)		1.25	
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)	0.00	0.90	
C & E Loss (ft)	0.00	Cum SA (acres)		0.58	

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	812.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.050	
W.S. Elev (ft)	812.47	Reach Len. (ft)	94.00	96.36	30.00



Crit W.S. (ft)		Flow Area (sq ft)		24.23
E.G. Slope (ft/ft)	0.005652	Area (sq ft)		24.23
Q Total (cfs)	70.00	Flow (cfs)		70.00
Top Width (ft)	15.40	Top Width (ft)		15.40
Vel Total (ft/s)	2.89	Avg. Vel. (ft/s)		2.89
Max Chl Dpth (ft)	2.77	Hydr. Depth (ft)		1.57
Conv. Total (cfs)	931.1	Conv. (cfs)		931.1
Length Wtd. (ft)	96.36	Wetted Per. (ft)		16.48
Min Ch El (ft)	809.70	Shear (lb/sq ft)		0.52
Alpha	1.00	Stream Power (lb/ft s)		1.50
Frctn Loss (ft)	0.58	Cum Volume (acre-ft)	0.00	1.06
C & E Loss (ft)	0.00	Cum SA (acres)		0.61

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	813.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.30	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)		Flow Area (sq ft)		38.17	
E.G. Slope (ft/ft)	0.005561	Area (sq ft)		38.17	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	18.50	Top Width (ft)		18.50	
Vel Total (ft/s)	3.41	Avg. Vel. (ft/s)		3.41	
Max Chl Dpth (ft)	3.60	Hydr. Depth (ft)		2.06	
Conv. Total (cfs)	1743.3	Conv. (cfs)		1743.3	
Length Wtd. (ft)	96.36	Wetted Per. (ft)		20.04	
Min Ch El (ft)	809.70	Shear (lb/sq ft)		0.66	
Alpha	1.00	Stream Power (lb/ft s)		2.25	
Frctn Loss (ft)	0.56	Cum Volume (acre-ft)	0.01	1.61	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.03	0.72	

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	814.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.86	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)		Flow Area (sq ft)		49.26	
E.G. Slope (ft/ft)	0.005490	Area (sq ft)		49.26	
Q Total (cfs)	180.00	Flow (cfs)		180.00	
Top Width (ft)	21.29	Top Width (ft)		21.29	
Vel Total (ft/s)	3.65	Avg. Vel. (ft/s)		3.65	
Max Chl Dpth (ft)	4.16	Hydr. Depth (ft)		2.31	
Conv. Total (cfs)	2429.2	Conv. (cfs)		2429.2	
Length Wtd. (ft)	96.36	Wetted Per. (ft)		23.05	
Min Ch El (ft)	809.70	Shear (lb/sq ft)		0.73	
Alpha	1.00	Stream Power (lb/ft s)		2.68	
Frctn Loss (ft)	0.56	Cum Volume (acre-ft)	0.08	2.05	0.01
C & E Loss (ft)	0.00	Cum SA (acres)	0.12	0.80	0.00

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	814.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	814.53	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)		Flow Area (sq ft)	2.49	64.06	
E.G. Slope (ft/ft)	0.005564	Area (sq ft)	2.49	64.06	
Q Total (cfs)	270.00	Flow (cfs)	0.94	269.06	
Top Width (ft)	31.99	Top Width (ft)	9.47	22.53	
Vel Total (ft/s)	4.06	Avg. Vel. (ft/s)	0.38	4.20	
Max Chl Dpth (ft)	4.83	Hydr. Depth (ft)	0.26	2.84	
Conv. Total (cfs)	3619.7	Conv. (cfs)	12.6	3607.1	
Length Wtd. (ft)	96.36	Wetted Per. (ft)	9.48	24.56	
Min Ch El (ft)	809.70	Shear (lb/sq ft)	0.09	0.91	
Alpha	1.07	Stream Power (lb/ft s)	0.03	3.80	
Frctn Loss (ft)	0.63	Cum Volume (acre-ft)	0.33	2.62	0.24
C & E Loss (ft)	0.01	Cum SA (acres)	0.44	0.85	0.53

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.24	Wt. n-Val.	0.120	0.050	
Vel Head (ft)	0.33	Reach Len. (ft)	94.00	96.36	30.00
W.S. Elev (ft)	814.92	Flow Area (sq ft)	7.54	72.91	
Crit W.S. (ft)		Area (sq ft)	7.54	72.91	
E.G. Slope (ft/ft)	0.005800	Flow (cfs)	4.22	335.78	
Q Total (cfs)	340.00	Top Width (ft)	16.48	22.92	
Top Width (ft)	39.39	Avg. Vel. (ft/s)	0.56	4.61	
Vel Total (ft/s)	4.23	Hydr. Depth (ft)	0.46	3.18	
Max Chl Dpth (ft)	5.22	Conv. (cfs)	55.4	4409.1	
Conv. Total (cfs)	4464.5	Wetted Per. (ft)	16.50	25.11	
Length Wtd. (ft)	96.27	Shear (lb/sq ft)	0.17	1.05	
Min Ch El (ft)	809.70	Stream Power (lb/ft s)	0.09	4.84	
Alpha	1.17	Cum Volume (acre-ft)	0.65	2.96	0.60
Frctn Loss (ft)	0.70	Cum SA (acres)	0.72	0.87	0.87
C & E Loss (ft)	0.01				

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.64	Wt. n-Val.	0.120	0.050	0.090
Vel Head (ft)	0.40	Reach Len. (ft)	94.00	96.36	30.00
W.S. Elev (ft)	815.24	Flow Area (sq ft)	13.69	80.39	9.77
Crit W.S. (ft)		Area (sq ft)	13.69	80.39	9.77
E.G. Slope (ft/ft)	0.006437	Flow (cfs)	10.24	415.03	4.72
Q Total (cfs)	430.00	Top Width (ft)	20.89	23.00	44.61
Top Width (ft)	88.50	Avg. Vel. (ft/s)	0.75	5.16	0.48
Vel Total (ft/s)	4.14	Hydr. Depth (ft)	0.66	3.50	0.22
Max Chl Dpth (ft)	5.54	Conv. (cfs)	127.7	5172.9	58.9
Conv. Total (cfs)	5359.4	Wetted Per. (ft)	20.93	25.23	44.62
Length Wtd. (ft)	94.61	Shear (lb/sq ft)	0.26	1.28	0.09
Min Ch El (ft)	809.70	Stream Power (lb/ft s)	0.20	6.61	0.04
Alpha	1.50	Cum Volume (acre-ft)	1.10	3.32	1.14
Frctn Loss (ft)	0.75	Cum SA (acres)	1.03	0.87	1.22
C & E Loss (ft)	0.01				

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.93	Wt. n-Val.	0.120	0.050	0.091
Vel Head (ft)	0.51	Reach Len. (ft)	94.00	96.36	30.00
W.S. Elev (ft)	815.42	Flow Area (sq ft)	17.66	84.55	18.03
Crit W.S. (ft)		Area (sq ft)	17.66	84.55	18.03
E.G. Slope (ft/ft)	0.007888	Flow (cfs)	16.23	499.68	14.10
Q Total (cfs)	530.00	Top Width (ft)	23.06	23.00	46.84
Top Width (ft)	92.90	Avg. Vel. (ft/s)	0.92	5.91	0.78
Vel Total (ft/s)	4.41	Hydr. Depth (ft)	0.77	3.68	0.38
Max Chl Dpth (ft)	5.72	Conv. (cfs)	182.7	5626.1	158.7
Conv. Total (cfs)	5967.6	Wetted Per. (ft)	23.10	25.23	46.86
Length Wtd. (ft)	91.36	Shear (lb/sq ft)	0.38	1.65	0.19
Min Ch El (ft)	809.70	Stream Power (lb/ft s)	0.35	9.75	0.15
Alpha	1.70	Cum Volume (acre-ft)	1.60	3.62	1.68
Frctn Loss (ft)	0.81	Cum SA (acres)	1.30	0.88	1.44
C & E Loss (ft)	0.00				

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.32	Wt. n-Val.	0.120	0.050	0.091
Vel Head (ft)	0.76	Reach Len. (ft)	94.00	96.36	30.00
W.S. Elev (ft)	815.56	Flow Area (sq ft)	21.06	87.82	24.83
Crit W.S. (ft)		Area (sq ft)	21.06	87.82	24.83
E.G. Slope (ft/ft)	0.011295	Flow (cfs)	24.85	637.06	28.09
Q Total (cfs)	690.00	Top Width (ft)	24.77	23.00	48.61
Top Width (ft)	96.38	Avg. Vel. (ft/s)	1.18	7.25	1.13
Vel Total (ft/s)	5.16	Hydr. Depth (ft)	0.85	3.82	0.51
Max Chl Dpth (ft)	5.86	Conv. (cfs)	233.8	5994.2	264.3
Conv. Total (cfs)	6492.3	Wetted Per. (ft)	24.82	25.23	48.63
Length Wtd. (ft)	86.09	Shear (lb/sq ft)	0.60	2.45	0.36
Min Ch El (ft)	809.70				

Alpha	1.83	Stream Power (lb/ft s)	0.71	17.80	0.41
Frctn Loss (ft)	0.85	Cum Volume (acre-ft)	2.21	4.07	2.67
C & E Loss (ft)	0.09	Cum SA (acres)	1.41	0.88	2.00

CROSS SECTION RIVER: Main Channel  
 REACH: Upper RS: 128

INPUT

Description:

Station Elevation Data		num=		18							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	822	21	820	45	819.25	53	819	60	815		
66	814	67	813	68	812	68	811	75	809.3		
81	811	83	812	85	813	89	814	111	814		
166	814.49	198	815	231	820						

Manning's n Values		num=		6							
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	45	.12	66	.05	89	.12	111	.03		
166	.012										

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	66	89		127 138.25	48	.1	.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	811.56				
Vel Head (ft)	0.11	Wt. n-Val.		0.050	
W.S. Elev (ft)	811.45	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)		Flow Area (sq ft)		17.07	
E.G. Slope (ft/ft)	0.006560	Area (sq ft)		17.07	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	13.90	Top Width (ft)		13.90	
Vel Total (ft/s)	2.64	Avg. Vel. (ft/s)		2.64	
Max Chl Dpth (ft)	2.15	Hydr. Depth (ft)		1.23	
Conv. Total (cfs)	555.6	Conv. (cfs)		555.6	
Length Wtd. (ft)	138.25	Wetted Per. (ft)		14.89	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		0.47	
Alpha	1.00	Stream Power (lb/ft s)		1.24	
Frctn Loss (ft)	1.00	Cum Volume (acre-ft)		0.71	
C & E Loss (ft)	0.00	Cum SA (acres)		0.51	

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	811.79				
Vel Head (ft)	0.12	Wt. n-Val.		0.050	
W.S. Elev (ft)	811.67	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)		Flow Area (sq ft)		20.14	
E.G. Slope (ft/ft)	0.006226	Area (sq ft)		20.14	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	14.33	Top Width (ft)		14.33	
Vel Total (ft/s)	2.78	Avg. Vel. (ft/s)		2.78	
Max Chl Dpth (ft)	2.36	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	709.7	Conv. (cfs)		709.7	
Length Wtd. (ft)	138.25	Wetted Per. (ft)		15.59	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		0.50	
Alpha	1.00	Stream Power (lb/ft s)		1.40	
Frctn Loss (ft)	0.96	Cum Volume (acre-ft)	0.00	0.85	
C & E Loss (ft)	0.00	Cum SA (acres)		0.55	

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	812.02				
Vel Head (ft)	0.14	Wt. n-Val.		0.050	
W.S. Elev (ft)	811.88	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)		Flow Area (sq ft)		23.24	
E.G. Slope (ft/ft)	0.006390	Area (sq ft)		23.24	
Q Total (cfs)	70.00	Flow (cfs)		70.00	

Top Width (ft)	14.76	Top Width (ft)	14.76
Vel Total (ft/s)	3.01	Avg. Vel. (ft/s)	3.01
Max Chl Dpth (ft)	2.58	Hydr. Depth (ft)	1.58
Conv. Total (cfs)	875.7	Conv. (cfs)	875.7
Length Wtd. (ft)	138.25	Wetted Per. (ft)	16.28
Min Ch El (ft)	809.30	Shear (lb/sq ft)	0.57
Alpha	1.00	Stream Power (lb/ft s)	1.71
Frctn Loss (ft)	0.95	Cum Volume (acre-ft)	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.58

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	812.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.050	
W.S. Elev (ft)	812.73	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)		Flow Area (sq ft)		36.75	
E.G. Slope (ft/ft)	0.006014	Area (sq ft)		36.75	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	17.18	Top Width (ft)		17.18	
Vel Total (ft/s)	3.54	Avg. Vel. (ft/s)		3.54	
Max Chl Dpth (ft)	3.43	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	1676.3	Conv. (cfs)		1676.3	
Length Wtd. (ft)	138.25	Wetted Per. (ft)		19.33	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		0.71	
Alpha	1.00	Stream Power (lb/ft s)		2.53	
Frctn Loss (ft)	0.90	Cum Volume (acre-ft)	0.01	1.53	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.03	0.68	

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	813.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.27	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)		Flow Area (sq ft)		46.52	
E.G. Slope (ft/ft)	0.006169	Area (sq ft)		46.52	
Q Total (cfs)	180.00	Flow (cfs)		180.00	
Top Width (ft)	19.33	Top Width (ft)		19.33	
Vel Total (ft/s)	3.87	Avg. Vel. (ft/s)		3.87	
Max Chl Dpth (ft)	3.97	Hydr. Depth (ft)		2.41	
Conv. Total (cfs)	2291.7	Conv. (cfs)		2291.7	
Length Wtd. (ft)	138.18	Wetted Per. (ft)		21.80	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		0.82	
Alpha	1.00	Stream Power (lb/ft s)		3.18	
Frctn Loss (ft)	0.92	Cum Volume (acre-ft)	0.08	1.95	0.01
C & E Loss (ft)	0.01	Cum SA (acres)	0.12	0.75	0.00

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	814.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.82	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)		Flow Area (sq ft)		58.04	
E.G. Slope (ft/ft)	0.007919	Area (sq ft)		58.04	
Q Total (cfs)	270.00	Flow (cfs)		270.00	
Top Width (ft)	22.11	Top Width (ft)		22.11	
Vel Total (ft/s)	4.65	Avg. Vel. (ft/s)		4.65	
Max Chl Dpth (ft)	4.52	Hydr. Depth (ft)		2.62	
Conv. Total (cfs)	3034.0	Conv. (cfs)		3034.0	
Length Wtd. (ft)	137.19	Wetted Per. (ft)		24.88	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		1.15	
Alpha	1.00	Stream Power (lb/ft s)		5.37	
Frctn Loss (ft)	0.95	Cum Volume (acre-ft)	0.33	2.48	0.24
C & E Loss (ft)	0.01	Cum SA (acres)	0.43	0.80	0.53

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	814.52	Element	Left OB	Channel	Right OB
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Vel Head (ft)	0.43	Wt. n-Val.	0.120	0.050	0.087
W.S. Elev (ft)	814.09	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)		Flow Area (sq ft)	0.02	64.10	2.41
E.G. Slope (ft/ft)	0.009454	Area (sq ft)	0.02	64.10	2.41
Q Total (cfs)	340.00	Flow (cfs)	0.00	339.25	0.74
Top Width (ft)	55.56	Top Width (ft)	0.54	23.00	32.02
Vel Total (ft/s)	5.11	Avg. Vel. (ft/s)	0.15	5.29	0.31
Max Chl Dpth (ft)	4.79	Hydr. Depth (ft)	0.04	2.79	0.08
Conv. Total (cfs)	3496.8	Conv. (cfs)	0.0	3489.1	7.6
Length Wtd. (ft)	136.34	Wetted Per. (ft)	0.54	25.86	32.02
Min Ch El (ft)	809.30	Shear (lb/sq ft)	0.03	1.46	0.04
Alpha	1.07	Stream Power (lb/ft s)	0.00	7.74	0.01
Frctn Loss (ft)	0.94	Cum Volume (acre-ft)	0.64	2.81	0.60
C & E Loss (ft)	0.05	Cum SA (acres)	0.70	0.81	0.85

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

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.88	Wt. n-Val.	0.120	0.050	0.057
Vel Head (ft)	0.51	Reach Len. (ft)	127.00	138.25	48.00
W.S. Elev (ft)	814.37	Flow Area (sq ft)	0.41	70.54	15.76
Crit W.S. (ft)		Area (sq ft)	0.41	70.54	15.76
E.G. Slope (ft/ft)	0.010149	Flow (cfs)	0.16	412.26	17.58
Q Total (cfs)	430.00	Top Width (ft)	2.21	23.00	63.43
Top Width (ft)	88.64	Avg. Vel. (ft/s)	0.40	5.84	1.11
Vel Total (ft/s)	4.96	Hydr. Depth (ft)	0.18	3.07	0.25
Max Chl Dpth (ft)	5.07	Conv. (cfs)	1.6	4092.1	174.5
Conv. Total (cfs)	4268.2	Wetted Per. (ft)	2.25	25.86	63.43
Length Wtd. (ft)	134.15	Shear (lb/sq ft)	0.12	1.73	0.16
Min Ch El (ft)	809.30	Stream Power (lb/ft s)	0.05	10.10	0.18
Alpha	1.33	Cum Volume (acre-ft)	1.08	3.15	1.13
Frctn Loss (ft)	1.00	Cum SA (acres)	1.00	0.82	1.18
C & E Loss (ft)	0.06				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.13	Wt. n-Val.	0.120	0.050	0.046
Vel Head (ft)	0.51	Reach Len. (ft)	127.00	138.25	48.00
W.S. Elev (ft)	814.62	Flow Area (sq ft)	1.14	76.23	34.48
Crit W.S. (ft)		Area (sq ft)	1.14	76.23	34.48
E.G. Slope (ft/ft)	0.009936	Flow (cfs)	0.64	464.17	65.19
Q Total (cfs)	530.00	Top Width (ft)	3.70	23.00	84.93
Top Width (ft)	111.63	Avg. Vel. (ft/s)	0.56	6.09	1.89
Vel Total (ft/s)	4.74	Hydr. Depth (ft)	0.31	3.31	0.41
Max Chl Dpth (ft)	5.32	Conv. (cfs)	6.4	4656.6	654.0
Conv. Total (cfs)	5317.0	Wetted Per. (ft)	3.75	25.86	84.93
Length Wtd. (ft)	130.07	Shear (lb/sq ft)	0.19	1.83	0.25
Min Ch El (ft)	809.30	Stream Power (lb/ft s)	0.11	11.13	0.48
Alpha	1.47	Cum Volume (acre-ft)	1.58	3.44	1.66
Frctn Loss (ft)	0.99	Cum SA (acres)	1.28	0.83	1.40
C & E Loss (ft)	0.05				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.38	Wt. n-Val.	0.120	0.050	0.038
Vel Head (ft)	0.45				

W.S. Elev (ft)	814.93	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)		Flow Area (sq ft)	2.61	83.52	64.59
E.G. Slope (ft/ft)	0.008629	Area (sq ft)	2.61	83.52	64.59
Q Total (cfs)	690.00	Flow (cfs)	1.79	503.75	184.46
Top Width (ft)	133.44	Top Width (ft)	5.60	23.00	104.83
Vel Total (ft/s)	4.58	Avg. Vel. (ft/s)	0.69	6.03	2.86
Max Chl Dpth (ft)	5.63	Hydr. Depth (ft)	0.47	3.63	0.62
Conv. Total (cfs)	7428.1	Conv. (cfs)	19.3	5423.0	1985.8
Length Wtd. (ft)	122.86	Wetted Per. (ft)	5.68	25.86	104.84
Min Ch El (ft)	809.30	Shear (lb/sq ft)	0.25	1.74	0.33
Alpha	1.37	Stream Power (lb/ft s)	0.17	10.49	0.95
Frctn Loss (ft)	0.86	Cum Volume (acre-ft)	2.18	3.88	2.64
C & E Loss (ft)	0.02	Cum SA (acres)	1.37	0.83	1.95

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: Main Channel  
REACH: Upper RS: 126

INPUT

Description:

Station Elevation Data		num= 16		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	812	29	812.67	40	813	57	813	58	812
60	811	61	810	63	809	67	808.5	71	809
73	810	75	811	77	812	84	813	136	814
148	816								

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	.03	29	.12	57	.05	77	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	57	77		71 114.63	143	.1	.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.56	Wt. n-Val.		0.050	
Vel Head (ft)	0.14	Reach Len. (ft)	71.00	114.63	143.00
W.S. Elev (ft)	810.41	Flow Area (sq ft)		17.23	
Crit W.S. (ft)		Area (sq ft)		17.23	
E.G. Slope (ft/ft)	0.007857	Flow (cfs)		52.00	
Q Total (cfs)	52.00	Top Width (ft)		13.24	
Top Width (ft)	13.24	Avg. Vel. (ft/s)		3.02	
Vel Total (ft/s)	3.02	Hydr. Depth (ft)		1.30	
Max Chl Dpth (ft)	1.91	Conv. (cfs)		586.7	
Conv. Total (cfs)	586.7	Wetted Per. (ft)		14.05	
Length Wtd. (ft)	114.63	Shear (lb/sq ft)		0.60	
Min Ch El (ft)	808.50	Stream Power (lb/ft s)		1.82	
Alpha	1.00	Cum Volume (acre-ft)		0.65	
Frctn Loss (ft)	1.11	Cum SA (acres)		0.46	
C & E Loss (ft)	0.00				

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

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.82	Wt. n-Val.		0.050	
Vel Head (ft)	0.16	Reach Len. (ft)	71.00	114.63	143.00
W.S. Elev (ft)	810.66	Flow Area (sq ft)		20.58	
Crit W.S. (ft)		Area (sq ft)		20.58	
E.G. Slope (ft/ft)	0.007602	Flow (cfs)		66.00	
Q Total (cfs)	66.00	Top Width (ft)		13.98	
Top Width (ft)	13.98	Avg. Vel. (ft/s)		3.21	
Vel Total (ft/s)	3.21	Hydr. Depth (ft)		1.47	
Max Chl Dpth (ft)	2.16	Conv. (cfs)		757.0	
Conv. Total (cfs)	757.0				

Length Wtd. (ft)	114.63	Wetted Per. (ft)	14.95
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.65
Alpha	1.00	Stream Power (lb/ft s)	2.10
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	0.79
C & E Loss (ft)	0.01	Cum SA (acres)	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 OUTPUT Profile #2

E.G. Elev (ft)	811.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.050	
W.S. Elev (ft)	810.89	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)		Flow Area (sq ft)		23.83	
E.G. Slope (ft/ft)	0.007364	Area (sq ft)		23.83	
Q Total (cfs)	80.00	Flow (cfs)		80.00	
Top Width (ft)	14.66	Top Width (ft)		14.66	
Vel Total (ft/s)	3.36	Avg. Vel. (ft/s)		3.36	
Max Chl Dpth (ft)	2.39	Hydr. Depth (ft)		1.63	
Conv. Total (cfs)	932.3	Conv. (cfs)		932.3	
Length Wtd. (ft)	114.63	Wetted Per. (ft)		15.77	
Min Ch El (ft)	808.50	Shear (lb/sq ft)		0.69	
Alpha	1.00	Stream Power (lb/ft s)		2.33	
Frctn Loss (ft)	1.32	Cum Volume (acre-ft)	0.00	0.93	
C & E Loss (ft)	0.02	Cum SA (acres)		0.53	

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.

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

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	812.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.050	
W.S. Elev (ft)	811.80	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)		Flow Area (sq ft)		38.73	
E.G. Slope (ft/ft)	0.006918	Area (sq ft)		38.73	
Q Total (cfs)	150.00	Flow (cfs)		150.00	
Top Width (ft)	18.19	Top Width (ft)		18.19	
Vel Total (ft/s)	3.87	Avg. Vel. (ft/s)		3.87	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		2.13	
Conv. Total (cfs)	1803.5	Conv. (cfs)		1803.5	
Length Wtd. (ft)	114.63	Wetted Per. (ft)		19.75	
Min Ch El (ft)	808.50	Shear (lb/sq ft)		0.85	
Alpha	1.00	Stream Power (lb/ft s)		3.28	
Frctn Loss (ft)	1.54	Cum Volume (acre-ft)	0.01	1.41	0.00
C & E Loss (ft)	0.05	Cum SA (acres)	0.03	0.62	

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 OUTPUT Profile #10

E.G. Elev (ft)	812.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	812.28	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)		Flow Area (sq ft)	1.74	47.93	0.28
E.G. Slope (ft/ft)	0.007122	Area (sq ft)	1.74	47.93	0.28
Q Total (cfs)	210.00	Flow (cfs)	1.95	207.98	0.08

Top Width (ft)	33.54	Top Width (ft)	12.27	19.28	1.98
Vel Total (ft/s)	4.20	Avg. Vel. (ft/s)	1.12	4.34	0.28
Max Chl Dpth (ft)	3.78	Hydr. Depth (ft)	0.14	2.49	0.14
Conv. Total (cfs)	2488.3	Conv. (cfs)	23.1	2464.3	0.9
Length Wtd. (ft)	114.43	Wetted Per. (ft)	12.56	21.06	2.00
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.06	1.01	0.06
Alpha	1.06	Stream Power (lb/ft s)	0.07	4.39	0.02
Frctn Loss (ft)	1.54	Cum Volume (acre-ft)	0.07	1.80	0.01
C & E Loss (ft)	0.06	Cum SA (acres)	0.11	0.69	0.00

Warning: Divided flow computed for this cross-section.

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

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 OUTPUT Profile #25

E.G. Elev (ft)	813.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	812.90	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)		Flow Area (sq ft)	17.10	59.92	2.81
E.G. Slope (ft/ft)	0.006275	Area (sq ft)	17.10	59.92	2.81
Q Total (cfs)	320.00	Flow (cfs)	42.67	275.72	1.60
Top Width (ft)	62.68	Top Width (ft)	36.52	19.90	6.27
Vel Total (ft/s)	4.01	Avg. Vel. (ft/s)	2.50	4.60	0.57
Max Chl Dpth (ft)	4.40	Hydr. Depth (ft)	0.47	3.01	0.45
Conv. Total (cfs)	4039.5	Conv. (cfs)	538.7	3480.6	20.2
Length Wtd. (ft)	111.79	Wetted Per. (ft)	37.42	21.92	6.33
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.18	1.07	0.17
Alpha	1.19	Stream Power (lb/ft s)	0.45	4.93	0.10
Frctn Loss (ft)	1.35	Cum Volume (acre-ft)	0.31	2.29	0.24
C & E Loss (ft)	0.07	Cum SA (acres)	0.38	0.73	0.52

Warning: Divided flow computed for this cross-section.

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

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 OUTPUT Profile #50

E.G. Elev (ft)	813.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.28	Wt. n-Val.	0.034	0.050	0.120
W.S. Elev (ft)	813.26	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	812.62	Flow Area (sq ft)	36.11	67.27	7.15
E.G. Slope (ft/ft)	0.005491	Area (sq ft)	36.11	67.27	7.15
Q Total (cfs)	410.00	Flow (cfs)	95.39	311.39	3.22
Top Width (ft)	97.69	Top Width (ft)	57.00	20.00	20.69
Vel Total (ft/s)	3.71	Avg. Vel. (ft/s)	2.64	4.63	0.45
Max Chl Dpth (ft)	4.76	Hydr. Depth (ft)	0.63	3.36	0.35
Conv. Total (cfs)	5532.8	Conv. (cfs)	1287.3	4202.1	43.5
Length Wtd. (ft)	109.63	Wetted Per. (ft)	58.28	22.07	20.77
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.21	1.04	0.12
Alpha	1.30	Stream Power (lb/ft s)	0.56	4.84	0.05
Frctn Loss (ft)	1.16	Cum Volume (acre-ft)	0.59	2.60	0.59
C & E Loss (ft)	0.08	Cum SA (acres)	0.62	0.75	0.83

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



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 OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.82	Wt. n-Val.	0.036	0.050	0.120
Vel Head (ft)	0.32	Reach Len. (ft)	71.00	114.63	143.00
W.S. Elev (ft)	813.50	Flow Area (sq ft)	49.44	71.94	13.41
Crit W.S. (ft)		Area (sq ft)	49.44	71.94	13.41
E.G. Slope (ft/ft)	0.006009	Flow (cfs)	148.58	364.35	7.07
Q Total (cfs)	520.00	Top Width (ft)	57.00	20.00	32.85
Top Width (ft)	109.85	Avg. Vel. (ft/s)	3.01	5.06	0.53
Vel Total (ft/s)	3.86	Hydr. Depth (ft)	0.87	3.60	0.41
Max Chl Dpth (ft)	5.00	Conv. (cfs)	1916.8	4700.4	91.2
Conv. Total (cfs)	6708.4	Wetted Per. (ft)	58.51	22.07	32.93
Length Wtd. (ft)	107.17	Shear (lb/sq ft)	0.32	1.22	0.15
Min Ch El (ft)	808.50	Stream Power (lb/ft s)	0.95	6.19	0.08
Alpha	1.38	Cum Volume (acre-ft)	1.01	2.93	1.11
Frctn Loss (ft)	1.00	Cum SA (acres)	0.92	0.76	1.13
C & E Loss (ft)	0.05				

Warning: The cross-section end points had to be extended vertically for the computed water surface.  
 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 OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.09	Wt. n-Val.	0.038	0.050	0.120
Vel Head (ft)	0.35	Reach Len. (ft)	71.00	114.63	143.00
W.S. Elev (ft)	813.75	Flow Area (sq ft)	63.57	76.90	23.15
Crit W.S. (ft)		Area (sq ft)	63.57	76.90	23.15
E.G. Slope (ft/ft)	0.006202	Flow (cfs)	212.06	413.62	14.32
Q Total (cfs)	640.00	Top Width (ft)	57.00	20.00	45.74
Top Width (ft)	122.74	Avg. Vel. (ft/s)	3.34	5.38	0.62
Vel Total (ft/s)	3.91	Hydr. Depth (ft)	1.12	3.84	0.51
Max Chl Dpth (ft)	5.24	Conv. (cfs)	2692.9	5252.3	181.8
Conv. Total (cfs)	8127.0	Wetted Per. (ft)	58.76	22.07	45.82
Length Wtd. (ft)	104.93	Shear (lb/sq ft)	0.42	1.35	0.20
Min Ch El (ft)	808.50	Stream Power (lb/ft s)	1.40	7.26	0.12
Alpha	1.46	Cum Volume (acre-ft)	1.49	3.20	1.63
Frctn Loss (ft)	0.95	Cum SA (acres)	1.19	0.76	1.33
C & E Loss (ft)	0.05				

Warning: The cross-section end points had to be extended vertically for the computed water surface.  
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.50	Wt. n-Val.	0.040	0.050	0.120
Vel Head (ft)	0.37	Reach Len. (ft)	71.00	114.63	143.00
W.S. Elev (ft)	814.13	Flow Area (sq ft)	85.72	84.67	44.44
Crit W.S. (ft)		Area (sq ft)	85.72	84.67	44.44
E.G. Slope (ft/ft)	0.005984	Flow (cfs)	318.11	477.01	34.88
Q Total (cfs)	830.00	Top Width (ft)	57.00	20.00	59.80
Top Width (ft)	136.80	Avg. Vel. (ft/s)	3.71	5.63	0.78
Vel Total (ft/s)	3.86	Hydr. Depth (ft)	1.50	4.23	0.74
Max Chl Dpth (ft)	5.63	Conv. (cfs)	4112.5	6166.6	450.9
Conv. Total (cfs)	10730.0				

Length Wtd. (ft)	102.76	Wetted Per. (ft)	59.15	22.07	59.89
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.54	1.43	0.28
Alpha	1.58	Stream Power (lb/ft s)	2.01	8.07	0.22
Frctn Loss (ft)	0.92	Cum Volume (acre-ft)	2.06	3.61	2.58
C & E Loss (ft)	0.05	Cum SA (acres)	1.28	0.76	1.86

Warning: The cross-section end points had to be extended vertically for the computed water surface.  
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: Main Channel  
REACH: Upper RS: 124

INPUT

Description:

Station Elevation Data		num=		18					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	9	814	21	813	50	812	139	811
141	810	143	809	145	808	150	807.2	151	808
156	809	157	810	159	811	166	812	171	813
181	819	190	821	225	825				

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.12	139	.05	159	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	139	159		84 112.09	66	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	809.43	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.050	
W.S. Elev (ft)	809.25	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	808.84	Flow Area (sq ft)		15.30	
E.G. Slope (ft/ft)	0.012301	Area (sq ft)		15.30	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	13.76	Top Width (ft)		13.76	
Vel Total (ft/s)	3.40	Avg. Vel. (ft/s)		3.40	
Max Chl Dpth (ft)	2.05	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	468.8	Conv. (cfs)		468.8	
Length Wtd. (ft)	112.09	Wetted Per. (ft)		14.61	
Min Ch El (ft)	807.20	Shear (lb/sq ft)		0.80	
Alpha	1.00	Stream Power (lb/ft s)		2.73	
Frctn Loss (ft)	2.34	Cum Volume (acre-ft)		0.61	
C & E Loss (ft)	0.02	Cum SA (acres)		0.43	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	809.58	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.050	
W.S. Elev (ft)	809.33	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	809.00	Flow Area (sq ft)		16.39	
E.G. Slope (ft/ft)	0.016154	Area (sq ft)		16.39	
Q Total (cfs)	66.00	Flow (cfs)		66.00	
Top Width (ft)	14.00	Top Width (ft)		14.00	
Vel Total (ft/s)	4.03	Avg. Vel. (ft/s)		4.03	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.17	
Conv. Total (cfs)	519.3	Conv. (cfs)		519.3	
Length Wtd. (ft)	112.09	Wetted Per. (ft)		14.89	
Min Ch El (ft)	807.20	Shear (lb/sq ft)		1.11	

Alpha	1.00	Stream Power (lb/ft s)	4.47
Frctn Loss (ft)	2.31	Cum Volume (acre-ft)	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.46

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

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.73	Wt. n-Val.		0.050	
Vel Head (ft)	0.33	Reach Len. (ft)	84.00	112.09	66.00
W.S. Elev (ft)	809.39	Flow Area (sq ft)		17.23	
Crit W.S. (ft)	809.14	Area (sq ft)		17.23	
E.G. Slope (ft/ft)	0.020499	Flow (cfs)		80.00	
Q Total (cfs)	80.00	Top Width (ft)		14.18	
Top Width (ft)	14.18	Avg. Vel. (ft/s)		4.64	
Vel Total (ft/s)	4.64	Hydr. Depth (ft)		1.22	
Max Chl Dpth (ft)	2.19	Conv. (cfs)		558.8	
Conv. Total (cfs)	558.8	Wetted Per. (ft)		15.11	
Length Wtd. (ft)	112.09	Shear (lb/sq ft)		1.46	
Min Ch El (ft)	807.20	Stream Power (lb/ft s)		6.78	
Alpha	1.00	Cum Volume (acre-ft)	0.00	0.87	
Frctn Loss (ft)	2.26	Cum SA (acres)		0.49	
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.44	Wt. n-Val.		0.050	
Vel Head (ft)	0.74	Reach Len. (ft)	84.00	112.09	66.00
W.S. Elev (ft)	809.70	Flow Area (sq ft)		21.74	
Crit W.S. (ft)	809.70	Area (sq ft)		21.74	
E.G. Slope (ft/ft)	0.036515	Flow (cfs)		150.00	
Q Total (cfs)	150.00	Top Width (ft)		15.10	
Top Width (ft)	15.10	Avg. Vel. (ft/s)		6.90	
Vel Total (ft/s)	6.90	Hydr. Depth (ft)		1.44	
Max Chl Dpth (ft)	2.50	Conv. (cfs)		785.0	
Conv. Total (cfs)	785.0	Wetted Per. (ft)		16.24	
Length Wtd. (ft)	112.09	Shear (lb/sq ft)		3.05	
Min Ch El (ft)	807.20	Stream Power (lb/ft s)		21.06	
Alpha	1.00	Cum Volume (acre-ft)	0.01	1.33	0.00
Frctn Loss (ft)	1.98	Cum SA (acres)	0.03	0.58	
C & E Loss (ft)	0.15				

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.97	Wt. n-Val.		0.050	
Vel Head (ft)	0.87	Reach Len. (ft)	84.00	112.09	66.00
W.S. Elev (ft)	810.10	Flow Area (sq ft)		28.04	
Crit W.S. (ft)	810.10	Area (sq ft)		28.04	
E.G. Slope (ft/ft)	0.034611	Flow (cfs)		210.00	
Q Total (cfs)	210.00	Top Width (ft)		16.40	
Top Width (ft)	16.40	Avg. Vel. (ft/s)		7.49	
Vel Total (ft/s)	7.49				

Max Chl Dpth (ft)	2.90	Hydr. Depth (ft)	1.71	
Conv. Total (cfs)	1128.8	Conv. (cfs)	1128.8	
Length Wtd. (ft)	112.09	Wetted Per. (ft)	17.78	
Min Ch El (ft)	807.20	Shear (lb/sq ft)	3.41	
Alpha	1.00	Stream Power (lb/ft s)	25.52	
Frctn Loss (ft)	1.65	Cum Volume (acre-ft)	0.07	1.70
C & E Loss (ft)	0.18	Cum SA (acres)	0.10	0.64
				0.01
				0.00

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #25

E.G. Elev (ft)	811.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	810.73	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	810.73	Flow Area (sq ft)		39.14	
E.G. Slope (ft/ft)	0.032137	Area (sq ft)		39.14	
Q Total (cfs)	320.00	Flow (cfs)		320.00	
Top Width (ft)	18.92	Top Width (ft)		18.92	
Vel Total (ft/s)	8.17	Avg. Vel. (ft/s)		8.17	
Max Chl Dpth (ft)	3.53	Hydr. Depth (ft)		2.07	
Conv. Total (cfs)	1785.0	Conv. (cfs)		1785.0	
Length Wtd. (ft)	112.09	Wetted Per. (ft)		20.59	
Min Ch El (ft)	807.20	Shear (lb/sq ft)		3.81	
Alpha	1.00	Stream Power (lb/ft s)		31.18	
Frctn Loss (ft)	1.55	Cum Volume (acre-ft)	0.29	2.16	0.24
C & E Loss (ft)	0.21	Cum SA (acres)	0.35	0.68	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 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 OUTPUT Profile #50

E.G. Elev (ft)	812.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.11	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	811.20	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	811.20	Flow Area (sq ft)	1.70	48.30	0.13
E.G. Slope (ft/ft)	0.028129	Area (sq ft)	1.70	48.30	0.13
Q Total (cfs)	410.00	Flow (cfs)	0.75	409.19	0.06
Top Width (ft)	38.74	Top Width (ft)	17.38	20.00	1.37
Vel Total (ft/s)	8.18	Avg. Vel. (ft/s)	0.44	8.47	0.44
Max Chl Dpth (ft)	4.00	Hydr. Depth (ft)	0.10	2.42	0.10
Conv. Total (cfs)	2444.6	Conv. (cfs)	4.5	2439.8	0.3
Length Wtd. (ft)	112.06	Wetted Per. (ft)	17.38	21.80	1.38
Min Ch El (ft)	807.20	Shear (lb/sq ft)	0.17	3.89	0.17

Alpha	1.07	Stream Power (lb/ft s)	0.08	32.96	0.07
Frctn Loss (ft)	1.60	Cum Volume (acre-ft)	0.56	2.45	0.58
C & E Loss (ft)	0.21	Cum SA (acres)	0.56	0.69	0.79

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 OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	812.77	Wt. n-Val.	0.120	0.050	0.120
Vel Head (ft)	0.85	Reach Len. (ft)	84.00	112.09	66.00
W.S. Elev (ft)	811.92	Flow Area (sq ft)	37.81	62.84	2.97
Crit W.S. (ft)	811.92	Area (sq ft)	37.81	62.84	2.97
E.G. Slope (ft/ft)	0.016220	Flow (cfs)	35.57	481.65	2.78
Q Total (cfs)	520.00	Top Width (ft)	82.04	20.00	6.45
Top Width (ft)	108.49	Avg. Vel. (ft/s)	0.94	7.67	0.93
Vel Total (ft/s)	5.02	Hydr. Depth (ft)	0.46	3.14	0.46
Max Chl Dpth (ft)	4.72	Conv. (cfs)	279.3	3781.8	21.8
Conv. Total (cfs)	4083.0	Wetted Per. (ft)	82.04	21.80	6.52
Length Wtd. (ft)	111.01	Shear (lb/sq ft)	0.47	2.92	0.46
Min Ch El (ft)	807.20	Stream Power (lb/ft s)	0.44	22.37	0.43
Alpha	2.16	Cum Volume (acre-ft)	0.94	2.75	1.09
Frctn Loss (ft)	1.40	Cum SA (acres)	0.80	0.70	1.07
C & E Loss (ft)	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 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 OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.10	Wt. n-Val.	0.120	0.050	0.120
Vel Head (ft)	0.81	Reach Len. (ft)	84.00	112.09	66.00
W.S. Elev (ft)	812.29	Flow Area (sq ft)	71.15	70.12	5.71
Crit W.S. (ft)	812.29	Area (sq ft)	71.15	70.12	5.71
E.G. Slope (ft/ft)	0.014528	Flow (cfs)	86.18	547.30	6.52
Q Total (cfs)	640.00	Top Width (ft)	97.30	20.00	8.43
Top Width (ft)	125.73	Avg. Vel. (ft/s)	1.21	7.81	1.14
Vel Total (ft/s)	4.35	Hydr. Depth (ft)	0.73	3.51	0.68
Max Chl Dpth (ft)	5.09	Conv. (cfs)	715.0	4540.6	54.1
Conv. Total (cfs)	5309.7	Wetted Per. (ft)	97.31	21.80	8.53
Length Wtd. (ft)	109.89	Shear (lb/sq ft)	0.66	2.92	0.61
Min Ch El (ft)	807.20	Stream Power (lb/ft s)	0.80	22.77	0.69
Alpha	2.76	Cum Volume (acre-ft)	1.38	3.00	1.58
Frctn Loss (ft)	1.48	Cum SA (acres)	1.06	0.71	1.24
C & E Loss (ft)	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 OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.53				
Vel Head (ft)	0.88	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	812.65	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	812.65	Flow Area (sq ft)	108.43	77.39	9.10
E.G. Slope (ft/ft)	0.014886	Area (sq ft)	108.43	77.39	9.10
Q Total (cfs)	830.00	Flow (cfs)	164.40	653.00	12.60
Top Width (ft)	138.09	Top Width (ft)	107.84	20.00	10.25
Vel Total (ft/s)	4.26	Avg. Vel. (ft/s)	1.52	8.44	1.38
Max Chl Dpth (ft)	5.45	Hydr. Depth (ft)	1.01	3.87	0.89
Conv. Total (cfs)	6802.8	Conv. (cfs)	1347.5	5352.1	103.2
Length Wtd. (ft)	108.58	Wetted Per. (ft)	107.86	21.80	10.38
Min Ch El (ft)	807.20	Shear (lb/sq ft)	0.93	3.30	0.81
Alpha	3.12	Stream Power (lb/ft s)	1.42	27.84	1.13
Frctn Loss (ft)	1.67	Cum Volume (acre-ft)	1.90	3.40	2.49
C & E Loss (ft)	0.01	Cum SA (acres)	1.15	0.71	1.74

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: Main Channel  
 REACH: Upper RS: 122

INPUT

Description:

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	28	812	58	811	86	811	87	810
88	809	89	808	90	807	94	806	97	805.6
103	806	109	807	112	808	115	809	118	810
135	810	151	812	155	813	174	815	177	816
189	817	233	820						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	86	.05	135	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	86	118		85	95.62	89	.1
							.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.07				
Vel Head (ft)	0.35	Wt. n-Val.		0.050	
W.S. Elev (ft)	806.73	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)	806.73	Flow Area (sq ft)		11.02	
E.G. Slope (ft/ft)	0.043082	Area (sq ft)		11.02	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	16.29	Top Width (ft)		16.29	
Vel Total (ft/s)	4.72	Avg. Vel. (ft/s)		4.72	
Max Chl Dpth (ft)	1.13	Hydr. Depth (ft)		0.68	
Conv. Total (cfs)	250.5	Conv. (cfs)		250.5	
Length Wtd. (ft)	95.62	Wetted Per. (ft)		16.48	
Min Ch El (ft)	805.60	Shear (lb/sq ft)		1.80	
Alpha	1.00	Stream Power (lb/ft s)		8.49	
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)		0.58	
C & E Loss (ft)	0.10	Cum SA (acres)		0.39	

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.27	Wt. n-Val.		0.050	
Vel Head (ft)	0.28	Reach Len. (ft)	85.00	95.62	89.00
W.S. Elev (ft)	806.98	Flow Area (sq ft)		15.46	
Crit W.S. (ft)		Area (sq ft)		15.46	
E.G. Slope (ft/ft)	0.027280	Flow (cfs)		66.00	
Q Total (cfs)	66.00	Top Width (ft)		18.82	
Top Width (ft)	18.82	Avg. Vel. (ft/s)		4.27	
Vel Total (ft/s)	4.27	Hydr. Depth (ft)		0.82	
Max Chl Dpth (ft)	1.38	Conv. (cfs)		399.6	
Conv. Total (cfs)	399.6	Wetted Per. (ft)		19.06	
Length Wtd. (ft)	95.62	Shear (lb/sq ft)		1.38	
Min Ch El (ft)	805.60	Stream Power (lb/ft s)		5.90	
Alpha	1.00	Cum Volume (acre-ft)	0.00	0.70	
Frctn Loss (ft)	0.34	Cum SA (acres)		0.42	
C & E Loss (ft)	0.08				

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

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.45	Wt. n-Val.		0.050	
Vel Head (ft)	0.26	Reach Len. (ft)	85.00	95.62	89.00
W.S. Elev (ft)	807.19	Flow Area (sq ft)		19.53	
Crit W.S. (ft)		Area (sq ft)		19.53	
E.G. Slope (ft/ft)	0.019789	Flow (cfs)		80.00	
Q Total (cfs)	80.00	Top Width (ft)		19.77	
Top Width (ft)	19.77	Avg. Vel. (ft/s)		4.10	
Vel Total (ft/s)	4.10	Hydr. Depth (ft)		0.99	
Max Chl Dpth (ft)	1.59	Conv. (cfs)		568.7	
Conv. Total (cfs)	568.7	Wetted Per. (ft)		20.13	
Length Wtd. (ft)	95.62	Shear (lb/sq ft)		1.20	
Min Ch El (ft)	805.60	Stream Power (lb/ft s)		4.91	
Alpha	1.00	Cum Volume (acre-ft)	0.00	0.83	
Frctn Loss (ft)	0.32	Cum SA (acres)		0.45	
C & E Loss (ft)	0.07				

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

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.26	Wt. n-Val.		0.050	
Vel Head (ft)	0.25	Reach Len. (ft)	85.00	95.62	89.00
W.S. Elev (ft)	808.01	Flow Area (sq ft)		37.02	
Crit W.S. (ft)		Area (sq ft)		37.02	
E.G. Slope (ft/ft)	0.010352	Flow (cfs)		150.00	
Q Total (cfs)	150.00	Top Width (ft)		23.04	
Top Width (ft)	23.04	Avg. Vel. (ft/s)		4.05	
Vel Total (ft/s)	4.05	Hydr. Depth (ft)		1.61	
Max Chl Dpth (ft)	2.41	Conv. (cfs)		1474.3	
Conv. Total (cfs)	1474.3	Wetted Per. (ft)		23.87	
Length Wtd. (ft)	95.62	Shear (lb/sq ft)		1.00	
Min Ch El (ft)	805.60	Stream Power (lb/ft s)		4.06	
Alpha	1.00	Cum Volume (acre-ft)	0.01	1.26	0.00
Frctn Loss (ft)	0.28	Cum SA (acres)	0.03	0.53	
C & E Loss (ft)	0.06				

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

CROSS SECTION OUTPUT		Profile #10			
E.G. Elev (ft)	808.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.050	
W.S. Elev (ft)	808.58	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)		Flow Area (sq ft)		50.75	
E.G. Slope (ft/ft)	0.008138	Area (sq ft)		50.75	
Q Total (cfs)	210.00	Flow (cfs)		210.00	
Top Width (ft)	25.31	Top Width (ft)		25.31	
Vel Total (ft/s)	4.14	Avg. Vel. (ft/s)		4.14	
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)		2.01	
Conv. Total (cfs)	2327.8	Conv. (cfs)		2327.8	
Length Wtd. (ft)	95.62	Wetted Per. (ft)		26.46	
Min Ch El (ft)	805.60	Shear (lb/sq ft)		0.97	
Alpha	1.00	Stream Power (lb/ft s)		4.03	
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	0.07	1.59	0.01
C & E Loss (ft)	0.06	Cum SA (acres)	0.10	0.59	0.00

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

CROSS SECTION OUTPUT		Profile #25			
E.G. Elev (ft)	809.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.050	
W.S. Elev (ft)	809.29	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)		Flow Area (sq ft)		69.70	
E.G. Slope (ft/ft)	0.007655	Area (sq ft)		69.70	
Q Total (cfs)	320.00	Flow (cfs)		320.00	
Top Width (ft)	28.15	Top Width (ft)		28.15	
Vel Total (ft/s)	4.59	Avg. Vel. (ft/s)		4.59	
Max Chl Dpth (ft)	3.69	Hydr. Depth (ft)		2.48	
Conv. Total (cfs)	3657.5	Conv. (cfs)		3657.5	
Length Wtd. (ft)	95.62	Wetted Per. (ft)		29.71	
Min Ch El (ft)	805.60	Shear (lb/sq ft)		1.12	
Alpha	1.00	Stream Power (lb/ft s)		5.15	
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	0.29	2.02	0.24
C & E Loss (ft)	0.07	Cum SA (acres)	0.35	0.62	0.51

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

CROSS SECTION OUTPUT		Profile #50			
E.G. Elev (ft)	810.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.		0.050	
W.S. Elev (ft)	809.63	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)		Flow Area (sq ft)		79.67	
E.G. Slope (ft/ft)	0.008627	Area (sq ft)		79.67	
Q Total (cfs)	410.00	Flow (cfs)		410.00	
Top Width (ft)	29.53	Top Width (ft)		29.53	
Vel Total (ft/s)	5.15	Avg. Vel. (ft/s)		5.15	
Max Chl Dpth (ft)	4.03	Hydr. Depth (ft)		2.70	
Conv. Total (cfs)	4414.3	Conv. (cfs)		4414.3	
Length Wtd. (ft)	95.54	Wetted Per. (ft)		31.29	
Min Ch El (ft)	805.60	Shear (lb/sq ft)		1.37	
Alpha	1.00	Stream Power (lb/ft s)		7.06	
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)	0.55	2.28	0.58
C & E Loss (ft)	0.08	Cum SA (acres)	0.54	0.63	0.79

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



CROSS SECTION OUTPUT Profile #100

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.48		
Vel Head (ft)	0.53	0.050	
W.S. Elev (ft)	809.95		
Crit W.S. (ft)		85.00	89.00
E.G. Slope (ft/ft)	0.010058	95.62	
Q Total (cfs)	520.00	89.37	
Top Width (ft)	30.81	520.00	
Vel Total (ft/s)	5.82	89.37	
Max Chl Dpth (ft)	4.35	520.00	
Conv. Total (cfs)	5184.9	89.37	
Length Wtd. (ft)	95.36	520.00	
Min Ch El (ft)	805.60	30.81	
Alpha	1.00	5.82	
Frctn Loss (ft)	0.38	2.90	
C & E Loss (ft)	0.11	5184.9	
		32.76	
		1.71	
		9.97	
	0.90	2.55	1.09
	0.72	0.64	1.06

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

CROSS SECTION OUTPUT Profile #200

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.83		
Vel Head (ft)	0.70	0.050	0.051
W.S. Elev (ft)	810.14		
Crit W.S. (ft)		85.00	89.00
E.G. Slope (ft/ft)	0.012526	95.62	
Q Total (cfs)	640.00	95.06	2.41
Top Width (ft)	49.23	95.06	2.41
Vel Total (ft/s)	6.57	637.92	2.08
Max Chl Dpth (ft)	4.54	31.14	18.10
Conv. Total (cfs)	5718.4	6.71	0.86
Length Wtd. (ft)	95.21	3.05	0.13
Min Ch El (ft)	805.60	5699.8	18.6
Alpha	1.04	33.17	18.11
Frctn Loss (ft)	0.47	2.24	0.10
C & E Loss (ft)	0.15	15.04	0.09
		1.31	1.58
		0.97	1.22

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 OUTPUT Profile #500

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	811.35		
Vel Head (ft)	0.96	0.050	0.052
W.S. Elev (ft)	810.39		
Crit W.S. (ft)		85.00	89.00
E.G. Slope (ft/ft)	0.015975	95.62	
Q Total (cfs)	830.00	102.91	7.20
Top Width (ft)	51.49	102.91	7.20
Vel Total (ft/s)	7.54	816.49	13.51
Max Chl Dpth (ft)	4.79	31.39	20.11
Conv. Total (cfs)	6566.9	7.93	1.88
Length Wtd. (ft)	94.85	3.28	0.36
Min Ch El (ft)	805.60	6460.0	106.9
Alpha	1.09	33.52	20.13
Frctn Loss (ft)	0.55	3.06	0.36
C & E Loss (ft)	0.21	24.29	0.67
		1.79	2.48
		1.05	1.72

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: Main Channel  
 REACH: Upper RS: 120

INPUT

Description:

Station Elevation Data		num= 19									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	17	813	54	811	85	810	144	809		
146	808	147	807	148	806	150	805	156	804.8		
169	805	173	806	177	807	181	809	186	810		
193	811	200	813	210	814	242	815				

Manning's n Values		num= 3			
Sta	n Val	Sta	n Val	Sta	n Val
0	.03	144	.05	181	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.	
	144	181		66	60.99	51	.1	.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.60				
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
W.S. Elev (ft)	806.57	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)		39.02	
E.G. Slope (ft/ft)	0.001325	Area (sq ft)		39.02	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	27.86	Top Width (ft)		27.86	
Vel Total (ft/s)	1.33	Avg. Vel. (ft/s)		1.33	
Max Chl Dpth (ft)	1.77	Hydr. Depth (ft)		1.40	
Conv. Total (cfs)	1428.8	Conv. (cfs)		1428.8	
Length Wtd. (ft)	60.99	Wetted Per. (ft)		28.53	
Min Ch El (ft)	804.80	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.15	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)		0.52	
C & E Loss (ft)	0.01	Cum SA (acres)		0.34	

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

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.84				
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
W.S. Elev (ft)	806.81	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)		45.72	
E.G. Slope (ft/ft)	0.001336	Area (sq ft)		45.72	
Q Total (cfs)	66.00	Flow (cfs)		66.00	
Top Width (ft)	29.04	Top Width (ft)		29.04	
Vel Total (ft/s)	1.44	Avg. Vel. (ft/s)		1.44	
Max Chl Dpth (ft)	2.01	Hydr. Depth (ft)		1.57	
Conv. Total (cfs)	1805.9	Conv. (cfs)		1805.9	
Length Wtd. (ft)	60.99	Wetted Per. (ft)		29.84	
Min Ch El (ft)	804.80	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.18	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	0.00	0.63	
C & E Loss (ft)	0.02	Cum SA (acres)		0.37	

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

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.06				
Vel Head (ft)	0.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	807.02	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)		52.03	
E.G. Slope (ft/ft)	0.001341	Area (sq ft)		52.03	
Q Total (cfs)	80.00	Flow (cfs)		80.00	
Top Width (ft)	30.06	Top Width (ft)		30.06	
Vel Total (ft/s)	1.54	Avg. Vel. (ft/s)		1.54	

Max Chl Dpth (ft)	2.22	Hydr. Depth (ft)	1.73
Conv. Total (cfs)	2184.5	Conv. (cfs)	2184.5
Length Wtd. (ft)	60.99	Wetted Per. (ft)	30.98
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.14
Alpha	1.00	Stream Power (lb/ft s)	0.22
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	0.00
C & E Loss (ft)	0.02	Cum SA (acres)	0.39

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

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	807.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.050	
W.S. Elev (ft)	807.86	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)		78.44	
E.G. Slope (ft/ft)	0.001361	Area (sq ft)		78.44	
Q Total (cfs)	150.00	Flow (cfs)		150.00	
Top Width (ft)	32.59	Top Width (ft)		32.59	
Vel Total (ft/s)	1.91	Avg. Vel. (ft/s)		1.91	
Max Chl Dpth (ft)	3.06	Hydr. Depth (ft)		2.41	
Conv. Total (cfs)	4065.8	Conv. (cfs)		4065.8	
Length Wtd. (ft)	60.99	Wetted Per. (ft)		34.06	
Min Ch El (ft)	804.80	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)		0.37	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	0.01	1.13	0.00
C & E Loss (ft)	0.03	Cum SA (acres)	0.03	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 OUTPUT Profile #10

E.G. Elev (ft)	808.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	808.44	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)		97.89	
E.G. Slope (ft/ft)	0.001400	Area (sq ft)		97.89	
Q Total (cfs)	210.00	Flow (cfs)		210.00	
Top Width (ft)	34.77	Top Width (ft)		34.77	
Vel Total (ft/s)	2.15	Avg. Vel. (ft/s)		2.15	
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)		2.82	
Conv. Total (cfs)	5612.5	Conv. (cfs)		5612.5	
Length Wtd. (ft)	60.99	Wetted Per. (ft)		36.53	
Min Ch El (ft)	804.80	Shear (lb/sq ft)		0.23	
Alpha	1.00	Stream Power (lb/ft s)		0.50	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	0.07	1.43	0.01
C & E Loss (ft)	0.03	Cum SA (acres)	0.10	0.52	0.00

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

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	809.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	809.15	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)	0.62	123.27	0.05
E.G. Slope (ft/ft)	0.001644	Area (sq ft)	0.62	123.27	0.05
Q Total (cfs)	320.00	Flow (cfs)	0.22	319.78	0.00
Top Width (ft)	46.30	Top Width (ft)	8.57	37.00	0.73
Vel Total (ft/s)	2.58	Avg. Vel. (ft/s)	0.35	2.59	0.09
Max Chl Dpth (ft)	4.35	Hydr. Depth (ft)	0.07	3.33	0.07
Conv. Total (cfs)	7892.8	Conv. (cfs)	5.4	7887.3	0.1
Length Wtd. (ft)	61.11	Wetted Per. (ft)	8.57	39.02	0.74
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.01	0.32	0.01
Alpha	1.01	Stream Power (lb/ft s)	0.00	0.84	0.00

Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	0.29	1.81	0.24
C & E Loss (ft)	0.03	Cum SA (acres)	0.34	0.55	0.51

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

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	809.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	809.49	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)	7.01	135.94	0.59
E.G. Slope (ft/ft)	0.001894	Area (sq ft)	7.01	135.94	0.59
Q Total (cfs)	410.00	Flow (cfs)	5.90	403.98	0.12
Top Width (ft)	68.20	Top Width (ft)	28.77	37.00	2.44
Vel Total (ft/s)	2.86	Avg. Vel. (ft/s)	0.84	2.97	0.21
Max Chl Dpth (ft)	4.69	Hydr. Depth (ft)	0.24	3.67	0.24
Conv. Total (cfs)	9421.9	Conv. (cfs)	135.5	9283.6	2.8
Length Wtd. (ft)	61.43	Wetted Per. (ft)	28.77	39.02	2.49
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.03	0.41	0.03
Alpha	1.07	Stream Power (lb/ft s)	0.02	1.22	0.01
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	0.55	2.05	0.58
C & E Loss (ft)	0.02	Cum SA (acres)	0.52	0.56	0.79

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

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	809.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	809.83	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)	20.21	148.52	1.71
E.G. Slope (ft/ft)	0.002108	Area (sq ft)	20.21	148.52	1.71
Q Total (cfs)	520.00	Flow (cfs)	25.51	493.95	0.53
Top Width (ft)	89.97	Top Width (ft)	48.83	37.00	4.14
Vel Total (ft/s)	3.05	Avg. Vel. (ft/s)	1.26	3.33	0.31
Max Chl Dpth (ft)	5.03	Hydr. Depth (ft)	0.41	4.01	0.41
Conv. Total (cfs)	11326.9	Conv. (cfs)	555.7	10759.5	11.6
Length Wtd. (ft)	61.83	Wetted Per. (ft)	48.84	39.02	4.22
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.05	0.50	0.05
Alpha	1.14	Stream Power (lb/ft s)	0.07	1.67	0.02
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	0.88	2.29	1.08
C & E Loss (ft)	0.01	Cum SA (acres)	0.68	0.56	1.06

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	810.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	810.00	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)	29.76	155.07	2.52
E.G. Slope (ft/ft)	0.002616	Area (sq ft)	29.76	155.07	2.52
Q Total (cfs)	640.00	Flow (cfs)	47.70	591.30	1.00
Top Width (ft)	101.17	Top Width (ft)	59.14	37.00	5.03
Vel Total (ft/s)	3.42	Avg. Vel. (ft/s)	1.60	3.81	0.39
Max Chl Dpth (ft)	5.20	Hydr. Depth (ft)	0.50	4.19	0.50
Conv. Total (cfs)	12513.1	Conv. (cfs)	932.7	11561.0	19.5
Length Wtd. (ft)	61.93	Wetted Per. (ft)	59.15	39.02	5.13
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.08	0.65	0.08
Alpha	1.17	Stream Power (lb/ft s)	0.13	2.47	0.03
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	1.28	2.52	1.57
C & E Loss (ft)	0.01	Cum SA (acres)	0.91	0.57	1.19

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

than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500

Parameter	Value	Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.58				
Vel Head (ft)	0.26	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	810.33	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)		Flow Area (sq ft)	50.47	167.01	4.51
E.G. Slope (ft/ft)	0.003002	Area (sq ft)	50.47	167.01	4.51
Q Total (cfs)	830.00	Flow (cfs)	111.01	716.79	2.20
Top Width (ft)	113.44	Top Width (ft)	69.15	37.00	7.29
Vel Total (ft/s)	3.74	Avg. Vel. (ft/s)	2.20	4.29	0.49
Max Chl Dpth (ft)	5.53	Hydr. Depth (ft)	0.73	4.51	0.62
Conv. Total (cfs)	15149.3	Conv. (cfs)	2026.2	13083.0	40.1
Length Wtd. (ft)	62.21	Wetted Per. (ft)	69.16	39.02	7.41
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.14	0.80	0.11
Alpha	1.18	Stream Power (lb/ft s)	0.30	3.44	0.06
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	1.74	2.87	2.47
C & E Loss (ft)	0.01	Cum SA (acres)	0.98	0.57	1.69

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: Main Channel  
REACH: Upper RS: 118

INPUT

Description:

Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	36	812	75	810	99	809	150	808
151	807	152	806	153	805	156	804.1	160	805
164	806	167	807	169	808	174	808.46	176	809
204	810	215	811	239	813	272	815		

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	150	.05	169	.09	174	.12	215	.03
239	.12								

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	150	169		92 100.08	101	.1	.3

CROSS SECTION OUTPUT Profile #1

Parameter	Value	Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.41				
Vel Head (ft)	0.17	Wt. n-Val.		0.050	
W.S. Elev (ft)	806.23	Reach Len. (ft)	92.00	100.08	101.00
Crit W.S. (ft)		Flow Area (sq ft)		15.57	
E.G. Slope (ft/ft)	0.010787	Area (sq ft)		15.57	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	12.94	Top Width (ft)		12.94	
Vel Total (ft/s)	3.34	Avg. Vel. (ft/s)		3.34	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.20	
Conv. Total (cfs)	500.7	Conv. (cfs)		500.7	
Length Wtd. (ft)	100.08	Wetted Per. (ft)		13.84	
Min Ch El (ft)	804.10	Shear (lb/sq ft)		0.76	
Alpha	1.00	Stream Power (lb/ft s)		2.53	
Frctn Loss (ft)	1.01	Cum Volume (acre-ft)		0.48	
C & E Loss (ft)	0.01	Cum SA (acres)		0.31	

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

CROSS SECTION OUTPUT Profile #1.4

Parameter	Value	Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.65				
Vel Head (ft)	0.20	Wt. n-Val.		0.050	
W.S. Elev (ft)	806.45	Reach Len. (ft)	92.00	100.08	101.00

Crit W.S. (ft)		Flow Area (sq ft)	18.43
E.G. Slope (ft/ft)	0.010859	Area (sq ft)	18.43
Q Total (cfs)	66.00	Flow (cfs)	66.00
Top Width (ft)	13.79	Top Width (ft)	13.79
Vel Total (ft/s)	3.58	Avg. Vel. (ft/s)	3.58
Max Chl Dpth (ft)	2.35	Hydr. Depth (ft)	1.34
Conv. Total (cfs)	633.4	Conv. (cfs)	633.4
Length Wtd. (ft)	100.08	Wetted Per. (ft)	14.82
Min Ch El (ft)	804.10	Shear (lb/sq ft)	0.84
Alpha	1.00	Stream Power (lb/ft s)	3.02
Frctn Loss (ft)	1.02	Cum Volume (acre-ft)	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.34

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

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	806.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.050	
W.S. Elev (ft)	806.64	Reach Len. (ft)	92.00	100.08	101.00
Crit W.S. (ft)		Flow Area (sq ft)		21.15	
E.G. Slope (ft/ft)	0.010888	Area (sq ft)		21.15	
Q Total (cfs)	80.00	Flow (cfs)		80.00	
Top Width (ft)	14.56	Top Width (ft)		14.56	
Vel Total (ft/s)	3.78	Avg. Vel. (ft/s)		3.78	
Max Chl Dpth (ft)	2.54	Hydr. Depth (ft)		1.45	
Conv. Total (cfs)	766.7	Conv. (cfs)		766.7	
Length Wtd. (ft)	100.08	Wetted Per. (ft)		15.70	
Min Ch El (ft)	804.10	Shear (lb/sq ft)		0.92	
Alpha	1.00	Stream Power (lb/ft s)		3.46	
Frctn Loss (ft)	1.03	Cum Volume (acre-ft)	0.00	0.70	
C & E Loss (ft)	0.01	Cum SA (acres)		0.36	

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

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	807.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.		0.050	
W.S. Elev (ft)	807.40	Reach Len. (ft)	92.00	100.08	101.00
Crit W.S. (ft)		Flow Area (sq ft)		33.37	
E.G. Slope (ft/ft)	0.010664	Area (sq ft)		33.37	
Q Total (cfs)	150.00	Flow (cfs)		150.00	
Top Width (ft)	17.21	Top Width (ft)		17.21	
Vel Total (ft/s)	4.50	Avg. Vel. (ft/s)		4.50	
Max Chl Dpth (ft)	3.30	Hydr. Depth (ft)		1.94	
Conv. Total (cfs)	1452.5	Conv. (cfs)		1452.5	
Length Wtd. (ft)	100.08	Wetted Per. (ft)		18.82	
Min Ch El (ft)	804.10	Shear (lb/sq ft)		1.18	
Alpha	1.00	Stream Power (lb/ft s)		5.31	
Frctn Loss (ft)	0.99	Cum Volume (acre-ft)	0.01	1.05	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.03	0.43	

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

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	808.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.		0.050	
W.S. Elev (ft)	807.93	Reach Len. (ft)	92.00	100.08	101.00
Crit W.S. (ft)		Flow Area (sq ft)		42.79	
E.G. Slope (ft/ft)	0.010381	Area (sq ft)		42.79	
Q Total (cfs)	210.00	Flow (cfs)		210.00	
Top Width (ft)	18.78	Top Width (ft)		18.78	
Vel Total (ft/s)	4.91	Avg. Vel. (ft/s)		4.91	

Max Chl Dpth (ft)	3.83	Hydr. Depth (ft)	2.28		
Conv. Total (cfs)	2061.1	Conv. (cfs)	2061.1		
Length Wtd. (ft)	100.08	Wetted Per. (ft)	20.73		
Min Ch El (ft)	804.10	Shear (lb/sq ft)	1.34		
Alpha	1.00	Stream Power (lb/ft s)	6.56		
Frctn Loss (ft)	0.93	Cum Volume (acre-ft)	0.07	1.33	0.01
C & E Loss (ft)	0.02	Cum SA (acres)	0.10	0.49	0.00

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.02	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.44	Reach Len. (ft)	92.00	100.08	101.00
W.S. Elev (ft)	808.58	Flow Area (sq ft)	8.61	55.19	1.78
Crit W.S. (ft)		Area (sq ft)	8.61	55.19	1.78
E.G. Slope (ft/ft)	0.009259	Flow (cfs)	18.00	300.61	1.39
Q Total (cfs)	320.00	Top Width (ft)	29.64	19.00	5.45
Top Width (ft)	54.09	Avg. Vel. (ft/s)	2.09	5.45	0.78
Vel Total (ft/s)	4.88	Hydr. Depth (ft)	0.29	2.90	0.33
Max Chl Dpth (ft)	4.48	Conv. (cfs)	187.1	3124.0	14.4
Conv. Total (cfs)	3325.6	Wetted Per. (ft)	29.64	21.00	5.49
Length Wtd. (ft)	99.86	Shear (lb/sq ft)	0.17	1.52	0.19
Min Ch El (ft)	804.10	Stream Power (lb/ft s)	0.35	8.28	0.15
Alpha	1.18	Cum Volume (acre-ft)	0.29	1.69	0.24
Frctn Loss (ft)	0.97	Cum SA (acres)	0.31	0.51	0.51
C & E Loss (ft)	0.00				

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.40	Wt. n-Val.	0.030	0.050	0.091
Vel Head (ft)	0.34	Reach Len. (ft)	92.00	100.08	101.00
W.S. Elev (ft)	809.06	Flow Area (sq ft)	28.64	64.30	4.87
Crit W.S. (ft)	808.57	Area (sq ft)	28.64	64.30	4.87
E.G. Slope (ft/ft)	0.006615	Flow (cfs)	77.07	327.78	5.15
Q Total (cfs)	410.00	Top Width (ft)	52.46	19.00	8.70
Top Width (ft)	80.16	Avg. Vel. (ft/s)	2.69	5.10	1.06
Vel Total (ft/s)	4.19	Hydr. Depth (ft)	0.55	3.38	0.56
Max Chl Dpth (ft)	4.96	Conv. (cfs)	947.5	4030.2	63.3
Conv. Total (cfs)	5041.1	Wetted Per. (ft)	52.47	21.00	8.79
Length Wtd. (ft)	99.33	Shear (lb/sq ft)	0.23	1.26	0.23
Min Ch El (ft)	804.10	Stream Power (lb/ft s)	0.61	6.45	0.24
Alpha	1.26	Cum Volume (acre-ft)	0.52	1.91	0.58
Frctn Loss (ft)	0.92	Cum SA (acres)	0.45	0.52	0.78
C & E Loss (ft)	0.04				

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

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.80	Wt. n-Val.	0.030	0.050	0.096
Vel Head (ft)	0.26	Reach Len. (ft)	92.00	100.08	101.00
W.S. Elev (ft)	809.54	Flow Area (sq ft)	56.32	73.34	12.18
Crit W.S. (ft)	809.00	Area (sq ft)	56.32	73.34	12.18
E.G. Slope (ft/ft)	0.004509	Flow (cfs)	172.17	336.95	10.87
Q Total (cfs)	520.00	Top Width (ft)	63.88	19.00	22.02
Top Width (ft)	104.90	Avg. Vel. (ft/s)	3.06	4.59	0.89
Vel Total (ft/s)	3.67	Hydr. Depth (ft)	0.88	3.86	0.55
Max Chl Dpth (ft)	5.44	Conv. (cfs)	2564.1	5018.0	161.9
Conv. Total (cfs)	7744.0	Wetted Per. (ft)	63.90	21.00	22.12
Length Wtd. (ft)	98.75	Shear (lb/sq ft)	0.25	0.98	0.15
Min Ch El (ft)	804.10	Stream Power (lb/ft s)	0.76	4.52	0.14
Alpha	1.25	Cum Volume (acre-ft)	0.82	2.14	1.08
Frctn Loss (ft)	0.84	Cum SA (acres)	0.59	0.52	1.04
C & E Loss (ft)	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 OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.96	Wt. n-Val.	0.030	0.050	0.097
Vel Head (ft)	0.36	Reach Len. (ft)	92.00	100.08	101.00
W.S. Elev (ft)	809.61	Flow Area (sq ft)	60.89	74.69	13.80
Crit W.S. (ft)		Area (sq ft)	60.89	74.69	13.80
E.G. Slope (ft/ft)	0.006054	Flow (cfs)	223.28	402.42	14.30
Q Total (cfs)	640.00	Top Width (ft)	65.57	19.00	24.00
Top Width (ft)	108.57	Avg. Vel. (ft/s)	3.67	5.39	1.04
Vel Total (ft/s)	4.28	Hydr. Depth (ft)	0.93	3.93	0.58
Max Chl Dpth (ft)	5.51	Conv. (cfs)	2869.7	5172.0	183.8
Conv. Total (cfs)	8225.5	Wetted Per. (ft)	65.59	21.00	24.10
Length Wtd. (ft)	98.02	Shear (lb/sq ft)	0.35	1.34	0.22
Min Ch El (ft)	804.10	Stream Power (lb/ft s)	1.29	7.24	0.22
Alpha	1.25	Cum Volume (acre-ft)	1.21	2.36	1.56
Frctn Loss (ft)	0.76	Cum SA (acres)	0.81	0.53	1.18
C & E Loss (ft)	0.03				

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.31	Wt. n-Val.	0.030	0.050	0.101
Vel Head (ft)	0.40	Reach Len. (ft)	92.00	100.08	101.00
W.S. Elev (ft)	809.91	Flow Area (sq ft)	81.74	80.41	22.31
Crit W.S. (ft)		Area (sq ft)	81.74	80.41	22.31
E.G. Slope (ft/ft)	0.006217	Flow (cfs)	344.76	461.23	24.01
Q Total (cfs)	830.00	Top Width (ft)	72.81	19.00	32.44
Top Width (ft)	124.25	Avg. Vel. (ft/s)	4.22	5.74	1.08
Vel Total (ft/s)	4.50	Hydr. Depth (ft)	1.12	4.23	0.69
Max Chl Dpth (ft)	5.81	Conv. (cfs)	4372.5	5849.8	304.5
Conv. Total (cfs)	10526.8	Wetted Per. (ft)	72.83	21.00	32.55
Length Wtd. (ft)	97.41	Shear (lb/sq ft)	0.44	1.49	0.27
Min Ch El (ft)	804.10	Stream Power (lb/ft s)	1.84	8.53	0.29
Alpha	1.27	Cum Volume (acre-ft)	1.64	2.70	2.45
Frctn Loss (ft)	0.78	Cum SA (acres)	0.87	0.53	1.67
C & E Loss (ft)	0.03				

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 116

INPUT

Description:

Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	30	813	86	809	103	808	155	808
156	807	158	806	159	805	161	804	165	803.5
170	804	172	805	174	806	176	807	178	808
215	809	226	810	237	811	270	815		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	155	.05	176	.09	237	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	155	176		125 126.41	122	.1	.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	805.40	Wt. n-Val.		0.050	
Vel Head (ft)	0.15	Reach Len. (ft)	125.00	126.41	122.00
W.S. Elev (ft)	805.24	Flow Area (sq ft)		16.50	
Crit W.S. (ft)		Area (sq ft)		16.50	
E.G. Slope (ft/ft)	0.009392	Flow (cfs)		52.00	
Q Total (cfs)	52.00	Top Width (ft)		13.73	
Top Width (ft)	13.73	Avg. Vel. (ft/s)		3.15	
Vel Total (ft/s)	3.15				



Max Chl Dpth (ft)	1.74	Hydr. Depth (ft)	1.20
Conv. Total (cfs)	536.6	Conv. (cfs)	536.6
Length Wtd. (ft)	126.41	Wetted Per. (ft)	14.42
Min Ch El (ft)	803.50	Shear (lb/sq ft)	0.67
Alpha	1.00	Stream Power (lb/ft s)	2.11
Frctn Loss (ft)	1.26	Cum Volume (acre-ft)	0.45
C & E Loss (ft)	0.00	Cum SA (acres)	0.28

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

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	805.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.050	
W.S. Elev (ft)	805.45	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)		Flow Area (sq ft)		19.36	
E.G. Slope (ft/ft)	0.009503	Area (sq ft)		19.36	
Q Total (cfs)	66.00	Flow (cfs)		66.00	
Top Width (ft)	14.34	Top Width (ft)		14.34	
Vel Total (ft/s)	3.41	Avg. Vel. (ft/s)		3.41	
Max Chl Dpth (ft)	1.95	Hydr. Depth (ft)		1.35	
Conv. Total (cfs)	677.0	Conv. (cfs)		677.0	
Length Wtd. (ft)	126.41	Wetted Per. (ft)		15.16	
Min Ch El (ft)	803.50	Shear (lb/sq ft)		0.76	
Alpha	1.00	Stream Power (lb/ft s)		2.58	
Frctn Loss (ft)	1.25	Cum Volume (acre-ft)	0.00	0.54	
C & E Loss (ft)	0.00	Cum SA (acres)		0.31	

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

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	805.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.050	
W.S. Elev (ft)	805.63	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)		Flow Area (sq ft)		21.99	
E.G. Slope (ft/ft)	0.009654	Area (sq ft)		21.99	
Q Total (cfs)	80.00	Flow (cfs)		80.00	
Top Width (ft)	14.88	Top Width (ft)		14.88	
Vel Total (ft/s)	3.64	Avg. Vel. (ft/s)		3.64	
Max Chl Dpth (ft)	2.13	Hydr. Depth (ft)		1.48	
Conv. Total (cfs)	814.2	Conv. (cfs)		814.2	
Length Wtd. (ft)	126.41	Wetted Per. (ft)		15.82	
Min Ch El (ft)	803.50	Shear (lb/sq ft)		0.84	
Alpha	1.00	Stream Power (lb/ft s)		3.05	
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)	0.00	0.65	
C & E Loss (ft)	0.00	Cum SA (acres)		0.33	

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

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	806.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.29	Wt. n-Val.		0.050	
W.S. Elev (ft)	806.43	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)		Flow Area (sq ft)		34.98	
E.G. Slope (ft/ft)	0.009287	Area (sq ft)		34.98	
Q Total (cfs)	150.00	Flow (cfs)		150.00	
Top Width (ft)	17.72	Top Width (ft)		17.72	
Vel Total (ft/s)	4.29	Avg. Vel. (ft/s)		4.29	
Max Chl Dpth (ft)	2.93	Hydr. Depth (ft)		1.97	
Conv. Total (cfs)	1556.6	Conv. (cfs)		1556.6	
Length Wtd. (ft)	126.41	Wetted Per. (ft)		19.10	
Min Ch El (ft)	803.50	Shear (lb/sq ft)		1.06	
Alpha	1.00	Stream Power (lb/ft s)		4.55	

Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	0.01	0.97	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.03	0.39	

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 OUTPUT Profile #10

E.G. Elev (ft)	807.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.		0.050	0.000
W.S. Elev (ft)	807.04	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)		Flow Area (sq ft)		46.61	0.00
E.G. Slope (ft/ft)	0.008298	Area (sq ft)		46.61	0.00
Q Total (cfs)	210.00	Flow (cfs)		210.00	0.00
Top Width (ft)	20.13	Top Width (ft)		20.04	0.09
Vel Total (ft/s)	4.51	Avg. Vel. (ft/s)		4.51	0.11
Max Chl Dpth (ft)	3.54	Hydr. Depth (ft)		2.33	0.02
Conv. Total (cfs)	2305.3	Conv. (cfs)		2305.3	0.0
Length Wtd. (ft)	126.41	Wetted Per. (ft)		21.71	0.10
Min Ch El (ft)	803.50	Shear (lb/sq ft)		1.11	
Alpha	1.00	Stream Power (lb/ft s)		5.01	
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)	0.07	1.23	0.01
C & E Loss (ft)	0.02	Cum SA (acres)	0.10	0.44	0.00

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

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	808.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.		0.050	0.090
W.S. Elev (ft)	807.56	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)		Flow Area (sq ft)		57.14	0.32
E.G. Slope (ft/ft)	0.010200	Area (sq ft)		57.14	0.32
Q Total (cfs)	320.00	Flow (cfs)		319.79	0.21
Top Width (ft)	21.69	Top Width (ft)		20.56	1.12
Vel Total (ft/s)	5.57	Avg. Vel. (ft/s)		5.60	0.66
Max Chl Dpth (ft)	4.06	Hydr. Depth (ft)		2.78	0.28
Conv. Total (cfs)	3168.5	Conv. (cfs)		3166.4	2.1
Length Wtd. (ft)	126.22	Wetted Per. (ft)		22.45	1.26
Min Ch El (ft)	803.50	Shear (lb/sq ft)		1.62	0.16
Alpha	1.01	Stream Power (lb/ft s)		9.07	0.11
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	0.28	1.56	0.23
C & E Loss (ft)	0.07	Cum SA (acres)	0.28	0.47	0.50

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

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	808.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.70	Wt. n-Val.		0.050	0.090
W.S. Elev (ft)	807.74	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)		Flow Area (sq ft)		60.79	0.55
E.G. Slope (ft/ft)	0.013810	Area (sq ft)		60.79	0.55
Q Total (cfs)	410.00	Flow (cfs)		409.49	0.51
Top Width (ft)	22.22	Top Width (ft)		20.74	1.48
Vel Total (ft/s)	6.68	Avg. Vel. (ft/s)		6.74	0.93
Max Chl Dpth (ft)	4.24	Hydr. Depth (ft)		2.93	0.37
Conv. Total (cfs)	3488.9	Conv. (cfs)		3484.6	4.3
Length Wtd. (ft)	126.03	Wetted Per. (ft)		22.69	1.65
Min Ch El (ft)	803.50	Shear (lb/sq ft)		2.31	0.28
Alpha	1.01	Stream Power (lb/ft s)		15.56	0.26
Frctn Loss (ft)	1.22	Cum Volume (acre-ft)	0.49	1.76	0.57
C & E Loss (ft)	0.15	Cum SA (acres)	0.40	0.47	0.77

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.

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.88	Wt. n-Val.		0.050	0.090
Vel Head (ft)	1.10	Reach Len. (ft)	125.00	126.41	122.00
W.S. Elev (ft)	807.78	Flow Area (sq ft)		61.56	0.60
Crit W.S. (ft)	807.49	Area (sq ft)		61.56	0.60
E.G. Slope (ft/ft)	0.021364	Flow (cfs)		519.28	0.72
Q Total (cfs)	520.00	Top Width (ft)		20.78	1.55
Top Width (ft)	22.33	Avg. Vel. (ft/s)		8.44	1.19
Vel Total (ft/s)	8.37	Hydr. Depth (ft)		2.96	0.39
Max Chl Dpth (ft)	4.28	Conv. (cfs)		3552.8	4.9
Conv. Total (cfs)	3557.7	Wetted Per. (ft)		22.75	1.73
Length Wtd. (ft)	125.86	Shear (lb/sq ft)		3.61	0.46
Min Ch El (ft)	803.50	Stream Power (lb/ft s)		30.45	0.55
Alpha	1.02	Cum Volume (acre-ft)	0.76	1.98	1.06
Frctn Loss (ft)	1.18	Cum SA (acres)	0.52	0.48	1.01
C & E Loss (ft)	0.28				

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 OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.18	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.61	Reach Len. (ft)	125.00	126.41	122.00
W.S. Elev (ft)	808.57	Flow Area (sq ft)	32.27	78.18	8.10
Crit W.S. (ft)	808.57	Area (sq ft)	32.27	78.18	8.10
E.G. Slope (ft/ft)	0.010170	Flow (cfs)	104.67	528.65	6.68
Q Total (cfs)	640.00	Top Width (ft)	61.65	21.00	23.01
Top Width (ft)	105.67	Avg. Vel. (ft/s)	3.24	6.76	0.82
Vel Total (ft/s)	5.40	Hydr. Depth (ft)	0.52	3.72	0.35
Max Chl Dpth (ft)	5.07	Conv. (cfs)	1037.9	5242.1	66.2
Conv. Total (cfs)	6346.3	Wetted Per. (ft)	61.67	23.06	23.25
Length Wtd. (ft)	125.61	Shear (lb/sq ft)	0.33	2.15	0.22
Min Ch El (ft)	803.50	Stream Power (lb/ft s)	1.08	14.55	0.18
Alpha	1.36	Cum Volume (acre-ft)	1.11	2.18	1.54
Frctn Loss (ft)	0.75	Cum SA (acres)	0.68	0.48	1.12
C & E Loss (ft)	0.14				

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 OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.50	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.66	Reach Len. (ft)	125.00	126.41	122.00
W.S. Elev (ft)	808.84	Flow Area (sq ft)	49.64	83.88	15.72
Crit W.S. (ft)	808.84	Area (sq ft)	49.64	83.88	15.72
E.G. Slope (ft/ft)	0.010552	Flow (cfs)	208.28	605.56	16.16
Q Total (cfs)	830.00				

Top Width (ft)	120.33	Top Width (ft)	66.27	21.00	33.06
Vel Total (ft/s)	5.56	Avg. Vel. (ft/s)	4.20	7.22	1.03
Max Chl Dpth (ft)	5.34	Hydr. Depth (ft)	0.75	3.99	0.48
Conv. Total (cfs)	8079.8	Conv. (cfs)	2027.6	5895.0	157.3
Length Wtd. (ft)	125.48	Wetted Per. (ft)	66.30	23.06	33.31
Min Ch El (ft)	803.50	Shear (lb/sq ft)	0.49	2.40	0.31
Alpha	1.37	Stream Power (lb/ft s)	2.07	17.30	0.32
Frctn Loss (ft)	0.86	Cum Volume (acre-ft)	1.50	2.51	2.41
C & E Loss (ft)	0.14	Cum SA (acres)	0.72	0.49	1.59

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: Main Channel  
REACH: Upper RS: 114

INPUT

Description:

Station Elevation Data	num=	16							
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev									
0 815 85 807 127 806 131 805 134 804									
137 803 143 802.1 147 803 148 804 150 805									
153 806 201 806 226 807 236 808 240 809									
257 815									

Manning's n Values	num=	5							
Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val									
0 .03 127 .12 131 .05 153 .09 226 .12									

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.									
127 153 258 281.56 256 .1 .3									

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	804.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.96	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)		Flow Area (sq ft)		15.97	
E.G. Slope (ft/ft)	0.010619	Area (sq ft)		15.97	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	13.85	Top Width (ft)		13.85	
Vel Total (ft/s)	3.26	Avg. Vel. (ft/s)		3.26	
Max Chl Dpth (ft)	1.86	Hydr. Depth (ft)		1.15	
Conv. Total (cfs)	504.6	Conv. (cfs)		504.6	
Length Wtd. (ft)	281.56	Wetted Per. (ft)		14.57	
Min Ch El (ft)	802.10	Shear (lb/sq ft)		0.73	
Alpha	1.00	Stream Power (lb/ft s)		2.37	
Frctn Loss (ft)	3.19	Cum Volume (acre-ft)		0.40	
C & E Loss (ft)	0.00	Cum SA (acres)		0.24	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.  
Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	804.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.050	
W.S. Elev (ft)	804.19	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)		Flow Area (sq ft)		19.21	
E.G. Slope (ft/ft)	0.010263	Area (sq ft)		19.21	

Q Total (cfs)	66.00	Flow (cfs)	66.00
Top Width (ft)	14.94	Top Width (ft)	14.94
Vel Total (ft/s)	3.44	Avg. Vel. (ft/s)	3.44
Max Chl Dpth (ft)	2.09	Hydr. Depth (ft)	1.29
Conv. Total (cfs)	651.5	Conv. (cfs)	651.5
Length Wtd. (ft)	281.56	Wetted Per. (ft)	15.75
Min Ch El (ft)	802.10	Shear (lb/sq ft)	0.78
Alpha	1.00	Stream Power (lb/ft s)	2.68
Frctn Loss (ft)	3.18	Cum Volume (acre-ft)	0.49
C & E Loss (ft)	0.00	Cum SA (acres)	0.26

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	804.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.050	
W.S. Elev (ft)	804.40	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)		Flow Area (sq ft)		22.58	
E.G. Slope (ft/ft)	0.009685	Area (sq ft)		22.58	
Q Total (cfs)	80.00	Flow (cfs)		80.00	
Top Width (ft)	16.02	Top Width (ft)		16.02	
Vel Total (ft/s)	3.54	Avg. Vel. (ft/s)		3.54	
Max Chl Dpth (ft)	2.30	Hydr. Depth (ft)		1.41	
Conv. Total (cfs)	812.9	Conv. (cfs)		812.9	
Length Wtd. (ft)	281.56	Wetted Per. (ft)		16.93	
Min Ch El (ft)	802.10	Shear (lb/sq ft)		0.81	
Alpha	1.00	Stream Power (lb/ft s)		2.86	
Frctn Loss (ft)	3.10	Cum Volume (acre-ft)	0.00	0.58	
C & E Loss (ft)	0.01	Cum SA (acres)		0.28	

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	805.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.054	
W.S. Elev (ft)	805.22	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)		Flow Area (sq ft)		37.35	
E.G. Slope (ft/ft)	0.010246	Area (sq ft)		37.35	
Q Total (cfs)	150.00	Flow (cfs)		150.00	
Top Width (ft)	20.54	Top Width (ft)		20.54	
Vel Total (ft/s)	4.02	Avg. Vel. (ft/s)		4.02	
Max Chl Dpth (ft)	3.12	Hydr. Depth (ft)		1.82	
Conv. Total (cfs)	1481.9	Conv. (cfs)		1481.9	
Length Wtd. (ft)	281.56	Wetted Per. (ft)		21.74	
Min Ch El (ft)	802.10	Shear (lb/sq ft)		1.10	
Alpha	1.00	Stream Power (lb/ft s)		4.41	
Frctn Loss (ft)	3.16	Cum Volume (acre-ft)	0.01	0.87	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.03	0.34	

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	806.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.062	
W.S. Elev (ft)	805.87	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)	804.77	Flow Area (sq ft)		52.19	
E.G. Slope (ft/ft)	0.011273	Area (sq ft)		52.19	
Q Total (cfs)	210.00	Flow (cfs)		210.00	
Top Width (ft)	25.09	Top Width (ft)		25.09	

Vel Total (ft/s)	4.02	Avg. Vel. (ft/s)	4.02		
Max Chl Dpth (ft)	3.77	Hydr. Depth (ft)	2.08		
Conv. Total (cfs)	1977.9	Conv. (cfs)	1977.9		
Length Wtd. (ft)	281.56	Wetted Per. (ft)	26.48		
Min Ch El (ft)	802.10	Shear (lb/sq ft)	1.39		
Alpha	1.00	Stream Power (lb/ft s)	5.58		
Frctn Loss (ft)	3.23	Cum Volume (acre-ft)	0.07	1.09	0.01
C & E Loss (ft)	0.02	Cum SA (acres)	0.10	0.38	

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	806.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.	0.030	0.063	0.090
W.S. Elev (ft)	806.49	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)	805.39	Flow Area (sq ft)	5.00	68.19	26.40
E.G. Slope (ft/ft)	0.009360	Area (sq ft)	5.00	68.19	26.40
Q Total (cfs)	320.00	Flow (cfs)	9.35	286.32	24.33
Top Width (ft)	106.69	Top Width (ft)	20.49	26.00	60.20
Vel Total (ft/s)	3.21	Avg. Vel. (ft/s)	1.87	4.20	0.92
Max Chl Dpth (ft)	4.39	Hydr. Depth (ft)	0.24	2.62	0.44
Conv. Total (cfs)	3307.5	Conv. (cfs)	96.7	2959.4	251.5
Length Wtd. (ft)	280.34	Wetted Per. (ft)	20.50	27.43	60.21
Min Ch El (ft)	802.10	Shear (lb/sq ft)	0.14	1.45	0.26
Alpha	1.54	Stream Power (lb/ft s)	0.27	6.10	0.24
Frctn Loss (ft)	3.08	Cum Volume (acre-ft)	0.27	1.38	0.20
C & E Loss (ft)	0.03	Cum SA (acres)	0.25	0.40	0.41

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	807.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.030	0.063	0.090
W.S. Elev (ft)	806.87	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)	805.79	Flow Area (sq ft)	15.95	78.16	51.33
E.G. Slope (ft/ft)	0.007117	Area (sq ft)	15.95	78.16	51.33
Q Total (cfs)	410.00	Flow (cfs)	38.30	313.46	58.24
Top Width (ft)	132.39	Top Width (ft)	36.60	26.00	69.79
Vel Total (ft/s)	2.82	Avg. Vel. (ft/s)	2.40	4.01	1.13
Max Chl Dpth (ft)	4.77	Hydr. Depth (ft)	0.44	3.01	0.74
Conv. Total (cfs)	4859.8	Conv. (cfs)	454.0	3715.5	690.4
Length Wtd. (ft)	278.84	Wetted Per. (ft)	36.61	27.43	69.81
Min Ch El (ft)	802.10	Shear (lb/sq ft)	0.19	1.27	0.33
Alpha	1.64	Stream Power (lb/ft s)	0.46	5.08	0.37
Frctn Loss (ft)	2.96	Cum Volume (acre-ft)	0.47	1.56	0.50
C & E Loss (ft)	0.06	Cum SA (acres)	0.35	0.40	0.67

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	807.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.030	0.063	0.090
W.S. Elev (ft)	807.26	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)	806.58	Flow Area (sq ft)	32.10	88.16	79.52
E.G. Slope (ft/ft)	0.005221	Area (sq ft)	32.10	88.16	79.52
Q Total (cfs)	520.00	Flow (cfs)	92.08	328.12	99.80

Top Width (ft)	146.28	Top Width (ft)	44.72	26.00	75.56
Vel Total (ft/s)	2.60	Avg. Vel. (ft/s)	2.87	3.72	1.26
Max Chl Dpth (ft)	5.16	Hydr. Depth (ft)	0.72	3.39	1.05
Conv. Total (cfs)	7196.3	Conv. (cfs)	1274.3	4540.9	1381.2
Length Wtd. (ft)	277.35	Wetted Per. (ft)	44.74	27.43	75.59
Min Ch El (ft)	802.10	Shear (lb/sq ft)	0.23	1.05	0.34
Alpha	1.55	Stream Power (lb/ft s)	0.67	3.90	0.43
Frctn Loss (ft)	2.76	Cum Volume (acre-ft)	0.72	1.77	0.95
C & E Loss (ft)	0.09	Cum SA (acres)	0.46	0.41	0.91

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	807.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.030	0.063	0.090
W.S. Elev (ft)	807.63	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)	806.79	Flow Area (sq ft)	49.75	97.98	108.78
E.G. Slope (ft/ft)	0.003941	Area (sq ft)	49.75	97.98	108.78
Q Total (cfs)	640.00	Flow (cfs)	156.77	339.95	143.28
Top Width (ft)	154.07	Top Width (ft)	48.73	26.00	79.34
Vel Total (ft/s)	2.50	Avg. Vel. (ft/s)	3.15	3.47	1.32
Max Chl Dpth (ft)	5.53	Hydr. Depth (ft)	1.02	3.77	1.37
Conv. Total (cfs)	10194.4	Conv. (cfs)	2497.1	5415.0	2282.3
Length Wtd. (ft)	276.23	Wetted Per. (ft)	48.78	27.43	79.39
Min Ch El (ft)	802.10	Shear (lb/sq ft)	0.25	0.88	0.34
Alpha	1.48	Stream Power (lb/ft s)	0.79	3.05	0.44
Frctn Loss (ft)	2.52	Cum Volume (acre-ft)	1.00	1.92	1.37
C & E Loss (ft)	0.14	Cum SA (acres)	0.52	0.41	0.98

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	808.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.030	0.063	0.090
W.S. Elev (ft)	807.82	Reach Len. (ft)	258.00	281.56	256.00
Crit W.S. (ft)	807.09	Flow Area (sq ft)	59.25	102.94	124.10
E.G. Slope (ft/ft)	0.004832	Area (sq ft)	59.25	102.94	124.10
Q Total (cfs)	830.00	Flow (cfs)	225.99	408.73	195.28
Top Width (ft)	158.01	Top Width (ft)	50.76	26.00	81.25
Vel Total (ft/s)	2.90	Avg. Vel. (ft/s)	3.81	3.97	1.57
Max Chl Dpth (ft)	5.72	Hydr. Depth (ft)	1.17	3.96	1.53
Conv. Total (cfs)	11939.9	Conv. (cfs)	3251.0	5879.7	2809.1
Length Wtd. (ft)	274.27	Wetted Per. (ft)	50.81	27.43	81.31
Min Ch El (ft)	802.10	Shear (lb/sq ft)	0.35	1.13	0.46
Alpha	1.46	Stream Power (lb/ft s)	1.34	4.50	0.72
Frctn Loss (ft)	2.22	Cum Volume (acre-ft)	1.35	2.24	2.21
C & E Loss (ft)	0.07	Cum SA (acres)	0.56	0.42	1.43

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: Main Channel  
 REACH: Upper RS: 112

INPUT

Description:

Station Elevation Data		num= 20		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	812	24	810	62	805	64	804	67	803
69	802	72	801	78	800	82	799	85	798.8
87	799	88	800	88	801	89	802	90	803
90	804	172	804	185	805	192	806	211	810

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	.03	64	.05	90	.09	192	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	64	90	122	122.27	122	.1	.3

CROSS SECTION OUTPUT Profile #1

Element	Value	Left OB	Channel	Right OB
E.G. Elev (ft)	800.93			
Vel Head (ft)	0.18		0.050	
W.S. Elev (ft)	800.75	122.00	122.27	122.00
Crit W.S. (ft)			17.18	
E.G. Slope (ft/ft)	0.012010		17.18	
Q Total (cfs)	59.00		59.00	
Top Width (ft)	14.50		14.50	
Vel Total (ft/s)	3.43		3.43	
Max Chl Dpth (ft)	1.95		1.19	
Conv. Total (cfs)	538.4		538.4	
Length Wtd. (ft)	122.27		15.86	
Min Ch El (ft)	798.80		0.81	
Alpha	1.00		2.79	
Frctn Loss (ft)	1.34		0.29	
C & E Loss (ft)	0.00		0.15	

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

CROSS SECTION OUTPUT Profile #1.4

Element	Value	Left OB	Channel	Right OB
E.G. Elev (ft)	801.19			
Vel Head (ft)	0.21		0.050	
W.S. Elev (ft)	800.98	122.00	122.27	122.00
Crit W.S. (ft)			20.63	
E.G. Slope (ft/ft)	0.012314		20.63	
Q Total (cfs)	76.00		76.00	
Top Width (ft)	15.86		15.86	
Vel Total (ft/s)	3.68		3.68	
Max Chl Dpth (ft)	2.18		1.30	
Conv. Total (cfs)	684.9		684.9	
Length Wtd. (ft)	122.27		17.47	
Min Ch El (ft)	798.80		0.91	
Alpha	1.00		3.34	
Frctn Loss (ft)	1.31	0.00	0.36	
C & E Loss (ft)	0.01		0.16	

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

CROSS SECTION OUTPUT Profile #2

Element	Value	Left OB	Channel	Right OB
E.G. Elev (ft)	801.49			



Vel Head (ft)	0.25	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.25	Reach Len. (ft)	122.00	122.27	122.00
Crit W.S. (ft)		Flow Area (sq ft)		25.05	
E.G. Slope (ft/ft)	0.012277	Area (sq ft)		25.05	
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	16.98	Top Width (ft)		16.98	
Vel Total (ft/s)	3.99	Avg. Vel. (ft/s)		3.99	
Max Chl Dpth (ft)	2.45	Hydr. Depth (ft)		1.47	
Conv. Total (cfs)	902.5	Conv. (cfs)		902.5	
Length Wtd. (ft)	122.27	Wetted Per. (ft)		18.76	
Min Ch El (ft)	798.80	Shear (lb/sq ft)		1.02	
Alpha	1.00	Stream Power (lb/ft s)		4.09	
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)	0.00	0.43	
C & E Loss (ft)	0.01	Cum SA (acres)		0.18	

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

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.30	Wt. n-Val.		0.050	
Vel Head (ft)	0.35	Reach Len. (ft)	122.00	122.27	122.00
W.S. Elev (ft)	801.96	Flow Area (sq ft)		38.12	
Crit W.S. (ft)		Area (sq ft)		38.12	
E.G. Slope (ft/ft)	0.012142	Flow (cfs)		180.00	
Q Total (cfs)	180.00	Top Width (ft)		19.82	
Top Width (ft)	19.82	Avg. Vel. (ft/s)		4.72	
Vel Total (ft/s)	4.72	Hydr. Depth (ft)		1.92	
Max Chl Dpth (ft)	3.16	Conv. (cfs)		1633.5	
Conv. Total (cfs)	1633.5	Wetted Per. (ft)		22.01	
Length Wtd. (ft)	122.27	Shear (lb/sq ft)		1.31	
Min Ch El (ft)	798.80	Stream Power (lb/ft s)		6.20	
Alpha	1.00	Cum Volume (acre-ft)	0.01	0.62	0.00
Frctn Loss (ft)	1.12	Cum SA (acres)	0.03	0.21	
C & E Loss (ft)	0.03				

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.87	Wt. n-Val.		0.050	
Vel Head (ft)	0.41	Reach Len. (ft)	122.00	122.27	122.00
W.S. Elev (ft)	802.46	Flow Area (sq ft)		48.57	
Crit W.S. (ft)		Area (sq ft)		48.57	
E.G. Slope (ft/ft)	0.011655	Flow (cfs)		250.00	
Q Total (cfs)	250.00	Top Width (ft)		21.39	
Top Width (ft)	21.39	Avg. Vel. (ft/s)		5.15	
Vel Total (ft/s)	5.15	Hydr. Depth (ft)		2.27	
Max Chl Dpth (ft)	3.66	Conv. (cfs)		2315.8	
Conv. Total (cfs)	2315.8	Wetted Per. (ft)		23.90	
Length Wtd. (ft)	122.27	Shear (lb/sq ft)		1.48	
Min Ch El (ft)	798.80	Stream Power (lb/ft s)		7.61	
Alpha	1.00	Cum Volume (acre-ft)	0.07	0.76	0.01
Frctn Loss (ft)	1.03	Cum SA (acres)	0.10	0.22	
C & E Loss (ft)	0.05				

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

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.62	Wt. n-Val.		0.050	
Vel Head (ft)	0.55	Reach Len. (ft)	122.00	122.27	122.00
W.S. Elev (ft)	803.07	Flow Area (sq ft)		62.00	
Crit W.S. (ft)		Area (sq ft)		62.00	
E.G. Slope (ft/ft)	0.012744	Flow (cfs)		370.00	
Q Total (cfs)	370.00				

Top Width (ft)	23.20	Top Width (ft)	23.20		
Vel Total (ft/s)	5.97	Avg. Vel. (ft/s)	5.97		
Max Chl Dpth (ft)	4.27	Hydr. Depth (ft)	2.67		
Conv. Total (cfs)	3277.6	Conv. (cfs)	3277.6		
Length Wtd. (ft)	122.26	Wetted Per. (ft)	26.13		
Min Ch El (ft)	798.80	Shear (lb/sq ft)	1.89		
Alpha	1.00	Stream Power (lb/ft s)	11.26		
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.25	0.96	0.12
C & E Loss (ft)	0.09	Cum SA (acres)	0.19	0.24	0.24

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

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	804.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.76	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.29	Reach Len. (ft)	122.00	122.27	122.00
Crit W.S. (ft)		Flow Area (sq ft)		67.38	
E.G. Slope (ft/ft)	0.016341	Area (sq ft)		67.38	
Q Total (cfs)	470.00	Flow (cfs)		470.00	
Top Width (ft)	23.88	Top Width (ft)		23.88	
Vel Total (ft/s)	6.97	Avg. Vel. (ft/s)		6.97	
Max Chl Dpth (ft)	4.49	Hydr. Depth (ft)		2.82	
Conv. Total (cfs)	3676.7	Conv. (cfs)		3676.7	
Length Wtd. (ft)	122.24	Wetted Per. (ft)		27.09	
Min Ch El (ft)	798.80	Shear (lb/sq ft)		2.54	
Alpha	1.00	Stream Power (lb/ft s)		17.70	
Frctn Loss (ft)	0.67	Cum Volume (acre-ft)	0.42	1.09	0.35
C & E Loss (ft)	0.18	Cum SA (acres)	0.24	0.24	0.46

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

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

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	804.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.08	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.48	Reach Len. (ft)	122.00	122.27	122.00
Crit W.S. (ft)		Flow Area (sq ft)		72.00	
E.G. Slope (ft/ft)	0.022196	Area (sq ft)		72.00	
Q Total (cfs)	600.00	Flow (cfs)		600.00	
Top Width (ft)	24.45	Top Width (ft)		24.45	
Vel Total (ft/s)	8.33	Avg. Vel. (ft/s)		8.33	
Max Chl Dpth (ft)	4.68	Hydr. Depth (ft)		2.94	
Conv. Total (cfs)	4027.3	Conv. (cfs)		4027.3	
Length Wtd. (ft)	122.23	Wetted Per. (ft)		27.88	
Min Ch El (ft)	798.80	Shear (lb/sq ft)		3.58	
Alpha	1.00	Stream Power (lb/ft s)		29.82	
Frctn Loss (ft)	0.67	Cum Volume (acre-ft)	0.62	1.25	0.71
C & E Loss (ft)	0.28	Cum SA (acres)	0.33	0.25	0.68

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

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	805.12	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.52	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.60	Reach Len. (ft)	122.00	122.27	122.00
Crit W.S. (ft)	803.60	Flow Area (sq ft)		74.82	
E.G. Slope (ft/ft)	0.030376	Area (sq ft)		74.82	

Q Total (cfs)	740.00	Flow (cfs)	740.00		
Top Width (ft)	24.80	Top Width (ft)	24.80		
Vel Total (ft/s)	9.89	Avg. Vel. (ft/s)	9.89		
Max Chl Dpth (ft)	4.80	Hydr. Depth (ft)	3.02		
Conv. Total (cfs)	4245.9	Conv. (cfs)	4245.9		
Length Wtd. (ft)	122.22	Wetted Per. (ft)	28.36		
Min Ch El (ft)	798.80	Shear (lb/sq ft)	5.00		
Alpha	1.00	Stream Power (lb/ft s)	49.49		
Frctn Loss (ft)	0.76	Cum Volume (acre-ft)	0.85	1.37	1.05
C & E Loss (ft)	0.41	Cum SA (acres)	0.38	0.25	0.75

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #500

E.G. Elev (ft)	805.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.93	Wt. n-Val.	0.030	0.050	0.090
W.S. Elev (ft)	804.79	Reach Len. (ft)	122.00	122.27	122.00
Crit W.S. (ft)	804.79	Flow Area (sq ft)	0.62	105.43	68.43
E.G. Slope (ft/ft)	0.014356	Area (sq ft)	0.62	105.43	68.43
Q Total (cfs)	980.00	Flow (cfs)	1.82	867.23	110.95
Top Width (ft)	119.78	Top Width (ft)	1.57	26.00	92.21
Vel Total (ft/s)	5.62	Avg. Vel. (ft/s)	2.95	8.23	1.62
Max Chl Dpth (ft)	5.99	Hydr. Depth (ft)	0.39	4.05	0.74
Conv. Total (cfs)	8179.1	Conv. (cfs)	15.2	7237.9	926.0
Length Wtd. (ft)	122.20	Wetted Per. (ft)	1.76	30.03	92.24
Min Ch El (ft)	798.80	Shear (lb/sq ft)	0.31	3.15	0.66
Alpha	1.91	Stream Power (lb/ft s)	0.93	25.89	1.08
Frctn Loss (ft)	0.67	Cum Volume (acre-ft)	1.17	1.56	1.65
C & E Loss (ft)	0.22	Cum SA (acres)	0.40	0.25	0.92

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: Main Channel  
 REACH: Upper RS: 110

INPUT

Description:

Station Elevation Data	num=	18							
Sta Elev Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev
0 809 26 808	59 807	85 804	121 802						
124 801 126 800	129 799	132 798	136 797.4						
139 798 142 799	144 800	147 801	149 802						
215 802 255 802	278 810								

Manning's n Values num= 4  
 Sta n Val Sta n Val Sta n Val Sta n Val  
 0 .03 121 .05 149 .09 215 .12

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 121 149 50 49.87 49 .1 .3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	799.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.050	
W.S. Elev (ft)	799.42	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)	798.91	Flow Area (sq ft)		18.02	
E.G. Slope (ft/ft)	0.010109	Area (sq ft)		18.02	
Q Total (cfs)	59.00	Flow (cfs)		59.00	
Top Width (ft)	15.11	Top Width (ft)		15.11	
Vel Total (ft/s)	3.27	Avg. Vel. (ft/s)		3.27	
Max Chl Dpth (ft)	2.02	Hydr. Depth (ft)		1.19	
Conv. Total (cfs)	586.8	Conv. (cfs)		586.8	
Length Wtd. (ft)	49.87	Wetted Per. (ft)		15.70	
Min Ch El (ft)	797.40	Shear (lb/sq ft)		0.72	
Alpha	1.00	Stream Power (lb/ft s)		2.37	
Frctn Loss (ft)	0.71	Cum Volume (acre-ft)		0.24	
C & E Loss (ft)	0.02	Cum SA (acres)		0.11	

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

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	799.87	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.		0.050	
W.S. Elev (ft)	799.68	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)	799.09	Flow Area (sq ft)		22.16	
E.G. Slope (ft/ft)	0.009442	Area (sq ft)		22.16	
Q Total (cfs)	76.00	Flow (cfs)		76.00	
Top Width (ft)	16.42	Top Width (ft)		16.42	
Vel Total (ft/s)	3.43	Avg. Vel. (ft/s)		3.43	
Max Chl Dpth (ft)	2.28	Hydr. Depth (ft)		1.35	
Conv. Total (cfs)	782.2	Conv. (cfs)		782.2	
Length Wtd. (ft)	49.87	Wetted Per. (ft)		17.12	
Min Ch El (ft)	797.40	Shear (lb/sq ft)		0.76	
Alpha	1.00	Stream Power (lb/ft s)		2.62	
Frctn Loss (ft)	0.67	Cum Volume (acre-ft)	0.00	0.30	
C & E Loss (ft)	0.02	Cum SA (acres)		0.12	

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

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	800.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.		0.050	
W.S. Elev (ft)	800.00	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)		Flow Area (sq ft)		27.68	
E.G. Slope (ft/ft)	0.008851	Area (sq ft)		27.68	
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	18.02	Top Width (ft)		18.02	
Vel Total (ft/s)	3.61	Avg. Vel. (ft/s)		3.61	
Max Chl Dpth (ft)	2.60	Hydr. Depth (ft)		1.54	
Conv. Total (cfs)	1062.9	Conv. (cfs)		1062.9	
Length Wtd. (ft)	49.87	Wetted Per. (ft)		18.85	
Min Ch El (ft)	797.40	Shear (lb/sq ft)		0.81	
Alpha	1.00	Stream Power (lb/ft s)		2.93	
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)	0.00	0.35	
C & E Loss (ft)	0.02	Cum SA (acres)		0.13	

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 OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.14	Element			
Vel Head (ft)	0.24	Wt. n-Val.		0.050	
W.S. Elev (ft)	800.91	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)		Flow Area (sq ft)		45.95	
E.G. Slope (ft/ft)	0.007195	Area (sq ft)		45.95	
Q Total (cfs)	180.00	Flow (cfs)		180.00	
Top Width (ft)	22.53	Top Width (ft)		22.53	
Vel Total (ft/s)	3.92	Avg. Vel. (ft/s)		3.92	
Max Chl Dpth (ft)	3.51	Hydr. Depth (ft)		2.04	
Conv. Total (cfs)	2122.0	Conv. (cfs)		2122.0	
Length Wtd. (ft)	49.87	Wetted Per. (ft)		23.71	
Min Ch El (ft)	797.40	Shear (lb/sq ft)		0.87	
Alpha	1.00	Stream Power (lb/ft s)		3.41	
Frctn Loss (ft)	0.56	Cum Volume (acre-ft)	0.01	0.51	0.00
C & E Loss (ft)	0.04	Cum SA (acres)	0.03	0.15	

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.80	Element			
Vel Head (ft)	0.26	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.54	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)		Flow Area (sq ft)		61.18	
E.G. Slope (ft/ft)	0.006393	Area (sq ft)		61.18	
Q Total (cfs)	250.00	Flow (cfs)		250.00	
Top Width (ft)	25.69	Top Width (ft)		25.69	
Vel Total (ft/s)	4.09	Avg. Vel. (ft/s)		4.09	
Max Chl Dpth (ft)	4.14	Hydr. Depth (ft)		2.38	
Conv. Total (cfs)	3126.8	Conv. (cfs)		3126.8	
Length Wtd. (ft)	49.87	Wetted Per. (ft)		27.13	
Min Ch El (ft)	797.40	Shear (lb/sq ft)		0.90	
Alpha	1.00	Stream Power (lb/ft s)		3.68	
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	0.07	0.61	0.01
C & E Loss (ft)	0.05	Cum SA (acres)	0.10	0.16	

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

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

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.65	Element			
Vel Head (ft)	0.24	Wt. n-Val.	0.030	0.050	0.099
W.S. Elev (ft)	802.41	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)		Flow Area (sq ft)	1.51	85.07	43.67
E.G. Slope (ft/ft)	0.004538	Area (sq ft)	1.51	85.07	43.67
Q Total (cfs)	370.00	Flow (cfs)	1.75	344.09	24.16
Top Width (ft)	142.55	Top Width (ft)	7.37	28.00	107.18
Vel Total (ft/s)	2.84	Avg. Vel. (ft/s)	1.16	4.04	0.55
Max Chl Dpth (ft)	5.01	Hydr. Depth (ft)	0.20	3.04	0.41
Conv. Total (cfs)	5492.3	Conv. (cfs)	26.0	5107.8	358.6
Length Wtd. (ft)	49.84	Wetted Per. (ft)	7.39	29.62	107.25
Min Ch El (ft)	797.40	Shear (lb/sq ft)	0.06	0.81	0.12
Alpha	1.89	Stream Power (lb/ft s)	0.07	3.29	0.06
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	0.25	0.75	0.06
C & E Loss (ft)	0.09	Cum SA (acres)	0.18	0.17	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.

additional cross sections.

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

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	803.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.030	0.050	0.099
W.S. Elev (ft)	803.04	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)	801.30	Flow Area (sq ft)	9.70	102.67	111.60
E.G. Slope (ft/ft)	0.002733	Area (sq ft)	9.70	102.67	111.60
Q Total (cfs)	470.00	Flow (cfs)	16.21	365.30	88.49
Top Width (ft)	155.67	Top Width (ft)	18.69	28.00	108.98
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)	1.67	3.56	0.79
Max Chl Dpth (ft)	5.64	Hydr. Depth (ft)	0.52	3.67	1.02
Conv. Total (cfs)	8990.4	Conv. (cfs)	310.0	6987.7	1692.7
Length Wtd. (ft)	49.79	Wetted Per. (ft)	18.72	29.62	109.16
Min Ch El (ft)	797.40	Shear (lb/sq ft)	0.09	0.59	0.17
Alpha	2.28	Stream Power (lb/ft s)	0.15	2.10	0.14
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	0.41	0.85	0.19
C & E Loss (ft)	0.13	Cum SA (acres)	0.21	0.17	0.31

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 OUTPUT Profile #100

E.G. Elev (ft)	803.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.030	0.050	0.099
W.S. Elev (ft)	803.46	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)		Flow Area (sq ft)	19.27	114.58	158.20
E.G. Slope (ft/ft)	0.002431	Area (sq ft)	19.27	114.58	158.20
Q Total (cfs)	600.00	Flow (cfs)	38.19	413.69	148.12
Top Width (ft)	164.55	Top Width (ft)	26.34	28.00	110.21
Vel Total (ft/s)	2.05	Avg. Vel. (ft/s)	1.98	3.61	0.94
Max Chl Dpth (ft)	6.06	Hydr. Depth (ft)	0.73	4.09	1.44
Conv. Total (cfs)	12168.3	Conv. (cfs)	774.4	8389.9	3004.0
Length Wtd. (ft)	49.73	Wetted Per. (ft)	26.38	29.62	110.45
Min Ch El (ft)	797.40	Shear (lb/sq ft)	0.11	0.59	0.22
Alpha	2.24	Stream Power (lb/ft s)	0.22	2.12	0.20
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	0.60	0.99	0.49
C & E Loss (ft)	0.05	Cum SA (acres)	0.29	0.17	0.53

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

additional cross sections.

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	803.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.030	0.050	0.099
W.S. Elev (ft)	803.73	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)		Flow Area (sq ft)	26.87	121.98	187.46
E.G. Slope (ft/ft)	0.002609	Area (sq ft)	26.87	121.98	187.46
Q Total (cfs)	740.00	Flow (cfs)	61.62	475.76	202.62
Top Width (ft)	170.07	Top Width (ft)	31.10	28.00	110.97
Vel Total (ft/s)	2.20	Avg. Vel. (ft/s)	2.29	3.90	1.08
Max Chl Dpth (ft)	6.33	Hydr. Depth (ft)	0.86	4.36	1.69
Conv. Total (cfs)	14486.2	Conv. (cfs)	1206.3	9313.4	3966.5
Length Wtd. (ft)	49.70	Wetted Per. (ft)	31.15	29.62	111.26
Min Ch El (ft)	797.40	Shear (lb/sq ft)	0.14	0.67	0.27
Alpha	2.18	Stream Power (lb/ft s)	0.32	2.62	0.30
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	0.81	1.09	0.79
C & E Loss (ft)	0.05	Cum SA (acres)	0.33	0.17	0.59

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 OUTPUT Profile #500

Parameter	Value	Element	Left OB	Channel	Right OB
E.G. Elev (ft)	804.29	Element			
Vel Head (ft)	0.19	Wt. n-Val.	0.030	0.050	0.100
W.S. Elev (ft)	804.10	Reach Len. (ft)	50.00	49.87	49.00
Crit W.S. (ft)		Flow Area (sq ft)	39.70	132.44	229.11
E.G. Slope (ft/ft)	0.002884	Area (sq ft)	39.70	132.44	229.11
Q Total (cfs)	980.00	Flow (cfs)	110.79	573.65	295.56
Top Width (ft)	176.92	Top Width (ft)	36.88	28.00	112.04
Vel Total (ft/s)	2.44	Avg. Vel. (ft/s)	2.79	4.33	1.29
Max Chl Dpth (ft)	6.70	Hydr. Depth (ft)	1.08	4.73	2.04
Conv. Total (cfs)	18248.3	Conv. (cfs)	2063.0	10681.7	5503.5
Length Wtd. (ft)	49.67	Wetted Per. (ft)	36.94	29.62	112.40
Min Ch El (ft)	797.40	Shear (lb/sq ft)	0.19	0.80	0.37
Alpha	2.07	Stream Power (lb/ft s)	0.54	3.49	0.47
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	1.11	1.23	1.23
C & E Loss (ft)	0.05	Cum SA (acres)	0.35	0.17	0.63

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: Main Channel  
REACH: Upper RS: 108

INPUT

Description:

Station Elevation Data		num= 20		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	807	44	806	62	805	88	803	125	802
127	801	129	800	130	799	132	798	133	797
136	796.7	139	797	140	798	141	799	142	800
143	801	144	802	207	802	234	802	269	810

Manning's n Values		num= 3		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val
0	.03	125	.05	144	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	125	144		107	100.34	.1	.3

CROSS SECTION OUTPUT Profile #1

Parameter	Value	Element	Left OB	Channel	Right OB
E.G. Elev (ft)	798.86	Element			
Vel Head (ft)	0.35	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.51	Reach Len. (ft)	107.00	100.34	87.00
Crit W.S. (ft)		Flow Area (sq ft)		12.36	
E.G. Slope (ft/ft)	0.021325	Area (sq ft)		12.36	
Q Total (cfs)	59.00	Flow (cfs)		59.00	
Top Width (ft)	9.53	Top Width (ft)		9.53	
Vel Total (ft/s)	4.77	Avg. Vel. (ft/s)		4.77	
Max Chl Dpth (ft)	1.81	Hydr. Depth (ft)		1.30	
Conv. Total (cfs)	404.0	Conv. (cfs)		404.0	
Length Wtd. (ft)	100.34	Wetted Per. (ft)		10.72	
Min Ch El (ft)	796.70	Shear (lb/sq ft)		1.54	
Alpha	1.00	Stream Power (lb/ft s)		7.33	
Frctn Loss (ft)	0.59	Cum Volume (acre-ft)		0.22	
C & E Loss (ft)	0.09	Cum SA (acres)		0.10	

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 OUTPUT Profile #1.4

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.18		
Vel Head (ft)	0.39		
W.S. Elev (ft)	798.79		
Crit W.S. (ft)			
E.G. Slope (ft/ft)	0.020385		
Q Total (cfs)	76.00		
Top Width (ft)	10.36		
Vel Total (ft/s)	5.03		
Max Chl Dpth (ft)	2.09		
Conv. Total (cfs)	532.3		
Length Wtd. (ft)	100.34		
Min Ch El (ft)	796.70		
Alpha	1.00		
Frctn Loss (ft)	0.57		
C & E Loss (ft)	0.10		
Wt. n-Val.		0.050	
Reach Len. (ft)	107.00	100.34	87.00
Flow Area (sq ft)		15.12	
Area (sq ft)		15.12	
Flow (cfs)		76.00	
Top Width (ft)		10.36	
Avg. Vel. (ft/s)		5.03	
Hydr. Depth (ft)		1.46	
Conv. (cfs)		532.3	
Wetted Per. (ft)		11.73	
Shear (lb/sq ft)		1.64	
Stream Power (lb/ft s)		8.25	
Cum Volume (acre-ft)	0.00	0.27	
Cum SA (acres)		0.10	

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 OUTPUT Profile #2

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.57		
Vel Head (ft)	0.44		
W.S. Elev (ft)	799.13		
Crit W.S. (ft)			
E.G. Slope (ft/ft)	0.019066		
Q Total (cfs)	100.00		
Top Width (ft)	11.27		
Vel Total (ft/s)	5.29		
Max Chl Dpth (ft)	2.43		
Conv. Total (cfs)	724.2		
Length Wtd. (ft)	100.34		
Min Ch El (ft)	796.70		
Alpha	1.00		
Frctn Loss (ft)	0.57		
C & E Loss (ft)	0.11		
Wt. n-Val.		0.050	
Reach Len. (ft)	107.00	100.34	87.00
Flow Area (sq ft)		18.89	
Area (sq ft)		18.89	
Flow (cfs)		100.00	
Top Width (ft)		11.27	
Avg. Vel. (ft/s)		5.29	
Hydr. Depth (ft)		1.68	
Conv. (cfs)		724.2	
Wetted Per. (ft)		12.89	
Shear (lb/sq ft)		1.74	
Stream Power (lb/ft s)		9.24	
Cum Volume (acre-ft)	0.00	0.33	
Cum SA (acres)		0.11	

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

CROSS SECTION OUTPUT Profile #5

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.55		
Vel Head (ft)	0.62		
W.S. Elev (ft)	799.93		
Crit W.S. (ft)			
E.G. Slope (ft/ft)	0.019499		
Q Total (cfs)	180.00		
Top Width (ft)	12.86		
Vel Total (ft/s)	6.32		
Max Chl Dpth (ft)	3.23		
Conv. Total (cfs)	1289.0		
Length Wtd. (ft)	100.34		
Min Ch El (ft)	796.70		
Alpha	1.00		
Frctn Loss (ft)	0.63		
C & E Loss (ft)	0.15		
Wt. n-Val.		0.050	
Reach Len. (ft)	107.00	100.34	87.00
Flow Area (sq ft)		28.46	
Area (sq ft)		28.46	
Flow (cfs)		180.00	
Top Width (ft)		12.86	
Avg. Vel. (ft/s)		6.32	
Hydr. Depth (ft)		2.21	
Conv. (cfs)		1289.0	
Wetted Per. (ft)		15.13	
Shear (lb/sq ft)		2.29	
Stream Power (lb/ft s)		14.48	
Cum Volume (acre-ft)	0.01	0.46	0.00
Cum SA (acres)	0.03	0.13	

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 OUTPUT Profile #10

Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.20		
Vel Head (ft)	0.79		
W.S. Elev (ft)	800.41		
Reach Len. (ft)	107.00	100.34	87.00
Wt. n-Val.		0.050	



Crit W.S. (ft)		Flow Area (sq ft)		35.01	
E.G. Slope (ft/ft)	0.021763	Area (sq ft)		35.01	
Q Total (cfs)	250.00	Flow (cfs)		250.00	
Top Width (ft)	14.24	Top Width (ft)		14.24	
Vel Total (ft/s)	7.14	Avg. Vel. (ft/s)		7.14	
Max Chl Dpth (ft)	3.71	Hydr. Depth (ft)		2.46	
Conv. Total (cfs)	1694.7	Conv. (cfs)		1694.7	
Length Wtd. (ft)	100.34	Wetted Per. (ft)		16.84	
Min Ch El (ft)	796.70	Shear (lb/sq ft)		2.82	
Alpha	1.00	Stream Power (lb/ft s)		20.17	
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	0.07	0.55	0.01
C & E Loss (ft)	0.19	Cum SA (acres)	0.10	0.14	

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 OUTPUT Profile #25

E.G. Elev (ft)	802.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.18	Wt. n-Val.		0.050	
W.S. Elev (ft)	800.91	Reach Len. (ft)	107.00	100.34	87.00
Crit W.S. (ft)	800.75	Flow Area (sq ft)		42.42	
E.G. Slope (ft/ft)	0.028798	Area (sq ft)		42.42	
Q Total (cfs)	370.00	Flow (cfs)		370.00	
Top Width (ft)	15.72	Top Width (ft)		15.72	
Vel Total (ft/s)	8.72	Avg. Vel. (ft/s)		8.72	
Max Chl Dpth (ft)	4.21	Hydr. Depth (ft)		2.70	
Conv. Total (cfs)	2180.3	Conv. (cfs)		2180.3	
Length Wtd. (ft)	100.45	Wetted Per. (ft)		18.65	
Min Ch El (ft)	796.70	Shear (lb/sq ft)		4.09	
Alpha	1.00	Stream Power (lb/ft s)		35.68	
Frctn Loss (ft)	0.78	Cum Volume (acre-ft)	0.25	0.68	0.03
C & E Loss (ft)	0.29	Cum SA (acres)	0.17	0.14	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.

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

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	802.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.45	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.29	Reach Len. (ft)	107.00	100.34	87.00
Crit W.S. (ft)	801.29	Flow Area (sq ft)		48.69	
E.G. Slope (ft/ft)	0.032322	Area (sq ft)		48.69	
Q Total (cfs)	470.00	Flow (cfs)		470.00	
Top Width (ft)	16.87	Top Width (ft)		16.87	
Vel Total (ft/s)	9.65	Avg. Vel. (ft/s)		9.65	
Max Chl Dpth (ft)	4.59	Hydr. Depth (ft)		2.89	
Conv. Total (cfs)	2614.3	Conv. (cfs)		2614.3	
Length Wtd. (ft)	100.52	Wetted Per. (ft)		20.05	
Min Ch El (ft)	796.70	Shear (lb/sq ft)		4.90	
Alpha	1.00	Stream Power (lb/ft s)		47.30	
Frctn Loss (ft)	0.78	Cum Volume (acre-ft)	0.40	0.76	0.13
C & E Loss (ft)	0.37	Cum SA (acres)	0.20	0.14	0.25

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #100

E.G. Elev (ft)	803.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.68	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	802.65	Reach Len. (ft)	107.00	100.34	87.00
Crit W.S. (ft)	802.65	Flow Area (sq ft)	7.75	73.69	59.15
E.G. Slope (ft/ft)	0.011758	Area (sq ft)	7.75	73.69	59.15
Q Total (cfs)	600.00	Flow (cfs)	19.60	521.62	58.78
Top Width (ft)	135.77	Top Width (ft)	23.94	19.00	92.83
Vel Total (ft/s)	4.27	Avg. Vel. (ft/s)	2.53	7.08	0.99
Max Chl Dpth (ft)	5.95	Hydr. Depth (ft)	0.32	3.88	0.64
Conv. Total (cfs)	5533.3	Conv. (cfs)	180.7	4810.5	542.0
Length Wtd. (ft)	99.88	Wetted Per. (ft)	23.95	22.64	92.90
Min Ch El (ft)	796.70	Shear (lb/sq ft)	0.24	2.39	0.47
Alpha	2.41	Stream Power (lb/ft s)	0.60	16.91	0.46
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	0.58	0.88	0.37
C & E Loss (ft)	0.14	Cum SA (acres)	0.26	0.15	0.42

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 OUTPUT Profile #200

E.G. Elev (ft)	803.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.65	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	802.95	Reach Len. (ft)	107.00	100.34	87.00
Crit W.S. (ft)	802.95	Flow Area (sq ft)	16.76	79.48	87.64
E.G. Slope (ft/ft)	0.011187	Area (sq ft)	16.76	79.48	87.64
Q Total (cfs)	740.00	Flow (cfs)	53.50	577.16	109.34
Top Width (ft)	148.38	Top Width (ft)	35.22	19.00	94.16
Vel Total (ft/s)	4.02	Avg. Vel. (ft/s)	3.19	7.26	1.25
Max Chl Dpth (ft)	6.25	Hydr. Depth (ft)	0.48	4.18	0.93
Conv. Total (cfs)	6996.4	Conv. (cfs)	505.8	5456.8	1033.7
Length Wtd. (ft)	99.59	Wetted Per. (ft)	35.23	22.64	94.27
Min Ch El (ft)	796.70	Shear (lb/sq ft)	0.33	2.45	0.65
Alpha	2.60	Stream Power (lb/ft s)	1.06	17.81	0.81
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	0.79	0.97	0.64
C & E Loss (ft)	0.14	Cum SA (acres)	0.30	0.15	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: 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 OUTPUT Profile #500

E.G. Elev (ft)	803.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	803.25	Reach Len. (ft)	107.00	100.34	87.00
Crit W.S. (ft)	803.25	Flow Area (sq ft)	28.11	85.13	115.80
E.G. Slope (ft/ft)	0.012283	Area (sq ft)	28.11	85.13	115.80
Q Total (cfs)	980.00	Flow (cfs)	121.43	677.99	180.58
Top Width (ft)	154.70	Top Width (ft)	40.23	19.00	95.46
Vel Total (ft/s)	4.28	Avg. Vel. (ft/s)	4.32	7.96	1.56
Max Chl Dpth (ft)	6.55	Hydr. Depth (ft)	0.70	4.48	1.21
Conv. Total (cfs)	8842.6	Conv. (cfs)	1095.7	6117.6	1629.4
Length Wtd. (ft)	99.44	Wetted Per. (ft)	40.26	22.64	95.60
Min Ch El (ft)	796.70	Shear (lb/sq ft)	0.54	2.88	0.93
Alpha	2.55	Stream Power (lb/ft s)	2.31	22.97	1.45
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)	1.08	1.10	1.04
C & E Loss (ft)	0.17	Cum SA (acres)	0.30	0.15	0.52

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 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: Main Channel  
 REACH: Upper RS: 106

INPUT

Description:

Station Elevation Data		num= 20									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	802	25	801	48	800	51	799	54	798		
57	797	61	796	65	796	69	796	71	797		
72	798	74	799	76	800	78	801	86	801		
113	801	137	801	176	802	183	803	213	812		

Manning's n Values		num= 4							
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val		
0	.03	48	.05	78	.09	137	.12		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	48	78		131 143.5	154	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	798.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.12	Reach Len. (ft)	131.00	143.50	154.00
Crit W.S. (ft)		Flow Area (sq ft)		29.21	
E.G. Slope (ft/ft)	0.002712	Area (sq ft)		29.21	
Q Total (cfs)	59.00	Flow (cfs)		59.00	
Top Width (ft)	18.60	Top Width (ft)		18.60	
Vel Total (ft/s)	2.02	Avg. Vel. (ft/s)		2.02	
Max Chl Dpth (ft)	2.12	Hydr. Depth (ft)		1.57	
Conv. Total (cfs)	1132.9	Conv. (cfs)		1132.9	
Length Wtd. (ft)	143.50	Wetted Per. (ft)		19.59	
Min Ch El (ft)	796.00	Shear (lb/sq ft)		0.25	
Alpha	1.00	Stream Power (lb/ft s)		0.51	
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)		0.18	
C & E Loss (ft)	0.00	Cum SA (acres)		0.06	

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	798.53	Element	Left OB	Channel	Right OB
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Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.46	Reach Len. (ft)	131.00	143.50	154.00
Crit W.S. (ft)		Flow Area (sq ft)		35.71	
E.G. Slope (ft/ft)	0.002591	Area (sq ft)		35.71	
Q Total (cfs)	76.00	Flow (cfs)		76.00	
Top Width (ft)	20.27	Top Width (ft)		20.27	
Vel Total (ft/s)	2.13	Avg. Vel. (ft/s)		2.13	
Max Chl Dpth (ft)	2.45	Hydr. Depth (ft)		1.76	
Conv. Total (cfs)	1493.2	Conv. (cfs)		1493.2	
Length Wtd. (ft)	143.50	Wetted Per. (ft)		21.39	
Min Ch El (ft)	796.00	Shear (lb/sq ft)		0.27	
Alpha	1.00	Stream Power (lb/ft s)		0.57	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	0.00	0.22	
C & E Loss (ft)	0.00	Cum SA (acres)		0.07	

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	798.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.81	Reach Len. (ft)	131.00	143.50	154.00
Crit W.S. (ft)		Flow Area (sq ft)		43.12	
E.G. Slope (ft/ft)	0.002677	Area (sq ft)		43.12	
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	22.03	Top Width (ft)		22.03	
Vel Total (ft/s)	2.32	Avg. Vel. (ft/s)		2.32	
Max Chl Dpth (ft)	2.81	Hydr. Depth (ft)		1.96	
Conv. Total (cfs)	1932.7	Conv. (cfs)		1932.7	
Length Wtd. (ft)	143.50	Wetted Per. (ft)		23.28	
Min Ch El (ft)	796.00	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		0.72	
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)	0.00	0.26	
C & E Loss (ft)	0.00	Cum SA (acres)		0.07	

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	799.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.050	
W.S. Elev (ft)	799.65	Reach Len. (ft)	131.00	143.50	154.00
Crit W.S. (ft)		Flow Area (sq ft)		63.43	
E.G. Slope (ft/ft)	0.003040	Area (sq ft)		63.43	
Q Total (cfs)	180.00	Flow (cfs)		180.00	
Top Width (ft)	26.23	Top Width (ft)		26.23	
Vel Total (ft/s)	2.84	Avg. Vel. (ft/s)		2.84	
Max Chl Dpth (ft)	3.65	Hydr. Depth (ft)		2.42	
Conv. Total (cfs)	3264.7	Conv. (cfs)		3264.7	
Length Wtd. (ft)	143.49	Wetted Per. (ft)		27.83	
Min Ch El (ft)	796.00	Shear (lb/sq ft)		0.43	
Alpha	1.00	Stream Power (lb/ft s)		1.23	
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)	0.01	0.36	0.00
C & E Loss (ft)	0.00	Cum SA (acres)	0.03	0.08	

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	800.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.030	0.050	
W.S. Elev (ft)	800.16	Reach Len. (ft)	131.00	143.50	154.00
Crit W.S. (ft)		Flow Area (sq ft)	0.29	77.45	
E.G. Slope (ft/ft)	0.003340	Area (sq ft)	0.29	77.45	
Q Total (cfs)	250.00	Flow (cfs)	0.15	249.85	
Top Width (ft)	31.95	Top Width (ft)	3.63	28.32	
Vel Total (ft/s)	3.22	Avg. Vel. (ft/s)	0.53	3.23	
Max Chl Dpth (ft)	4.16	Hydr. Depth (ft)	0.08	2.74	
Conv. Total (cfs)	4325.6	Conv. (cfs)	2.6	4323.0	
Length Wtd. (ft)	143.32	Wetted Per. (ft)	3.64	30.09	
Min Ch El (ft)	796.00	Shear (lb/sq ft)	0.02	0.54	
Alpha	1.01	Stream Power (lb/ft s)	0.01	1.73	
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)	0.07	0.42	0.01
C & E Loss (ft)	0.00	Cum SA (acres)	0.09	0.09	

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.02	Wt. n-Val.	0.030	0.050	
Vel Head (ft)	0.21	Reach Len. (ft)	131.00	143.50	154.00
W.S. Elev (ft)	800.81	Flow Area (sq ft)	7.49	96.25	
Crit W.S. (ft)		Area (sq ft)	7.49	96.25	
E.G. Slope (ft/ft)	0.003538	Flow (cfs)	12.04	357.96	
Q Total (cfs)	370.00	Top Width (ft)	18.56	29.61	
Top Width (ft)	48.18	Avg. Vel. (ft/s)	1.61	3.72	
Vel Total (ft/s)	3.57	Hydr. Depth (ft)	0.40	3.25	
Max Chl Dpth (ft)	4.81	Conv. (cfs)	202.5	6018.3	
Conv. Total (cfs)	6220.8	Wetted Per. (ft)	18.58	31.54	
Length Wtd. (ft)	142.58	Shear (lb/sq ft)	0.09	0.67	
Min Ch El (ft)	796.00	Stream Power (lb/ft s)	0.14	2.51	
Alpha	1.06	Cum Volume (acre-ft)	0.24	0.52	0.03
Frctn Loss (ft)	0.45	Cum SA (acres)	0.15	0.09	0.03
C & E Loss (ft)	0.01				

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.46	Wt. n-Val.	0.030	0.050	0.091
Vel Head (ft)	0.22	Reach Len. (ft)	131.00	143.50	154.00
W.S. Elev (ft)	801.24	Flow Area (sq ft)	17.71	109.17	15.21
Crit W.S. (ft)		Area (sq ft)	17.71	109.17	15.21
E.G. Slope (ft/ft)	0.003383	Flow (cfs)	36.72	427.88	5.41
Q Total (cfs)	470.00	Top Width (ft)	28.97	30.00	68.32
Top Width (ft)	127.29	Avg. Vel. (ft/s)	2.07	3.92	0.36
Vel Total (ft/s)	3.31	Hydr. Depth (ft)	0.61	3.64	0.22
Max Chl Dpth (ft)	5.24	Conv. (cfs)	631.3	7356.9	92.9
Conv. Total (cfs)	8081.1	Wetted Per. (ft)	29.00	31.97	68.32
Length Wtd. (ft)	142.04	Shear (lb/sq ft)	0.13	0.72	0.05
Min Ch El (ft)	796.00	Stream Power (lb/ft s)	0.27	2.83	0.02
Alpha	1.31	Cum Volume (acre-ft)	0.38	0.58	0.11
Frctn Loss (ft)	0.41	Cum SA (acres)	0.17	0.09	0.18
C & E Loss (ft)	0.02				

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.91	Wt. n-Val.	0.030	0.050	0.093
Vel Head (ft)	0.21	Reach Len. (ft)	131.00	143.50	154.00
W.S. Elev (ft)	801.70	Flow Area (sq ft)	33.65	122.94	50.69
Crit W.S. (ft)		Area (sq ft)	33.65	122.94	50.69
E.G. Slope (ft/ft)	0.002956	Flow (cfs)	80.10	487.63	32.27
Q Total (cfs)	600.00	Top Width (ft)	40.45	30.00	86.23
Top Width (ft)	156.68	Avg. Vel. (ft/s)	2.38	3.97	0.64
Vel Total (ft/s)	2.89	Hydr. Depth (ft)	0.83	4.10	0.59
Max Chl Dpth (ft)	5.70	Conv. (cfs)	1473.2	8968.5	593.5
Conv. Total (cfs)	11035.2	Wetted Per. (ft)	40.49	31.97	86.24
Length Wtd. (ft)	141.74	Shear (lb/sq ft)	0.15	0.71	0.11
Min Ch El (ft)	796.00	Stream Power (lb/ft s)	0.37	2.82	0.07
Alpha	1.62	Cum Volume (acre-ft)	0.53	0.65	0.26
Frctn Loss (ft)	0.37	Cum SA (acres)	0.18	0.09	0.24
C & E Loss (ft)	0.01				

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.35	Wt. n-Val.	0.030	0.050	0.095
Vel Head (ft)	0.18	Reach Len. (ft)	131.00	143.50	154.00
W.S. Elev (ft)	802.18	Flow Area (sq ft)	55.43	137.27	95.81
Crit W.S. (ft)		Area (sq ft)	55.43	137.27	95.81
E.G. Slope (ft/ft)	0.002336	Flow (cfs)	145.59	520.81	73.61
Q Total (cfs)	740.00	Top Width (ft)	48.00	30.00	99.23
Top Width (ft)	177.23	Avg. Vel. (ft/s)	2.63	3.79	0.77
Vel Total (ft/s)	2.56	Hydr. Depth (ft)	1.15	4.58	0.97
Max Chl Dpth (ft)	6.18	Conv. (cfs)	3012.5	10776.6	1523.1
Conv. Total (cfs)	15312.2				

Length Wtd. (ft)	141.52	Wetted Per. (ft)	48.22	31.97	99.25
Min Ch El (ft)	796.00	Shear (lb/sq ft)	0.17	0.63	0.14
Alpha	1.76	Stream Power (lb/ft s)	0.44	2.38	0.11
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	0.70	0.72	0.45
C & E Loss (ft)	0.01	Cum SA (acres)	0.19	0.09	0.28

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	803.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.030	0.050	0.097
W.S. Elev (ft)	802.85	Reach Len. (ft)	131.00	143.50	154.00
Crit W.S. (ft)		Flow Area (sq ft)	87.79	157.49	164.31
E.G. Slope (ft/ft)	0.001743	Area (sq ft)	87.79	157.49	164.31
Q Total (cfs)	980.00	Flow (cfs)	268.20	565.78	146.02
Top Width (ft)	181.95	Top Width (ft)	48.00	30.00	103.95
Vel Total (ft/s)	2.39	Avg. Vel. (ft/s)	3.05	3.59	0.89
Max Chl Dpth (ft)	6.85	Hydr. Depth (ft)	1.83	5.25	1.58
Conv. Total (cfs)	23472.7	Conv. (cfs)	6423.8	13551.4	3497.5
Length Wtd. (ft)	141.33	Wetted Per. (ft)	48.89	31.97	104.02
Min Ch El (ft)	796.00	Shear (lb/sq ft)	0.20	0.54	0.17
Alpha	1.77	Stream Power (lb/ft s)	0.60	1.93	0.15
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	0.93	0.83	0.76
C & E Loss (ft)	0.00	Cum SA (acres)	0.19	0.09	0.32

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

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 104

INPUT

Description:

Station Elevation Data		num=	17							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	800	81	799	82	798	85	797	89	796	
95	795.2	100	796	101	797	103	798	104	799	
106	800	145	801	169	802	192	803	201	804	
215	805	257	808							

Manning's n Values		num=	4			
Sta	n Val	Sta	n Val	Sta	n Val	
0	.12	81	.05	106	.09	
				192	.12	

Bank Sta: Left	Right	Coeff Contr.	Expan.
81	106	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	797.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.050	
W.S. Elev (ft)	797.78	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)		31.86	
E.G. Slope (ft/ft)	0.002206	Area (sq ft)		31.86	
Q Total (cfs)	59.00	Flow (cfs)		59.00	
Top Width (ft)	19.89	Top Width (ft)		19.89	
Vel Total (ft/s)	1.85	Avg. Vel. (ft/s)		1.85	
Max Chl Dpth (ft)	2.58	Hydr. Depth (ft)		1.60	
Conv. Total (cfs)	1256.2	Conv. (cfs)		1256.2	
Length Wtd. (ft)	82.50	Wetted Per. (ft)		20.85	
Min Ch El (ft)	795.20	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.39	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)		0.08	
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	798.20	Element			
Vel Head (ft)	0.06	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.14	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)		39.32	
E.G. Slope (ft/ft)	0.002002	Area (sq ft)		39.32	
Q Total (cfs)	76.00	Flow (cfs)		76.00	
Top Width (ft)	21.28	Top Width (ft)		21.28	
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)		1.93	
Max Chl Dpth (ft)	2.94	Hydr. Depth (ft)		1.85	
Conv. Total (cfs)	1698.5	Conv. (cfs)		1698.5	
Length Wtd. (ft)	82.50	Wetted Per. (ft)		22.44	
Min Ch El (ft)	795.20	Shear (lb/sq ft)		0.22	
Alpha	1.00	Stream Power (lb/ft s)		0.42	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.00	0.09	
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	798.55	Element			
Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.48	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)		46.66	
E.G. Slope (ft/ft)	0.002073	Area (sq ft)		46.66	
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	21.96	Top Width (ft)		21.96	
Vel Total (ft/s)	2.14	Avg. Vel. (ft/s)		2.14	
Max Chl Dpth (ft)	3.28	Hydr. Depth (ft)		2.13	
Conv. Total (cfs)	2196.5	Conv. (cfs)		2196.5	
Length Wtd. (ft)	82.50	Wetted Per. (ft)		23.40	
Min Ch El (ft)	795.20	Shear (lb/sq ft)		0.26	
Alpha	1.00	Stream Power (lb/ft s)		0.55	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.00	0.11	
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.37	Element			
Vel Head (ft)	0.12	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	799.25	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	2.50	64.17	
E.G. Slope (ft/ft)	0.002583	Area (sq ft)	2.50	64.17	
Q Total (cfs)	180.00	Flow (cfs)	0.39	179.61	
Top Width (ft)	43.61	Top Width (ft)	20.11	23.50	
Vel Total (ft/s)	2.70	Avg. Vel. (ft/s)	0.16	2.80	
Max Chl Dpth (ft)	4.05	Hydr. Depth (ft)	0.12	2.73	
Conv. Total (cfs)	3542.0	Conv. (cfs)	7.7	3534.3	
Length Wtd. (ft)	82.50	Wetted Per. (ft)	20.11	25.44	
Min Ch El (ft)	795.20	Shear (lb/sq ft)	0.02	0.41	
Alpha	1.07	Stream Power (lb/ft s)	0.00	1.14	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.01	0.15	0.00
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.87	Element			
Vel Head (ft)	0.16	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	799.71	Reach Len. (ft)	82.50	82.50	82.50

Crit W.S. (ft)		Flow Area (sq ft)	20.51	75.27	
E.G. Slope (ft/ft)	0.002931	Area (sq ft)	20.51	75.27	
Q Total (cfs)	250.00	Flow (cfs)	6.90	243.10	
Top Width (ft)	82.06	Top Width (ft)	57.64	24.42	
Vel Total (ft/s)	2.61	Avg. Vel. (ft/s)	0.34	3.23	
Max Chl Dpth (ft)	4.51	Hydr. Depth (ft)	0.36	3.08	
Conv. Total (cfs)	4617.4	Conv. (cfs)	127.5	4489.9	
Length Wtd. (ft)	82.50	Wetted Per. (ft)	57.64	26.47	
Min Ch El (ft)	795.20	Shear (lb/sq ft)	0.07	0.52	
Alpha	1.49	Stream Power (lb/ft s)	0.02	1.68	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	0.04	0.17	0.01
C & E Loss (ft)	0.02	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	800.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	800.39	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	71.84	92.07	2.92
E.G. Slope (ft/ft)	0.002781	Area (sq ft)	71.84	92.07	2.92
Q Total (cfs)	370.00	Flow (cfs)	43.17	325.98	0.85
Top Width (ft)	121.09	Top Width (ft)	81.00	25.00	15.09
Vel Total (ft/s)	2.22	Avg. Vel. (ft/s)	0.60	3.54	0.29
Max Chl Dpth (ft)	5.19	Hydr. Depth (ft)	0.89	3.68	0.19
Conv. Total (cfs)	7016.2	Conv. (cfs)	818.6	6181.5	16.1
Length Wtd. (ft)	82.50	Wetted Per. (ft)	81.39	27.12	15.10
Min Ch El (ft)	795.20	Shear (lb/sq ft)	0.15	0.59	0.03
Alpha	2.25	Stream Power (lb/ft s)	0.09	2.09	0.01
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	0.12	0.21	0.03
C & E Loss (ft)	0.01	Cum SA (acres)			

Warning: The cross-section end points had to be extended vertically for the computed water surface.  
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	801.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	800.86	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	110.56	104.02	14.59
E.G. Slope (ft/ft)	0.002508	Area (sq ft)	110.56	104.02	14.59
Q Total (cfs)	470.00	Flow (cfs)	83.75	379.35	6.90
Top Width (ft)	139.73	Top Width (ft)	81.00	25.00	33.73
Vel Total (ft/s)	2.05	Avg. Vel. (ft/s)	0.76	3.65	0.47
Max Chl Dpth (ft)	5.66	Hydr. Depth (ft)	1.36	4.16	0.43
Conv. Total (cfs)	9385.9	Conv. (cfs)	1672.6	7575.6	137.7
Length Wtd. (ft)	82.50	Wetted Per. (ft)	81.87	27.12	33.74
Min Ch El (ft)	795.20	Shear (lb/sq ft)	0.21	0.60	0.07
Alpha	2.58	Stream Power (lb/ft s)	0.16	2.19	0.03
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.19	0.23	0.06
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	801.52	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	801.35	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	150.10	116.23	34.76
E.G. Slope (ft/ft)	0.002359	Area (sq ft)	150.10	116.23	34.76
Q Total (cfs)	600.00	Flow (cfs)	134.69	442.67	22.64
Top Width (ft)	153.47	Top Width (ft)	81.00	25.00	47.47
Vel Total (ft/s)	1.99	Avg. Vel. (ft/s)	0.90	3.81	0.65



Max Chl Dpth (ft)	6.15	Hydr. Depth (ft)	1.85	4.65	0.73
Conv. Total (cfs)	12353.0	Conv. (cfs)	2773.0	9113.9	466.2
Length Wtd. (ft)	82.50	Wetted Per. (ft)	82.36	27.12	47.49
Min Ch El (ft)	795.20	Shear (lb/sq ft)	0.27	0.63	0.11
Alpha	2.74	Stream Power (lb/ft s)	0.24	2.40	0.07
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.25	0.26	0.11
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	802.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	801.87	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	192.29	129.25	62.75
E.G. Slope (ft/ft)	0.002108	Area (sq ft)	192.29	129.25	62.75
Q Total (cfs)	740.00	Flow (cfs)	191.57	499.42	49.00
Top Width (ft)	165.98	Top Width (ft)	81.00	25.00	59.98
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)	1.00	3.86	0.78
Max Chl Dpth (ft)	6.67	Hydr. Depth (ft)	2.37	5.17	1.05
Conv. Total (cfs)	16119.1	Conv. (cfs)	4173.0	10878.7	1067.4
Length Wtd. (ft)	82.50	Wetted Per. (ft)	82.88	27.12	60.01
Min Ch El (ft)	795.20	Shear (lb/sq ft)	0.31	0.63	0.14
Alpha	2.80	Stream Power (lb/ft s)	0.30	2.42	0.11
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.32	0.29	0.17
C & E Loss (ft)	0.00	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	802.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	802.59	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	250.17	147.11	111.56
E.G. Slope (ft/ft)	0.001931	Area (sq ft)	250.17	147.11	111.56
Q Total (cfs)	980.00	Flow (cfs)	282.73	593.24	104.03
Top Width (ft)	182.54	Top Width (ft)	81.00	25.00	76.54
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)	1.13	4.03	0.93
Max Chl Dpth (ft)	7.39	Hydr. Depth (ft)	3.09	5.88	1.46
Conv. Total (cfs)	22298.8	Conv. (cfs)	6433.2	13498.6	2367.0
Length Wtd. (ft)	82.50	Wetted Per. (ft)	83.59	27.12	76.58
Min Ch El (ft)	795.20	Shear (lb/sq ft)	0.36	0.65	0.18
Alpha	2.78	Stream Power (lb/ft s)	0.41	2.64	0.16
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	0.42	0.32	0.27
C & E Loss (ft)	0.00	Cum SA (acres)			

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

CROSS SECTION RIVER: Main Channel  
REACH: Lower RS: 102

INPUT

Description:

Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	810	30	800	75	799	89	798	92	797
94	796	99	795	102	794.7	106	795	111	796
114	797	117	798	120	799	187	801	202	803
212	804	228	805	292	807	304	808		

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	89	.05	120	.09	187	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
89	120	124	120.73	112	.1	.3

CROSS SECTION OUTPUT		Profile #1			
E.G. Elev (ft)	797.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
W.S. Elev (ft)	797.68	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)		48.83	
E.G. Slope (ft/ft)	0.000934	Area (sq ft)		48.83	
Q Total (cfs)	66.00	Flow (cfs)		66.00	
Top Width (ft)	26.07	Top Width (ft)		26.07	
Vel Total (ft/s)	1.35	Avg. Vel. (ft/s)		1.35	
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)		1.87	
Conv. Total (cfs)	2159.2	Conv. (cfs)		2159.2	
Length Wtd. (ft)	120.73	Wetted Per. (ft)		26.91	
Min Ch El (ft)	794.70	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.14	
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)		0.13	
C & E Loss (ft)	0.00	Cum SA (acres)		0.07	

CROSS SECTION OUTPUT		Profile #1.4			
E.G. Elev (ft)	798.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	798.04	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	0.01	58.70	
E.G. Slope (ft/ft)	0.000930	Area (sq ft)	0.01	58.70	
Q Total (cfs)	85.00	Flow (cfs)	0.00	85.00	
Top Width (ft)	28.70	Top Width (ft)	0.58	28.12	
Vel Total (ft/s)	1.45	Avg. Vel. (ft/s)	0.03	1.45	
Max Chl Dpth (ft)	3.34	Hydr. Depth (ft)	0.02	2.09	
Conv. Total (cfs)	2786.7	Conv. (cfs)	0.0	2786.7	
Length Wtd. (ft)	120.73	Wetted Per. (ft)	0.58	29.08	
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.00	0.12	
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.17	
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	0.00	0.16	
C & E Loss (ft)	0.00	Cum SA (acres)	0.00	0.07	

CROSS SECTION OUTPUT		Profile #2			
E.G. Elev (ft)	798.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	798.38	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	1.00	68.37	
E.G. Slope (ft/ft)	0.000981	Area (sq ft)	1.00	68.37	
Q Total (cfs)	110.00	Flow (cfs)	0.13	109.87	
Top Width (ft)	34.44	Top Width (ft)	5.30	29.14	
Vel Total (ft/s)	1.59	Avg. Vel. (ft/s)	0.13	1.61	
Max Chl Dpth (ft)	3.68	Hydr. Depth (ft)	0.19	2.35	
Conv. Total (cfs)	3511.8	Conv. (cfs)	4.1	3507.7	
Length Wtd. (ft)	120.63	Wetted Per. (ft)	5.32	30.15	
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.01	0.14	
Alpha	1.03	Stream Power (lb/ft s)	0.00	0.22	
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	0.00	0.18	0.02
C & E Loss (ft)	0.00	Cum SA (acres)	0.03	0.08	0.07

CROSS SECTION OUTPUT		Profile #5			
E.G. Elev (ft)	799.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	799.13	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	9.28	91.21	0.30
E.G. Slope (ft/ft)	0.001319	Area (sq ft)	9.28	91.21	0.30
Q Total (cfs)	200.00	Flow (cfs)	2.50	197.47	0.03
Top Width (ft)	55.53	Top Width (ft)	20.03	31.00	4.49
Vel Total (ft/s)	1.98	Avg. Vel. (ft/s)	0.27	2.17	0.10
Max Chl Dpth (ft)	4.43	Hydr. Depth (ft)	0.46	2.94	0.07
Conv. Total (cfs)	5506.0	Conv. (cfs)	68.7	5436.5	0.8
Length Wtd. (ft)	120.26	Wetted Per. (ft)	20.07	32.11	4.49

Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.04	0.23	0.01
Alpha	1.18	Stream Power (lb/ft s)	0.01	0.51	0.00
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	0.06	0.24	0.07
C & E Loss (ft)	0.01	Cum SA (acres)	0.12	0.08	0.08

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	799.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	799.59	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	23.29	105.49	5.93
E.G. Slope (ft/ft)	0.001525	Area (sq ft)	23.29	105.49	5.93
Q Total (cfs)	280.00	Flow (cfs)	7.75	270.55	1.70
Top Width (ft)	91.70	Top Width (ft)	40.77	31.00	19.93
Vel Total (ft/s)	2.08	Avg. Vel. (ft/s)	0.33	2.56	0.29
Max Chl Dpth (ft)	4.89	Hydr. Depth (ft)	0.57	3.40	0.30
Conv. Total (cfs)	7170.5	Conv. (cfs)	198.4	6928.5	43.6
Length Wtd. (ft)	120.13	Wetted Per. (ft)	40.81	32.11	19.94
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.05	0.31	0.03
Alpha	1.47	Stream Power (lb/ft s)	0.02	0.80	0.01
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.12	0.28	0.11
C & E Loss (ft)	0.01	Cum SA (acres)	0.15	0.08	0.11

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	800.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	800.25	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	58.14	125.70	26.03
E.G. Slope (ft/ft)	0.001663	Area (sq ft)	58.14	125.70	26.03
Q Total (cfs)	420.00	Flow (cfs)	28.81	378.40	12.79
Top Width (ft)	132.50	Top Width (ft)	59.74	31.00	41.76
Vel Total (ft/s)	2.00	Avg. Vel. (ft/s)	0.50	3.01	0.49
Max Chl Dpth (ft)	5.55	Hydr. Depth (ft)	0.97	4.05	0.62
Conv. Total (cfs)	10298.3	Conv. (cfs)	706.4	9278.4	313.5
Length Wtd. (ft)	119.98	Wetted Per. (ft)	59.83	32.11	41.78
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.10	0.41	0.06
Alpha	2.04	Stream Power (lb/ft s)	0.05	1.22	0.03
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.23	0.33	0.20
C & E Loss (ft)	0.02	Cum SA (acres)	0.18	0.08	0.14

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	800.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	800.72	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	86.89	140.44	49.67
E.G. Slope (ft/ft)	0.001658	Area (sq ft)	86.89	140.44	49.67
Q Total (cfs)	540.00	Flow (cfs)	55.26	454.52	30.22
Top Width (ft)	149.86	Top Width (ft)	61.17	31.00	57.69
Vel Total (ft/s)	1.95	Avg. Vel. (ft/s)	0.64	3.24	0.61
Max Chl Dpth (ft)	6.02	Hydr. Depth (ft)	1.42	4.53	0.86
Conv. Total (cfs)	13260.9	Conv. (cfs)	1357.1	11161.7	742.1
Length Wtd. (ft)	119.86	Wetted Per. (ft)	61.33	32.11	57.72
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.15	0.45	0.09
Alpha	2.34	Stream Power (lb/ft s)	0.09	1.47	0.05
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.32	0.37	0.27
C & E Loss (ft)	0.02	Cum SA (acres)	0.18	0.08	0.16

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	801.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	801.21	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	117.38	155.71	81.56
E.G. Slope (ft/ft)	0.001602	Area (sq ft)	117.38	155.71	81.56
Q Total (cfs)	680.00	Flow (cfs)	88.19	530.59	61.23

Top Width (ft)	162.25	Top Width (ft)	62.64	31.00	68.61
Vel Total (ft/s)	1.92	Avg. Vel. (ft/s)	0.75	3.41	0.75
Max Chl Dpth (ft)	6.51	Hydr. Depth (ft)	1.87	5.02	1.19
Conv. Total (cfs)	16990.3	Conv. (cfs)	2203.5	13257.1	1529.8
Length Wtd. (ft)	119.71	Wetted Per. (ft)	62.89	32.11	68.65
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.19	0.48	0.12
Alpha	2.50	Stream Power (lb/ft s)	0.14	1.65	0.09
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.41	0.41	0.35
C & E Loss (ft)	0.02	Cum SA (acres)	0.19	0.08	0.19

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	801.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	801.74	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	150.67	171.97	118.60
E.G. Slope (ft/ft)	0.001531	Area (sq ft)	150.67	171.97	118.60
Q Total (cfs)	850.00	Flow (cfs)	128.46	612.17	109.38
Top Width (ft)	167.76	Top Width (ft)	64.22	31.00	72.55
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)	0.85	3.56	0.92
Max Chl Dpth (ft)	7.04	Hydr. Depth (ft)	2.35	5.55	1.63
Conv. Total (cfs)	21723.4	Conv. (cfs)	3283.0	15645.1	2795.3
Length Wtd. (ft)	119.51	Wetted Per. (ft)	64.55	32.11	72.63
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.22	0.51	0.16
Alpha	2.52	Stream Power (lb/ft s)	0.19	1.82	0.14
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.51	0.45	0.46
C & E Loss (ft)	0.02	Cum SA (acres)	0.19	0.08	0.21

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	802.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	802.47	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	198.31	194.59	173.51
E.G. Slope (ft/ft)	0.001455	Area (sq ft)	198.31	194.59	173.51
Q Total (cfs)	1120.00	Flow (cfs)	193.39	733.26	193.35
Top Width (ft)	175.42	Top Width (ft)	66.41	31.00	78.02
Vel Total (ft/s)	1.98	Avg. Vel. (ft/s)	0.98	3.77	1.11
Max Chl Dpth (ft)	7.77	Hydr. Depth (ft)	2.99	6.28	2.22
Conv. Total (cfs)	29359.9	Conv. (cfs)	5069.6	19221.8	5068.6
Length Wtd. (ft)	119.28	Wetted Per. (ft)	66.85	32.11	78.14
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.27	0.55	0.20
Alpha	2.47	Stream Power (lb/ft s)	0.26	2.07	0.22
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	0.65	0.51	0.63
C & E Loss (ft)	0.02	Cum SA (acres)	0.20	0.08	0.24

CROSS SECTION RIVER: Main Channel  
REACH: Lower RS: 100

INPUT

Description:

Station Elevation Data	num=	17								
Sta Elev Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev	Sta Elev
0 810 42 799	104 798	105 797	107 796	108 795	113 794	121 796	127 797	130 798	158 798	163 798
235 802	263 805									

Manning's n Values	num=	5								
Sta n Val Sta n Val	Sta n Val	Sta n Val	Sta n Val	Sta n Val	Sta n Val	Sta n Val	Sta n Val	Sta n Val	Sta n Val	Sta n Val
0 .12 104 .05	130 .09	163 .12	203 .12							

Bank Sta: Left	Right	Coeff	Contr.	Expan.
104	130	.1		.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	797.59	Element	Left OB	Channel	Right OB
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Vel Head (ft)	0.03	Wt. n-Val.	0.050
W.S. Elev (ft)	797.56	Reach Len. (ft)	
Crit W.S. (ft)	795.68	Flow Area (sq ft)	46.91
E.G. Slope (ft/ft)	0.001001	Area (sq ft)	46.91
Q Total (cfs)	66.00	Flow (cfs)	66.00
Top Width (ft)	24.23	Top Width (ft)	24.23
Vel Total (ft/s)	1.41	Avg. Vel. (ft/s)	1.41
Max Chl Dpth (ft)	3.56	Hydr. Depth (ft)	1.94
Conv. Total (cfs)	2085.7	Conv. (cfs)	2085.7
Length Wtd. (ft)		Wetted Per. (ft)	25.63
Min Ch El (ft)	794.00	Shear (lb/sq ft)	0.11
Alpha	1.00	Stream Power (lb/ft s)	0.16
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	797.96	Wt. n-Val.		0.050	
Vel Head (ft)	0.04	Reach Len. (ft)			
W.S. Elev (ft)	797.92	Flow Area (sq ft)		55.99	
Crit W.S. (ft)	795.87	Area (sq ft)		55.99	
E.G. Slope (ft/ft)	0.001001	Flow (cfs)		85.00	
Q Total (cfs)	85.00	Top Width (ft)		25.69	
Top Width (ft)	25.69	Avg. Vel. (ft/s)		1.52	
Vel Total (ft/s)	1.52	Hydr. Depth (ft)		2.18	
Max Chl Dpth (ft)	3.92	Conv. (cfs)		2686.0	
Conv. Total (cfs)	2686.0	Wetted Per. (ft)		27.30	
Length Wtd. (ft)		Shear (lb/sq ft)		0.13	
Min Ch El (ft)	794.00	Stream Power (lb/ft s)		0.19	
Alpha	1.00	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	798.30	Wt. n-Val.	0.120	0.050	0.099
Vel Head (ft)	0.04	Reach Len. (ft)			
W.S. Elev (ft)	798.26	Flow Area (sq ft)	2.07	64.71	13.41
Crit W.S. (ft)	796.11	Area (sq ft)	2.07	64.71	13.41
E.G. Slope (ft/ft)	0.001001	Flow (cfs)	0.21	107.24	2.56
Q Total (cfs)	110.00	Top Width (ft)	16.01	26.00	52.89
Top Width (ft)	94.90	Avg. Vel. (ft/s)	0.10	1.66	0.19
Vel Total (ft/s)	1.37	Hydr. Depth (ft)	0.13	2.49	0.25
Max Chl Dpth (ft)	4.26	Conv. (cfs)	6.5	3389.7	80.8
Conv. Total (cfs)	3477.0	Wetted Per. (ft)	16.01	27.65	52.91
Length Wtd. (ft)		Shear (lb/sq ft)	0.01	0.15	0.02
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.00	0.24	0.00
Alpha	1.42	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.06	Wt. n-Val.	0.120	0.050	0.099
Vel Head (ft)	0.05	Reach Len. (ft)			
W.S. Elev (ft)	799.01	Flow Area (sq ft)	31.76	84.32	55.38
Crit W.S. (ft)	796.76	Area (sq ft)	31.76	84.32	55.38
E.G. Slope (ft/ft)	0.001000	Flow (cfs)	7.96	166.66	25.38
Q Total (cfs)	200.00	Top Width (ft)	62.05	26.00	58.42
Top Width (ft)	146.47	Avg. Vel. (ft/s)	0.25	1.98	0.46
Vel Total (ft/s)	1.17	Hydr. Depth (ft)	0.51	3.24	0.95
Max Chl Dpth (ft)	5.01	Conv. (cfs)	251.6	5268.9	802.5
Conv. Total (cfs)	6323.1	Wetted Per. (ft)	62.06	27.65	58.49
Length Wtd. (ft)		Shear (lb/sq ft)	0.03	0.19	0.06
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.01	0.38	0.03
Alpha	2.41	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.53	Wt. n-Val.	0.120	0.050	0.099
Vel Head (ft)	0.06	Reach Len. (ft)			
W.S. Elev (ft)	799.48	Flow Area (sq ft)	61.09	96.43	83.40
Crit W.S. (ft)	797.18	Area (sq ft)	61.09	96.43	83.40
E.G. Slope (ft/ft)	0.001000	Flow (cfs)	23.22	208.45	48.34
Q Total (cfs)	280.00	Top Width (ft)	63.83	26.00	61.84
Top Width (ft)	151.67	Avg. Vel. (ft/s)	0.38	2.16	0.58
Vel Total (ft/s)	1.16	Hydr. Depth (ft)	0.96	3.71	1.35
Max Chl Dpth (ft)	5.48	Conv. (cfs)	734.1	6590.1	1528.2
Conv. Total (cfs)	8852.3	Wetted Per. (ft)	63.90	27.65	61.94
Length Wtd. (ft)		Shear (lb/sq ft)	0.06	0.22	0.08
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.02	0.47	0.05
Alpha	2.63	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.20	Wt. n-Val.	0.120	0.050	0.100
Vel Head (ft)	0.06	Reach Len. (ft)			
W.S. Elev (ft)	800.14	Flow Area (sq ft)	104.07	113.60	125.84
Crit W.S. (ft)	797.73	Area (sq ft)	104.07	113.60	125.84
E.G. Slope (ft/ft)	0.001000	Flow (cfs)	54.93	273.87	91.19
Q Total (cfs)	420.00	Top Width (ft)	66.35	26.00	66.68
Top Width (ft)	159.03	Avg. Vel. (ft/s)	0.53	2.41	0.72
Vel Total (ft/s)	1.22	Hydr. Depth (ft)	1.57	4.37	1.89
Max Chl Dpth (ft)	6.14	Conv. (cfs)	1737.0	8659.7	2883.4
Conv. Total (cfs)	13280.0	Wetted Per. (ft)	66.50	27.65	66.83
Length Wtd. (ft)		Shear (lb/sq ft)	0.10	0.26	0.12
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.05	0.62	0.09
Alpha	2.64	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.68	Wt. n-Val.	0.120	0.050	0.100
Vel Head (ft)	0.07	Reach Len. (ft)			
W.S. Elev (ft)	800.62	Flow Area (sq ft)	136.34	126.08	158.68
Crit W.S. (ft)	798.46	Area (sq ft)	136.34	126.08	158.68
E.G. Slope (ft/ft)	0.001000	Flow (cfs)	84.57	325.80	129.63
Q Total (cfs)	540.00	Top Width (ft)	68.18	26.00	70.20
Top Width (ft)	164.38	Avg. Vel. (ft/s)	0.62	2.58	0.82
Vel Total (ft/s)	1.28	Hydr. Depth (ft)	2.00	4.85	2.26
Max Chl Dpth (ft)	6.62	Conv. (cfs)	2674.1	10301.8	4099.0
Conv. Total (cfs)	17074.9	Wetted Per. (ft)	68.40	27.65	70.38
Length Wtd. (ft)		Shear (lb/sq ft)	0.12	0.28	0.14
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.08	0.74	0.12
Alpha	2.58	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.18	Wt. n-Val.	0.120	0.050	0.101
Vel Head (ft)	0.07	Reach Len. (ft)			
W.S. Elev (ft)	801.11	Flow Area (sq ft)	170.52	138.93	194.44
Crit W.S. (ft)	798.82	Area (sq ft)	170.52	138.93	194.44
E.G. Slope (ft/ft)	0.001001	Flow (cfs)	120.51	383.09	176.40
Q Total (cfs)	680.00	Top Width (ft)	70.07	26.00	76.61
Top Width (ft)	172.68	Avg. Vel. (ft/s)	0.71	2.76	0.91
Vel Total (ft/s)	1.35	Hydr. Depth (ft)	2.43	5.34	2.54
Max Chl Dpth (ft)	7.11	Conv. (cfs)	3810.0	12111.2	5576.8
Conv. Total (cfs)	21497.9				

Length Wtd. (ft)		Wetted Per. (ft)	70.35	27.65	76.81
Min Ch El (ft)	794.00	Shear (lb/sq ft)	0.15	0.31	0.16
Alpha	2.52	Stream Power (lb/ft s)	0.11	0.87	0.14
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	801.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.120	0.050	0.101
W.S. Elev (ft)	801.64	Reach Len. (ft)			
Crit W.S. (ft)	799.14	Flow Area (sq ft)	207.91	152.61	239.18
E.G. Slope (ft/ft)	0.001001	Area (sq ft)	207.91	152.61	239.18
Q Total (cfs)	850.00	Flow (cfs)	164.56	448.20	237.24
Top Width (ft)	191.52	Top Width (ft)	72.08	26.00	93.45
Vel Total (ft/s)	1.42	Avg. Vel. (ft/s)	0.79	2.94	0.99
Max Chl Dpth (ft)	7.64	Hydr. Depth (ft)	2.88	5.87	2.56
Conv. Total (cfs)	26860.7	Conv. (cfs)	5200.3	14163.4	7497.1
Length Wtd. (ft)		Wetted Per. (ft)	72.42	27.65	93.66
Min Ch El (ft)	794.00	Shear (lb/sq ft)	0.18	0.34	0.16
Alpha	2.46	Stream Power (lb/ft s)	0.14	1.01	0.16
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	802.46	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.120	0.050	0.102
W.S. Elev (ft)	802.37	Reach Len. (ft)			
Crit W.S. (ft)	799.50	Flow Area (sq ft)	261.68	171.64	314.57
E.G. Slope (ft/ft)	0.001001	Area (sq ft)	261.68	171.64	314.57
Q Total (cfs)	1120.00	Flow (cfs)	235.17	545.02	339.81
Top Width (ft)	209.33	Top Width (ft)	74.87	26.00	108.46
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)	0.90	3.18	1.08
Max Chl Dpth (ft)	8.37	Hydr. Depth (ft)	3.50	6.60	2.90
Conv. Total (cfs)	35400.7	Conv. (cfs)	7433.2	17226.8	10740.7
Length Wtd. (ft)		Wetted Per. (ft)	75.31	27.65	108.70
Min Ch El (ft)	794.00	Shear (lb/sq ft)	0.22	0.39	0.18
Alpha	2.42	Stream Power (lb/ft s)	0.20	1.23	0.20
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Tributary

Reach	River Sta.	n1	n2	n3	n4
Reach 1	206	.12	.05	.12	
Reach 1	204	.12	.05	.12	
Reach 1	202	.12	.05	.12	.03
Reach 1	200	.12	.05	.12	.03

River:Main Channel

Reach	River Sta.	n1	n2	n3	n4	n5	n6
Upper	142	.03	.12	.05	.12		
Upper	140	.03	.05	.12			
Upper	138	.12	.05	.12			
Upper	136	.12	.05	.12			
Upper	134	.12	.05	.09	.12		
Upper	132	.03	.12	.05	.12	.09	.12
Upper	130	.03	.12	.05	.09	.12	
Upper	128	.03	.12	.05	.12	.03	.012

Upper	126	.03	.12	.05	.12		
Upper	124	.12	.05	.12			
Upper	122	.12	.05	.12			
Upper	120	.03	.05	.12			
Upper	118	.03	.05	.09	.12	.03	.12
Upper	116	.03	.05	.09	.12		
Upper	114	.03	.12	.05	.09	.12	
Upper	112	.03	.05	.09	.12		
Upper	110	.03	.05	.09	.12		
Upper	108	.03	.05	.12			
Upper	106	.03	.05	.09	.12		
Upper	104	.12	.05	.09	.12		
Lower	102	.12	.05	.09	.12		
Lower	100	.12	.05	.09	.12	.12	

SUMMARY OF REACH LENGTHS

River: Tributary

Reach	River Sta.	Left	Channel	Right
Reach 1	206	137	146.15	145
Reach 1	204	125	133.28	133
Reach 1	202	219	240.43	214
Reach 1	200			

River: Main Channel

Reach	River Sta.	Left	Channel	Right
Upper	142	73	77.35	71
Upper	140	122	117.16	112
Upper	138	119	119.41	117
Upper	136	63	102.79	80
Upper	134	42	77.12	53
Upper	132	59	64.73	67
Upper	130	94	96.36	30
Upper	128	127	138.25	48
Upper	126	71	114.63	143
Upper	124	84	112.09	66
Upper	122	85	95.62	89
Upper	120	66	60.99	51
Upper	118	92	100.08	101
Upper	116	125	126.41	122
Upper	114	258	281.56	256
Upper	112	122	122.27	122
Upper	110	50	49.87	49
Upper	108	107	100.34	87
Upper	106	131	143.5	154
Upper	104			
Lower	102	124	120.73	112
Lower	100			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Tributary

Reach	River Sta.	Contr.	Expan.
Reach 1	206	.1	.3
Reach 1	204	.1	.3
Reach 1	202	.1	.3
Reach 1	200	.1	.3

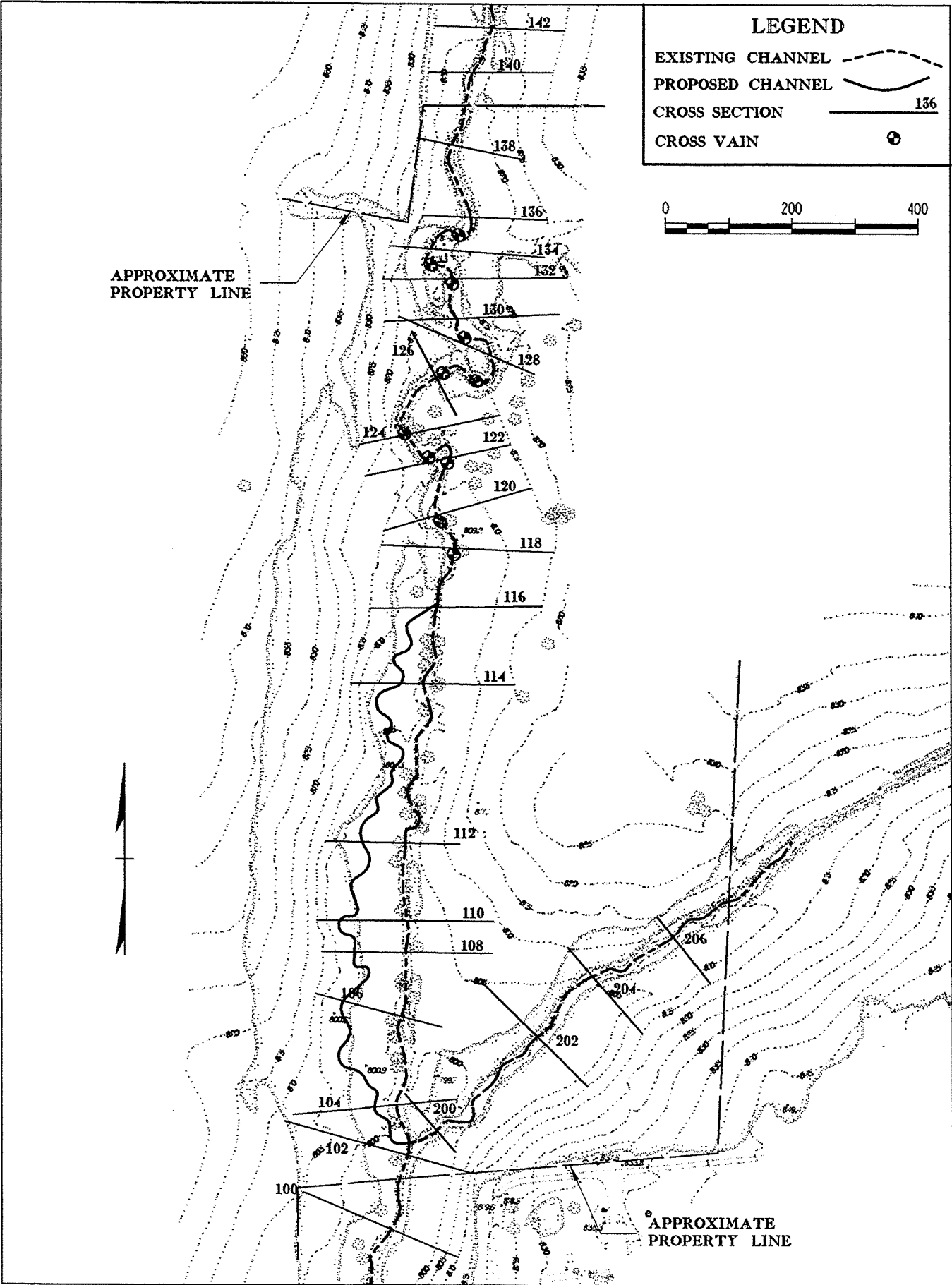


River: Main Channel

Reach	River Sta.	Contr.	Expan.
Upper	142	.1	.3
Upper	140	.1	.3
Upper	138	.1	.3
Upper	136	.1	.3
Upper	134	.1	.3
Upper	132	.1	.3
Upper	130	.1	.3
Upper	128	.1	.3
Upper	126	.1	.3
Upper	124	.1	.3
Upper	122	.1	.3
Upper	120	.1	.3
Upper	118	.1	.3
Upper	116	.1	.3
Upper	114	.1	.3
Upper	112	.1	.3
Upper	110	.1	.3
Upper	108	.1	.3
Upper	106	.1	.3
Upper	104	.1	.3
Lower	102	.1	.3
Lower	100	.1	.3

# APPENDIX C

## CROSS SECTION LOCATIONS FOR PROPOSED CONDITIONS



# APPENDIX D

## HEC-RAS REPORT FOR PROPOSED CONDITIONS

HEC-RAS Version 3.0.1 Mar 2001  
 U.S. Army Corp of Engineers  
 Hydrologic Engineering Center  
 609 Second Street, Suite D  
 Davis, California 95616-4687  
 (916) 756-1104

```

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

PROJECT DATA

Project Title: Lyle Creek Stream Restoration  
 Project File : LyleCreek.prj  
 Run Date and Time: 7/30/01 8:17:32 AM

Project in English units

Project Description:  
 Lyle Creek Stream Restoration - Catawaba County North Carolina

PLAN DATA

Plan Title: proposed  
 Plan File : g:\PROJECTS\EcoScience\LyleCreek\Hydraulics\LyleCreek.p02

Geometry Title: proposed  
 Geometry File : g:\PROJECTS\EcoScience\LyleCreek\Hydraulics\LyleCreek.g02

Flow Title : flow  
 Flow File : g:\PROJECTS\EcoScience\LyleCreek\Hydraulics\LyleCreek.f01

Plan Description:  
 proposed2 conditions

Plan Summary Information:

Number of:	Cross Sections =	26	Multitple Openings =	0
	Culverts =	0	Inline Weirs =	10
	Bridges =	0		

Computational Information

Water surface calculation tolerance =	0.01
Critical depth calculation tolerance =	0.01
Maximum number of interations =	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: flow

Flow File : g:\PROJECTS\EcoScience\LyleCreek\Hydrualics\LyleCreek.f01

Flow Data (cfs)

River	Reach	RS	1	1.4	2	5	10	25	50	100
Tributary	Reach 1	206	3	3	4	9	10	20	30	40
Tributary	Reach 1	200	25	35	50	90	120	180	230	290
Main Channel	Upper	142	45	56	70	130	180	270	340	430
Main Channel	Upper	126	52	66	80	150	210	320	410	520
Main Channel	Upper	112	59	76	100	180	250	370	470	600
Main Channel	Lower	102	66	85	110	200	280	420	540	680

River	Reach	RS	200	500
Tributary	Reach 1	206	50	60
Tributary	Reach 1	200	370	480
Main Channel	Upper	142	530	690
Main Channel	Upper	126	640	830
Main Channel	Upper	112	740	980
Main Channel	Lower	102	850	1120

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
Tributary	Reach 1	1	Normal S = .001	
Tributary	Reach 1	1.4	Normal S = .001	
Tributary	Reach 1	2	Normal S = .001	
Tributary	Reach 1	5	Normal S = .001	
Tributary	Reach 1	10	Normal S = .001	
Tributary	Reach 1	25	Normal S = .001	
Tributary	Reach 1	50	Normal S = .001	
Tributary	Reach 1	100	Normal S = .001	
Tributary	Reach 1	200	Normal S = .001	
Tributary	Reach 1	500	Normal S = .001	
Main Channel	Upper	1	Normal S = .001	
Main Channel	Upper	1.4	Normal S = .001	
Main Channel	Upper	2	Normal S = .001	
Main Channel	Upper	5	Normal S = .001	
Main Channel	Upper	10	Normal S = .001	
Main Channel	Upper	25	Normal S = .001	
Main Channel	Upper	50	Normal S = .001	
Main Channel	Upper	100	Normal S = .001	
Main Channel	Upper	200	Normal S = .001	
Main Channel	Upper	500	Normal S = .001	
Main Channel	Lower	1	Normal S = .001	
Main Channel	Lower	1.4	Normal S = .001	
Main Channel	Lower	2	Normal S = .001	
Main Channel	Lower	5	Normal S = .001	
Main Channel	Lower	10	Normal S = .001	
Main Channel	Lower	25	Normal S = .001	
Main Channel	Lower	50	Normal S = .001	
Main Channel	Lower	100	Normal S = .001	
Main Channel	Lower	200	Normal S = .001	
Main Channel	Lower	500	Normal S = .001	

GEOMETRY DATA

Geometry Title: proposed

Geometry File : g:\PROJECTS\EcoScience\LyleCreek\Hydrualics\LyleCreek.g02

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
Tributary	Reach 1		J1
Main Channel	Upper		J1
Main Channel	Lower	J1	

JUNCTION INFORMATION

Name: J1  
 Description: Junction of Main Channel and Tributary  
 Energy computation Method

Length across Junction		Tributary		Length	Angle
River	Reach	River	Reach		
Main Channel	Upper	to Main Channel	Lower	82.5	
Tributary	Reach 1	to Main Channel	Lower	85	

CROSS SECTION RIVER: Tributary  
 REACH: Reach 1 RS: 206

INPUT

Description:

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	40	807	79	807	84	803.5	86	803.5
88	802.5	94	802.5	96	803	97	804	98	805
99	806	100	807	111	810	132	815		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	79	.05	111	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	79	100		137 146.15	145	.1	.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.82				
Vel Head (ft)	0.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	802.78	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)		Flow Area (sq ft)		1.93	
E.G. Slope (ft/ft)	0.017709	Area (sq ft)		1.93	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	7.69	Top Width (ft)		7.69	
Vel Total (ft/s)	1.56	Avg. Vel. (ft/s)		1.56	
Max Chl Dpth (ft)	0.28	Hydr. Depth (ft)		0.25	
Conv. Total (cfs)	22.5	Conv. (cfs)		22.5	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		7.79	
Min Ch El (ft)	802.50	Shear (lb/sq ft)		0.27	
Alpha	1.00	Stream Power (lb/ft s)		0.43	
Frctn Loss (ft)	1.67	Cum Volume (acre-ft)		0.20	
C & E Loss (ft)	0.01	Cum SA (acres)		0.15	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.82				
Vel Head (ft)	0.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	802.78	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)		Flow Area (sq ft)		1.94	
E.G. Slope (ft/ft)	0.017242	Area (sq ft)		1.94	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	7.70	Top Width (ft)		7.70	
Vel Total (ft/s)	1.54	Avg. Vel. (ft/s)		1.54	

Max Chl Dpth (ft)	0.28	Hydr. Depth (ft)	0.25
Conv. Total (cfs)	22.8	Conv. (cfs)	22.8
Length Wtd. (ft)	146.15	Wetted Per. (ft)	7.80
Min Ch El (ft)	802.50	Shear (lb/sq ft)	0.27
Alpha	1.00	Stream Power (lb/ft s)	0.41
Frctn Loss (ft)	1.67	Cum Volume (acre-ft)	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.15

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	802.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	802.84	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)		Flow Area (sq ft)		2.36	
E.G. Slope (ft/ft)	0.017059	Area (sq ft)		2.36	
Q Total (cfs)	4.00	Flow (cfs)		4.00	
Top Width (ft)	8.02	Top Width (ft)		8.02	
Vel Total (ft/s)	1.70	Avg. Vel. (ft/s)		1.70	
Max Chl Dpth (ft)	0.34	Hydr. Depth (ft)		0.29	
Conv. Total (cfs)	30.6	Conv. (cfs)		30.6	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		8.14	
Min Ch El (ft)	802.50	Shear (lb/sq ft)		0.31	
Alpha	1.00	Stream Power (lb/ft s)		0.52	
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	0.00	0.28	
C & E Loss (ft)	0.01	Cum SA (acres)		0.16	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	803.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.21	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	802.88	Flow Area (sq ft)		5.73	
E.G. Slope (ft/ft)	0.005846	Area (sq ft)		5.73	
Q Total (cfs)	9.00	Flow (cfs)		9.00	
Top Width (ft)	9.64	Top Width (ft)		9.64	
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)		1.57	
Max Chl Dpth (ft)	0.71	Hydr. Depth (ft)		0.59	
Conv. Total (cfs)	117.7	Conv. (cfs)		117.7	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		9.95	
Min Ch El (ft)	802.50	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.33	
Frctn Loss (ft)	1.97	Cum Volume (acre-ft)	0.01	0.41	0.04
C & E Loss (ft)	0.01	Cum SA (acres)	0.02	0.18	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	803.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.25	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	802.91	Flow Area (sq ft)		6.12	
E.G. Slope (ft/ft)	0.005899	Area (sq ft)		6.12	
Q Total (cfs)	10.00	Flow (cfs)		10.00	
Top Width (ft)	9.76	Top Width (ft)		9.76	



Vel Total (ft/s)	1.63	Avg. Vel. (ft/s)	1.63		
Max Chl Dpth (ft)	0.75	Hydr. Depth (ft)	0.63		
Conv. Total (cfs)	130.2	Conv. (cfs)	130.2		
Length Wtd. (ft)	146.15	Wetted Per. (ft)	10.10		
Min Ch El (ft)	802.50	Shear (lb/sq ft)	0.22		
Alpha	1.00	Stream Power (lb/ft s)	0.36		
Frctn Loss (ft)	1.99	Cum Volume (acre-ft)	0.05	0.50	0.16
C & E Loss (ft)	0.01	Cum SA (acres)	0.05	0.19	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	803.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.60	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	803.12	Flow Area (sq ft)		9.94	
E.G. Slope (ft/ft)	0.006784	Area (sq ft)		9.94	
Q Total (cfs)	20.00	Flow (cfs)		20.00	
Top Width (ft)	12.75	Top Width (ft)		12.75	
Vel Total (ft/s)	2.01	Avg. Vel. (ft/s)		2.01	
Max Chl Dpth (ft)	1.10	Hydr. Depth (ft)		0.78	
Conv. Total (cfs)	242.8	Conv. (cfs)		242.8	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		13.33	
Min Ch El (ft)	802.50	Shear (lb/sq ft)		0.32	
Alpha	1.00	Stream Power (lb/ft s)		0.64	
Frctn Loss (ft)	2.12	Cum Volume (acre-ft)	0.15	0.64	0.34
C & E Loss (ft)	0.01	Cum SA (acres)	0.07	0.21	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	803.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.82	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	803.29	Flow Area (sq ft)		12.72	
E.G. Slope (ft/ft)	0.007171	Area (sq ft)		12.72	
Q Total (cfs)	30.00	Flow (cfs)		30.00	
Top Width (ft)	13.27	Top Width (ft)		13.27	
Vel Total (ft/s)	2.36	Avg. Vel. (ft/s)		2.36	
Max Chl Dpth (ft)	1.32	Hydr. Depth (ft)		0.96	
Conv. Total (cfs)	354.3	Conv. (cfs)		354.3	
Length Wtd. (ft)	146.15	Wetted Per. (ft)		14.01	
Min Ch El (ft)	802.50	Shear (lb/sq ft)		0.41	
Alpha	1.00	Stream Power (lb/ft s)		0.96	
Frctn Loss (ft)	2.17	Cum Volume (acre-ft)	0.22	0.75	0.48
C & E Loss (ft)	0.02	Cum SA (acres)	0.07	0.22	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	804.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.050	
W.S. Elev (ft)	804.00	Reach Len. (ft)	137.00	146.15	145.00
Crit W.S. (ft)	803.43	Flow Area (sq ft)		15.17	
E.G. Slope (ft/ft)	0.007470	Area (sq ft)		15.17	
Q Total (cfs)	40.00	Flow (cfs)		40.00	

Top Width (ft)	13.71	Top Width (ft)	13.71		
Vel Total (ft/s)	2.64	Avg. Vel. (ft/s)	2.64		
Max Chl Dpth (ft)	1.50	Hydr. Depth (ft)	1.11		
Conv. Total (cfs)	462.8	Conv. (cfs)	462.8		
Length Wtd. (ft)	146.15	Wetted Per. (ft)	14.58		
Min Ch El (ft)	802.50	Shear (lb/sq ft)	0.49		
Alpha	1.00	Stream Power (lb/ft s)	1.28		
Frctn Loss (ft)	2.20	Cum Volume (acre-ft)	0.29	0.86	0.62
C & E Loss (ft)	0.02	Cum SA (acres)	0.07	0.23	0.17

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	804.16	Wt. n-Val.		0.050	
Vel Head (ft)	0.17	Reach Len. (ft)	137.00	146.15	145.00
W.S. Elev (ft)	803.98	Flow Area (sq ft)		14.92	
Crit W.S. (ft)	803.60	Area (sq ft)		14.92	
E.G. Slope (ft/ft)	0.012271	Flow (cfs)		50.00	
Q Total (cfs)	50.00	Top Width (ft)		13.67	
Top Width (ft)	13.67	Avg. Vel. (ft/s)		3.35	
Vel Total (ft/s)	3.35	Hydr. Depth (ft)		1.09	
Max Chl Dpth (ft)	1.48	Conv. (cfs)		451.4	
Conv. Total (cfs)	451.4	Wetted Per. (ft)		14.52	
Length Wtd. (ft)	146.15	Shear (lb/sq ft)		0.79	
Min Ch El (ft)	802.50	Stream Power (lb/ft s)		2.64	
Alpha	1.00	Cum Volume (acre-ft)	0.38	1.00	0.78
Frctn Loss (ft)	2.00	Cum SA (acres)	0.07	0.25	0.17
C & E Loss (ft)	0.00				

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

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	804.15	Wt. n-Val.		0.050	
Vel Head (ft)	0.44	Reach Len. (ft)	137.00	146.15	145.00
W.S. Elev (ft)	803.71	Flow Area (sq ft)		11.27	
Crit W.S. (ft)	803.71	Area (sq ft)		11.27	
E.G. Slope (ft/ft)	0.041521	Flow (cfs)		60.00	
Q Total (cfs)	60.00	Top Width (ft)		13.00	
Top Width (ft)	13.00	Avg. Vel. (ft/s)		5.33	
Vel Total (ft/s)	5.33	Hydr. Depth (ft)		0.87	
Max Chl Dpth (ft)	1.21	Conv. (cfs)		294.5	
Conv. Total (cfs)	294.5	Wetted Per. (ft)		13.66	
Length Wtd. (ft)	146.15	Shear (lb/sq ft)		2.14	
Min Ch El (ft)	802.50	Stream Power (lb/ft s)		11.39	
Alpha	1.00	Cum Volume (acre-ft)	0.56	1.20	1.05
Frctn Loss (ft)	1.13	Cum SA (acres)	0.27	0.25	0.28
C & E Loss (ft)	0.11				

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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: Tributary  
REACH: Reach 1 RS: 204

INPUT

Description:

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	25	810	47	805	93	805	101	805
105	801.87	107	801.87	109	800.87	118	800.87	121	801
122	802	123	803	124	804	126	805	145	806
164	809	177	810						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	101	.05	126	.12

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

101	126	125	133.28	133	.1	.3
-----	-----	-----	--------	-----	----	----

CROSS SECTION OUTPUT Profile #1

Parameter	Value	Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.14				
Vel Head (ft)	0.02	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.13	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.01	Flow Area (sq ft)		2.98	
E.G. Slope (ft/ft)	0.007964	Area (sq ft)		2.98	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	12.65	Top Width (ft)		12.65	
Vel Total (ft/s)	1.01	Avg. Vel. (ft/s)		1.01	
Max Chl Dpth (ft)	0.26	Hydr. Depth (ft)		0.24	
Conv. Total (cfs)	33.6	Conv. (cfs)		33.6	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		12.76	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.12	
Frctn Loss (ft)	2.40	Cum Volume (acre-ft)		0.19	
C & E Loss (ft)	0.01	Cum SA (acres)		0.11	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #1.4

Parameter	Value	Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.14				
Vel Head (ft)	0.02	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.13	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.01	Flow Area (sq ft)		2.96	
E.G. Slope (ft/ft)	0.008134	Area (sq ft)		2.96	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	12.64	Top Width (ft)		12.64	
Vel Total (ft/s)	1.01	Avg. Vel. (ft/s)		1.01	
Max Chl Dpth (ft)	0.26	Hydr. Depth (ft)		0.23	
Conv. Total (cfs)	33.3	Conv. (cfs)		33.3	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		12.76	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.12	
Alpha	1.00	Stream Power (lb/ft s)		0.12	
Frctn Loss (ft)	2.40	Cum Volume (acre-ft)	0.00	0.23	
C & E Loss (ft)	0.01	Cum SA (acres)		0.12	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2

Parameter	Value	Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.19				
Vel Head (ft)	0.02	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.17	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.05	Flow Area (sq ft)		3.52	

E.G. Slope (ft/ft)	0.008286	Area (sq ft)		3.52
Q Total (cfs)	4.00	Flow (cfs)		4.00
Top Width (ft)	12.77	Top Width (ft)		12.77
Vel Total (ft/s)	1.14	Avg. Vel. (ft/s)		1.14
Max Chl Dpth (ft)	0.30	Hydr. Depth (ft)		0.28
Conv. Total (cfs)	43.9	Conv. (cfs)		43.9
Length Wtd. (ft)	133.28	Wetted Per. (ft)		12.92
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.14
Alpha	1.00	Stream Power (lb/ft s)		0.16
Frctn Loss (ft)	2.40	Cum Volume (acre-ft)	0.00	0.27
C & E Loss (ft)	0.01	Cum SA (acres)		0.12

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	801.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.14	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.14	Flow Area (sq ft)		3.18	
E.G. Slope (ft/ft)	0.058430	Area (sq ft)		3.18	
Q Total (cfs)	9.00	Flow (cfs)		9.00	
Top Width (ft)	12.69	Top Width (ft)		12.69	
Vel Total (ft/s)	2.83	Avg. Vel. (ft/s)		2.83	
Max Chl Dpth (ft)	0.27	Hydr. Depth (ft)		0.25	
Conv. Total (cfs)	37.2	Conv. (cfs)		37.2	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		12.82	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.90	
Alpha	1.00	Stream Power (lb/ft s)		2.56	
Frctn Loss (ft)	0.55	Cum Volume (acre-ft)	0.01	0.39	0.04
C & E Loss (ft)	0.03	Cum SA (acres)	0.02	0.14	0.17

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 OUTPUT Profile #10

E.G. Elev (ft)	801.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.16	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.16	Flow Area (sq ft)		3.39	
E.G. Slope (ft/ft)	0.058316	Area (sq ft)		3.39	
Q Total (cfs)	10.00	Flow (cfs)		10.00	
Top Width (ft)	12.74	Top Width (ft)		12.74	
Vel Total (ft/s)	2.95	Avg. Vel. (ft/s)		2.95	
Max Chl Dpth (ft)	0.29	Hydr. Depth (ft)		0.27	
Conv. Total (cfs)	41.4	Conv. (cfs)		41.4	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		12.88	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.96	
Alpha	1.00	Stream Power (lb/ft s)		2.83	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	0.05	0.48	0.16
C & E Loss (ft)	0.04	Cum SA (acres)	0.05	0.16	0.17

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 OUTPUT Profile #25

E.G. Elev (ft)	801.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.32	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.32	Flow Area (sq ft)		5.48	
E.G. Slope (ft/ft)	0.050046	Area (sq ft)		5.48	
Q Total (cfs)	20.00	Flow (cfs)		20.00	
Top Width (ft)	13.22	Top Width (ft)		13.22	
Vel Total (ft/s)	3.65	Avg. Vel. (ft/s)		3.65	
Max Chl Dpth (ft)	0.45	Hydr. Depth (ft)		0.41	
Conv. Total (cfs)	89.4	Conv. (cfs)		89.4	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		13.47	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		1.27	
Alpha	1.00	Stream Power (lb/ft s)		4.64	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.15	0.62	0.34
C & E Loss (ft)	0.06	Cum SA (acres)	0.07	0.17	0.17

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 OUTPUT Profile #50

E.G. Elev (ft)	801.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.45	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.45	Flow Area (sq ft)		7.23	
E.G. Slope (ft/ft)	0.046860	Area (sq ft)		7.23	
Q Total (cfs)	30.00	Flow (cfs)		30.00	
Top Width (ft)	13.62	Top Width (ft)		13.62	
Vel Total (ft/s)	4.15	Avg. Vel. (ft/s)		4.15	
Max Chl Dpth (ft)	0.58	Hydr. Depth (ft)		0.53	
Conv. Total (cfs)	138.6	Conv. (cfs)		138.6	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		13.94	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		1.52	
Alpha	1.00	Stream Power (lb/ft s)		6.29	
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.22	0.72	0.48
C & E Loss (ft)	0.08	Cum SA (acres)	0.07	0.17	0.17

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 OUTPUT Profile #100

E.G. Elev (ft)	801.89	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.32	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.57	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)	801.57	Flow Area (sq ft)		8.82	

E.G. Slope (ft/ft)	0.044621	Area (sq ft)		8.82	
Q Total (cfs)	40.00	Flow (cfs)		40.00	
Top Width (ft)	13.96	Top Width (ft)		13.96	
Vel Total (ft/s)	4.54	Avg. Vel. (ft/s)		4.54	
Max Chl Dpth (ft)	0.70	Hydr. Depth (ft)		0.63	
Conv. Total (cfs)	189.4	Conv. (cfs)		189.4	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		14.36	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		1.71	
Alpha	1.00	Stream Power (lb/ft s)		7.76	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	0.29	0.82	0.62
C & E Loss (ft)	0.09	Cum SA (acres)	0.07	0.18	0.17

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #200

E.G. Elev (ft)	802.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.050	
W.S. Elev (ft)	801.99	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)		Flow Area (sq ft)		15.14	
E.G. Slope (ft/ft)	0.015340	Area (sq ft)		15.14	
Q Total (cfs)	50.00	Flow (cfs)		50.00	
Top Width (ft)	17.13	Top Width (ft)		17.13	
Vel Total (ft/s)	3.30	Avg. Vel. (ft/s)		3.30	
Max Chl Dpth (ft)	1.12	Hydr. Depth (ft)		0.88	
Conv. Total (cfs)	403.7	Conv. (cfs)		403.7	
Length Wtd. (ft)	133.28	Wetted Per. (ft)		17.82	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.81	
Alpha	1.00	Stream Power (lb/ft s)		2.69	
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.38	0.95	0.78
C & E Loss (ft)	0.05	Cum SA (acres)	0.07	0.20	0.17

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	802.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	802.73	Reach Len. (ft)	125.00	133.28	133.00
Crit W.S. (ft)		Flow Area (sq ft)		28.48	
E.G. Slope (ft/ft)	0.003153	Area (sq ft)		28.48	
Q Total (cfs)	60.00	Flow (cfs)		60.00	
Top Width (ft)	18.82	Top Width (ft)		18.82	
Vel Total (ft/s)	2.11	Avg. Vel. (ft/s)		2.11	
Max Chl Dpth (ft)	1.86	Hydr. Depth (ft)		1.51	
Conv. Total (cfs)	1068.5	Conv. (cfs)		1068.5	
Length Wtd. (ft)	133.18	Wetted Per. (ft)		20.07	
Min Ch El (ft)	800.87	Shear (lb/sq ft)		0.28	
Alpha	1.00	Stream Power (lb/ft s)		0.59	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.56	1.13	1.05
C & E Loss (ft)	0.02	Cum SA (acres)	0.27	0.20	0.28

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: Tributary  
 REACH: Reach 1 RS: 202

INPUT

Description:

Station Elevation Data num= 15									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	810	24	803	94	802	98	799.5	100	799.5
102	798.5	110	798.5	113	799	114	800	116	801
118	802	145	802.72	169	803	210	804	230	805

Manning's n Values num= 4					
Sta	n Val	Sta	n Val	Sta	n Val
0	.12	94	.05	118	.12
				145	.03

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	94	118		219 240.43	214	.1	.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	798.73				
Vel Head (ft)	0.08	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.66	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)	798.66	Flow Area (sq ft)		1.35	
E.G. Slope (ft/ft)	0.072557	Area (sq ft)		1.35	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	9.26	Top Width (ft)		9.26	
Vel Total (ft/s)	2.21	Avg. Vel. (ft/s)		2.21	
Max Chl Dpth (ft)	0.16	Hydr. Depth (ft)		0.15	
Conv. Total (cfs)	11.1	Conv. (cfs)		11.1	
Length Wtd. (ft)	240.43	Wetted Per. (ft)		9.31	
Min Ch El (ft)	798.50	Shear (lb/sq ft)		0.66	
Alpha	1.00	Stream Power (lb/ft s)		1.46	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)		0.18	
C & E Loss (ft)	0.02	Cum SA (acres)		0.08	

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 OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	798.73				
Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.66	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)	798.66	Flow Area (sq ft)		1.38	
E.G. Slope (ft/ft)	0.068681	Area (sq ft)		1.38	
Q Total (cfs)	3.00	Flow (cfs)		3.00	
Top Width (ft)	9.28	Top Width (ft)		9.28	
Vel Total (ft/s)	2.18	Avg. Vel. (ft/s)		2.18	
Max Chl Dpth (ft)	0.16	Hydr. Depth (ft)		0.15	
Conv. Total (cfs)	11.4	Conv. (cfs)		11.4	
Length Wtd. (ft)	240.43	Wetted Per. (ft)		9.33	
Min Ch El (ft)	798.50	Shear (lb/sq ft)		0.63	
Alpha	1.00	Stream Power (lb/ft s)		1.38	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.00	0.22	
C & E Loss (ft)	0.02	Cum SA (acres)		0.08	

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 OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	798.78	Wt. n-Val.		0.050	
Vel Head (ft)	0.09	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	798.69	Flow Area (sq ft)		1.68	
Crit W.S. (ft)	798.69	Area (sq ft)		1.68	
E.G. Slope (ft/ft)	0.065436	Flow (cfs)		4.00	
Q Total (cfs)	4.00	Top Width (ft)		9.53	
Top Width (ft)	9.53	Avg. Vel. (ft/s)		2.38	
Vel Total (ft/s)	2.38	Hydr. Depth (ft)		0.18	
Max Chl Dpth (ft)	0.19	Conv. (cfs)		15.6	
Conv. Total (cfs)	15.6	Wetted Per. (ft)		9.59	
Length Wtd. (ft)	240.43	Shear (lb/sq ft)		0.72	
Min Ch El (ft)	798.50	Stream Power (lb/ft s)		1.70	
Alpha	1.00	Cum Volume (acre-ft)	0.00	0.26	
Frctn Loss (ft)	0.12	Cum SA (acres)		0.09	
C & E Loss (ft)	0.02				

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.41	Wt. n-Val.		0.050	
Vel Head (ft)	0.01	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	799.40	Flow Area (sq ft)		10.02	
Crit W.S. (ft)		Area (sq ft)		10.02	
E.G. Slope (ft/ft)	0.001377	Flow (cfs)		9.00	
Q Total (cfs)	9.00	Top Width (ft)		13.19	
Top Width (ft)	13.19	Avg. Vel. (ft/s)		0.90	
Vel Total (ft/s)	0.90	Hydr. Depth (ft)		0.76	
Max Chl Dpth (ft)	0.90	Conv. (cfs)		242.6	
Conv. Total (cfs)	242.6	Wetted Per. (ft)		13.61	
Length Wtd. (ft)	239.76	Shear (lb/sq ft)		0.06	
Min Ch El (ft)	798.50	Stream Power (lb/ft s)		0.06	
Alpha	1.00	Cum Volume (acre-ft)	0.01	0.37	0.04
Frctn Loss (ft)	0.13	Cum SA (acres)	0.02	0.10	0.17
C & E Loss (ft)	0.00				

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.86	Wt. n-Val.		0.050	
Vel Head (ft)	0.01	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	799.86	Flow Area (sq ft)		17.10	
Crit W.S. (ft)		Area (sq ft)		17.10	
E.G. Slope (ft/ft)	0.000390	Flow (cfs)		10.00	
Q Total (cfs)	10.00	Top Width (ft)		16.43	
Top Width (ft)	16.43	Avg. Vel. (ft/s)		0.58	
Vel Total (ft/s)	0.58	Hydr. Depth (ft)		1.04	
Max Chl Dpth (ft)	1.36	Conv. (cfs)		506.6	
Conv. Total (cfs)	506.6	Wetted Per. (ft)		17.17	
Length Wtd. (ft)	235.77	Shear (lb/sq ft)		0.02	
Min Ch El (ft)	798.50	Stream Power (lb/ft s)		0.01	
Alpha	1.00	Cum Volume (acre-ft)	0.05	0.45	0.16
Frctn Loss (ft)	0.09	Cum SA (acres)	0.05	0.11	0.17
C & E Loss (ft)	0.00				

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



CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.52	Wt. n-Val.		0.050	
Vel Head (ft)	0.01	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	800.51	Flow Area (sq ft)		28.54	
Crit W.S. (ft)		Area (sq ft)		28.54	
E.G. Slope (ft/ft)	0.000340	Flow (cfs)		20.00	
Q Total (cfs)	20.00	Top Width (ft)		18.65	
Top Width (ft)	18.65	Avg. Vel. (ft/s)		0.70	
Vel Total (ft/s)	0.70	Hydr. Depth (ft)		1.53	
Max Chl Dpth (ft)	2.01	Conv. (cfs)		1084.0	
Conv. Total (cfs)	1084.0	Wetted Per. (ft)		19.75	
Length Wtd. (ft)	231.67	Shear (lb/sq ft)		0.03	
Min Ch El (ft)	798.50	Stream Power (lb/ft s)		0.02	
Alpha	1.00	Cum Volume (acre-ft)	0.15	0.56	0.34
Frctn Loss (ft)	0.06	Cum SA (acres)	0.07	0.12	0.17
C & E Loss (ft)	0.00				

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

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.99	Wt. n-Val.		0.050	
Vel Head (ft)	0.01	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	800.98	Flow Area (sq ft)		37.63	
Crit W.S. (ft)		Area (sq ft)		37.63	
E.G. Slope (ft/ft)	0.000345	Flow (cfs)		30.00	
Q Total (cfs)	30.00	Top Width (ft)		20.33	
Top Width (ft)	20.33	Avg. Vel. (ft/s)		0.80	
Vel Total (ft/s)	0.80	Hydr. Depth (ft)		1.85	
Max Chl Dpth (ft)	2.48	Conv. (cfs)		1615.3	
Conv. Total (cfs)	1615.3	Wetted Per. (ft)		21.67	
Length Wtd. (ft)	229.99	Shear (lb/sq ft)		0.04	
Min Ch El (ft)	798.50	Stream Power (lb/ft s)		0.03	
Alpha	1.00	Cum Volume (acre-ft)	0.22	0.65	0.48
Frctn Loss (ft)	0.05	Cum SA (acres)	0.07	0.12	0.17
C & E Loss (ft)	0.00				

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

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.48	Wt. n-Val.		0.050	
Vel Head (ft)	0.01	Reach Len. (ft)	219.00	240.43	214.00
W.S. Elev (ft)	801.47	Flow Area (sq ft)		47.95	
Crit W.S. (ft)		Area (sq ft)		47.95	
E.G. Slope (ft/ft)	0.000308	Flow (cfs)		40.00	
Q Total (cfs)	40.00	Top Width (ft)		22.08	
Top Width (ft)	22.08	Avg. Vel. (ft/s)		0.83	
Vel Total (ft/s)	0.83	Hydr. Depth (ft)		2.17	
Max Chl Dpth (ft)	2.97	Conv. (cfs)		2280.6	
Conv. Total (cfs)	2280.6	Wetted Per. (ft)		23.68	
Length Wtd. (ft)	228.75	Shear (lb/sq ft)		0.04	
Min Ch El (ft)	798.50	Stream Power (lb/ft s)		0.03	
Alpha	1.00	Cum Volume (acre-ft)	0.29	0.73	0.62
Frctn Loss (ft)	0.05	Cum SA (acres)	0.07	0.13	0.17
C & E Loss (ft)	0.00				

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

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.00	Wt. n-Val.		0.050	
Vel Head (ft)	0.01				

W.S. Elev (ft)	801.99	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)		Flow Area (sq ft)		59.97	
E.G. Slope (ft/ft)	0.000256	Area (sq ft)		59.97	
Q Total (cfs)	50.00	Flow (cfs)		50.00	
Top Width (ft)	23.96	Top Width (ft)		23.96	
Vel Total (ft/s)	0.83	Avg. Vel. (ft/s)		0.83	
Max Chl Dpth (ft)	3.49	Hydr. Depth (ft)		2.50	
Conv. Total (cfs)	3125.0	Conv. (cfs)		3125.0	
Length Wtd. (ft)	227.74	Wetted Per. (ft)		25.83	
Min Ch El (ft)	798.50	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.38	0.83	0.78
C & E Loss (ft)	0.00	Cum SA (acres)	0.07	0.13	0.17

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	802.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	802.72	Reach Len. (ft)	219.00	240.43	214.00
Crit W.S. (ft)		Flow Area (sq ft)	17.96	77.44	9.62
E.G. Slope (ft/ft)	0.000147	Area (sq ft)	17.96	77.44	9.62
Q Total (cfs)	60.00	Flow (cfs)	1.36	57.91	0.73
Top Width (ft)	101.00	Top Width (ft)	50.14	24.00	26.86
Vel Total (ft/s)	0.57	Avg. Vel. (ft/s)	0.08	0.75	0.08
Max Chl Dpth (ft)	4.22	Hydr. Depth (ft)	0.36	3.23	0.36
Conv. Total (cfs)	4951.1	Conv. (cfs)	112.1	4778.9	60.1
Length Wtd. (ft)	226.58	Wetted Per. (ft)	50.15	25.88	26.87
Min Ch El (ft)	798.50	Shear (lb/sq ft)	0.00	0.03	0.00
Alpha	1.65	Stream Power (lb/ft s)	0.00	0.02	0.00
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	0.54	0.97	1.03
C & E Loss (ft)	0.00	Cum SA (acres)	0.19	0.13	0.24

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: Tributary  
REACH: Reach 1 RS: 200

INPUT

Description:

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	800	27	799	32	796.34	35	796.34	36	795.34
43	795.34	47	796	48	797	50	798	51	799
54	799	79	799.23	120	799				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	27	.05	54	.12	79	.03

Bank Sta: Left	Right	Coeff Contr.	Expan.
27	51	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	797.76	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.050	
W.S. Elev (ft)	797.75	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)		35.08	
E.G. Slope (ft/ft)	0.000301	Area (sq ft)		35.08	
Q Total (cfs)	25.00	Flow (cfs)		25.00	
Top Width (ft)	20.16	Top Width (ft)		20.16	
Vel Total (ft/s)	0.71	Avg. Vel. (ft/s)		0.71	
Max Chl Dpth (ft)	2.41	Hydr. Depth (ft)		1.74	
Conv. Total (cfs)	1441.3	Conv. (cfs)		1441.3	
Length Wtd. (ft)	85.00	Wetted Per. (ft)		21.58	

Min Ch El (ft)	795.34	Shear (lb/sq ft)	0.03
Alpha	1.00	Stream Power (lb/ft s)	0.02
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	0.08
C & E Loss (ft)	0.00	Cum SA (acres)	

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

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	798.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.12	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)		42.72	
E.G. Slope (ft/ft)	0.000334	Area (sq ft)		42.72	
Q Total (cfs)	35.00	Flow (cfs)		35.00	
Top Width (ft)	21.47	Top Width (ft)		21.47	
Vel Total (ft/s)	0.82	Avg. Vel. (ft/s)		0.82	
Max Chl Dpth (ft)	2.78	Hydr. Depth (ft)		1.99	
Conv. Total (cfs)	1914.3	Conv. (cfs)		1914.3	
Length Wtd. (ft)	85.00	Wetted Per. (ft)		23.08	
Min Ch El (ft)	795.34	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.00	0.10	
C & E Loss (ft)	0.00	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	798.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.050	
W.S. Elev (ft)	798.47	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)		50.37	
E.G. Slope (ft/ft)	0.000422	Area (sq ft)		50.37	
Q Total (cfs)	50.00	Flow (cfs)		50.00	
Top Width (ft)	22.47	Top Width (ft)		22.47	
Vel Total (ft/s)	0.99	Avg. Vel. (ft/s)		0.99	
Max Chl Dpth (ft)	3.13	Hydr. Depth (ft)		2.24	
Conv. Total (cfs)	2432.6	Conv. (cfs)		2432.6	
Length Wtd. (ft)	85.00	Wetted Per. (ft)		24.31	
Min Ch El (ft)	795.34	Shear (lb/sq ft)		0.05	
Alpha	1.00	Stream Power (lb/ft s)		0.05	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.00	0.12	
C & E Loss (ft)	0.00	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	799.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.120	0.050	0.043
W.S. Elev (ft)	799.27	Reach Len. (ft)	85.00	85.00	85.00
Crit W.S. (ft)		Flow Area (sq ft)	0.96	69.12	10.77
E.G. Slope (ft/ft)	0.000498	Area (sq ft)	0.96	69.12	10.77
Q Total (cfs)	90.00	Flow (cfs)	0.07	87.48	2.45
Top Width (ft)	100.19	Top Width (ft)	7.19	24.00	69.00
Vel Total (ft/s)	1.11	Avg. Vel. (ft/s)	0.07	1.27	0.23
Max Chl Dpth (ft)	3.93	Hydr. Depth (ft)	0.13	2.88	0.16
Conv. Total (cfs)	4034.8	Conv. (cfs)	3.1	3921.9	109.8
Length Wtd. (ft)	85.00	Wetted Per. (ft)	7.19	26.20	69.27
Min Ch El (ft)	795.34	Shear (lb/sq ft)	0.00	0.08	0.00
Alpha	1.26	Stream Power (lb/ft s)	0.00	0.10	0.00
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.01	0.16	0.01
C & E Loss (ft)	0.00	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.78	Wt. n-Val.	0.120	0.050	0.042
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	799.76	Flow Area (sq ft)	7.76	80.92	44.71
Crit W.S. (ft)		Area (sq ft)	7.76	80.92	44.71
E.G. Slope (ft/ft)	0.000361	Flow (cfs)	0.96	96.91	22.14
Q Total (cfs)	120.00	Top Width (ft)	20.46	24.00	69.00
Top Width (ft)	113.46	Avg. Vel. (ft/s)	0.12	1.20	0.50
Vel Total (ft/s)	0.90	Hydr. Depth (ft)	0.38	3.37	0.65
Max Chl Dpth (ft)	4.42	Conv. (cfs)	50.3	5100.6	1165.2
Conv. Total (cfs)	6316.2	Wetted Per. (ft)	20.48	26.20	69.76
Length Wtd. (ft)	85.00	Shear (lb/sq ft)	0.01	0.07	0.01
Min Ch El (ft)	795.34	Stream Power (lb/ft s)	0.00	0.08	0.01
Alpha	1.49	Cum Volume (acre-ft)	0.03	0.18	0.05
Frctn Loss (ft)	0.07	Cum SA (acres)			
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.46	Wt. n-Val.	0.120	0.050	0.042
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	800.44	Flow Area (sq ft)	25.41	97.32	91.86
Crit W.S. (ft)		Area (sq ft)	25.41	97.32	91.86
E.G. Slope (ft/ft)	0.000264	Flow (cfs)	4.86	112.77	62.37
Q Total (cfs)	180.00	Top Width (ft)	27.00	24.00	69.00
Top Width (ft)	120.00	Avg. Vel. (ft/s)	0.19	1.16	0.68
Vel Total (ft/s)	0.84	Hydr. Depth (ft)	0.94	4.06	1.33
Max Chl Dpth (ft)	5.10	Conv. (cfs)	298.9	6937.5	3836.8
Conv. Total (cfs)	11073.2	Wetted Per. (ft)	27.46	26.20	70.44
Length Wtd. (ft)	85.00	Shear (lb/sq ft)	0.02	0.06	0.02
Min Ch El (ft)	795.34	Stream Power (lb/ft s)	0.00	0.07	0.01
Alpha	1.42	Cum Volume (acre-ft)	0.08	0.22	0.12
Frctn Loss (ft)	0.07	Cum SA (acres)			
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.93	Wt. n-Val.	0.120	0.050	0.043
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	800.92	Flow Area (sq ft)	38.31	108.78	124.82
Crit W.S. (ft)		Area (sq ft)	38.31	108.78	124.82
E.G. Slope (ft/ft)	0.000226	Flow (cfs)	8.81	125.60	95.60
Q Total (cfs)	230.00	Top Width (ft)	27.00	24.00	69.00
Top Width (ft)	120.00	Avg. Vel. (ft/s)	0.23	1.15	0.77
Vel Total (ft/s)	0.85	Hydr. Depth (ft)	1.42	4.53	1.81
Max Chl Dpth (ft)	5.58	Conv. (cfs)	585.6	8352.3	6357.4
Conv. Total (cfs)	15295.3	Wetted Per. (ft)	27.94	26.20	70.92
Length Wtd. (ft)	85.00	Shear (lb/sq ft)	0.02	0.06	0.02
Min Ch El (ft)	795.34	Stream Power (lb/ft s)	0.00	0.07	0.02
Alpha	1.36	Cum Volume (acre-ft)	0.12	0.24	0.17
Frctn Loss (ft)	0.06	Cum SA (acres)			
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.43	Wt. n-Val.	0.120	0.050	0.043
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	801.41				

Crit W.S. (ft)		Flow Area (sq ft)	51.62	120.61	158.82
E.G. Slope (ft/ft)	0.000204	Area (sq ft)	51.62	120.61	158.82
Q Total (cfs)	290.00	Flow (cfs)	13.58	141.64	134.78
Top Width (ft)	120.00	Top Width (ft)	27.00	24.00	69.00
Vel Total (ft/s)	0.88	Avg. Vel. (ft/s)	0.26	1.17	0.85
Max Chl Dpth (ft)	6.07	Hydr. Depth (ft)	1.91	5.03	2.30
Conv. Total (cfs)	20311.2	Conv. (cfs)	951.2	9920.0	9439.9
Length Wtd. (ft)	85.00	Wetted Per. (ft)	28.43	26.20	71.41
Min Ch El (ft)	795.34	Shear (lb/sq ft)	0.02	0.06	0.03
Alpha	1.32	Stream Power (lb/ft s)	0.01	0.07	0.02
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.16	0.27	0.23
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.95	Wt. n-Val.	0.120	0.050	0.043
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	801.93	Flow Area (sq ft)	65.73	133.16	194.89
Crit W.S. (ft)		Area (sq ft)	65.73	133.16	194.89
E.G. Slope (ft/ft)	0.000198	Flow (cfs)	19.78	164.61	185.60
Q Total (cfs)	370.00	Top Width (ft)	27.00	24.00	69.00
Top Width (ft)	120.00	Avg. Vel. (ft/s)	0.30	1.24	0.95
Vel Total (ft/s)	0.94	Hydr. Depth (ft)	2.43	5.55	2.82
Max Chl Dpth (ft)	6.59	Conv. (cfs)	1405.9	11698.6	13190.4
Conv. Total (cfs)	26294.9	Wetted Per. (ft)	28.95	26.20	71.94
Length Wtd. (ft)	85.00	Shear (lb/sq ft)	0.03	0.06	0.03
Min Ch El (ft)	795.34	Stream Power (lb/ft s)	0.01	0.08	0.03
Alpha	1.29	Cum Volume (acre-ft)	0.21	0.30	0.31
Frctn Loss (ft)	0.05	Cum SA (acres)			
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.68	Wt. n-Val.	0.120	0.050	0.043
Vel Head (ft)	0.02	Reach Len. (ft)	85.00	85.00	85.00
W.S. Elev (ft)	802.66	Flow Area (sq ft)	85.43	150.66	245.22
Crit W.S. (ft)		Area (sq ft)	85.43	150.66	245.22
E.G. Slope (ft/ft)	0.000181	Flow (cfs)	28.79	193.34	257.87
Q Total (cfs)	480.00	Top Width (ft)	27.00	24.00	69.00
Top Width (ft)	120.00	Avg. Vel. (ft/s)	0.34	1.28	1.05
Vel Total (ft/s)	1.00	Hydr. Depth (ft)	3.16	6.28	3.55
Max Chl Dpth (ft)	7.32	Conv. (cfs)	2140.3	14373.0	19170.6
Conv. Total (cfs)	35683.9	Wetted Per. (ft)	29.68	26.20	72.67
Length Wtd. (ft)	85.00	Shear (lb/sq ft)	0.03	0.06	0.04
Min Ch El (ft)	795.34	Stream Power (lb/ft s)	0.01	0.08	0.04
Alpha	1.27	Cum Volume (acre-ft)	0.28	0.34	0.41
Frctn Loss (ft)	0.05	Cum SA (acres)			
C & E Loss (ft)	0.01				

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

CROSS SECTION RIVER: Main Channel  
 REACH: Upper RS: 142

INPUT

Description:

Station Elevation Data		num= 22							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830	18	828	44	826	62	825	79	824
86	823	93	822	99	821	103	820	105	819
107	818	109	817	112	816	116	814.6	117	816
121	817	123	818	125	819	129	820	190	821
198	822	206	825						

Manning's n Values	num=	4			
Sta	n Val	Sta	n Val	Sta	n Val
0	.03	93	.12	107	.05
				125	.12

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
105	129	73	77.35	71	.1
					.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	817.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.45	Wt. n-Val.		0.050	
W.S. Elev (ft)	816.67	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	816.67	Flow Area (sq ft)		8.39	
E.G. Slope (ft/ft)	0.045730	Area (sq ft)		8.39	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	9.67	Top Width (ft)		9.67	
Vel Total (ft/s)	5.36	Avg. Vel. (ft/s)		5.36	
Max Chl Dpth (ft)	2.07	Hydr. Depth (ft)		0.87	
Conv. Total (cfs)	210.4	Conv. (cfs)		210.4	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		10.81	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		2.21	
Alpha	1.00	Stream Power (lb/ft s)		11.88	
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.11	1.48	0.02
C & E Loss (ft)	0.11	Cum SA (acres)	0.50	0.81	0.13

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	817.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.		0.050	
W.S. Elev (ft)	816.83	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	816.83	Flow Area (sq ft)		10.08	
E.G. Slope (ft/ft)	0.044152	Area (sq ft)		10.08	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	10.82	Top Width (ft)		10.82	
Vel Total (ft/s)	5.55	Avg. Vel. (ft/s)		5.55	
Max Chl Dpth (ft)	2.23	Hydr. Depth (ft)		0.93	
Conv. Total (cfs)	266.5	Conv. (cfs)		266.5	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		12.02	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		2.31	
Alpha	1.00	Stream Power (lb/ft s)		12.84	
Frctn Loss (ft)	0.84	Cum Volume (acre-ft)	0.19	1.63	0.03
C & E Loss (ft)	0.12	Cum SA (acres)	0.70	0.84	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 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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.53				
Vel Head (ft)	0.52	Wt. n-Val.		0.050	
W.S. Elev (ft)	817.01	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	817.01	Flow Area (sq ft)		12.15	
E.G. Slope (ft/ft)	0.042444	Area (sq ft)		12.15	
Q Total (cfs)	70.00	Flow (cfs)		70.00	
Top Width (ft)	12.05	Top Width (ft)		12.05	
Vel Total (ft/s)	5.76	Avg. Vel. (ft/s)		5.76	
Max Chl Dpth (ft)	2.41	Hydr. Depth (ft)		1.01	
Conv. Total (cfs)	339.8	Conv. (cfs)		339.8	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		13.30	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		2.42	
Alpha	1.00	Stream Power (lb/ft s)		13.95	
Frctn Loss (ft)	0.78	Cum Volume (acre-ft)	0.31	1.79	0.06
C & E Loss (ft)	0.13	Cum SA (acres)	0.80	0.87	0.20

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.26				
Vel Head (ft)	0.69	Wt. n-Val.		0.050	
W.S. Elev (ft)	817.57	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	817.57	Flow Area (sq ft)		19.56	
E.G. Slope (ft/ft)	0.037679	Area (sq ft)		19.56	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	14.30	Top Width (ft)		14.30	
Vel Total (ft/s)	6.65	Avg. Vel. (ft/s)		6.65	
Max Chl Dpth (ft)	2.97	Hydr. Depth (ft)		1.37	
Conv. Total (cfs)	669.7	Conv. (cfs)		669.7	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		15.81	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		2.91	
Alpha	1.00	Stream Power (lb/ft s)		19.34	
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)	0.83	2.30	0.20
C & E Loss (ft)	0.17	Cum SA (acres)	1.74	0.98	0.40

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.74				
Vel Head (ft)	0.80	Wt. n-Val.		0.050	
W.S. Elev (ft)	817.94	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	817.94	Flow Area (sq ft)		25.12	
E.G. Slope (ft/ft)	0.035823	Area (sq ft)		25.12	

Q Total (cfs)	180.00	Flow (cfs)		180.00
Top Width (ft)	15.78	Top Width (ft)		15.78
Vel Total (ft/s)	7.17	Avg. Vel. (ft/s)		7.17
Max Chl Dpth (ft)	3.34	Hydr. Depth (ft)		1.59
Conv. Total (cfs)	951.0	Conv. (cfs)		951.0
Length Wtd. (ft)	77.35	Wetted Per. (ft)		17.47
Min Ch El (ft)	814.60	Shear (lb/sq ft)		3.22
Alpha	1.00	Stream Power (lb/ft s)		23.05
Frctn Loss (ft)	0.58	Cum Volume (acre-ft)	1.23	2.63 0.33
C & E Loss (ft)	0.20	Cum SA (acres)	1.98	1.02 0.48

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: 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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	819.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.96	Wt. n-Val.		0.055	
W.S. Elev (ft)	818.49	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	818.49	Flow Area (sq ft)		34.30	
E.G. Slope (ft/ft)	0.040876	Area (sq ft)		34.30	
Q Total (cfs)	270.00	Flow (cfs)		270.00	
Top Width (ft)	17.96	Top Width (ft)		17.96	
Vel Total (ft/s)	7.87	Avg. Vel. (ft/s)		7.87	
Max Chl Dpth (ft)	3.89	Hydr. Depth (ft)		1.91	
Conv. Total (cfs)	1335.5	Conv. (cfs)		1335.5	
Length Wtd. (ft)	77.35	Wetted Per. (ft)		19.90	
Min Ch El (ft)	814.60	Shear (lb/sq ft)		4.40	
Alpha	1.00	Stream Power (lb/ft s)		34.62	
Frctn Loss (ft)	0.56	Cum Volume (acre-ft)	1.89	3.06	0.54
C & E Loss (ft)	0.24	Cum SA (acres)	2.26	1.05	0.57

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	819.92	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.		0.058	
W.S. Elev (ft)	818.85	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	818.85	Flow Area (sq ft)		41.06	
E.G. Slope (ft/ft)	0.043714	Area (sq ft)		41.06	
Q Total (cfs)	340.00	Flow (cfs)		340.00	
Top Width (ft)	19.40	Top Width (ft)		19.40	



Vel Total (ft/s)	8.28	Avg. Vel. (ft/s)	8.28		
Max Chl Dpth (ft)	4.25	Hydr. Depth (ft)	2.12		
Conv. Total (cfs)	1626.2	Conv. (cfs)	1626.2		
Length Wtd. (ft)	77.34	Wetted Per. (ft)	21.52		
Min Ch El (ft)	814.60	Shear (lb/sq ft)	5.21		
Alpha	1.00	Stream Power (lb/ft s)	43.11		
Frctn Loss (ft)	0.55	Cum Volume (acre-ft)	2.36	3.33	0.70
C & E Loss (ft)	0.27	Cum SA (acres)	2.32	1.07	0.62

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	820.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.17	Wt. n-Val.	0.120	0.062	
W.S. Elev (ft)	819.27	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	819.27	Flow Area (sq ft)	0.07	49.45	
E.G. Slope (ft/ft)	0.048582	Area (sq ft)	0.07	49.45	
Q Total (cfs)	430.00	Flow (cfs)	0.05	429.95	
Top Width (ft)	21.59	Top Width (ft)	0.53	21.06	
Vel Total (ft/s)	8.68	Avg. Vel. (ft/s)	0.66	8.69	
Max Chl Dpth (ft)	4.67	Hydr. Depth (ft)	0.13	2.35	
Conv. Total (cfs)	1950.9	Conv. (cfs)	0.2	1950.7	
Length Wtd. (ft)	77.31	Wetted Per. (ft)	0.59	23.28	
Min Ch El (ft)	814.60	Shear (lb/sq ft)	0.36	6.44	
Alpha	1.00	Stream Power (lb/ft s)	0.24	56.01	
Frctn Loss (ft)	0.56	Cum Volume (acre-ft)	3.09	3.66	0.95
C & E Loss (ft)	0.29	Cum SA (acres)	2.66	1.07	0.78

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	820.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.29	Wt. n-Val.	0.120	0.067	
W.S. Elev (ft)	819.66	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	819.66	Flow Area (sq ft)	0.43	58.01	
E.G. Slope (ft/ft)	0.054308	Area (sq ft)	0.43	58.01	
Q Total (cfs)	530.00	Flow (cfs)	0.55	529.45	
Top Width (ft)	23.94	Top Width (ft)	1.31	22.63	
Vel Total (ft/s)	9.07	Avg. Vel. (ft/s)	1.28	9.13	

Max Chl Dpth (ft)	5.06	Hydr. Depth (ft)	0.33	2.56	
Conv. Total (cfs)	2274.3	Conv. (cfs)	2.4	2271.9	
Length Wtd. (ft)	77.26	Wetted Per. (ft)	1.47	24.90	
Min Ch El (ft)	814.60	Shear (lb/sq ft)	1.00	7.90	
Alpha	1.01	Stream Power (lb/ft s)	1.27	72.10	
Frctn Loss (ft)	0.56	Cum Volume (acre-ft)	3.99	4.00	1.26
C & E Loss (ft)	0.32	Cum SA (acres)	2.99	1.07	1.00

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	821.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.32	Wt. n-Val.	0.120	0.070	0.120
W.S. Elev (ft)	820.33	Reach Len. (ft)	73.00	77.35	71.00
Crit W.S. (ft)	820.33	Flow Area (sq ft)	1.89	73.99	3.38
E.G. Slope (ft/ft)	0.047778	Area (sq ft)	1.89	73.99	3.38
Q Total (cfs)	690.00	Flow (cfs)	3.32	683.91	2.77
Top Width (ft)	47.65	Top Width (ft)	3.33	24.00	20.32
Vel Total (ft/s)	8.70	Avg. Vel. (ft/s)	1.76	9.24	0.82
Max Chl Dpth (ft)	5.73	Hydr. Depth (ft)	0.57	3.08	0.17
Conv. Total (cfs)	3156.7	Conv. (cfs)	15.2	3128.9	12.7
Length Wtd. (ft)	77.14	Wetted Per. (ft)	3.61	26.31	20.32
Min Ch El (ft)	814.60	Shear (lb/sq ft)	1.56	8.39	0.50
Alpha	1.12	Stream Power (lb/ft s)	2.74	77.53	0.41
Frctn Loss (ft)	0.55	Cum Volume (acre-ft)	5.26	4.49	1.80
C & E Loss (ft)	0.31	Cum SA (acres)	3.19	1.08	1.31

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 140

INPUT

Description:

Station Elevation Data		num= 20							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	830	23	827	50	825	58	824	68	823
78	821	92	820	105	819	109	818	117	816
123	815	127	813.5	136	815	138	816	139	817
140	818	150	819	173	820	184	821	197	825

Manning's n Values		num= 4					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	68	.05	109	.05	140	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	109	140		122 117.16	112	.1	.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.76				
Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	815.69	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)		20.53	
E.G. Slope (ft/ft)	0.004937	Area (sq ft)		20.53	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	18.48	Top Width (ft)		18.48	
Vel Total (ft/s)	2.19	Avg. Vel. (ft/s)		2.19	
Max Chl Dpth (ft)	2.18	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	640.4	Conv. (cfs)		640.4	
Length Wtd. (ft)	117.16	Wetted Per. (ft)		19.09	
Min Ch El (ft)	813.50	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		0.73	
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.11	1.46	0.02
C & E Loss (ft)	0.01	Cum SA (acres)	0.50	0.79	0.13

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 OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.97				
Vel Head (ft)	0.08	Wt. n-Val.		0.050	
W.S. Elev (ft)	815.89	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)		24.43	
E.G. Slope (ft/ft)	0.004795	Area (sq ft)		24.43	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	20.10	Top Width (ft)		20.10	
Vel Total (ft/s)	2.29	Avg. Vel. (ft/s)		2.29	
Max Chl Dpth (ft)	2.39	Hydr. Depth (ft)		1.22	
Conv. Total (cfs)	808.7	Conv. (cfs)		808.7	
Length Wtd. (ft)	117.16	Wetted Per. (ft)		20.77	
Min Ch El (ft)	813.50	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		0.81	
Frctn Loss (ft)	0.84	Cum Volume (acre-ft)	0.19	1.60	0.03
C & E Loss (ft)	0.01	Cum SA (acres)	0.70	0.81	0.15

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

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.22				
Vel Head (ft)	0.09	Wt. n-Val.		0.050	
W.S. Elev (ft)	816.13	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)		29.50	
E.G. Slope (ft/ft)	0.004425	Area (sq ft)		29.50	
Q Total (cfs)	70.00	Flow (cfs)		70.00	
Top Width (ft)	21.64	Top Width (ft)		21.64	
Vel Total (ft/s)	2.37	Avg. Vel. (ft/s)		2.37	
Max Chl Dpth (ft)	2.63	Hydr. Depth (ft)		1.36	
Conv. Total (cfs)	1052.3	Conv. (cfs)		1052.3	
Length Wtd. (ft)	117.16	Wetted Per. (ft)		22.43	
Min Ch El (ft)	813.50	Shear (lb/sq ft)		0.36	
Alpha	1.00	Stream Power (lb/ft s)		0.86	
Frctn Loss (ft)	0.81	Cum Volume (acre-ft)	0.31	1.75	0.06
C & E Loss (ft)	0.01	Cum SA (acres)	0.80	0.84	0.20

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

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.09	Wt. n-Val.		0.050	
Vel Head (ft)	0.11	Reach Len. (ft)	122.00	117.16	112.00
W.S. Elev (ft)	816.99	Flow Area (sq ft)		49.89	
Crit W.S. (ft)		Area (sq ft)		49.89	
E.G. Slope (ft/ft)	0.003420	Flow (cfs)		130.00	
Q Total (cfs)	130.00	Top Width (ft)		25.93	
Top Width (ft)	25.93	Avg. Vel. (ft/s)		2.61	
Vel Total (ft/s)	2.61	Hydr. Depth (ft)		1.92	
Max Chl Dpth (ft)	3.49	Conv. (cfs)		2223.1	
Conv. Total (cfs)	2223.1	Wetted Per. (ft)		27.18	
Length Wtd. (ft)	117.16	Shear (lb/sq ft)		0.39	
Min Ch El (ft)	813.50	Stream Power (lb/ft s)		1.02	
Alpha	1.00	Cum Volume (acre-ft)	0.83	2.24	0.20
Frctn Loss (ft)	0.70	Cum SA (acres)	1.74	0.94	0.40
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.66	Wt. n-Val.		0.050	
Vel Head (ft)	0.12	Reach Len. (ft)	122.00	117.16	112.00
W.S. Elev (ft)	817.54	Flow Area (sq ft)		65.09	
Crit W.S. (ft)		Area (sq ft)		65.09	
E.G. Slope (ft/ft)	0.003118	Flow (cfs)		180.00	
Q Total (cfs)	180.00	Top Width (ft)		28.71	
Top Width (ft)	28.71	Avg. Vel. (ft/s)		2.77	
Vel Total (ft/s)	2.77	Hydr. Depth (ft)		2.27	
Max Chl Dpth (ft)	4.04	Conv. (cfs)		3223.4	
Conv. Total (cfs)	3223.4	Wetted Per. (ft)		30.26	
Length Wtd. (ft)	117.16	Shear (lb/sq ft)		0.42	
Min Ch El (ft)	813.50	Stream Power (lb/ft s)		1.16	
Alpha	1.00	Cum Volume (acre-ft)	1.23	2.55	0.33
Frctn Loss (ft)	0.66	Cum SA (acres)	1.98	0.98	0.48
C & E Loss (ft)	0.01				

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

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.43	Wt. n-Val.	0.050	0.050	0.120
Vel Head (ft)	0.15	Reach Len. (ft)	122.00	117.16	112.00
W.S. Elev (ft)	818.28	Flow Area (sq ft)	0.16	87.49	0.40
Crit W.S. (ft)		Area (sq ft)	0.16	87.49	0.40
E.G. Slope (ft/ft)	0.002911	Flow (cfs)	0.07	269.86	0.07
Q Total (cfs)	270.00	Top Width (ft)	1.13	31.00	2.82
Top Width (ft)	34.95	Avg. Vel. (ft/s)	0.43	3.08	0.18
Vel Total (ft/s)	3.07	Hydr. Depth (ft)	0.14	2.82	0.14
Max Chl Dpth (ft)	4.78	Conv. (cfs)	1.3	5002.0	1.3
Conv. Total (cfs)	5004.6	Wetted Per. (ft)	1.16	32.79	2.83
Length Wtd. (ft)	117.16	Shear (lb/sq ft)	0.02	0.48	0.03
Min Ch El (ft)	813.50	Stream Power (lb/ft s)	0.01	1.50	0.00
Alpha	1.01	Cum Volume (acre-ft)	1.89	2.95	0.54
Frctn Loss (ft)	0.63	Cum SA (acres)	2.26	1.01	0.57
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.91	Element	0.050	0.050	0.120
Vel Head (ft)	0.17	Wt. n-Val.	0.050	0.050	0.120
W.S. Elev (ft)	818.74	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)	1.09	101.61	2.72
E.G. Slope (ft/ft)	0.002777	Area (sq ft)	1.09	101.61	2.72
Q Total (cfs)	340.00	Flow (cfs)	0.86	338.23	0.91
Top Width (ft)	41.32	Top Width (ft)	2.95	31.00	7.37
Vel Total (ft/s)	3.23	Avg. Vel. (ft/s)	0.79	3.33	0.33
Max Chl Dpth (ft)	5.24	Hydr. Depth (ft)	0.37	3.28	0.37
Conv. Total (cfs)	6451.8	Conv. (cfs)	16.3	6418.2	17.3
Length Wtd. (ft)	117.18	Wetted Per. (ft)	3.04	32.79	7.41
Min Ch El (ft)	813.50	Shear (lb/sq ft)	0.06	0.54	0.06
Alpha	1.06	Stream Power (lb/ft s)	0.05	1.79	0.02
Frctn Loss (ft)	0.62	Cum Volume (acre-ft)	2.36	3.20	0.70
C & E Loss (ft)	0.02	Cum SA (acres)	2.32	1.02	0.61

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 OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	819.42	Element	0.050	0.050	0.120
Vel Head (ft)	0.20	Wt. n-Val.	0.050	0.050	0.120
W.S. Elev (ft)	819.22	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)	3.20	116.61	7.78
E.G. Slope (ft/ft)	0.002755	Area (sq ft)	3.20	116.61	7.78
Q Total (cfs)	430.00	Flow (cfs)	2.97	423.79	3.24
Top Width (ft)	52.97	Top Width (ft)	6.88	31.00	15.09
Vel Total (ft/s)	3.37	Avg. Vel. (ft/s)	0.93	3.63	0.42
Max Chl Dpth (ft)	5.72	Hydr. Depth (ft)	0.47	3.76	0.52
Conv. Total (cfs)	8192.9	Conv. (cfs)	56.5	8074.6	61.8
Length Wtd. (ft)	117.20	Wetted Per. (ft)	7.01	32.79	15.15
Min Ch El (ft)	813.50	Shear (lb/sq ft)	0.08	0.61	0.09
Alpha	1.15	Stream Power (lb/ft s)	0.07	2.22	0.04
Frctn Loss (ft)	0.61	Cum Volume (acre-ft)	3.09	3.51	0.94
C & E Loss (ft)	0.02	Cum SA (acres)	2.66	1.02	0.77

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

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	819.92	Element	0.050	0.050	0.120
Vel Head (ft)	0.23	Wt. n-Val.	0.050	0.050	0.120
W.S. Elev (ft)	819.69	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)	7.80	131.01	17.27
E.G. Slope (ft/ft)	0.002737	Area (sq ft)	7.80	131.01	17.27
Q Total (cfs)	530.00	Flow (cfs)	8.60	512.85	8.55
Top Width (ft)	69.69	Top Width (ft)	12.92	31.00	25.77
Vel Total (ft/s)	3.40	Avg. Vel. (ft/s)	1.10	3.91	0.50
Max Chl Dpth (ft)	6.19	Hydr. Depth (ft)	0.60	4.23	0.67
Conv. Total (cfs)	10131.1	Conv. (cfs)	164.4	9803.3	163.4
Length Wtd. (ft)	117.25	Wetted Per. (ft)	13.06	32.79	25.84
Min Ch El (ft)	813.50	Shear (lb/sq ft)	0.10	0.68	0.11
Alpha	1.29	Stream Power (lb/ft s)	0.11	2.67	0.06
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	3.98	3.83	1.25
C & E Loss (ft)	0.02	Cum SA (acres)	2.98	1.02	0.97

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

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	820.56	Element	0.050	0.050	0.120
Vel Head (ft)	0.27	Wt. n-Val.	0.050	0.050	0.120
W.S. Elev (ft)	820.29	Reach Len. (ft)	122.00	117.16	112.00
Crit W.S. (ft)		Flow Area (sq ft)	18.06	149.81	36.61
E.G. Slope (ft/ft)	0.002734	Area (sq ft)	18.06	149.81	36.61

Q Total (cfs)	690.00	Flow (cfs)	25.18	640.98	23.84
Top Width (ft)	88.30	Top Width (ft)	21.09	31.00	36.21
Vel Total (ft/s)	3.37	Avg. Vel. (ft/s)	1.39	4.28	0.65
Max Chl Dpth (ft)	6.79	Hydr. Depth (ft)	0.86	4.83	1.01
Conv. Total (cfs)	13195.6	Conv. (cfs)	481.6	12258.1	455.9
Length Wtd. (ft)	117.38	Wetted Per. (ft)	21.26	32.79	36.30
Min Ch El (ft)	813.50	Shear (lb/sq ft)	0.15	0.78	0.17
Alpha	1.50	Stream Power (lb/ft s)	0.20	3.34	0.11
Frctn Loss (ft)	0.57	Cum Volume (acre-ft)	5.24	4.29	1.77
C & E Loss (ft)	0.02	Cum SA (acres)	3.17	1.03	1.26

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: Main Channel  
REACH: Upper RS: 138

INPUT

Description:

Station Elevation Data		num=		18					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	47	820	61	819	96	818	103	817
107	816	109	815	111	814	115	812.4	119	814
121	815	123	816	125	817	127	818	132	819
141	820	149	821	169	825				

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.12	103	.05	121	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	103	127		119 119.41	117	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	814.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.		0.050	
W.S. Elev (ft)	814.68	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	814.21	Flow Area (sq ft)		12.80	
E.G. Slope (ft/ft)	0.012368	Area (sq ft)		12.80	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	10.73	Top Width (ft)		10.73	
Vel Total (ft/s)	3.51	Avg. Vel. (ft/s)		3.51	
Max Chl Dpth (ft)	2.28	Hydr. Depth (ft)		1.19	
Conv. Total (cfs)	404.6	Conv. (cfs)		404.6	
Length Wtd. (ft)	119.41	Wetted Per. (ft)		11.67	
Min Ch El (ft)	812.40	Shear (lb/sq ft)		0.85	
Alpha	1.00	Stream Power (lb/ft s)		2.98	
Frctn Loss (ft)	1.27	Cum Volume (acre-ft)	0.11	1.41	0.02
C & E Loss (ft)	0.01	Cum SA (acres)	0.50	0.75	0.13

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	815.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.050	
W.S. Elev (ft)	814.90	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	814.37	Flow Area (sq ft)		15.20	
E.G. Slope (ft/ft)	0.012003	Area (sq ft)		15.20	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	11.59	Top Width (ft)		11.59	
Vel Total (ft/s)	3.68	Avg. Vel. (ft/s)		3.68	
Max Chl Dpth (ft)	2.50	Hydr. Depth (ft)		1.31	
Conv. Total (cfs)	511.1	Conv. (cfs)		511.1	
Length Wtd. (ft)	119.41	Wetted Per. (ft)		12.63	
Min Ch El (ft)	812.40	Shear (lb/sq ft)		0.90	

Alpha	1.00	Stream Power (lb/ft s)	3.32		
Frctn Loss (ft)	1.31	Cum Volume (acre-ft)	0.19	1.54	0.03
C & E Loss (ft)	0.01	Cum SA (acres)	0.70	0.77	0.15

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	815.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.052	
W.S. Elev (ft)	815.17	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	814.56	Flow Area (sq ft)		18.53	
E.G. Slope (ft/ft)	0.012094	Area (sq ft)		18.53	
Q Total (cfs)	70.00	Flow (cfs)		70.00	
Top Width (ft)	12.69	Top Width (ft)		12.69	
Vel Total (ft/s)	3.78	Avg. Vel. (ft/s)		3.78	
Max Chl Dpth (ft)	2.77	Hydr. Depth (ft)		1.46	
Conv. Total (cfs)	636.5	Conv. (cfs)		636.5	
Length Wtd. (ft)	119.41	Wetted Per. (ft)		13.86	
Min Ch El (ft)	812.40	Shear (lb/sq ft)		1.01	
Alpha	1.00	Stream Power (lb/ft s)		3.81	
Frctn Loss (ft)	1.38	Cum Volume (acre-ft)	0.31	1.68	0.06
C & E Loss (ft)	0.00	Cum SA (acres)	0.80	0.80	0.20

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	816.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.062	
W.S. Elev (ft)	816.13	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	815.20	Flow Area (sq ft)		32.54	
E.G. Slope (ft/ft)	0.012894	Area (sq ft)		32.54	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	16.78	Top Width (ft)		16.78	
Vel Total (ft/s)	3.99	Avg. Vel. (ft/s)		3.99	
Max Chl Dpth (ft)	3.73	Hydr. Depth (ft)		1.94	
Conv. Total (cfs)	1144.9	Conv. (cfs)		1144.9	
Length Wtd. (ft)	119.41	Wetted Per. (ft)		18.39	
Min Ch El (ft)	812.40	Shear (lb/sq ft)		1.42	
Alpha	1.00	Stream Power (lb/ft s)		5.69	
Frctn Loss (ft)	1.60	Cum Volume (acre-ft)	0.83	2.13	0.20
C & E Loss (ft)	0.01	Cum SA (acres)	1.74	0.88	0.40

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	816.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.065	
W.S. Elev (ft)	816.72	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	815.60	Flow Area (sq ft)		43.41	
E.G. Slope (ft/ft)	0.013261	Area (sq ft)		43.41	
Q Total (cfs)	180.00	Flow (cfs)		180.00	
Top Width (ft)	20.30	Top Width (ft)		20.30	
Vel Total (ft/s)	4.15	Avg. Vel. (ft/s)		4.15	
Max Chl Dpth (ft)	4.32	Hydr. Depth (ft)		2.14	
Conv. Total (cfs)	1563.1	Conv. (cfs)		1563.1	
Length Wtd. (ft)	119.41	Wetted Per. (ft)		22.12	
Min Ch El (ft)	812.40	Shear (lb/sq ft)		1.62	
Alpha	1.00	Stream Power (lb/ft s)		6.74	
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	1.23	2.40	0.33

C & E Loss (ft)	0.02	Cum SA (acres)	1.98	0.91	0.48
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Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.78	Element			
Vel Head (ft)	0.31	Wt. n-Val.	0.120	0.068	
W.S. Elev (ft)	817.46	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	816.20	Flow Area (sq ft)	0.75	59.82	
E.G. Slope (ft/ft)	0.013417	Area (sq ft)	0.75	59.82	
Q Total (cfs)	270.00	Flow (cfs)	0.40	269.60	
Top Width (ft)	26.17	Top Width (ft)	3.25	22.93	
Vel Total (ft/s)	4.46	Avg. Vel. (ft/s)	0.54	4.51	
Max Chl Dpth (ft)	5.06	Hydr. Depth (ft)	0.23	2.61	
Conv. Total (cfs)	2330.9	Conv. (cfs)	3.5	2327.4	
Length Wtd. (ft)	119.41	Wetted Per. (ft)	3.28	24.96	
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.19	2.01	
Alpha	1.02	Stream Power (lb/ft s)	0.10	9.05	
Frctn Loss (ft)	1.71	Cum Volume (acre-ft)	1.89	2.76	0.54
C & E Loss (ft)	0.03	Cum SA (acres)	2.25	0.94	0.57

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.27	Element			
Vel Head (ft)	0.35	Wt. n-Val.	0.120	0.071	
W.S. Elev (ft)	817.92	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	816.60	Flow Area (sq ft)	2.95	70.42	
E.G. Slope (ft/ft)	0.013762	Area (sq ft)	2.95	70.42	
Q Total (cfs)	340.00	Flow (cfs)	2.53	337.47	
Top Width (ft)	30.26	Top Width (ft)	6.42	23.83	
Vel Total (ft/s)	4.63	Avg. Vel. (ft/s)	0.86	4.79	
Max Chl Dpth (ft)	5.52	Hydr. Depth (ft)	0.46	2.95	
Conv. Total (cfs)	2898.3	Conv. (cfs)	21.6	2876.7	
Length Wtd. (ft)	119.40	Wetted Per. (ft)	6.49	25.97	
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.39	2.33	
Alpha	1.06	Stream Power (lb/ft s)	0.33	11.16	
Frctn Loss (ft)	1.63	Cum Volume (acre-ft)	2.35	2.97	0.70
C & E Loss (ft)	0.03	Cum SA (acres)	2.31	0.95	0.60

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	818.79	Element			
Vel Head (ft)	0.41	Wt. n-Val.	0.120	0.071	0.120
W.S. Elev (ft)	818.38	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	817.03	Flow Area (sq ft)	8.67	81.50	0.36
E.G. Slope (ft/ft)	0.013551	Area (sq ft)	8.67	81.50	0.36
Q Total (cfs)	430.00	Flow (cfs)	7.08	422.75	0.17
Top Width (ft)	46.17	Top Width (ft)	20.27	24.00	1.90
Vel Total (ft/s)	4.75	Avg. Vel. (ft/s)	0.82	5.19	0.47
Max Chl Dpth (ft)	5.98	Hydr. Depth (ft)	0.43	3.40	0.19
Conv. Total (cfs)	3693.9	Conv. (cfs)	60.8	3631.6	1.4
Length Wtd. (ft)	119.37	Wetted Per. (ft)	20.35	26.16	1.93
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.36	2.64	0.16
Alpha	1.17	Stream Power (lb/ft s)	0.29	13.67	0.07
Frctn Loss (ft)	1.58	Cum Volume (acre-ft)	3.07	3.24	0.93
C & E Loss (ft)	0.03	Cum SA (acres)	2.62	0.95	0.75



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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	819.30				
Vel Head (ft)	0.44	Wt. n-Val.	0.120	0.071	0.120
W.S. Elev (ft)	818.86	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)		Flow Area (sq ft)	22.50	93.07	1.85
E.G. Slope (ft/ft)	0.012488	Area (sq ft)	22.50	93.07	1.85
Q Total (cfs)	530.00	Flow (cfs)	22.26	506.29	1.44
Top Width (ft)	65.44	Top Width (ft)	37.14	24.00	4.31
Vel Total (ft/s)	4.51	Avg. Vel. (ft/s)	0.99	5.44	0.78
Max Chl Dpth (ft)	6.46	Hydr. Depth (ft)	0.61	3.88	0.43
Conv. Total (cfs)	4742.8	Conv. (cfs)	199.2	4530.6	12.9
Length Wtd. (ft)	119.34	Wetted Per. (ft)	37.22	26.16	4.39
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.47	2.77	0.33
Alpha	1.39	Stream Power (lb/ft s)	0.47	15.09	0.26
Frctn Loss (ft)	1.63	Cum Volume (acre-ft)	3.94	3.53	1.22
C & E Loss (ft)	0.05	Cum SA (acres)	2.91	0.95	0.94

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

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	819.97				
Vel Head (ft)	0.44	Wt. n-Val.	0.120	0.071	0.120
W.S. Elev (ft)	819.53	Reach Len. (ft)	119.00	119.41	117.00
Crit W.S. (ft)	817.94	Flow Area (sq ft)	52.40	109.20	6.45
E.G. Slope (ft/ft)	0.010775	Area (sq ft)	52.40	109.20	6.45
Q Total (cfs)	690.00	Flow (cfs)	69.88	613.90	6.21
Top Width (ft)	83.27	Top Width (ft)	49.47	24.00	9.80
Vel Total (ft/s)	4.11	Avg. Vel. (ft/s)	1.33	5.62	0.96
Max Chl Dpth (ft)	7.13	Hydr. Depth (ft)	1.06	4.55	0.66
Conv. Total (cfs)	6647.3	Conv. (cfs)	673.2	5914.2	59.9
Length Wtd. (ft)	119.29	Wetted Per. (ft)	49.57	26.16	9.93
Min Ch El (ft)	812.40	Shear (lb/sq ft)	0.71	2.81	0.44
Alpha	1.68	Stream Power (lb/ft s)	0.95	15.79	0.42
Frctn Loss (ft)	1.64	Cum Volume (acre-ft)	5.14	3.94	1.71
C & E Loss (ft)	0.07	Cum SA (acres)	3.07	0.95	1.20

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.

Note: Manning's n values were composited to a single value in the main channel.

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 136

INPUT

Description:

Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	20	823	41	821	81	818	113	817
114	816	115	815	116	814	117	813	118	812
122	811.7	125	812	127	813	129	814	131	815
135	816	161	817	182	818	196	820		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.12	113	.05	135	.12

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

113 131

63 102.79 80

.1 .3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.60	Wt. n-Val.		0.050	
Vel Head (ft)	0.15	Reach Len. (ft)	63.00	102.79	80.00
W.S. Elev (ft)	813.44	Flow Area (sq ft)		14.27	
Crit W.S. (ft)	812.89	Area (sq ft)		14.27	
E.G. Slope (ft/ft)	0.009236	Flow (cfs)		45.00	
Q Total (cfs)	45.00	Top Width (ft)		11.33	
Top Width (ft)	11.33	Avg. Vel. (ft/s)		3.15	
Vel Total (ft/s)	3.15	Hydr. Depth (ft)		1.26	
Max Chl Dpth (ft)	1.74	Conv. (cfs)		468.2	
Conv. Total (cfs)	468.2	Wetted Per. (ft)		12.29	
Length Wtd. (ft)	102.79	Shear (lb/sq ft)		0.67	
Min Ch El (ft)	811.70	Stream Power (lb/ft s)		2.11	
Alpha	1.00	Cum Volume (acre-ft)	0.11	1.37	0.02
Frctn Loss (ft)		Cum SA (acres)	0.50	0.72	0.13
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.79	Wt. n-Val.		0.050	
Vel Head (ft)	0.19	Reach Len. (ft)	63.00	102.79	80.00
W.S. Elev (ft)	813.61	Flow Area (sq ft)		16.16	
Crit W.S. (ft)	813.03	Area (sq ft)		16.16	
E.G. Slope (ft/ft)	0.010060	Flow (cfs)		56.00	
Q Total (cfs)	56.00	Top Width (ft)		11.82	
Top Width (ft)	11.82	Avg. Vel. (ft/s)		3.47	
Vel Total (ft/s)	3.47	Hydr. Depth (ft)		1.37	
Max Chl Dpth (ft)	1.91	Conv. (cfs)		558.3	
Conv. Total (cfs)	558.3	Wetted Per. (ft)		12.89	
Length Wtd. (ft)	102.79	Shear (lb/sq ft)		0.79	
Min Ch El (ft)	811.70	Stream Power (lb/ft s)		2.73	
Alpha	1.00	Cum Volume (acre-ft)	0.19	1.50	0.03
Frctn Loss (ft)		Cum SA (acres)	0.70	0.74	0.15
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.01	Wt. n-Val.		0.050	
Vel Head (ft)	0.23	Reach Len. (ft)	63.00	102.79	80.00
W.S. Elev (ft)	813.78	Flow Area (sq ft)		18.27	
Crit W.S. (ft)	813.21	Area (sq ft)		18.27	
E.G. Slope (ft/ft)	0.011123	Flow (cfs)		70.00	
Q Total (cfs)	70.00	Top Width (ft)		12.34	
Top Width (ft)	12.34	Avg. Vel. (ft/s)		3.83	
Vel Total (ft/s)	3.83	Hydr. Depth (ft)		1.48	
Max Chl Dpth (ft)	2.08	Conv. (cfs)		663.7	
Conv. Total (cfs)	663.7	Wetted Per. (ft)		13.53	
Length Wtd. (ft)	102.79	Shear (lb/sq ft)		0.94	
Min Ch El (ft)	811.70	Stream Power (lb/ft s)		3.59	
Alpha	1.00	Cum Volume (acre-ft)	0.31	1.63	0.06
Frctn Loss (ft)		Cum SA (acres)	0.80	0.76	0.20
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.77	Wt. n-Val.		0.050	
Vel Head (ft)	0.38	Reach Len. (ft)	63.00	102.79	80.00
W.S. Elev (ft)	814.39	Flow Area (sq ft)		26.33	
Crit W.S. (ft)	813.81	Area (sq ft)		26.33	
E.G. Slope (ft/ft)	0.013909	Flow (cfs)		130.00	
Q Total (cfs)	130.00	Top Width (ft)		14.17	
Top Width (ft)	14.17	Avg. Vel. (ft/s)		4.94	
Vel Total (ft/s)	4.94	Hydr. Depth (ft)		1.86	
Max Chl Dpth (ft)	2.69	Conv. (cfs)		1102.3	
Conv. Total (cfs)	1102.3				

Length Wtd. (ft)	102.79	Wetted Per. (ft)	15.75		
Min Ch El (ft)	811.70	Shear (lb/sq ft)	1.45		
Alpha	1.00	Stream Power (lb/ft s)	7.17		
Frctn Loss (ft)		Cum Volume (acre-ft)	0.83	2.05	0.20
C & E Loss (ft)		Cum SA (acres)	1.74	0.84	0.40

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	815.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.		0.050	
W.S. Elev (ft)	814.80	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)	814.21	Flow Area (sq ft)		32.47	
E.G. Slope (ft/ft)	0.014982	Area (sq ft)		32.47	
Q Total (cfs)	180.00	Flow (cfs)		180.00	
Top Width (ft)	15.41	Top Width (ft)		15.41	
Vel Total (ft/s)	5.54	Avg. Vel. (ft/s)		5.54	
Max Chl Dpth (ft)	3.10	Hydr. Depth (ft)		2.11	
Conv. Total (cfs)	1470.6	Conv. (cfs)		1470.6	
Length Wtd. (ft)	102.79	Wetted Per. (ft)		17.26	
Min Ch El (ft)	811.70	Shear (lb/sq ft)		1.76	
Alpha	1.00	Stream Power (lb/ft s)		9.75	
Frctn Loss (ft)		Cum Volume (acre-ft)	1.23	2.30	0.33
C & E Loss (ft)		Cum SA (acres)	1.98	0.86	0.48

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	816.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.63	Wt. n-Val.		0.050	0.050
W.S. Elev (ft)	815.42	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)	814.81	Flow Area (sq ft)		42.30	0.35
E.G. Slope (ft/ft)	0.015332	Area (sq ft)		42.30	0.35
Q Total (cfs)	270.00	Flow (cfs)		269.56	0.44
Top Width (ft)	18.08	Top Width (ft)		16.42	1.67
Vel Total (ft/s)	6.33	Avg. Vel. (ft/s)		6.37	1.27
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		2.58	0.21
Conv. Total (cfs)	2180.5	Conv. (cfs)		2177.0	3.6
Length Wtd. (ft)	102.79	Wetted Per. (ft)		18.57	1.72
Min Ch El (ft)	811.70	Shear (lb/sq ft)		2.18	0.19
Alpha	1.01	Stream Power (lb/ft s)		13.90	0.25
Frctn Loss (ft)		Cum Volume (acre-ft)	1.89	2.62	0.54
C & E Loss (ft)		Cum SA (acres)	2.25	0.88	0.57

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	816.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.		0.050	0.050
W.S. Elev (ft)	815.93	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)	815.21	Flow Area (sq ft)		50.86	1.73
E.G. Slope (ft/ft)	0.013605	Area (sq ft)		50.86	1.73
Q Total (cfs)	340.00	Flow (cfs)		336.47	3.53
Top Width (ft)	20.65	Top Width (ft)		16.93	3.72
Vel Total (ft/s)	6.46	Avg. Vel. (ft/s)		6.62	2.04
Max Chl Dpth (ft)	4.23	Hydr. Depth (ft)		3.00	0.46
Conv. Total (cfs)	2914.9	Conv. (cfs)		2884.7	30.2
Length Wtd. (ft)	102.79	Wetted Per. (ft)		19.29	3.83
Min Ch El (ft)	811.70	Shear (lb/sq ft)		2.24	0.38
Alpha	1.04	Stream Power (lb/ft s)		14.81	0.78
Frctn Loss (ft)		Cum Volume (acre-ft)	2.35	2.81	0.70
C & E Loss (ft)		Cum SA (acres)	2.30	0.89	0.60

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	817.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.74	Wt. n-Val.		0.050	0.057
W.S. Elev (ft)	816.44	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)	815.66	Flow Area (sq ft)		59.56	6.22
E.G. Slope (ft/ft)	0.012950	Area (sq ft)		59.56	6.22

Q Total (cfs)	430.00	Flow (cfs)	416.86	13.14
Top Width (ft)	32.78	Top Width (ft)	17.44	15.34
Vel Total (ft/s)	6.54	Avg. Vel. (ft/s)	7.00	2.11
Max Chl Dpth (ft)	4.74	Hydr. Depth (ft)	3.42	0.41
Conv. Total (cfs)	3778.6	Conv. (cfs)	3663.1	115.5
Length Wtd. (ft)	102.79	Wetted Per. (ft)	20.01	15.48
Min Ch El (ft)	811.70	Shear (lb/sq ft)	2.41	0.32
Alpha	1.11	Stream Power (lb/ft s)	16.84	0.69
Frctn Loss (ft)		Cum Volume (acre-ft)	3.06	0.92
C & E Loss (ft)		Cum SA (acres)	2.59	0.73

CROSS SECTION OUTPUT      Profile #200

E.G. Elev (ft)	817.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.		0.050	0.064
W.S. Elev (ft)	816.72	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)	816.19	Flow Area (sq ft)		64.57	11.64
E.G. Slope (ft/ft)	0.014914	Area (sq ft)		64.57	11.64
Q Total (cfs)	530.00	Flow (cfs)		504.98	25.02
Top Width (ft)	40.47	Top Width (ft)		17.72	22.75
Vel Total (ft/s)	6.95	Avg. Vel. (ft/s)		7.82	2.15
Max Chl Dpth (ft)	5.02	Hydr. Depth (ft)		3.64	0.51
Conv. Total (cfs)	4339.9	Conv. (cfs)		4135.0	204.9
Length Wtd. (ft)	102.79	Wetted Per. (ft)		20.41	22.88
Min Ch El (ft)	811.70	Shear (lb/sq ft)		2.95	0.47
Alpha	1.21	Stream Power (lb/ft s)		23.04	1.02
Frctn Loss (ft)		Cum Volume (acre-ft)	3.91	3.31	1.20
C & E Loss (ft)		Cum SA (acres)	2.86	0.89	0.90

CROSS SECTION OUTPUT      Profile #500

E.G. Elev (ft)	818.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.19	Wt. n-Val.	0.120	0.050	0.073
W.S. Elev (ft)	817.07	Reach Len. (ft)	63.00	102.79	80.00
Crit W.S. (ft)	816.90	Flow Area (sq ft)	0.07	70.74	21.04
E.G. Slope (ft/ft)	0.018153	Area (sq ft)	0.07	70.74	21.04
Q Total (cfs)	690.00	Flow (cfs)	0.01	640.51	49.48
Top Width (ft)	51.52	Top Width (ft)	2.12	18.00	31.39
Vel Total (ft/s)	7.51	Avg. Vel. (ft/s)	0.17	9.05	2.35
Max Chl Dpth (ft)	5.37	Hydr. Depth (ft)	0.03	3.93	0.67
Conv. Total (cfs)	5121.3	Conv. (cfs)	0.1	4754.0	367.2
Length Wtd. (ft)	102.79	Wetted Per. (ft)	2.12	20.81	31.54
Min Ch El (ft)	811.70	Shear (lb/sq ft)	0.04	3.85	0.76
Alpha	1.36	Stream Power (lb/ft s)	0.01	34.89	1.78
Frctn Loss (ft)		Cum Volume (acre-ft)	5.07	3.70	1.68
C & E Loss (ft)		Cum SA (acres)	3.00	0.90	1.15

INLINE WEIR                      RIVER: Main Channel  
 REACH: Upper                      RS: 134.5

INPUT

Description: cross-vane between x-sections 134 and 136  
 Distance from Upstream XS =      43  
 Deck/Roadway Width                =      2  
 Weir Coefficient                    =      3  
 Weir Embankment Coordinates    num =      2  
     Sta    Elev      Sta    Elev  
     113 812.22    131 812.22

Upstream Embankment side slope    =      4 horiz. to 1.0 vertical  
 Downstream Embankment side slope =      1 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow =      .95  
 Elevation at which weir flow begins =  
 Weir crest shape                    = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT      Profile #1

E.G. Elev (ft)	813.60	Min El Weir Flow (ft)	812.23
W.S. Elev (ft)	813.44	Wr Top Wdth (ft)	11.79
Q Total (cfs)	45.00	Total Gate Flow (cfs)	
Q Weir (cfs)	45.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	13.39	Gate Open Ht (ft)	
Weir Sta Lft (ft)	116.40	Gate #Open	
Weir Sta Rgt (ft)	128.19	Gate Area (sq ft)	
Weir Max Depth (ft)	1.38	Gate Submerg	
Weir Avg Depth (ft)	1.14	Gate Invert (ft)	
Weir Submerg	0.61		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	813.79	Min El Weir Flow (ft)	812.23
W.S. Elev (ft)	813.61	Wr Top Wdth (ft)	12.38
Q Total (cfs)	56.00	Total Gate Flow (cfs)	
Q Weir (cfs)	56.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	15.75	Gate Open Ht (ft)	
Weir Sta Lft (ft)	116.21	Gate #Open	
Weir Sta Rgt (ft)	128.58	Gate Area (sq ft)	
Weir Max Depth (ft)	1.57	Gate Submerg	
Weir Avg Depth (ft)	1.27	Gate Invert (ft)	
Weir Submerg	0.63		

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	814.01	Min El Weir Flow (ft)	812.23
W.S. Elev (ft)	813.78	Wr Top Wdth (ft)	13.03
Q Total (cfs)	70.00	Total Gate Flow (cfs)	
Q Weir (cfs)	70.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	18.50	Gate Open Ht (ft)	
Weir Sta Lft (ft)	115.99	Gate #Open	
Weir Sta Rgt (ft)	129.02	Gate Area (sq ft)	
Weir Max Depth (ft)	1.79	Gate Submerg	
Weir Avg Depth (ft)	1.42	Gate Invert (ft)	
Weir Submerg	0.65		

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	814.77	Min El Weir Flow (ft)	812.23
W.S. Elev (ft)	814.39	Wr Top Wdth (ft)	15.30
Q Total (cfs)	130.00	Total Gate Flow (cfs)	
Q Weir (cfs)	130.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	29.24	Gate Open Ht (ft)	
Weir Sta Lft (ft)	115.23	Gate #Open	
Weir Sta Rgt (ft)	130.53	Gate Area (sq ft)	
Weir Max Depth (ft)	2.55	Gate Submerg	
Weir Avg Depth (ft)	1.91	Gate Invert (ft)	
Weir Submerg	0.74		

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	815.28	Min El Weir Flow (ft)	812.23
W.S. Elev (ft)	814.80	Wr Top Wdth (ft)	17.41
Q Total (cfs)	180.00	Total Gate Flow (cfs)	
Q Weir (cfs)	180.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	37.58	Gate Open Ht (ft)	
Weir Sta Lft (ft)	114.72	Gate #Open	
Weir Sta Rgt (ft)	132.12	Gate Area (sq ft)	
Weir Max Depth (ft)	3.06	Gate Submerg	
Weir Avg Depth (ft)	2.16	Gate Invert (ft)	
Weir Submerg	0.78		

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	816.05	Min El Weir Flow (ft)	812.23
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W.S. Elev (ft)	815.42	Wr Top Wdth (ft)	22.25
Q Total (cfs)	270.00	Total Gate Flow (cfs)	
Q Weir (cfs)	270.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	52.39	Gate Open Ht (ft)	
Weir Sta Lft (ft)	113.95	Gate #Open	
Weir Sta Rgt (ft)	136.20	Gate Area (sq ft)	
Weir Max Depth (ft)	3.83	Gate Submerg	
Weir Avg Depth (ft)	2.35	Gate Invert (ft)	
Weir Submerg	0.78		

INLINE WEIR/SPILLWAY OUTPUT Profile #50

E.G. Elev (ft)	816.60	Min El Weir Flow (ft)	812.23
W.S. Elev (ft)	815.93	Wr Top Wdth (ft)	37.29
Q Total (cfs)	340.00	Total Gate Flow (cfs)	
Q Weir (cfs)	340.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	68.96	Gate Open Ht (ft)	
Weir Sta Lft (ft)	113.40	Gate #Open	
Weir Sta Rgt (ft)	150.68	Gate Area (sq ft)	
Weir Max Depth (ft)	4.38	Gate Submerg	
Weir Avg Depth (ft)	1.85	Gate Invert (ft)	
Weir Submerg	0.78		

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	817.18	Min El Weir Flow (ft)	812.23
W.S. Elev (ft)	816.44	Wr Top Wdth (ft)	57.32
Q Total (cfs)	430.00	Total Gate Flow (cfs)	
Q Weir (cfs)	430.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	95.14	Gate Open Ht (ft)	
Weir Sta Lft (ft)	107.38	Gate #Open	
Weir Sta Rgt (ft)	164.69	Gate Area (sq ft)	
Weir Max Depth (ft)	4.96	Gate Submerg	
Weir Avg Depth (ft)	1.66	Gate Invert (ft)	
Weir Submerg	0.73		

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	817.63	Min El Weir Flow (ft)	812.23
W.S. Elev (ft)	816.72	Wr Top Wdth (ft)	81.36
Q Total (cfs)	530.00	Total Gate Flow (cfs)	
Q Weir (cfs)	530.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	126.60	Gate Open Ht (ft)	
Weir Sta Lft (ft)	92.86	Gate #Open	
Weir Sta Rgt (ft)	174.22	Gate Area (sq ft)	
Weir Max Depth (ft)	5.41	Gate Submerg	
Weir Avg Depth (ft)	1.56	Gate Invert (ft)	
Weir Submerg	0.68		

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	818.25	Min El Weir Flow (ft)	812.23
W.S. Elev (ft)	817.07	Wr Top Wdth (ft)	106.17
Q Total (cfs)	690.00	Total Gate Flow (cfs)	
Q Weir (cfs)	690.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	186.71	Gate Open Ht (ft)	
Weir Sta Lft (ft)	77.61	Gate #Open	
Weir Sta Rgt (ft)	183.78	Gate Area (sq ft)	
Weir Max Depth (ft)	6.03	Gate Submerg	
Weir Avg Depth (ft)	1.76	Gate Invert (ft)	
Weir Submerg	0.59		

CROSS SECTION RIVER: Main Channel  
 REACH: Upper RS: 134

INPUT

Description:

Station Elevation Data									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	823	8	822	57	821	99	817	105	816
136	816	146	815	150	814	164	814	168	813
173	812	179	811.4	181	812	182	813	182	814
182	815	183	816	187	817	196	818	210	819
219	820	244	825						

Manning's n Values									
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	146	.05	183	.09	219	.12		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	146	183		41	77.12	53	.1
							.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.25	Wt. n-Val.		0.050	
Vel Head (ft)	0.14	Reach Len. (ft)	41.00	77.12	53.00
W.S. Elev (ft)	813.11	Flow Area (sq ft)		14.99	
Crit W.S. (ft)	812.66	Area (sq ft)		14.99	
E.G. Slope (ft/ft)	0.010409	Flow (cfs)		45.00	
Q Total (cfs)	45.00	Top Width (ft)		14.45	
Top Width (ft)	14.45	Avg. Vel. (ft/s)		3.00	
Vel Total (ft/s)	3.00	Hydr. Depth (ft)		1.04	
Max Chl Dpth (ft)	1.71	Conv. (cfs)		441.1	
Conv. Total (cfs)	441.1	Wetted Per. (ft)		15.20	
Length Wtd. (ft)	77.12	Shear (lb/sq ft)		0.64	
Min Ch El (ft)	811.40	Stream Power (lb/ft s)		1.92	
Alpha	1.00	Cum Volume (acre-ft)	0.11	1.34	0.02
Frctn Loss (ft)		Cum SA (acres)	0.50	0.69	0.13
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.44	Wt. n-Val.		0.050	
Vel Head (ft)	0.16	Reach Len. (ft)	41.00	77.12	53.00
W.S. Elev (ft)	813.28	Flow Area (sq ft)		17.46	
Crit W.S. (ft)	812.80	Area (sq ft)		17.46	
E.G. Slope (ft/ft)	0.010415	Flow (cfs)		56.00	
Q Total (cfs)	56.00	Top Width (ft)		15.12	
Top Width (ft)	15.12	Avg. Vel. (ft/s)		3.21	
Vel Total (ft/s)	3.21	Hydr. Depth (ft)		1.16	
Max Chl Dpth (ft)	1.88	Conv. (cfs)		548.7	
Conv. Total (cfs)	548.7	Wetted Per. (ft)		16.06	
Length Wtd. (ft)	77.12	Shear (lb/sq ft)		0.71	
Min Ch El (ft)	811.40	Stream Power (lb/ft s)		2.27	
Alpha	1.00	Cum Volume (acre-ft)	0.19	1.46	0.03
Frctn Loss (ft)		Cum SA (acres)	0.70	0.71	0.15
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.65	Wt. n-Val.		0.050	
Vel Head (ft)	0.18	Reach Len. (ft)	41.00	77.12	53.00
W.S. Elev (ft)	813.46	Flow Area (sq ft)		20.31	
Crit W.S. (ft)	812.95	Area (sq ft)		20.31	
E.G. Slope (ft/ft)	0.010614	Flow (cfs)		70.00	
Q Total (cfs)	70.00	Top Width (ft)		15.85	
Top Width (ft)	15.85	Avg. Vel. (ft/s)		3.45	
Vel Total (ft/s)	3.45	Hydr. Depth (ft)		1.28	
Max Chl Dpth (ft)	2.06	Conv. (cfs)		679.5	
Conv. Total (cfs)	679.5	Wetted Per. (ft)		17.00	
Length Wtd. (ft)	77.12	Shear (lb/sq ft)		0.79	
Min Ch El (ft)	811.40	Stream Power (lb/ft s)		2.73	
Alpha	1.00	Cum Volume (acre-ft)	0.31	1.59	0.06
Frctn Loss (ft)		Cum SA (acres)	0.80	0.73	0.20
C & E Loss (ft)					

## CROSS SECTION OUTPUT

Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.40	Wt. n-Val.		0.050	
Vel Head (ft)	0.21	Reach Len. (ft)	41.00	77.12	53.00
W.S. Elev (ft)	814.19	Flow Area (sq ft)		35.70	
Crit W.S. (ft)	813.45	Area (sq ft)		35.70	
E.G. Slope (ft/ft)	0.014479	Flow (cfs)		130.00	
Q Total (cfs)	130.00	Top Width (ft)		32.78	
Top Width (ft)	32.78	Avg. Vel. (ft/s)		3.64	
Vel Total (ft/s)	3.64	Hydr. Depth (ft)		1.09	
Max Chl Dpth (ft)	2.79	Conv. (cfs)		1080.4	
Conv. Total (cfs)	1080.4	Wetted Per. (ft)		34.75	
Length Wtd. (ft)	77.12	Shear (lb/sq ft)		0.93	
Min Ch El (ft)	811.40	Stream Power (lb/ft s)		3.38	
Alpha	1.00	Cum Volume (acre-ft)	0.83	1.98	0.20
Frctn Loss (ft)		Cum SA (acres)	1.74	0.79	0.40
C & E Loss (ft)					

## CROSS SECTION OUTPUT

Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.89	Wt. n-Val.		0.050	
Vel Head (ft)	0.18	Reach Len. (ft)	41.00	77.12	53.00
W.S. Elev (ft)	814.72	Flow Area (sq ft)		53.37	
Crit W.S. (ft)	813.79	Area (sq ft)		53.37	
E.G. Slope (ft/ft)	0.008025	Flow (cfs)		180.00	
Q Total (cfs)	180.00	Top Width (ft)		34.87	
Top Width (ft)	34.87	Avg. Vel. (ft/s)		3.37	
Vel Total (ft/s)	3.37	Hydr. Depth (ft)		1.53	
Max Chl Dpth (ft)	3.32	Conv. (cfs)		2009.3	
Conv. Total (cfs)	2009.3	Wetted Per. (ft)		37.43	
Length Wtd. (ft)	77.12	Shear (lb/sq ft)		0.71	
Min Ch El (ft)	811.40	Stream Power (lb/ft s)		2.41	
Alpha	1.00	Cum Volume (acre-ft)	1.23	2.19	0.33
Frctn Loss (ft)		Cum SA (acres)	1.98	0.81	0.48
C & E Loss (ft)					

## CROSS SECTION OUTPUT

Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.59	Wt. n-Val.	0.120	0.050	
Vel Head (ft)	0.18	Reach Len. (ft)	41.00	77.12	53.00
W.S. Elev (ft)	815.41	Flow Area (sq ft)	0.83	78.15	
Crit W.S. (ft)	814.39	Area (sq ft)	0.83	78.15	
E.G. Slope (ft/ft)	0.005423	Flow (cfs)	0.26	269.74	
Q Total (cfs)	270.00	Top Width (ft)	4.07	36.41	
Top Width (ft)	40.48	Avg. Vel. (ft/s)	0.31	3.45	
Vel Total (ft/s)	3.42	Hydr. Depth (ft)	0.20	2.15	
Max Chl Dpth (ft)	4.01	Conv. (cfs)	3.5	3662.9	
Conv. Total (cfs)	3666.5	Wetted Per. (ft)	4.09	39.45	
Length Wtd. (ft)	77.12	Shear (lb/sq ft)	0.07	0.67	
Min Ch El (ft)	811.40	Stream Power (lb/ft s)	0.02	2.31	
Alpha	1.02	Cum Volume (acre-ft)	1.89	2.47	0.54
Frctn Loss (ft)		Cum SA (acres)	2.25	0.82	0.57
C & E Loss (ft)					

## CROSS SECTION OUTPUT

Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.11	Wt. n-Val.	0.120	0.050	
Vel Head (ft)	0.19	Reach Len. (ft)	41.00	77.12	53.00
W.S. Elev (ft)	815.92	Flow Area (sq ft)	4.24	96.99	
Crit W.S. (ft)	814.62	Area (sq ft)	4.24	96.99	
E.G. Slope (ft/ft)	0.004246	Flow (cfs)	2.03	337.97	
Q Total (cfs)	340.00	Top Width (ft)	9.21	36.92	
Top Width (ft)	46.13	Avg. Vel. (ft/s)	0.48	3.48	
Vel Total (ft/s)	3.36	Hydr. Depth (ft)	0.46	2.63	
Max Chl Dpth (ft)	4.52	Conv. (cfs)	31.2	5186.3	
Conv. Total (cfs)	5217.6				



Length Wtd. (ft)	77.12	Wetted Per. (ft)	9.26	40.18	
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.12	0.64	
Alpha	1.07	Stream Power (lb/ft s)	0.06	2.23	
Frctn Loss (ft)		Cum Volume (acre-ft)	2.35	2.63	0.69
C & E Loss (ft)		Cum SA (acres)	2.29	0.83	0.60

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	816.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	816.43	Reach Len. (ft)	41.00	77.12	53.00
Crit W.S. (ft)	814.87	Flow Area (sq ft)	23.10	115.74	0.37
E.G. Slope (ft/ft)	0.003628	Area (sq ft)	23.10	115.74	0.37
Q Total (cfs)	430.00	Flow (cfs)	11.27	418.60	0.13
Top Width (ft)	82.28	Top Width (ft)	43.57	37.00	1.71
Vel Total (ft/s)	3.09	Avg. Vel. (ft/s)	0.49	3.62	0.35
Max Chl Dpth (ft)	5.03	Hydr. Depth (ft)	0.53	3.13	0.21
Conv. Total (cfs)	7139.3	Conv. (cfs)	187.1	6950.1	2.1
Length Wtd. (ft)	77.12	Wetted Per. (ft)	43.65	40.29	1.76
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.12	0.65	0.05
Alpha	1.34	Stream Power (lb/ft s)	0.06	2.35	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	3.04	2.84	0.92
C & E Loss (ft)		Cum SA (acres)	2.56	0.83	0.71

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	816.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	816.71	Reach Len. (ft)	41.00	77.12	53.00
Crit W.S. (ft)	815.12	Flow Area (sq ft)	35.76	126.28	1.02
E.G. Slope (ft/ft)	0.003959	Area (sq ft)	35.76	126.28	1.02
Q Total (cfs)	530.00	Flow (cfs)	23.77	505.71	0.52
Top Width (ft)	85.13	Top Width (ft)	45.28	37.00	2.85
Vel Total (ft/s)	3.25	Avg. Vel. (ft/s)	0.66	4.00	0.51
Max Chl Dpth (ft)	5.31	Hydr. Depth (ft)	0.79	3.41	0.36
Conv. Total (cfs)	8423.4	Conv. (cfs)	377.7	8037.4	8.3
Length Wtd. (ft)	77.12	Wetted Per. (ft)	45.39	40.29	2.94
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.19	0.77	0.09
Alpha	1.45	Stream Power (lb/ft s)	0.13	3.10	0.04
Frctn Loss (ft)		Cum Volume (acre-ft)	3.89	3.09	1.19
C & E Loss (ft)		Cum SA (acres)	2.83	0.83	0.88

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	817.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.31	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	817.06	Reach Len. (ft)	41.00	77.12	53.00
Crit W.S. (ft)	815.49	Flow Area (sq ft)	51.77	139.07	2.25
E.G. Slope (ft/ft)	0.004632	Area (sq ft)	51.77	139.07	2.25
Q Total (cfs)	690.00	Flow (cfs)	46.05	642.40	1.56
Top Width (ft)	89.14	Top Width (ft)	47.62	37.00	4.53
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)	0.89	4.62	0.69
Max Chl Dpth (ft)	5.66	Hydr. Depth (ft)	1.09	3.76	0.50
Conv. Total (cfs)	10138.5	Conv. (cfs)	676.6	9439.0	22.9
Length Wtd. (ft)	77.12	Wetted Per. (ft)	47.75	40.29	4.65
Min Ch El (ft)	811.40	Shear (lb/sq ft)	0.31	1.00	0.14
Alpha	1.56	Stream Power (lb/ft s)	0.28	4.61	0.10
Frctn Loss (ft)		Cum Volume (acre-ft)	5.03	3.45	1.66
C & E Loss (ft)		Cum SA (acres)	2.97	0.83	1.12

INLINE WEIR RIVER: Main Channel  
 REACH: Upper RS: 132.5

INPUT  
 Description: cross-vane between x-sections 132 and 134  
 Distance from Upstream XS = 31  
 Deck/Roadway Width = 2

Weir Coefficient = 3  
 Weir Embankment Coordinates num = 2  
 Sta Elev Sta Elev  
 146 811.94 183 811.94

Upstream Embankment side slope = 4 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 1 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Weir crest shape = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT Profile #1

E.G. Elev (ft)	813.25	Min El Weir Flow (ft)	811.95
W.S. Elev (ft)	813.11	Wr Top Wdth (ft)	15.01
Q Total (cfs)	45.00	Total Gate Flow (cfs)	
Q Weir (cfs)	45.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	15.10	Gate Open Ht (ft)	
Weir Sta Lft (ft)	166.99	Gate #Open	
Weir Sta Rgt (ft)	182.00	Gate Area (sq ft)	
Weir Max Depth (ft)	1.31	Gate Submerg	
Weir Avg Depth (ft)	1.01	Gate Invert (ft)	
Weir Submerg	0.85		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	813.44	Min El Weir Flow (ft)	811.95
W.S. Elev (ft)	813.28	Wr Top Wdth (ft)	15.75
Q Total (cfs)	56.00	Total Gate Flow (cfs)	
Q Weir (cfs)	56.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	17.98	Gate Open Ht (ft)	
Weir Sta Lft (ft)	166.25	Gate #Open	
Weir Sta Rgt (ft)	182.00	Gate Area (sq ft)	
Weir Max Depth (ft)	1.50	Gate Submerg	
Weir Avg Depth (ft)	1.14	Gate Invert (ft)	
Weir Submerg	0.86		

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	813.65	Min El Weir Flow (ft)	811.95
W.S. Elev (ft)	813.46	Wr Top Wdth (ft)	16.59
Q Total (cfs)	70.00	Total Gate Flow (cfs)	
Q Weir (cfs)	70.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	21.36	Gate Open Ht (ft)	
Weir Sta Lft (ft)	165.41	Gate #Open	
Weir Sta Rgt (ft)	182.00	Gate Area (sq ft)	
Weir Max Depth (ft)	1.71	Gate Submerg	
Weir Avg Depth (ft)	1.29	Gate Invert (ft)	
Weir Submerg	0.87		

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	814.40	Min El Weir Flow (ft)	811.95
W.S. Elev (ft)	814.19	Wr Top Wdth (ft)	33.60
Q Total (cfs)	130.00	Total Gate Flow (cfs)	
Q Weir (cfs)	130.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	40.59	Gate Open Ht (ft)	
Weir Sta Lft (ft)	148.40	Gate #Open	
Weir Sta Rgt (ft)	182.00	Gate Area (sq ft)	
Weir Max Depth (ft)	2.46	Gate Submerg	
Weir Avg Depth (ft)	1.21	Gate Invert (ft)	
Weir Submerg	0.83		

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	814.89	Min El Weir Flow (ft)	811.95
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W.S. Elev (ft)	814.72	Wr Top Wdth (ft)	35.57
Q Total (cfs)	180.00	Total Gate Flow (cfs)	
Q Weir (cfs)	180.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	57.65	Gate Open Ht (ft)	
Weir Sta Lft (ft)	146.43	Gate #Open	
Weir Sta Rgt (ft)	182.00	Gate Area (sq ft)	
Weir Max Depth (ft)	2.95	Gate Submerg	
Weir Avg Depth (ft)	1.62	Gate Invert (ft)	
Weir Submerg	0.86		

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	815.59	Min El Weir Flow (ft)	811.95
W.S. Elev (ft)	815.41	Wr Top Wdth (ft)	42.51
Q Total (cfs)	270.00	Total Gate Flow (cfs)	
Q Weir (cfs)	270.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	84.70	Gate Open Ht (ft)	
Weir Sta Lft (ft)	140.08	Gate #Open	
Weir Sta Rgt (ft)	182.59	Gate Area (sq ft)	
Weir Max Depth (ft)	3.65	Gate Submerg	
Weir Avg Depth (ft)	1.99	Gate Invert (ft)	
Weir Submerg	0.91		

INLINE WEIR/SPILLWAY OUTPUT Profile #50

E.G. Elev (ft)	816.11	Min El Weir Flow (ft)	811.95
W.S. Elev (ft)	815.92	Wr Top Wdth (ft)	79.09
Q Total (cfs)	340.00	Total Gate Flow (cfs)	
Q Weir (cfs)	340.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	111.48	Gate Open Ht (ft)	
Weir Sta Lft (ft)	104.35	Gate #Open	
Weir Sta Rgt (ft)	183.43	Gate Area (sq ft)	
Weir Max Depth (ft)	4.17	Gate Submerg	
Weir Avg Depth (ft)	1.41	Gate Invert (ft)	
Weir Submerg	0.90		

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	816.63	Min El Weir Flow (ft)	811.95
W.S. Elev (ft)	816.43	Wr Top Wdth (ft)	84.26
Q Total (cfs)	430.00	Total Gate Flow (cfs)	
Q Weir (cfs)	430.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	153.73	Gate Open Ht (ft)	
Weir Sta Lft (ft)	101.24	Gate #Open	
Weir Sta Rgt (ft)	185.50	Gate Area (sq ft)	
Weir Max Depth (ft)	4.69	Gate Submerg	
Weir Avg Depth (ft)	1.82	Gate Invert (ft)	
Weir Submerg	0.84		

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	816.95	Min El Weir Flow (ft)	811.95
W.S. Elev (ft)	816.71	Wr Top Wdth (ft)	87.51
Q Total (cfs)	530.00	Total Gate Flow (cfs)	
Q Weir (cfs)	530.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	181.65	Gate Open Ht (ft)	
Weir Sta Lft (ft)	99.29	Gate #Open	
Weir Sta Rgt (ft)	186.80	Gate Area (sq ft)	
Weir Max Depth (ft)	5.01	Gate Submerg	
Weir Avg Depth (ft)	2.08	Gate Invert (ft)	
Weir Submerg	0.91		

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	817.37	Min El Weir Flow (ft)	811.95
W.S. Elev (ft)	817.06	Wr Top Wdth (ft)	95.17

Q Total (cfs)	690.00	Total Gate Flow (cfs)
Q Weir (cfs)	690.00	Gate Group Q (cfs)
Wr Flw Area (sq ft)	219.65	Gate Open Ht (ft)
Weir Sta Lft (ft)	95.14	Gate #Open
Weir Sta Rgt (ft)	190.31	Gate Area (sq ft)
Weir Max Depth (ft)	5.43	Gate Submerg
Weir Avg Depth (ft)	2.31	Gate Invert (ft)
Weir Submerg	0.89	

CROSS SECTION RIVER: Main Channel  
 REACH: Upper RS: 132

INPUT

Description:

Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	825	72	822	96	821	107	820	134	817
152	816	176	815	177	814	177	813	178	810.9
181	812	186	812	189	813	191	814	193	815
224	815.48	253	816	267	817	274	818	290	825

Manning's n Values num= 6

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	107	.12	176	.05	193	.12	224	.09
253	.12								

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	176	193		59 64.73	67	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	813.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.01	Reach Len. (ft)	59.00	64.73	67.00
Crit W.S. (ft)	812.70	Flow Area (sq ft)		12.34	
E.G. Slope (ft/ft)	0.017330	Area (sq ft)		12.34	
Q Total (cfs)	45.00	Flow (cfs)		45.00	
Top Width (ft)	12.02	Top Width (ft)		12.02	
Vel Total (ft/s)	3.65	Avg. Vel. (ft/s)		3.65	
Max Chl Dpth (ft)	2.11	Hydr. Depth (ft)		1.03	
Conv. Total (cfs)	341.8	Conv. (cfs)		341.8	
Length Wtd. (ft)	64.73	Wetted Per. (ft)		13.72	
Min Ch El (ft)	810.90	Shear (lb/sq ft)		0.97	
Alpha	1.00	Stream Power (lb/ft s)		3.55	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.11	1.32	0.02
C & E Loss (ft)		Cum SA (acres)	0.50	0.66	0.13

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	813.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.16	Reach Len. (ft)	59.00	64.73	67.00
Crit W.S. (ft)	812.84	Flow Area (sq ft)		14.12	
E.G. Slope (ft/ft)	0.017951	Area (sq ft)		14.12	
Q Total (cfs)	56.00	Flow (cfs)		56.00	
Top Width (ft)	12.32	Top Width (ft)		12.32	
Vel Total (ft/s)	3.97	Avg. Vel. (ft/s)		3.97	
Max Chl Dpth (ft)	2.26	Hydr. Depth (ft)		1.15	
Conv. Total (cfs)	418.0	Conv. (cfs)		418.0	
Length Wtd. (ft)	64.73	Wetted Per. (ft)		14.19	
Min Ch El (ft)	810.90	Shear (lb/sq ft)		1.11	
Alpha	1.00	Stream Power (lb/ft s)		4.42	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.19	1.43	0.03
C & E Loss (ft)		Cum SA (acres)	0.70	0.68	0.15

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	813.61	Element	Left OB	Channel	Right OB
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Vel Head (ft)	0.29	Wt. n-Val.	0.050	
W.S. Elev (ft)	813.32	Reach Len. (ft)	59.00	64.73 67.00
Crit W.S. (ft)	813.00	Flow Area (sq ft)		16.15
E.G. Slope (ft/ft)	0.018810	Area (sq ft)		16.15
Q Total (cfs)	70.00	Flow (cfs)		70.00
Top Width (ft)	12.64	Top Width (ft)		12.64
Vel Total (ft/s)	4.34	Avg. Vel. (ft/s)		4.34
Max Chl Dpth (ft)	2.42	Hydr. Depth (ft)		1.28
Conv. Total (cfs)	510.4	Conv. (cfs)		510.4
Length Wtd. (ft)	64.73	Wetted Per. (ft)		14.72
Min Ch El (ft)	810.90	Shear (lb/sq ft)		1.29
Alpha	1.00	Stream Power (lb/ft s)		5.58
Frctn Loss (ft)		Cum Volume (acre-ft)	0.31	1.56 0.06
C & E Loss (ft)		Cum SA (acres)	0.80	0.70 0.20

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.36	Wt. n-Val.		0.050	
Vel Head (ft)	0.46	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	813.90	Flow Area (sq ft)		23.76	
Crit W.S. (ft)	813.53	Area (sq ft)		23.76	
E.G. Slope (ft/ft)	0.020983	Flow (cfs)		130.00	
Q Total (cfs)	130.00	Top Width (ft)		13.79	
Top Width (ft)	13.79	Avg. Vel. (ft/s)		5.47	
Vel Total (ft/s)	5.47	Hydr. Depth (ft)		1.72	
Max Chl Dpth (ft)	3.00	Conv. (cfs)		897.5	
Conv. Total (cfs)	897.5	Wetted Per. (ft)		16.58	
Length Wtd. (ft)	64.73	Shear (lb/sq ft)		1.88	
Min Ch El (ft)	810.90	Stream Power (lb/ft s)		10.27	
Alpha	1.00	Cum Volume (acre-ft)	0.83	1.92	0.20
Frctn Loss (ft)		Cum SA (acres)	1.74	0.75	0.40
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.87	Wt. n-Val.		0.050	
Vel Head (ft)	0.59	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	814.27	Flow Area (sq ft)		29.11	
Crit W.S. (ft)	813.92	Area (sq ft)		29.11	
E.G. Slope (ft/ft)	0.022648	Flow (cfs)		180.00	
Q Total (cfs)	180.00	Top Width (ft)		14.81	
Top Width (ft)	14.81	Avg. Vel. (ft/s)		6.18	
Vel Total (ft/s)	6.18	Hydr. Depth (ft)		1.97	
Max Chl Dpth (ft)	3.37	Conv. (cfs)		1196.1	
Conv. Total (cfs)	1196.1	Wetted Per. (ft)		17.91	
Length Wtd. (ft)	64.73	Shear (lb/sq ft)		2.30	
Min Ch El (ft)	810.90	Stream Power (lb/ft s)		14.21	
Alpha	1.00	Cum Volume (acre-ft)	1.23	2.12	0.33
Frctn Loss (ft)		Cum SA (acres)	1.98	0.76	0.48
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.57	Wt. n-Val.		0.050	
Vel Head (ft)	1.07	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	814.50	Flow Area (sq ft)		32.57	
Crit W.S. (ft)	814.50	Area (sq ft)		32.57	
E.G. Slope (ft/ft)	0.037240	Flow (cfs)		270.00	
Q Total (cfs)	270.00	Top Width (ft)		15.50	
Top Width (ft)	15.50	Avg. Vel. (ft/s)		8.29	
Vel Total (ft/s)	8.29	Hydr. Depth (ft)		2.10	
Max Chl Dpth (ft)	3.60	Conv. (cfs)		1399.1	
Conv. Total (cfs)	1399.1	Wetted Per. (ft)		18.74	
Length Wtd. (ft)	64.73	Shear (lb/sq ft)		4.04	
Min Ch El (ft)	810.90	Stream Power (lb/ft s)		33.49	
Alpha	1.00	Cum Volume (acre-ft)	1.89	2.38	0.54
Frctn Loss (ft)		Cum SA (acres)	2.25	0.78	0.57
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.08	Wt. n-Val.		0.050	
Vel Head (ft)	1.17	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	814.91	Flow Area (sq ft)		39.11	
Crit W.S. (ft)	814.91	Area (sq ft)		39.11	
E.G. Slope (ft/ft)	0.035513	Flow (cfs)		340.00	
Q Total (cfs)	340.00	Top Width (ft)		16.72	
Top Width (ft)	16.72	Avg. Vel. (ft/s)		8.69	
Vel Total (ft/s)	8.69	Hydr. Depth (ft)		2.34	
Max Chl Dpth (ft)	4.01	Conv. (cfs)		1804.2	
Conv. Total (cfs)	1804.2	Wetted Per. (ft)		20.23	
Length Wtd. (ft)	64.73	Shear (lb/sq ft)		4.29	
Min Ch El (ft)	810.90	Stream Power (lb/ft s)		37.27	
Alpha	1.00	Cum Volume (acre-ft)	2.34	2.51	0.69
Frctn Loss (ft)		Cum SA (acres)	2.29	0.78	0.60
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.60	Wt. n-Val.	0.120	0.050	0.118
Vel Head (ft)	0.89	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	815.71	Flow Area (sq ft)	6.07	52.79	16.10
Crit W.S. (ft)	815.71	Area (sq ft)	6.07	52.79	16.10
E.G. Slope (ft/ft)	0.019314	Flow (cfs)	5.24	408.72	16.04
Q Total (cfs)	430.00	Top Width (ft)	17.07	17.00	43.90
Top Width (ft)	77.97	Avg. Vel. (ft/s)	0.86	7.74	1.00
Vel Total (ft/s)	5.74	Hydr. Depth (ft)	0.36	3.11	0.37
Max Chl Dpth (ft)	4.81	Conv. (cfs)	37.7	2940.9	115.4
Conv. Total (cfs)	3094.1	Wetted Per. (ft)	17.09	20.57	43.91
Length Wtd. (ft)	64.73	Shear (lb/sq ft)	0.43	3.09	0.44
Min Ch El (ft)	810.90	Stream Power (lb/ft s)	0.37	23.96	0.44
Alpha	1.73	Cum Volume (acre-ft)	3.03	2.70	0.91
Frctn Loss (ft)		Cum SA (acres)	2.53	0.78	0.68
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.93	Wt. n-Val.	0.120	0.050	0.113
Vel Head (ft)	0.78	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	816.15	Flow Area (sq ft)	15.84	60.27	40.34
Crit W.S. (ft)	816.15	Area (sq ft)	15.84	60.27	40.34
E.G. Slope (ft/ft)	0.015594	Flow (cfs)	17.27	458.02	54.71
Q Total (cfs)	530.00	Top Width (ft)	26.72	17.00	62.12
Top Width (ft)	105.84	Avg. Vel. (ft/s)	1.09	7.60	1.36
Vel Total (ft/s)	4.55	Hydr. Depth (ft)	0.59	3.55	0.65
Max Chl Dpth (ft)	5.25	Conv. (cfs)	138.3	3667.8	438.1
Conv. Total (cfs)	4244.3	Wetted Per. (ft)	26.75	20.57	62.13
Length Wtd. (ft)	64.73	Shear (lb/sq ft)	0.58	2.85	0.63
Min Ch El (ft)	810.90	Stream Power (lb/ft s)	0.63	21.68	0.86
Alpha	2.42	Cum Volume (acre-ft)	3.86	2.92	1.17
Frctn Loss (ft)					

C & E Loss (ft) Cum SA (acres) 2.79 0.78 0.84

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	817.33	Wt. n-Val.	0.120	0.050	0.109
Vel Head (ft)	0.79	Reach Len. (ft)	59.00	64.73	67.00
W.S. Elev (ft)	816.54	Flow Area (sq ft)	27.52	66.85	65.41
Crit W.S. (ft)	816.54	Area (sq ft)	27.52	66.85	65.41
E.G. Slope (ft/ft)	0.015247	Flow (cfs)	36.74	538.18	115.08
Q Total (cfs)	690.00	Top Width (ft)	33.68	17.00	67.53
Top Width (ft)	118.22	Avg. Vel. (ft/s)	1.34	8.05	1.76
Vel Total (ft/s)	4.32	Hydr. Depth (ft)	0.82	3.93	0.97
Max Chl Dpth (ft)	5.64	Conv. (cfs)	297.6	4358.5	932.0
Conv. Total (cfs)	5588.0	Wetted Per. (ft)	33.72	20.57	67.56
Length Wtd. (ft)	64.73	Shear (lb/sq ft)	0.78	3.09	0.92
Min Ch El (ft)	810.90	Stream Power (lb/ft s)	1.04	24.90	1.62
Alpha	2.74	Cum Volume (acre-ft)	5.00	3.27	1.61
Frctn Loss (ft)		Cum SA (acres)	2.93	0.78	1.07
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR RIVER: Main Channel  
REACH: Upper RS: 130.5

INPUT

Description: cross-vane between x-sections 130 and 132  
 Distance from Upstream XS = 7  
 Deck/Roadway Width = 2  
 Weir Coefficient = 3  
 Weir Embankment Coordinates num = 2  
 Sta Elev Sta Elev  
 176 811.74 193 811.74

Upstream Embankment side slope = 4 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 1 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Weir crest shape = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT Profile #1

E.G. Elev (ft)	813.22	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	813.01	Wr Top Wdth (ft)	12.44
Q Total (cfs)	45.00	Total Gate Flow (cfs)	
Q Weir (cfs)	45.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	13.74	Gate Open Ht (ft)	
Weir Sta Lft (ft)	177.00	Gate #Open	
Weir Sta Rgt (ft)	189.44	Gate Area (sq ft)	
Weir Max Depth (ft)	1.48	Gate Submerg	
Weir Avg Depth (ft)	1.10	Gate Invert (ft)	
Weir Submerg	0.41		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	813.40	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	813.16	Wr Top Wdth (ft)	12.80
Q Total (cfs)	56.00	Total Gate Flow (cfs)	
Q Weir (cfs)	56.00	Gate Group Q (cfs)	

Wr Flw Area (sq ft)	16.06	Gate Open Ht (ft)	
Weir Sta Lft (ft)	177.00	Gate #Open	
Weir Sta Rgt (ft)	189.80	Gate Area (sq ft)	
Weir Max Depth (ft)	1.66	Gate Submerg	
Weir Avg Depth (ft)	1.25	Gate Invert (ft)	
Weir Submerg	0.46		

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	813.61	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	813.32	Wr Top Wdth (ft)	13.22
Q Total (cfs)	70.00	Total Gate Flow (cfs)	
Q Weir (cfs)	70.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	18.79	Gate Open Ht (ft)	
Weir Sta Lft (ft)	177.00	Gate #Open	
Weir Sta Rgt (ft)	190.22	Gate Area (sq ft)	
Weir Max Depth (ft)	1.87	Gate Submerg	
Weir Avg Depth (ft)	1.42	Gate Invert (ft)	
Weir Submerg	0.49		

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	814.36	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	813.90	Wr Top Wdth (ft)	15.08
Q Total (cfs)	130.00	Total Gate Flow (cfs)	
Q Weir (cfs)	130.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	29.32	Gate Open Ht (ft)	
Weir Sta Lft (ft)	176.64	Gate #Open	
Weir Sta Rgt (ft)	191.72	Gate Area (sq ft)	
Weir Max Depth (ft)	2.62	Gate Submerg	
Weir Avg Depth (ft)	1.94	Gate Invert (ft)	
Weir Submerg	0.57		

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	814.87	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	814.27	Wr Top Wdth (ft)	16.60
Q Total (cfs)	180.00	Total Gate Flow (cfs)	
Q Weir (cfs)	180.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	37.31	Gate Open Ht (ft)	
Weir Sta Lft (ft)	176.13	Gate #Open	
Weir Sta Rgt (ft)	192.73	Gate Area (sq ft)	
Weir Max Depth (ft)	3.13	Gate Submerg	
Weir Avg Depth (ft)	2.25	Gate Invert (ft)	
Weir Submerg	0.57		

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	815.57	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	814.50	Wr Top Wdth (ft)	66.44
Q Total (cfs)	270.00	Total Gate Flow (cfs)	
Q Weir (cfs)	270.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	63.40	Gate Open Ht (ft)	
Weir Sta Lft (ft)	162.40	Gate #Open	
Weir Sta Rgt (ft)	228.84	Gate Area (sq ft)	
Weir Max Depth (ft)	3.83	Gate Submerg	
Weir Avg Depth (ft)	0.95	Gate Invert (ft)	
Weir Submerg	0.52		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #50



E.G. Elev (ft)	816.08	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	814.91	Wr Top Wdth (ft)	103.54
Q Total (cfs)	340.00	Total Gate Flow (cfs)	
Q Weir (cfs)	340.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	107.77	Gate Open Ht (ft)	
Weir Sta Lft (ft)	150.57	Gate #Open	
Weir Sta Rgt (ft)	254.11	Gate Area (sq ft)	
Weir Max Depth (ft)	4.34	Gate Submerg	
Weir Avg Depth (ft)	1.04	Gate Invert (ft)	
Weir Submerg	0.41		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	816.60	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	815.71	Wr Top Wdth (ft)	120.09
Q Total (cfs)	430.00	Total Gate Flow (cfs)	
Q Weir (cfs)	430.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	165.63	Gate Open Ht (ft)	
Weir Sta Lft (ft)	141.26	Gate #Open	
Weir Sta Rgt (ft)	261.35	Gate Area (sq ft)	
Weir Max Depth (ft)	4.86	Gate Submerg	
Weir Avg Depth (ft)	1.38	Gate Invert (ft)	
Weir Submerg	0.29		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	816.93	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	816.15	Wr Top Wdth (ft)	130.75
Q Total (cfs)	530.00	Total Gate Flow (cfs)	
Q Weir (cfs)	530.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	207.41	Gate Open Ht (ft)	
Weir Sta Lft (ft)	135.26	Gate #Open	
Weir Sta Rgt (ft)	266.02	Gate Area (sq ft)	
Weir Max Depth (ft)	5.19	Gate Submerg	
Weir Avg Depth (ft)	1.59	Gate Invert (ft)	
Weir Submerg	0.20		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	817.33	Min El Weir Flow (ft)	811.75
W.S. Elev (ft)	816.54	Wr Top Wdth (ft)	138.32
Q Total (cfs)	690.00	Total Gate Flow (cfs)	
Q Weir (cfs)	690.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	261.78	Gate Open Ht (ft)	
Weir Sta Lft (ft)	131.01	Gate #Open	
Weir Sta Rgt (ft)	269.33	Gate Area (sq ft)	
Weir Max Depth (ft)	5.59	Gate Submerg	
Weir Avg Depth (ft)	1.89	Gate Invert (ft)	
Weir Submerg	0.21		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION RIVER: Main Channel  
 REACH: Upper RS: 130

INPUT

Description:

Station Elevation Data		num= 19							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	823	42	821	71	820	102	819	120	816
132	815	150	814	153	813	155	812	158	811
163	809.7	167	811	169	812	170	813	172	814
173	815	215	815.03	227	816	254	820		

Manning's n Values		num= 5							
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	102	.12	150	.05	173	.09	215	.12

Bank Sta:	Left	Right	Lengths:		Left Channel	Right	Coeff	Contr.	Expan.
	150	173	94	96.36	30		.1	.3	

CROSS SECTION OUTPUT Profile #1

Element	Value	Left OB	Channel	Right OB
E.G. Elev (ft)	812.58			
Vel Head (ft)	0.05		0.050	
W.S. Elev (ft)	812.53	94.00	96.36	30.00
Crit W.S. (ft)	811.28		25.16	
E.G. Slope (ft/ft)	0.002096		25.16	
Q Total (cfs)	45.00		45.00	
Top Width (ft)	15.58		15.58	
Vel Total (ft/s)	1.79		1.79	
Max Chl Dpth (ft)	2.83		1.61	
Conv. Total (cfs)	982.9		982.9	
Length Wtd. (ft)	96.36		16.70	
Min Ch El (ft)	809.70		0.20	
Alpha	1.00		0.35	
Frctn Loss (ft)		0.11	1.29	0.02
C & E Loss (ft)		0.50	0.64	0.13

CROSS SECTION OUTPUT Profile #1.4

Element	Value	Left OB	Channel	Right OB
E.G. Elev (ft)	812.73			
Vel Head (ft)	0.07		0.050	
W.S. Elev (ft)	812.67	94.00	96.36	30.00
Crit W.S. (ft)	811.43		27.36	
E.G. Slope (ft/ft)	0.002556		27.36	
Q Total (cfs)	56.00		56.00	
Top Width (ft)	16.00		16.00	
Vel Total (ft/s)	2.05		2.05	
Max Chl Dpth (ft)	2.97		1.71	
Conv. Total (cfs)	1107.7		1107.7	
Length Wtd. (ft)	96.36		17.21	
Min Ch El (ft)	809.70		0.25	
Alpha	1.00		0.52	
Frctn Loss (ft)		0.19	1.40	0.03
C & E Loss (ft)		0.70	0.66	0.15

CROSS SECTION OUTPUT Profile #2

Element	Value	Left OB	Channel	Right OB
E.G. Elev (ft)	812.91			
Vel Head (ft)	0.08		0.050	
W.S. Elev (ft)	812.83	94.00	96.36	30.00
Crit W.S. (ft)	811.60		30.01	
E.G. Slope (ft/ft)	0.003071		30.01	
Q Total (cfs)	70.00		70.00	
Top Width (ft)	16.49		16.49	
Vel Total (ft/s)	2.33		2.33	
Max Chl Dpth (ft)	3.13		1.82	

Conv. Total (cfs)	1263.1	Conv. (cfs)	1263.1	
Length Wtd. (ft)	96.36	Wetted Per. (ft)	17.80	
Min Ch El (ft)	809.70	Shear (lb/sq ft)	0.32	
Alpha	1.00	Stream Power (lb/ft s)	0.75	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.31	1.52
C & E Loss (ft)		Cum SA (acres)	0.80	0.68
				0.06
				0.20

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	813.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.43	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)	812.15	Flow Area (sq ft)		40.57	
E.G. Slope (ft/ft)	0.004748	Area (sq ft)		40.57	
Q Total (cfs)	130.00	Flow (cfs)		130.00	
Top Width (ft)	19.14	Top Width (ft)		19.14	
Vel Total (ft/s)	3.20	Avg. Vel. (ft/s)		3.20	
Max Chl Dpth (ft)	3.73	Hydr. Depth (ft)		2.12	
Conv. Total (cfs)	1886.7	Conv. (cfs)		1886.7	
Length Wtd. (ft)	96.36	Wetted Per. (ft)		20.73	
Min Ch El (ft)	809.70	Shear (lb/sq ft)		0.58	
Alpha	1.00	Stream Power (lb/ft s)		1.86	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.83	1.88	0.20
C & E Loss (ft)		Cum SA (acres)	1.74	0.72	0.40

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	813.97	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.23	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.73	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)	812.51	Flow Area (sq ft)		46.68	
E.G. Slope (ft/ft)	0.006320	Area (sq ft)		46.68	
Q Total (cfs)	180.00	Flow (cfs)		180.00	
Top Width (ft)	20.67	Top Width (ft)		20.67	
Vel Total (ft/s)	3.86	Avg. Vel. (ft/s)		3.86	
Max Chl Dpth (ft)	4.03	Hydr. Depth (ft)		2.26	
Conv. Total (cfs)	2264.3	Conv. (cfs)		2264.3	
Length Wtd. (ft)	96.36	Wetted Per. (ft)		22.38	
Min Ch El (ft)	809.70	Shear (lb/sq ft)		0.82	
Alpha	1.00	Stream Power (lb/ft s)		3.17	
Frctn Loss (ft)		Cum Volume (acre-ft)	1.23	2.07	0.33
C & E Loss (ft)		Cum SA (acres)	1.98	0.73	0.48

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	814.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.35	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	814.21	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)	813.07	Flow Area (sq ft)	0.38	56.88	
E.G. Slope (ft/ft)	0.008117	Area (sq ft)	0.38	56.88	
Q Total (cfs)	270.00	Flow (cfs)	0.09	269.91	
Top Width (ft)	25.90	Top Width (ft)	3.69	22.21	
Vel Total (ft/s)	4.72	Avg. Vel. (ft/s)	0.24	4.75	
Max Chl Dpth (ft)	4.51	Hydr. Depth (ft)	0.10	2.56	
Conv. Total (cfs)	2996.9	Conv. (cfs)	1.0	2995.9	
Length Wtd. (ft)	96.36	Wetted Per. (ft)	3.70	24.11	
Min Ch El (ft)	809.70	Shear (lb/sq ft)	0.05	1.20	
Alpha	1.01	Stream Power (lb/ft s)	0.01	5.67	
Frctn Loss (ft)		Cum Volume (acre-ft)	1.89	2.31	0.54
C & E Loss (ft)		Cum SA (acres)	2.24	0.75	0.57

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.94				
Vel Head (ft)	0.44	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	814.49	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)	813.45	Flow Area (sq ft)	2.17	63.28	
E.G. Slope (ft/ft)	0.009176	Area (sq ft)	2.17	63.28	
Q Total (cfs)	340.00	Flow (cfs)	1.01	338.99	
Top Width (ft)	31.34	Top Width (ft)	8.84	22.49	
Vel Total (ft/s)	5.19	Avg. Vel. (ft/s)	0.46	5.36	
Max Chl Dpth (ft)	4.79	Hydr. Depth (ft)	0.25	2.81	
Conv. Total (cfs)	3549.4	Conv. (cfs)	10.5	3538.8	
Length Wtd. (ft)	96.36	Wetted Per. (ft)	8.86	24.51	
Min Ch El (ft)	809.70	Shear (lb/sq ft)	0.14	1.48	
Alpha	1.06	Stream Power (lb/ft s)	0.07	7.92	
Frctn Loss (ft)		Cum Volume (acre-ft)	2.34	2.44	0.69
C & E Loss (ft)		Cum SA (acres)	2.28	0.75	0.60

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.27				
Vel Head (ft)	0.64	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	814.62	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)	813.86	Flow Area (sq ft)	3.48	66.23	
E.G. Slope (ft/ft)	0.012678	Area (sq ft)	3.48	66.23	
Q Total (cfs)	430.00	Flow (cfs)	2.23	427.77	
Top Width (ft)	33.82	Top Width (ft)	11.20	22.62	
Vel Total (ft/s)	6.17	Avg. Vel. (ft/s)	0.64	6.46	
Max Chl Dpth (ft)	4.92	Hydr. Depth (ft)	0.31	2.93	
Conv. Total (cfs)	3818.9	Conv. (cfs)	19.8	3799.1	
Length Wtd. (ft)	96.36	Wetted Per. (ft)	11.22	24.70	
Min Ch El (ft)	809.70	Shear (lb/sq ft)	0.25	2.12	
Alpha	1.09	Stream Power (lb/ft s)	0.16	13.71	
Frctn Loss (ft)		Cum Volume (acre-ft)	3.02	2.61	0.89
C & E Loss (ft)		Cum SA (acres)	2.51	0.75	0.65

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.55				
Vel Head (ft)	1.28	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	814.27	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)	814.27	Flow Area (sq ft)	0.66	58.35	
E.G. Slope (ft/ft)	0.028861	Area (sq ft)	0.66	58.35	
Q Total (cfs)	530.00	Flow (cfs)	0.37	529.63	
Top Width (ft)	27.15	Top Width (ft)	4.88	22.27	
Vel Total (ft/s)	8.98	Avg. Vel. (ft/s)	0.55	9.08	
Max Chl Dpth (ft)	4.57	Hydr. Depth (ft)	0.14	2.62	
Conv. Total (cfs)	3119.8	Conv. (cfs)	2.2	3117.6	
Length Wtd. (ft)	96.36	Wetted Per. (ft)	4.88	24.20	
Min Ch El (ft)	809.70	Shear (lb/sq ft)	0.24	4.34	
Alpha	1.02	Stream Power (lb/ft s)	0.14	39.43	
Frctn Loss (ft)		Cum Volume (acre-ft)	3.85	2.83	1.14
C & E Loss (ft)		Cum SA (acres)	2.77	0.75	0.79

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	816.26				

Vel Head (ft)	1.34	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	814.91	Reach Len. (ft)	94.00	96.36	30.00
Crit W.S. (ft)	814.84	Flow Area (sq ft)	7.50	72.85	
E.G. Slope (ft/ft)	0.023944	Area (sq ft)	7.50	72.85	
Q Total (cfs)	690.00	Flow (cfs)	8.51	681.49	
Top Width (ft)	39.35	Top Width (ft)	16.43	22.91	
Vel Total (ft/s)	8.59	Avg. Vel. (ft/s)	1.13	9.35	
Max Chl Dpth (ft)	5.21	Hydr. Depth (ft)	0.46	3.18	
Conv. Total (cfs)	4459.1	Conv. (cfs)	55.0	4404.1	
Length Wtd. (ft)	96.36	Wetted Per. (ft)	16.46	25.11	
Min Ch El (ft)	809.70	Shear (lb/sq ft)	0.68	4.34	
Alpha	1.17	Stream Power (lb/ft s)	0.77	40.57	
Frctn Loss (ft)		Cum Volume (acre-ft)	4.97	3.16	1.56
C & E Loss (ft)		Cum SA (acres)	2.89	0.75	1.02

INLINE WEIR RIVER: Main Channel  
REACH: Upper RS: 128.5

INPUT

Description: cross-vane between x-sections 128 and 130

Distance from Upstream XS = 39  
Deck/Roadway Width = 2  
Weir Coefficient = 3  
Weir Embankment Coordinates num = 2  
Sta Elev Sta Elev  
150 811.5 173 811.5

Upstream Embankment side slope = 4 horiz. to 1.0 vertical  
Downstream Embankment side slope = 1 horiz. to 1.0 vertical  
Maximum allowable submergence for weir flow = .95  
Elevation at which weir flow begins =  
Weir crest shape = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT Profile #1

E.G. Elev (ft)	812.58	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	812.53	Wr Top Wdth (ft)	15.73
Q Total (cfs)	45.00	Total Gate Flow (cfs)	
Q Weir (cfs)	45.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	14.97	Gate Open Ht (ft)	
Weir Sta Lft (ft)	153.84	Gate #Open	
Weir Sta Rgt (ft)	169.58	Gate Area (sq ft)	
Weir Max Depth (ft)	1.08	Gate Submerg	
Weir Avg Depth (ft)	0.95	Gate Invert (ft)	
Weir Submerg	0.50		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	812.73	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	812.67	Wr Top Wdth (ft)	16.20
Q Total (cfs)	56.00	Total Gate Flow (cfs)	
Q Weir (cfs)	56.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	17.43	Gate Open Ht (ft)	
Weir Sta Lft (ft)	153.54	Gate #Open	
Weir Sta Rgt (ft)	169.73	Gate Area (sq ft)	
Weir Max Depth (ft)	1.23	Gate Submerg	
Weir Avg Depth (ft)	1.08	Gate Invert (ft)	
Weir Submerg	0.53		

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	812.91	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	812.83	Wr Top Wdth (ft)	16.74
Q Total (cfs)	70.00	Total Gate Flow (cfs)	
Q Weir (cfs)	70.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	20.44	Gate Open Ht (ft)	
Weir Sta Lft (ft)	153.17	Gate #Open	

Weir Sta Rgt (ft)	169.91	Gate Area (sq ft)
Weir Max Depth (ft)	1.41	Gate Submerg
Weir Avg Depth (ft)	1.22	Gate Invert (ft)
Weir Submerg	0.65	

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	813.59	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	813.43	Wr Top Wdth (ft)	19.93
Q Total (cfs)	130.00	Total Gate Flow (cfs)	
Q Weir (cfs)	130.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	32.71	Gate Open Ht (ft)	
Weir Sta Lft (ft)	151.24	Gate #Open	
Weir Sta Rgt (ft)	171.17	Gate Area (sq ft)	
Weir Max Depth (ft)	2.09	Gate Submerg	
Weir Avg Depth (ft)	1.64	Gate Invert (ft)	
Weir Submerg	0.66		

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	813.97	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	813.73	Wr Top Wdth (ft)	21.83
Q Total (cfs)	180.00	Total Gate Flow (cfs)	
Q Weir (cfs)	180.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	40.61	Gate Open Ht (ft)	
Weir Sta Lft (ft)	150.10	Gate #Open	
Weir Sta Rgt (ft)	171.93	Gate Area (sq ft)	
Weir Max Depth (ft)	2.47	Gate Submerg	
Weir Avg Depth (ft)	1.86	Gate Invert (ft)	
Weir Submerg	0.70		

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	814.55	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	814.21	Wr Top Wdth (ft)	32.54
Q Total (cfs)	270.00	Total Gate Flow (cfs)	
Q Weir (cfs)	270.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	56.50	Gate Open Ht (ft)	
Weir Sta Lft (ft)	140.02	Gate #Open	
Weir Sta Rgt (ft)	172.55	Gate Area (sq ft)	
Weir Max Depth (ft)	3.05	Gate Submerg	
Weir Avg Depth (ft)	1.74	Gate Invert (ft)	
Weir Submerg	0.70		

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

INLINE WEIR/SPILLWAY OUTPUT Profile #50

E.G. Elev (ft)	814.94	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	814.49	Wr Top Wdth (ft)	39.78
Q Total (cfs)	340.00	Total Gate Flow (cfs)	
Q Weir (cfs)	340.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	70.27	Gate Open Ht (ft)	
Weir Sta Lft (ft)	133.16	Gate #Open	
Weir Sta Rgt (ft)	172.94	Gate Area (sq ft)	
Weir Max Depth (ft)	3.44	Gate Submerg	
Weir Avg Depth (ft)	1.77	Gate Invert (ft)	
Weir Submerg	0.63		

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	815.27	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	814.62	Wr Top Wdth (ft)	89.13
Q Total (cfs)	430.00	Total Gate Flow (cfs)	
Q Weir (cfs)	430.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	95.14	Gate Open Ht (ft)	
Weir Sta Lft (ft)	128.80	Gate #Open	
Weir Sta Rgt (ft)	217.93	Gate Area (sq ft)	
Weir Max Depth (ft)	3.77	Gate Submerg	
Weir Avg Depth (ft)	1.07	Gate Invert (ft)	
Weir Submerg	0.48		

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	815.55	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	814.27	Wr Top Wdth (ft)	96.02
Q Total (cfs)	530.00	Total Gate Flow (cfs)	
Q Weir (cfs)	530.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	121.33	Gate Open Ht (ft)	
Weir Sta Lft (ft)	125.41	Gate #Open	
Weir Sta Rgt (ft)	221.43	Gate Area (sq ft)	
Weir Max Depth (ft)	4.05	Gate Submerg	
Weir Avg Depth (ft)	1.26	Gate Invert (ft)	
Weir Submerg	0.39		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	816.26	Min El Weir Flow (ft)	811.51
W.S. Elev (ft)	814.91	Wr Top Wdth (ft)	110.25
Q Total (cfs)	690.00	Total Gate Flow (cfs)	
Q Weir (cfs)	690.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	194.79	Gate Open Ht (ft)	
Weir Sta Lft (ft)	118.47	Gate #Open	
Weir Sta Rgt (ft)	228.72	Gate Area (sq ft)	
Weir Max Depth (ft)	4.76	Gate Submerg	
Weir Avg Depth (ft)	1.77	Gate Invert (ft)	
Weir Submerg	0.45		

CROSS SECTION RIVER: Main Channel  
 REACH: Upper RS: 128

INPUT

Description:

Station Elevation Data	num=	18							
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev									
0 822 21 820 45 819.25 53 819 60 815									
66 814 67 813 68 812 68 811 75 809.3									
81 811 83 812 85 813 89 814 111 814									
166 814.49 198 815 231 820									

Manning's n Values	num=	6							
Sta n Val Sta n Val Sta n Val Sta n Val Sta n Val									
0 .03 45 .12 66 .05 89 .12 111 .03									
166 .012									

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.									
66 89 127 138.25 48 .1 .3									

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	812.11	Wt. n-Val.		0.050	
Vel Head (ft)	0.05	Reach Len. (ft)	127.00	138.25	48.00
W.S. Elev (ft)	812.07	Flow Area (sq ft)		26.03	
Crit W.S. (ft)	810.83	Area (sq ft)		26.03	
E.G. Slope (ft/ft)	0.001904	Flow (cfs)		45.00	
Q Total (cfs)	45.00	Top Width (ft)		15.20	
Top Width (ft)	15.20	Avg. Vel. (ft/s)		1.73	
Vel Total (ft/s)	1.73	Hydr. Depth (ft)		1.71	
Max Chl Dpth (ft)	2.77	Conv. (cfs)		1031.4	
Conv. Total (cfs)	1031.4	Wetted Per. (ft)		16.91	
Length Wtd. (ft)	138.25	Shear (lb/sq ft)		0.18	
Min Ch El (ft)	809.30	Stream Power (lb/ft s)		0.32	
Alpha	1.00	Cum Volume (acre-ft)	0.11	1.23	0.02
Frctn Loss (ft)		Cum SA (acres)	0.50	0.61	0.13
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	812.25	Wt. n-Val.		0.050	
Vel Head (ft)	0.06	Reach Len. (ft)	127.00	138.25	48.00
W.S. Elev (ft)	812.19	Flow Area (sq ft)		27.93	
Crit W.S. (ft)	810.97	Area (sq ft)		27.93	
E.G. Slope (ft/ft)	0.002415	Flow (cfs)		56.00	
Q Total (cfs)	56.00	Top Width (ft)		15.57	
Top Width (ft)	15.57	Avg. Vel. (ft/s)		2.01	
Vel Total (ft/s)	2.01	Hydr. Depth (ft)		1.79	
Max Chl Dpth (ft)	2.89	Conv. (cfs)		1139.4	
Conv. Total (cfs)	1139.4	Wetted Per. (ft)		17.36	
Length Wtd. (ft)	138.25	Shear (lb/sq ft)		0.24	
Min Ch El (ft)	809.30	Stream Power (lb/ft s)		0.49	
Alpha	1.00	Cum Volume (acre-ft)	0.19	1.34	0.03
Frctn Loss (ft)		Cum SA (acres)	0.70	0.63	0.15
C & E Loss (ft)					

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	812.53	Wt. n-Val.		0.050	
Vel Head (ft)	0.07	Reach Len. (ft)	127.00	138.25	48.00
W.S. Elev (ft)	812.46	Flow Area (sq ft)		32.28	
Crit W.S. (ft)	811.12	Area (sq ft)		32.28	
E.G. Slope (ft/ft)	0.002509	Flow (cfs)		70.00	
Q Total (cfs)	70.00	Top Width (ft)		16.38	
Top Width (ft)	16.38	Avg. Vel. (ft/s)		2.17	
Vel Total (ft/s)	2.17	Hydr. Depth (ft)		1.97	
Max Chl Dpth (ft)	3.16	Conv. (cfs)		1397.5	
Conv. Total (cfs)	1397.5	Wetted Per. (ft)		18.36	
Length Wtd. (ft)	138.25	Shear (lb/sq ft)		0.28	
Min Ch El (ft)	809.30	Stream Power (lb/ft s)		0.60	
Alpha	1.00	Cum Volume (acre-ft)	0.31	1.45	0.06
Frctn Loss (ft)		Cum SA (acres)	0.80	0.64	0.20
C & E Loss (ft)					

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.10	Wt. n-Val.		0.050	
Vel Head (ft)	0.16	Reach Len. (ft)	127.00	138.25	48.00
W.S. Elev (ft)	812.94	Flow Area (sq ft)		40.56	
Crit W.S. (ft)	811.61	Area (sq ft)		40.56	
E.G. Slope (ft/ft)	0.004568	Flow (cfs)		130.00	
Q Total (cfs)	130.00	Top Width (ft)		17.83	
Top Width (ft)	17.83				



Vel Total (ft/s)	3.20	Avg. Vel. (ft/s)	3.20
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)	2.27
Conv. Total (cfs)	1923.4	Conv. (cfs)	1923.4
Length Wtd. (ft)	138.25	Wetted Per. (ft)	20.12
Min Ch El (ft)	809.30	Shear (lb/sq ft)	0.57
Alpha	1.00	Stream Power (lb/ft s)	1.84
Frctn Loss (ft)		Cum Volume (acre-ft)	0.83
C & E Loss (ft)		Cum SA (acres)	1.74
			0.20
			0.40

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	813.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.32	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)	811.96	Flow Area (sq ft)		47.55	
E.G. Slope (ft/ft)	0.005839	Area (sq ft)		47.55	
Q Total (cfs)	180.00	Flow (cfs)		180.00	
Top Width (ft)	19.60	Top Width (ft)		19.60	
Vel Total (ft/s)	3.79	Avg. Vel. (ft/s)		3.79	
Max Chl Dpth (ft)	4.02	Hydr. Depth (ft)		2.43	
Conv. Total (cfs)	2355.6	Conv. (cfs)		2355.6	
Length Wtd. (ft)	138.25	Wetted Per. (ft)		22.09	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		0.78	
Alpha	1.00	Stream Power (lb/ft s)		2.97	
Frctn Loss (ft)		Cum Volume (acre-ft)	1.23	1.96	0.33
C & E Loss (ft)		Cum SA (acres)	1.98	0.69	0.48

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	814.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.81	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)	812.52	Flow Area (sq ft)		57.83	
E.G. Slope (ft/ft)	0.007994	Area (sq ft)		57.83	
Q Total (cfs)	270.00	Flow (cfs)		270.00	
Top Width (ft)	22.06	Top Width (ft)		22.06	
Vel Total (ft/s)	4.67	Avg. Vel. (ft/s)		4.67	
Max Chl Dpth (ft)	4.51	Hydr. Depth (ft)		2.62	
Conv. Total (cfs)	3019.9	Conv. (cfs)		3019.9	
Length Wtd. (ft)	138.25	Wetted Per. (ft)		24.83	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		1.16	
Alpha	1.00	Stream Power (lb/ft s)		5.43	
Frctn Loss (ft)		Cum Volume (acre-ft)	1.88	2.18	0.54
C & E Loss (ft)		Cum SA (acres)	2.24	0.70	0.57

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	814.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.49	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.93	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)	812.91	Flow Area (sq ft)		60.54	
E.G. Slope (ft/ft)	0.011276	Area (sq ft)		60.54	
Q Total (cfs)	340.00	Flow (cfs)		340.00	
Top Width (ft)	22.67	Top Width (ft)		22.67	
Vel Total (ft/s)	5.62	Avg. Vel. (ft/s)		5.62	
Max Chl Dpth (ft)	4.63	Hydr. Depth (ft)		2.67	
Conv. Total (cfs)	3201.9	Conv. (cfs)		3201.9	
Length Wtd. (ft)	138.25	Wetted Per. (ft)		25.50	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		1.67	
Alpha	1.00	Stream Power (lb/ft s)		9.39	
Frctn Loss (ft)		Cum Volume (acre-ft)	2.34	2.30	0.69
C & E Loss (ft)		Cum SA (acres)	2.27	0.70	0.60

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	814.66	Element			
Vel Head (ft)	0.88	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.78	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)	813.36	Flow Area (sq ft)		57.14	
E.G. Slope (ft/ft)	0.020908	Area (sq ft)		57.14	
Q Total (cfs)	430.00	Flow (cfs)		430.00	
Top Width (ft)	21.91	Top Width (ft)		21.91	
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)		7.53	
Max Chl Dpth (ft)	4.48	Hydr. Depth (ft)		2.61	
Conv. Total (cfs)	2973.8	Conv. (cfs)		2973.8	
Length Wtd. (ft)	138.25	Wetted Per. (ft)		24.65	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		3.03	
Alpha	1.00	Stream Power (lb/ft s)		22.77	
Frctn Loss (ft)		Cum Volume (acre-ft)	3.02	2.47	0.89
C & E Loss (ft)		Cum SA (acres)	2.50	0.70	0.65

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.12	Element			
Vel Head (ft)	1.34	Wt. n-Val.		0.050	
W.S. Elev (ft)	813.78	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)	813.78	Flow Area (sq ft)		57.12	
E.G. Slope (ft/ft)	0.031790	Area (sq ft)		57.12	
Q Total (cfs)	530.00	Flow (cfs)		530.00	
Top Width (ft)	21.90	Top Width (ft)		21.90	
Vel Total (ft/s)	9.28	Avg. Vel. (ft/s)		9.28	
Max Chl Dpth (ft)	4.48	Hydr. Depth (ft)		2.61	
Conv. Total (cfs)	2972.6	Conv. (cfs)		2972.6	
Length Wtd. (ft)	138.25	Wetted Per. (ft)		24.65	
Min Ch El (ft)	809.30	Shear (lb/sq ft)		4.60	
Alpha	1.00	Stream Power (lb/ft s)		42.68	
Frctn Loss (ft)		Cum Volume (acre-ft)	3.85	2.71	1.14
C & E Loss (ft)		Cum SA (acres)	2.77	0.70	0.79

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	815.38	Element			
Vel Head (ft)	0.47	Wt. n-Val.	0.120	0.050	0.039
W.S. Elev (ft)	814.91	Reach Len. (ft)	127.00	138.25	48.00
Crit W.S. (ft)	814.91	Flow Area (sq ft)	2.46	82.87	61.62
E.G. Slope (ft/ft)	0.009188	Area (sq ft)	2.46	82.87	61.62
Q Total (cfs)	690.00	Flow (cfs)	1.70	513.03	175.27
Top Width (ft)	131.48	Top Width (ft)	5.43	23.00	103.05
Vel Total (ft/s)	4.70	Avg. Vel. (ft/s)	0.69	6.19	2.84
Max Chl Dpth (ft)	5.61	Hydr. Depth (ft)	0.45	3.60	0.60
Conv. Total (cfs)	7198.6	Conv. (cfs)	17.8	5352.3	1828.6
Length Wtd. (ft)	138.25	Wetted Per. (ft)	5.51	25.86	103.05
Min Ch El (ft)	809.30	Shear (lb/sq ft)	0.26	1.84	0.34
Alpha	1.39	Stream Power (lb/ft s)	0.18	11.38	0.98
Frctn Loss (ft)		Cum Volume (acre-ft)	4.96	2.99	1.54
C & E Loss (ft)		Cum SA (acres)	2.87	0.70	0.98

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR RIVER: Main Channel  
 REACH: Upper RS: 126.2

INPUT  
 Description: 2of2 cross-vanes between x-sections 126 and 128

Distance from Upstream XS = 61  
 Deck/Roadway Width = 2  
 Weir Coefficient = 3  
 Weir Embankment Coordinates num = 2  
 Sta Elev Sta Elev  
 66 811.06 89 811.06

Upstream Embankment side slope = 4 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 1 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Weir crest shape = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT Profile #1

E.G. Elev (ft)	812.11	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	812.07	Wr Top Wdth (ft)	15.33
Q Total (cfs)	45.00	Total Gate Flow (cfs)	
Q Weir (cfs)	45.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	14.91	Gate Open Ht (ft)	
Weir Sta Lft (ft)	67.89	Gate #Open	
Weir Sta Rgt (ft)	83.22	Gate Area (sq ft)	
Weir Max Depth (ft)	1.05	Gate Submerg	
Weir Avg Depth (ft)	0.97	Gate Invert (ft)	
Weir Submerg	0.07		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	812.25	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	812.19	Wr Top Wdth (ft)	15.75
Q Total (cfs)	56.00	Total Gate Flow (cfs)	
Q Weir (cfs)	56.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	17.07	Gate Open Ht (ft)	
Weir Sta Lft (ft)	67.75	Gate #Open	
Weir Sta Rgt (ft)	83.50	Gate Area (sq ft)	
Weir Max Depth (ft)	1.19	Gate Submerg	
Weir Avg Depth (ft)	1.08	Gate Invert (ft)	
Weir Submerg	0.19		

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	812.53	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	812.46	Wr Top Wdth (ft)	16.60
Q Total (cfs)	70.00	Total Gate Flow (cfs)	
Q Weir (cfs)	70.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	21.65	Gate Open Ht (ft)	
Weir Sta Lft (ft)	67.47	Gate #Open	
Weir Sta Rgt (ft)	84.07	Gate Area (sq ft)	
Weir Max Depth (ft)	1.47	Gate Submerg	
Weir Avg Depth (ft)	1.30	Gate Invert (ft)	
Weir Submerg	0.25		

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	813.10	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	812.94	Wr Top Wdth (ft)	18.52
Q Total (cfs)	130.00	Total Gate Flow (cfs)	
Q Weir (cfs)	130.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	31.62	Gate Open Ht (ft)	
Weir Sta Lft (ft)	66.90	Gate #Open	
Weir Sta Rgt (ft)	85.42	Gate Area (sq ft)	

Weir Max Depth (ft)	2.04	Gate Submerg
Weir Avg Depth (ft)	1.71	Gate Invert (ft)
Weir Submerg	0.45	

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	813.54	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	813.32	Wr Top Wdth (ft)	20.71
Q Total (cfs)	180.00	Total Gate Flow (cfs)	
Q Weir (cfs)	180.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	40.20	Gate Open Ht (ft)	
Weir Sta Lft (ft)	66.46	Gate #Open	
Weir Sta Rgt (ft)	87.17	Gate Area (sq ft)	
Weir Max Depth (ft)	2.48	Gate Submerg	
Weir Avg Depth (ft)	1.94	Gate Invert (ft)	
Weir Submerg	0.48		

Warning: The inline weir solution failed to converge. The program used the solution with the least error.

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	814.15	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	813.81	Wr Top Wdth (ft)	62.87
Q Total (cfs)	270.00	Total Gate Flow (cfs)	
Q Weir (cfs)	270.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	58.37	Gate Open Ht (ft)	
Weir Sta Lft (ft)	65.09	Gate #Open	
Weir Sta Rgt (ft)	127.96	Gate Area (sq ft)	
Weir Max Depth (ft)	3.09	Gate Submerg	
Weir Avg Depth (ft)	0.93	Gate Invert (ft)	
Weir Submerg	0.43		

INLINE WEIR/SPILLWAY OUTPUT Profile #50

E.G. Elev (ft)	814.42	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	813.93	Wr Top Wdth (ft)	95.08
Q Total (cfs)	340.00	Total Gate Flow (cfs)	
Q Weir (cfs)	340.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	79.88	Gate Open Ht (ft)	
Weir Sta Lft (ft)	63.46	Gate #Open	
Weir Sta Rgt (ft)	158.54	Gate Area (sq ft)	
Weir Max Depth (ft)	3.36	Gate Submerg	
Weir Avg Depth (ft)	0.84	Gate Invert (ft)	
Weir Submerg	0.37		

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	814.66	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	813.78	Wr Top Wdth (ft)	114.67
Q Total (cfs)	430.00	Total Gate Flow (cfs)	
Q Weir (cfs)	430.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	105.03	Gate Open Ht (ft)	
Weir Sta Lft (ft)	62.04	Gate #Open	
Weir Sta Rgt (ft)	176.71	Gate Area (sq ft)	
Weir Max Depth (ft)	3.60	Gate Submerg	
Weir Avg Depth (ft)	0.92	Gate Invert (ft)	
Weir Submerg	0.39		

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	815.12	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	813.78	Wr Top Wdth (ft)	138.98
Q Total (cfs)	530.00	Total Gate Flow (cfs)	
Q Weir (cfs)	530.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	164.15	Gate Open Ht (ft)	

Weir Sta Lft (ft)	59.79	Gate #Open
Weir Sta Rgt (ft)	198.77	Gate Area (sq ft)
Weir Max Depth (ft)	4.06	Gate Submerg
Weir Avg Depth (ft)	1.18	Gate Invert (ft)
Weir Submerg	0.30	

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	815.38	Min El Weir Flow (ft)	811.07
W.S. Elev (ft)	814.91	Wr Top Wdth (ft)	141.17
Q Total (cfs)	690.00	Total Gate Flow (cfs)	
Q Weir (cfs)	690.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	200.88	Gate Open Ht (ft)	
Weir Sta Lft (ft)	59.34	Gate #Open	
Weir Sta Rgt (ft)	200.50	Gate Area (sq ft)	
Weir Max Depth (ft)	4.32	Gate Submerg	
Weir Avg Depth (ft)	1.42	Gate Invert (ft)	
Weir Submerg	0.29		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 126

INPUT

Description:

Station Elevation Data		num=	16						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	812	29	812.67	40	813	57	813	58	812
60	811	61	810	63	809	67	808.5	71	809
73	810	75	811	77	812	84	813	136	814
148	816								

Manning's n Values		num=	4				
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	29	.12	57	.05	77	.12

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
57	77	71 114.63	143	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	811.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.		0.050	
W.S. Elev (ft)	811.14	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	809.81	Flow Area (sq ft)		27.59	
E.G. Slope (ft/ft)	0.002076	Area (sq ft)		27.59	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	15.55	Top Width (ft)		15.55	
Vel Total (ft/s)	1.88	Avg. Vel. (ft/s)		1.88	
Max Chl Dpth (ft)	2.64	Hydr. Depth (ft)		1.77	
Conv. Total (cfs)	1141.3	Conv. (cfs)		1141.3	
Length Wtd. (ft)	114.63	Wetted Per. (ft)		16.80	
Min Ch El (ft)	808.50	Shear (lb/sq ft)		0.21	
Alpha	1.00	Stream Power (lb/ft s)		0.40	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.11	1.15	0.02
C & E Loss (ft)		Cum SA (acres)	0.50	0.56	0.13

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	811.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.		0.050	
W.S. Elev (ft)	811.30	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	809.97	Flow Area (sq ft)		30.25	
E.G. Slope (ft/ft)	0.002607	Area (sq ft)		30.25	
Q Total (cfs)	66.00	Flow (cfs)		66.00	
Top Width (ft)	16.22	Top Width (ft)		16.22	
Vel Total (ft/s)	2.18	Avg. Vel. (ft/s)		2.18	
Max Chl Dpth (ft)	2.80	Hydr. Depth (ft)		1.87	
Conv. Total (cfs)	1292.7	Conv. (cfs)		1292.7	
Length Wtd. (ft)	114.63	Wetted Per. (ft)		17.55	
Min Ch El (ft)	808.50	Shear (lb/sq ft)		0.28	
Alpha	1.00	Stream Power (lb/ft s)		0.61	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.19	1.25	0.03
C & E Loss (ft)		Cum SA (acres)	0.70	0.58	0.15

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	811.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.		0.050	
W.S. Elev (ft)	811.46	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	810.12	Flow Area (sq ft)		32.76	
E.G. Slope (ft/ft)	0.003089	Area (sq ft)		32.76	
Q Total (cfs)	80.00	Flow (cfs)		80.00	
Top Width (ft)	16.83	Top Width (ft)		16.83	
Vel Total (ft/s)	2.44	Avg. Vel. (ft/s)		2.44	
Max Chl Dpth (ft)	2.96	Hydr. Depth (ft)		1.95	
Conv. Total (cfs)	1439.4	Conv. (cfs)		1439.4	
Length Wtd. (ft)	114.63	Wetted Per. (ft)		18.23	
Min Ch El (ft)	808.50	Shear (lb/sq ft)		0.35	
Alpha	1.00	Stream Power (lb/ft s)		0.85	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.31	1.35	0.06
C & E Loss (ft)		Cum SA (acres)	0.80	0.59	0.20

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	812.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.030	0.050	0.001
W.S. Elev (ft)	812.05	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	810.71	Flow Area (sq ft)	0.05	43.43	0.01
E.G. Slope (ft/ft)	0.005036	Area (sq ft)	0.05	43.43	0.01
Q Total (cfs)	150.00	Flow (cfs)	0.02	149.98	0.00
Top Width (ft)	21.51	Top Width (ft)	2.12	19.05	0.34
Vel Total (ft/s)	3.45	Avg. Vel. (ft/s)	0.29	3.45	0.07
Max Chl Dpth (ft)	3.55	Hydr. Depth (ft)	0.02	2.28	0.02
Conv. Total (cfs)	2113.8	Conv. (cfs)	0.2	2113.6	0.0
Length Wtd. (ft)	114.63	Wetted Per. (ft)	2.17	20.73	0.35
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.01	0.66	
Alpha	1.00	Stream Power (lb/ft s)	0.00	2.27	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.83	1.65	0.20
C & E Loss (ft)		Cum SA (acres)	1.74	0.62	0.40

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	812.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	812.34	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	811.14	Flow Area (sq ft)	2.51	49.02	0.41
E.G. Slope (ft/ft)	0.006565	Area (sq ft)	2.51	49.02	0.41
Q Total (cfs)	210.00	Flow (cfs)	3.04	206.83	0.12
Top Width (ft)	36.45	Top Width (ft)	14.73	19.34	2.38
Vel Total (ft/s)	4.04	Avg. Vel. (ft/s)	1.21	4.22	0.31
Max Chl Dpth (ft)	3.84	Hydr. Depth (ft)	0.17	2.53	0.17
Conv. Total (cfs)	2591.8	Conv. (cfs)	37.5	2552.7	1.5
Length Wtd. (ft)	114.63	Wetted Per. (ft)	15.08	21.14	2.41
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.07	0.95	0.07
Alpha	1.07	Stream Power (lb/ft s)	0.08	4.01	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	1.23	1.81	0.33

C & E Loss (ft)	Cum SA (acres)	1.95	0.63	0.48
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CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	813.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.47	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	812.59	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	811.79	Flow Area (sq ft)	7.44	53.81	1.20
E.G. Slope (ft/ft)	0.010548	Area (sq ft)	7.44	53.81	1.20
Q Total (cfs)	320.00	Flow (cfs)	16.44	302.89	0.67
Top Width (ft)	49.07	Top Width (ft)	25.38	19.59	4.10
Vel Total (ft/s)	5.12	Avg. Vel. (ft/s)	2.21	5.63	0.56
Max Chl Dpth (ft)	4.09	Hydr. Depth (ft)	0.29	2.75	0.29
Conv. Total (cfs)	3115.8	Conv. (cfs)	160.1	2949.2	6.5
Length Wtd. (ft)	114.63	Wetted Per. (ft)	25.97	21.49	4.15
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.19	1.65	0.19
Alpha	1.15	Stream Power (lb/ft s)	0.42	9.28	0.11
Frctn Loss (ft)		Cum Volume (acre-ft)	1.87	2.01	0.54
C & E Loss (ft)		Cum SA (acres)	2.20	0.63	0.56

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	813.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.72	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	812.64	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	812.64	Flow Area (sq ft)	8.83	54.84	1.43
E.G. Slope (ft/ft)	0.015952	Area (sq ft)	8.83	54.84	1.43
Q Total (cfs)	410.00	Flow (cfs)	25.41	383.55	1.04
Top Width (ft)	51.76	Top Width (ft)	27.65	19.64	4.47
Vel Total (ft/s)	6.30	Avg. Vel. (ft/s)	2.88	6.99	0.73
Max Chl Dpth (ft)	4.14	Hydr. Depth (ft)	0.32	2.79	0.32
Conv. Total (cfs)	3246.2	Conv. (cfs)	201.2	3036.8	8.2
Length Wtd. (ft)	114.63	Wetted Per. (ft)	28.29	21.56	4.52
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.31	2.53	0.31
Alpha	1.17	Stream Power (lb/ft s)	0.89	17.72	0.23
Frctn Loss (ft)		Cum Volume (acre-ft)	2.33	2.12	0.69
C & E Loss (ft)		Cum SA (acres)	2.23	0.63	0.59

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	813.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	813.00	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	813.00	Flow Area (sq ft)	21.15	62.02	3.51
E.G. Slope (ft/ft)	0.013882	Area (sq ft)	21.15	62.02	3.51
Q Total (cfs)	520.00	Flow (cfs)	84.42	432.39	3.19
Top Width (ft)	84.04	Top Width (ft)	57.00	20.00	7.04
Vel Total (ft/s)	6.00	Avg. Vel. (ft/s)	3.99	6.97	0.91
Max Chl Dpth (ft)	4.50	Hydr. Depth (ft)	0.37	3.10	0.50
Conv. Total (cfs)	4413.4	Conv. (cfs)	716.5	3669.8	27.1
Length Wtd. (ft)	114.63	Wetted Per. (ft)	58.01	22.07	7.11
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.32	2.44	0.43
Alpha	1.19	Stream Power (lb/ft s)	1.26	16.98	0.39
Frctn Loss (ft)		Cum Volume (acre-ft)	2.99	2.28	0.89
C & E Loss (ft)		Cum SA (acres)	2.42	0.63	0.65

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	813.94	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.68	Wt. n-Val.	0.034	0.050	0.120
W.S. Elev (ft)	813.26	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	813.26	Flow Area (sq ft)	35.69	67.12	7.00
E.G. Slope (ft/ft)	0.013547	Area (sq ft)	35.69	67.12	7.00
Q Total (cfs)	640.00	Flow (cfs)	147.73	487.32	4.94
Top Width (ft)	97.31	Top Width (ft)	57.00	20.00	20.31
Vel Total (ft/s)	5.83	Avg. Vel. (ft/s)	4.14	7.26	0.71
Max Chl Dpth (ft)	4.76	Hydr. Depth (ft)	0.63	3.36	0.34
Conv. Total (cfs)	5498.6	Conv. (cfs)	1269.3	4186.9	42.5
Length Wtd. (ft)	114.63	Wetted Per. (ft)	58.27	22.07	20.38
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.52	2.57	0.29
Alpha	1.30	Stream Power (lb/ft s)	2.14	18.67	0.21
Frctn Loss (ft)		Cum Volume (acre-ft)	3.80	2.51	1.13
C & E Loss (ft)		Cum SA (acres)	2.68	0.64	0.78

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	814.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.75	Wt. n-Val.	0.037	0.050	0.120
W.S. Elev (ft)	813.55	Reach Len. (ft)	71.00	114.63	143.00
Crit W.S. (ft)	813.55	Flow Area (sq ft)	52.67	73.08	15.35
E.G. Slope (ft/ft)	0.013992	Area (sq ft)	52.67	73.08	15.35
Q Total (cfs)	830.00	Flow (cfs)	246.58	570.66	12.77
Top Width (ft)	112.80	Top Width (ft)	57.00	20.00	35.80
Vel Total (ft/s)	5.88	Avg. Vel. (ft/s)	4.68	7.81	0.83
Max Chl Dpth (ft)	5.05	Hydr. Depth (ft)	0.92	3.65	0.43
Conv. Total (cfs)	7016.7	Conv. (cfs)	2084.5	4824.2	107.9
Length Wtd. (ft)	114.63	Wetted Per. (ft)	58.57	22.07	35.87
Min Ch El (ft)	808.50	Shear (lb/sq ft)	0.79	2.89	0.37
Alpha	1.40	Stream Power (lb/ft s)	3.68	22.59	0.31
Frctn Loss (ft)		Cum Volume (acre-ft)	4.88	2.74	1.50
C & E Loss (ft)		Cum SA (acres)	2.78	0.64	0.91

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR RIVER: Main Channel  
REACH: Upper RS: 124.5

INPUT

Description: cross-vane between x-sections 124 and 126

Distance from Upstream XS = 112  
Deck/Roadway Width = 2  
Weir Coefficient = 3  
Weir Embankment Coordinates num = 2  
Sta Elev Sta Elev  
55 810 77 810

Upstream Embankment side slope = 4 horiz. to 1.0 vertical  
Downstream Embankment side slope = 1 horiz. to 1.0 vertical  
Maximum allowable submergence for weir flow = .95  
Elevation at which weir flow begins =  
Weir crest shape = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT Profile #1

E.G. Elev (ft)	811.19	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	811.14	Wr Top Wdth (ft)	15.77
Q Total (cfs)	52.00	Total Gate Flow (cfs)	



Q Weir (cfs)	52.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	16.45	Gate Open Ht (ft)	
Weir Sta Lft (ft)	59.62	Gate #Open	
Weir Sta Rgt (ft)	75.38	Gate Area (sq ft)	
Weir Max Depth (ft)	1.19	Gate Submerg	
Weir Avg Depth (ft)	1.04	Gate Invert (ft)	
Weir Submerg	0.67		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	811.38	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	811.30	Wr Top Wdth (ft)	16.51
Q Total (cfs)	66.00	Total Gate Flow (cfs)	
Q Weir (cfs)	66.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	19.46	Gate Open Ht (ft)	
Weir Sta Lft (ft)	59.24	Gate #Open	
Weir Sta Rgt (ft)	75.76	Gate Area (sq ft)	
Weir Max Depth (ft)	1.38	Gate Submerg	
Weir Avg Depth (ft)	1.18	Gate Invert (ft)	
Weir Submerg	0.69		

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	811.55	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	811.46	Wr Top Wdth (ft)	17.20
Q Total (cfs)	80.00	Total Gate Flow (cfs)	
Q Weir (cfs)	80.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	22.34	Gate Open Ht (ft)	
Weir Sta Lft (ft)	58.90	Gate #Open	
Weir Sta Rgt (ft)	76.10	Gate Area (sq ft)	
Weir Max Depth (ft)	1.55	Gate Submerg	
Weir Avg Depth (ft)	1.30	Gate Invert (ft)	
Weir Submerg	0.69		

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	812.23	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	812.05	Wr Top Wdth (ft)	31.01
Q Total (cfs)	150.00	Total Gate Flow (cfs)	
Q Weir (cfs)	150.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	36.35	Gate Open Ht (ft)	
Weir Sta Lft (ft)	0.00	Gate #Open	
Weir Sta Rgt (ft)	78.64	Gate Area (sq ft)	
Weir Max Depth (ft)	2.23	Gate Submerg	
Weir Avg Depth (ft)	1.17	Gate Invert (ft)	
Weir Submerg	0.60		

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	812.61	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	812.34	Wr Top Wdth (ft)	50.43
Q Total (cfs)	210.00	Total Gate Flow (cfs)	
Q Weir (cfs)	210.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	51.78	Gate Open Ht (ft)	
Weir Sta Lft (ft)	0.00	Gate #Open	
Weir Sta Rgt (ft)	81.29	Gate Area (sq ft)	
Weir Max Depth (ft)	2.61	Gate Submerg	
Weir Avg Depth (ft)	1.03	Gate Invert (ft)	
Weir Submerg	0.52		

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	813.06	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	812.59	Wr Top Wdth (ft)	86.90
Q Total (cfs)	320.00	Total Gate Flow (cfs)	
Q Weir (cfs)	320.00	Gate Group Q (cfs)	

Wr Flw Area (sq ft)	79.37	Gate Open Ht (ft)	
Weir Sta Lft (ft)	0.00	Gate #Open	
Weir Sta Rgt (ft)	86.90	Gate Area (sq ft)	
Weir Max Depth (ft)	3.06	Gate Submerg	
Weir Avg Depth (ft)	0.91	Gate Invert (ft)	
Weir Submerg	0.39		

INLINE WEIR/SPILLWAY OUTPUT Profile #50

E.G. Elev (ft)	813.36	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	812.64	Wr Top Wdth (ft)	102.58
Q Total (cfs)	410.00	Total Gate Flow (cfs)	
Q Weir (cfs)	410.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	107.93	Gate Open Ht (ft)	
Weir Sta Lft (ft)	0.00	Gate #Open	
Weir Sta Rgt (ft)	102.58	Gate Area (sq ft)	
Weir Max Depth (ft)	3.36	Gate Submerg	
Weir Avg Depth (ft)	1.05	Gate Invert (ft)	
Weir Submerg	0.24		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	813.67	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	813.00	Wr Top Wdth (ft)	118.77
Q Total (cfs)	520.00	Total Gate Flow (cfs)	
Q Weir (cfs)	520.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	142.40	Gate Open Ht (ft)	
Weir Sta Lft (ft)	0.00	Gate #Open	
Weir Sta Rgt (ft)	118.77	Gate Area (sq ft)	
Weir Max Depth (ft)	3.67	Gate Submerg	
Weir Avg Depth (ft)	1.20	Gate Invert (ft)	
Weir Submerg	0.28		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	813.94	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	813.26	Wr Top Wdth (ft)	132.92
Q Total (cfs)	640.00	Total Gate Flow (cfs)	
Q Weir (cfs)	640.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	176.63	Gate Open Ht (ft)	
Weir Sta Lft (ft)	0.00	Gate #Open	
Weir Sta Rgt (ft)	132.92	Gate Area (sq ft)	
Weir Max Depth (ft)	3.94	Gate Submerg	
Weir Avg Depth (ft)	1.33	Gate Invert (ft)	
Weir Submerg	0.28		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	814.31	Min El Weir Flow (ft)	810.01
W.S. Elev (ft)	813.55	Wr Top Wdth (ft)	137.84
Q Total (cfs)	830.00	Total Gate Flow (cfs)	
Q Weir (cfs)	830.00	Gate Group Q (cfs)	

Wr Flw Area (sq ft)	226.51	Gate Open Ht (ft)
Weir Sta Lft (ft)	0.00	Gate #Open
Weir Sta Rgt (ft)	137.84	Gate Area (sq ft)
Weir Max Depth (ft)	4.31	Gate Submerg
Weir Avg Depth (ft)	1.64	Gate Invert (ft)
Weir Submerg	0.30	

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION RIVER: Main Channel  
 REACH: Upper RS: 124

INPUT

Description:

Station Elevation Data		num=		18					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	9	814	21	813	50	812	139	811
141	810	143	809	145	808	150	807.2	151	808
156	809	157	810	159	811	166	812	171	813
181	819	190	821	225	825				

Manning's n Values		num=		3	
Sta	n Val	Sta	n Val	Sta	n Val
0	.12	139	.05	159	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	139	159		84 112.09	66	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	810.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
W.S. Elev (ft)	810.82	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	808.84	Flow Area (sq ft)		40.89	
E.G. Slope (ft/ft)	0.000753	Area (sq ft)		40.89	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	19.28	Top Width (ft)		19.28	
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)		1.27	
Max Chl Dpth (ft)	3.62	Hydr. Depth (ft)		2.12	
Conv. Total (cfs)	1894.4	Conv. (cfs)		1894.4	
Length Wtd. (ft)	112.09	Wetted Per. (ft)		21.00	
Min Ch El (ft)	807.20	Shear (lb/sq ft)		0.09	
Alpha	1.00	Stream Power (lb/ft s)		0.12	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.11	1.06	0.02
C & E Loss (ft)		Cum SA (acres)	0.50	0.51	0.13

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	811.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
W.S. Elev (ft)	810.98	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	809.00	Flow Area (sq ft)		44.03	
E.G. Slope (ft/ft)	0.000992	Area (sq ft)		44.03	
Q Total (cfs)	66.00	Flow (cfs)		66.00	
Top Width (ft)	19.93	Top Width (ft)		19.93	
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)		1.50	
Max Chl Dpth (ft)	3.78	Hydr. Depth (ft)		2.21	
Conv. Total (cfs)	2096.0	Conv. (cfs)		2096.0	
Length Wtd. (ft)	112.09	Wetted Per. (ft)		21.72	
Min Ch El (ft)	807.20	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.19	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.19	1.15	0.03
C & E Loss (ft)		Cum SA (acres)	0.70	0.53	0.15

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	811.15	Wt. n-Val.	0.120	0.050	0.120
Vel Head (ft)	0.05	Reach Len. (ft)	84.00	112.09	66.00
W.S. Elev (ft)	811.10	Flow Area (sq ft)	0.48	46.48	0.04
Crit W.S. (ft)	809.14	Area (sq ft)	0.48	46.48	0.04
E.G. Slope (ft/ft)	0.001221	Flow (cfs)	0.03	79.97	0.00
Q Total (cfs)	80.00	Top Width (ft)	9.27	20.00	0.73
Top Width (ft)	30.00	Avg. Vel. (ft/s)	0.06	1.72	0.06
Vel Total (ft/s)	1.70	Hydr. Depth (ft)	0.05	2.32	0.05
Max Chl Dpth (ft)	3.90	Conv. (cfs)	0.8	2288.3	0.1
Conv. Total (cfs)	2289.2	Wetted Per. (ft)	9.27	21.80	0.74
Length Wtd. (ft)	112.09	Shear (lb/sq ft)	0.00	0.16	0.00
Min Ch El (ft)	807.20	Stream Power (lb/ft s)	0.00	0.28	0.00
Alpha	1.02	Cum Volume (acre-ft)	0.31	1.25	0.06
Frctn Loss (ft)		Cum SA (acres)	0.80	0.54	0.20
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	811.58	Wt. n-Val.	0.120	0.050	0.120
Vel Head (ft)	0.12	Reach Len. (ft)	84.00	112.09	66.00
W.S. Elev (ft)	811.46	Flow Area (sq ft)	9.40	53.59	0.74
Crit W.S. (ft)	809.70	Area (sq ft)	9.40	53.59	0.74
E.G. Slope (ft/ft)	0.002589	Flow (cfs)	2.22	147.60	0.17
Q Total (cfs)	150.00	Top Width (ft)	40.91	20.00	3.22
Top Width (ft)	64.13	Avg. Vel. (ft/s)	0.24	2.75	0.23
Vel Total (ft/s)	2.35	Hydr. Depth (ft)	0.23	2.68	0.23
Max Chl Dpth (ft)	4.26	Conv. (cfs)	43.7	2901.1	3.4
Conv. Total (cfs)	2948.2	Wetted Per. (ft)	40.92	21.80	3.25
Length Wtd. (ft)	112.09	Shear (lb/sq ft)	0.04	0.40	0.04
Min Ch El (ft)	807.20	Stream Power (lb/ft s)	0.01	1.09	0.01
Alpha	1.35	Cum Volume (acre-ft)	0.82	1.53	0.20
Frctn Loss (ft)		Cum SA (acres)	1.71	0.57	0.39
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	811.80	Wt. n-Val.	0.120	0.050	0.120
Vel Head (ft)	0.20	Reach Len. (ft)	84.00	112.09	66.00
W.S. Elev (ft)	811.61	Flow Area (sq ft)	16.40	56.54	1.29
Crit W.S. (ft)	810.10	Area (sq ft)	16.40	56.54	1.29
E.G. Slope (ft/ft)	0.004123	Flow (cfs)	5.89	203.65	0.46
Q Total (cfs)	210.00	Top Width (ft)	54.03	20.00	4.25
Top Width (ft)	78.28	Avg. Vel. (ft/s)	0.36	3.60	0.36
Vel Total (ft/s)	2.83	Hydr. Depth (ft)	0.30	2.83	0.30
Max Chl Dpth (ft)	4.41	Conv. (cfs)	91.7	3171.8	7.2
Conv. Total (cfs)	3270.7	Wetted Per. (ft)	54.03	21.80	4.29
Length Wtd. (ft)	112.09	Shear (lb/sq ft)	0.08	0.67	0.08
Min Ch El (ft)	807.20	Stream Power (lb/ft s)	0.03	2.40	0.03
Alpha	1.57	Cum Volume (acre-ft)	1.21	1.67	0.32
Frctn Loss (ft)		Cum SA (acres)	1.90	0.58	0.47
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	812.09	Wt. n-Val.	0.120	0.050	0.120
Vel Head (ft)	0.42	Reach Len. (ft)	84.00	112.09	66.00
W.S. Elev (ft)	811.67	Flow Area (sq ft)	19.97	57.80	1.57
Crit W.S. (ft)	810.72	Area (sq ft)	19.97	57.80	1.57
E.G. Slope (ft/ft)	0.008761	Flow (cfs)	11.16	307.96	0.87
Q Total (cfs)	320.00	Top Width (ft)	59.62	20.00	4.69
Top Width (ft)	84.31	Avg. Vel. (ft/s)	0.56	5.33	0.56
Vel Total (ft/s)	4.03	Hydr. Depth (ft)	0.33	2.89	0.33
Max Chl Dpth (ft)	4.47	Conv. (cfs)	119.3	3290.2	9.3
Conv. Total (cfs)	3418.8	Wetted Per. (ft)	59.63	21.80	4.74
Length Wtd. (ft)	112.09	Shear (lb/sq ft)	0.18	1.45	0.18
Min Ch El (ft)	807.20	Stream Power (lb/ft s)	0.10	7.73	0.10
Alpha	1.68				

Frctn Loss (ft)	Cum Volume (acre-ft)	1.85	1.86	0.53
C & E Loss (ft)	Cum SA (acres)	2.13	0.58	0.55

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	812.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.93	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	811.38	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	811.20	Flow Area (sq ft)	6.53	52.06	0.51
E.G. Slope (ft/ft)	0.021546	Area (sq ft)	6.53	52.06	0.51
Q Total (cfs)	410.00	Flow (cfs)	3.94	405.75	0.31
Top Width (ft)	56.78	Top Width (ft)	34.10	20.00	2.68
Vel Total (ft/s)	6.94	Avg. Vel. (ft/s)	0.60	7.79	0.60
Max Chl Dpth (ft)	4.18	Hydr. Depth (ft)	0.19	2.60	0.19
Conv. Total (cfs)	2793.2	Conv. (cfs)	26.9	2764.2	2.1
Length Wtd. (ft)	112.09	Wetted Per. (ft)	34.10	21.80	2.71
Min Ch El (ft)	807.20	Shear (lb/sq ft)	0.26	3.21	0.26
Alpha	1.25	Stream Power (lb/ft s)	0.16	25.03	0.15
Frctn Loss (ft)		Cum Volume (acre-ft)	2.32	1.98	0.69
C & E Loss (ft)		Cum SA (acres)	2.18	0.58	0.58

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	812.77	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.85	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	811.92	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	811.92	Flow Area (sq ft)	37.63	62.79	2.96
E.G. Slope (ft/ft)	0.016270	Area (sq ft)	37.63	62.79	2.96
Q Total (cfs)	520.00	Flow (cfs)	35.40	481.83	2.77
Top Width (ft)	108.28	Top Width (ft)	81.84	20.00	6.44
Vel Total (ft/s)	5.03	Avg. Vel. (ft/s)	0.94	7.67	0.93
Max Chl Dpth (ft)	4.72	Hydr. Depth (ft)	0.46	3.14	0.46
Conv. Total (cfs)	4076.7	Conv. (cfs)	277.6	3777.4	21.7
Length Wtd. (ft)	112.09	Wetted Per. (ft)	81.85	21.80	6.50
Min Ch El (ft)	807.20	Shear (lb/sq ft)	0.47	2.93	0.46
Alpha	2.16	Stream Power (lb/ft s)	0.44	22.45	0.43
Frctn Loss (ft)		Cum Volume (acre-ft)	2.94	2.12	0.88
C & E Loss (ft)		Cum SA (acres)	2.30	0.58	0.62

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	813.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.82	Wt. n-Val.	0.120	0.050	0.120
W.S. Elev (ft)	812.28	Reach Len. (ft)	84.00	112.09	66.00
Crit W.S. (ft)	812.28	Flow Area (sq ft)	70.41	69.97	5.64
E.G. Slope (ft/ft)	0.014685	Area (sq ft)	70.41	69.97	5.64
Q Total (cfs)	640.00	Flow (cfs)	85.29	548.26	6.45
Top Width (ft)	125.47	Top Width (ft)	97.08	20.00	8.39
Vel Total (ft/s)	4.38	Avg. Vel. (ft/s)	1.21	7.84	1.14
Max Chl Dpth (ft)	5.08	Hydr. Depth (ft)	0.73	3.50	0.67
Conv. Total (cfs)	5281.3	Conv. (cfs)	703.8	4524.3	53.2
Length Wtd. (ft)	112.09	Wetted Per. (ft)	97.09	21.80	8.49
Min Ch El (ft)	807.20	Shear (lb/sq ft)	0.66	2.94	0.61
Alpha	2.75	Stream Power (lb/ft s)	0.81	23.06	0.70
Frctn Loss (ft)		Cum Volume (acre-ft)	3.71	2.33	1.11
C & E Loss (ft)		Cum SA (acres)	2.56	0.58	0.73

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #500

Parameter	Value	Element	Left OB	Channel	Right OB
E.G. Elev (ft)	813.53	Element	0.120	0.050	0.120
Vel Head (ft)	0.89	Wt. n-Val.	84.00	112.09	66.00
W.S. Elev (ft)	812.64	Reach Len. (ft)	107.38	77.20	9.00
Crit W.S. (ft)	812.64	Flow Area (sq ft)	107.38	77.20	9.00
E.G. Slope (ft/ft)	0.015078	Area (sq ft)	163.08	654.43	12.49
Q Total (cfs)	830.00	Flow (cfs)	107.56	20.00	10.20
Top Width (ft)	137.75	Top Width (ft)	1.52	8.48	1.39
Vel Total (ft/s)	4.29	Avg. Vel. (ft/s)	1.00	3.86	0.88
Max Chl Dpth (ft)	5.44	Hydr. Depth (ft)	1328.1	5329.6	101.7
Conv. Total (cfs)	6759.4	Conv. (cfs)	107.57	21.80	10.33
Length Wtd. (ft)	112.09	Wetted Per. (ft)	0.94	3.33	0.82
Min Ch El (ft)	807.20	Shear (lb/sq ft)	1.43	28.26	1.14
Alpha	3.11	Stream Power (lb/ft s)	4.75	2.55	1.46
Frctn Loss (ft)		Cum Volume (acre-ft)	2.64	0.58	0.83
C & E Loss (ft)		Cum SA (acres)			

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR RIVER: Main Channel  
 REACH: Upper RS: 122.5

INPUT  
 Description: cross-vane between x-sections 122 and 124  
 Distance from Upstream XS = 55  
 Deck/Roadway Width = 2  
 Weir Coefficient = 3  
 Weir Embankment Coordinates num = 2  
 Sta Elev Sta Elev  
 139 809.83 159 809.83

Upstream Embankment side slope = 4 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 1 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Weir crest shape = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT Profile #1

E.G. Elev (ft)	810.85	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	810.82	Wr Top Wdth (ft)	19.39
Q Total (cfs)	52.00	Total Gate Flow (cfs)	
Q Weir (cfs)	52.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	17.65	Gate Open Ht (ft)	
Weir Sta Lft (ft)	139.31	Gate #Open	
Weir Sta Rgt (ft)	158.69	Gate Area (sq ft)	
Weir Max Depth (ft)	1.02	Gate Submerg	
Weir Avg Depth (ft)	0.91	Gate Invert (ft)	
Weir Submerg	0.31		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	811.02	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	810.98	Wr Top Wdth (ft)	21.58
Q Total (cfs)	66.00	Total Gate Flow (cfs)	
Q Weir (cfs)	66.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	21.02	Gate Open Ht (ft)	
Weir Sta Lft (ft)	137.54	Gate #Open	
Weir Sta Rgt (ft)	159.11	Gate Area (sq ft)	
Weir Max Depth (ft)	1.19	Gate Submerg	
Weir Avg Depth (ft)	0.97	Gate Invert (ft)	
Weir Submerg	0.33		

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	811.15	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	811.10	Wr Top Wdth (ft)	34.41
Q Total (cfs)	80.00	Total Gate Flow (cfs)	
Q Weir (cfs)	80.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	24.76	Gate Open Ht (ft)	
Weir Sta Lft (ft)	125.64	Gate #Open	
Weir Sta Rgt (ft)	160.05	Gate Area (sq ft)	
Weir Max Depth (ft)	1.32	Gate Submerg	
Weir Avg Depth (ft)	0.72	Gate Invert (ft)	
Weir Submerg	0.34		

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	811.58	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	811.46	Wr Top Wdth (ft)	75.26
Q Total (cfs)	150.00	Total Gate Flow (cfs)	
Q Weir (cfs)	150.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	48.09	Gate Open Ht (ft)	
Weir Sta Lft (ft)	87.77	Gate #Open	
Weir Sta Rgt (ft)	163.03	Gate Area (sq ft)	
Weir Max Depth (ft)	1.75	Gate Submerg	
Weir Avg Depth (ft)	0.64	Gate Invert (ft)	
Weir Submerg	0.37		

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	811.80	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	811.61	Wr Top Wdth (ft)	97.04
Q Total (cfs)	210.00	Total Gate Flow (cfs)	
Q Weir (cfs)	210.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	67.64	Gate Open Ht (ft)	
Weir Sta Lft (ft)	67.58	Gate #Open	
Weir Sta Rgt (ft)	164.62	Gate Area (sq ft)	
Weir Max Depth (ft)	1.97	Gate Submerg	
Weir Avg Depth (ft)	0.70	Gate Invert (ft)	
Weir Submerg	0.36		

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	812.09	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	811.67	Wr Top Wdth (ft)	119.21
Q Total (cfs)	320.00	Total Gate Flow (cfs)	
Q Weir (cfs)	320.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	99.77	Gate Open Ht (ft)	
Weir Sta Lft (ft)	47.26	Gate #Open	
Weir Sta Rgt (ft)	166.47	Gate Area (sq ft)	
Weir Max Depth (ft)	2.26	Gate Submerg	
Weir Avg Depth (ft)	0.84	Gate Invert (ft)	
Weir Submerg	0.34		

INLINE WEIR/SPILLWAY OUTPUT Profile #50

E.G. Elev (ft)	812.32	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	811.38	Wr Top Wdth (ft)	126.76
Q Total (cfs)	410.00	Total Gate Flow (cfs)	
Q Weir (cfs)	410.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	127.10	Gate Open Ht (ft)	
Weir Sta Lft (ft)	40.82	Gate #Open	
Weir Sta Rgt (ft)	167.58	Gate Area (sq ft)	
Weir Max Depth (ft)	2.49	Gate Submerg	
Weir Avg Depth (ft)	1.00	Gate Invert (ft)	
Weir Submerg	0.30		

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	812.77	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	811.92	Wr Top Wdth (ft)	142.10
Q Total (cfs)	520.00	Total Gate Flow (cfs)	
Q Weir (cfs)	520.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	187.76	Gate Open Ht (ft)	
Weir Sta Lft (ft)	27.73	Gate #Open	
Weir Sta Rgt (ft)	169.84	Gate Area (sq ft)	
Weir Max Depth (ft)	2.94	Gate Submerg	
Weir Avg Depth (ft)	1.32	Gate Invert (ft)	
Weir Submerg	0.25		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	813.10	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	812.28	Wr Top Wdth (ft)	151.35
Q Total (cfs)	640.00	Total Gate Flow (cfs)	
Q Weir (cfs)	640.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	236.51	Gate Open Ht (ft)	
Weir Sta Lft (ft)	19.82	Gate #Open	
Weir Sta Rgt (ft)	171.16	Gate Area (sq ft)	
Weir Max Depth (ft)	3.27	Gate Submerg	
Weir Avg Depth (ft)	1.56	Gate Invert (ft)	
Weir Submerg	0.28		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	813.53	Min El Weir Flow (ft)	809.84
W.S. Elev (ft)	812.64	Wr Top Wdth (ft)	157.21
Q Total (cfs)	830.00	Total Gate Flow (cfs)	
Q Weir (cfs)	830.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	302.66	Gate Open Ht (ft)	
Weir Sta Lft (ft)	14.67	Gate #Open	
Weir Sta Rgt (ft)	171.88	Gate Area (sq ft)	
Weir Max Depth (ft)	3.70	Gate Submerg	
Weir Avg Depth (ft)	1.93	Gate Invert (ft)	
Weir Submerg	0.30		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 122

INPUT

Description:

Station Elevation Data		num=		22					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	28	812	58	811	86	811	87	810
88	809	89	808	90	807	94	806	97	805.6
103	806	109	807	112	808	115	809	118	810
135	810	151	812	155	813	174	815	177	816
189	817	233	820						

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



0 .12 86 .05 135 .12

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.  
 86 118 85 95.62 89 .1 .3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.17				
Vel Head (ft)	0.00	Wt. n-Val.		0.050	0.051
W.S. Elev (ft)	810.16	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)	806.73	Flow Area (sq ft)		95.88	2.89
E.G. Slope (ft/ft)	0.000080	Area (sq ft)		95.88	2.89
Q Total (cfs)	52.00	Flow (cfs)		51.78	0.22
Top Width (ft)	49.47	Top Width (ft)		31.16	18.31
Vel Total (ft/s)	0.53	Avg. Vel. (ft/s)		0.54	0.08
Max Chl Dpth (ft)	4.56	Hydr. Depth (ft)		3.08	0.16
Conv. Total (cfs)	5802.7	Conv. (cfs)		5777.8	24.9
Length Wtd. (ft)	95.62	Wetted Per. (ft)		33.21	18.32
Min Ch El (ft)	805.60	Shear (lb/sq ft)		0.01	0.00
Alpha	1.05	Stream Power (lb/ft s)		0.01	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.11	0.88	0.01
C & E Loss (ft)		Cum SA (acres)	0.50	0.45	0.11

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.26				
Vel Head (ft)	0.01	Wt. n-Val.		0.050	0.051
W.S. Elev (ft)	810.25	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)	806.86	Flow Area (sq ft)		98.68	4.56
E.G. Slope (ft/ft)	0.000117	Area (sq ft)		98.68	4.56
Q Total (cfs)	66.00	Flow (cfs)		65.44	0.56
Top Width (ft)	50.28	Top Width (ft)		31.25	19.02
Vel Total (ft/s)	0.64	Avg. Vel. (ft/s)		0.66	0.12
Max Chl Dpth (ft)	4.65	Hydr. Depth (ft)		3.16	0.24
Conv. Total (cfs)	6097.9	Conv. (cfs)		6046.0	51.9
Length Wtd. (ft)	95.62	Wetted Per. (ft)		33.33	19.04
Min Ch El (ft)	805.60	Shear (lb/sq ft)		0.02	0.00
Alpha	1.07	Stream Power (lb/ft s)		0.01	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.19	0.97	0.03
C & E Loss (ft)		Cum SA (acres)	0.70	0.46	0.14

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.34				
Vel Head (ft)	0.01	Wt. n-Val.		0.050	0.051
W.S. Elev (ft)	810.33	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)	806.98	Flow Area (sq ft)		100.97	5.98
E.G. Slope (ft/ft)	0.000159	Area (sq ft)		100.97	5.98
Q Total (cfs)	80.00	Flow (cfs)		78.99	1.01
Top Width (ft)	50.94	Top Width (ft)		31.33	19.61
Vel Total (ft/s)	0.75	Avg. Vel. (ft/s)		0.78	0.17
Max Chl Dpth (ft)	4.73	Hydr. Depth (ft)		3.22	0.30
Conv. Total (cfs)	6349.2	Conv. (cfs)		6269.4	79.8
Length Wtd. (ft)	95.62	Wetted Per. (ft)		33.44	19.63
Min Ch El (ft)	805.60	Shear (lb/sq ft)		0.03	0.00
Alpha	1.08	Stream Power (lb/ft s)		0.02	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.31	1.06	0.05
C & E Loss (ft)		Cum SA (acres)	0.79	0.48	0.18

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	810.69				
Vel Head (ft)	0.03	Wt. n-Val.		0.050	0.053
W.S. Elev (ft)	810.66	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)	807.42	Flow Area (sq ft)		111.60	13.05
E.G. Slope (ft/ft)	0.000389	Area (sq ft)		111.60	13.05
Q Total (cfs)	150.00	Flow (cfs)		144.76	5.24
Top Width (ft)	53.97	Top Width (ft)		31.66	22.31

Vel Total (ft/s)	1.20	Avg. Vel. (ft/s)	1.30	0.40
Max Chl Dpth (ft)	5.06	Hydr. Depth (ft)	3.52	0.58
Conv. Total (cfs)	7603.0	Conv. (cfs)	7337.3	265.6
Length Wtd. (ft)	95.62	Wetted Per. (ft)	33.91	22.35
Min Ch El (ft)	805.60	Shear (lb/sq ft)	0.08	0.01
Alpha	1.13	Stream Power (lb/ft s)	0.10	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)	0.81	0.19
C & E Loss (ft)		Cum SA (acres)	1.67	0.37

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	810.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.050	0.054
W.S. Elev (ft)	810.89	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)	807.74	Flow Area (sq ft)		118.66	18.20
E.G. Slope (ft/ft)	0.000609	Area (sq ft)		118.66	18.20
Q Total (cfs)	210.00	Flow (cfs)		199.26	10.74
Top Width (ft)	55.97	Top Width (ft)		31.89	24.09
Vel Total (ft/s)	1.53	Avg. Vel. (ft/s)		1.68	0.59
Max Chl Dpth (ft)	5.29	Hydr. Depth (ft)		3.72	0.76
Conv. Total (cfs)	8512.7	Conv. (cfs)		8077.3	435.4
Length Wtd. (ft)	95.62	Wetted Per. (ft)		34.23	24.14
Min Ch El (ft)	805.60	Shear (lb/sq ft)		0.13	0.03
Alpha	1.14	Stream Power (lb/ft s)		0.22	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	1.20	1.44	0.31
C & E Loss (ft)		Cum SA (acres)	1.85	0.51	0.45

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	811.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.120	0.050	0.055
W.S. Elev (ft)	811.19	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)	808.22	Flow Area (sq ft)	5.93	128.44	25.95
E.G. Slope (ft/ft)	0.001037	Area (sq ft)	5.93	128.44	25.95
Q Total (cfs)	320.00	Flow (cfs)	0.74	295.86	23.39
Top Width (ft)	92.29	Top Width (ft)	33.76	32.00	26.54
Vel Total (ft/s)	2.00	Avg. Vel. (ft/s)	0.13	2.30	0.90
Max Chl Dpth (ft)	5.59	Hydr. Depth (ft)	0.18	4.01	0.98
Conv. Total (cfs)	9938.3	Conv. (cfs)	23.0	9188.8	726.6
Length Wtd. (ft)	95.62	Wetted Per. (ft)	33.76	34.39	26.61
Min Ch El (ft)	805.60	Shear (lb/sq ft)	0.01	0.24	0.06
Alpha	1.25	Stream Power (lb/ft s)	0.00	0.56	0.06
Frctn Loss (ft)		Cum Volume (acre-ft)	1.83	1.62	0.51
C & E Loss (ft)		Cum SA (acres)	2.04	0.51	0.52

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	811.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.120	0.050	0.055
W.S. Elev (ft)	811.38	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)	808.57	Flow Area (sq ft)	12.67	134.35	30.98
E.G. Slope (ft/ft)	0.001412	Area (sq ft)	12.67	134.35	30.98
Q Total (cfs)	410.00	Flow (cfs)	2.77	372.16	35.07
Top Width (ft)	99.31	Top Width (ft)	39.29	32.00	28.01
Vel Total (ft/s)	2.30	Avg. Vel. (ft/s)	0.22	2.77	1.13
Max Chl Dpth (ft)	5.78	Hydr. Depth (ft)	0.32	4.20	1.11
Conv. Total (cfs)	10910.5	Conv. (cfs)	73.7	9903.5	933.3
Length Wtd. (ft)	95.62	Wetted Per. (ft)	39.30	34.39	28.10
Min Ch El (ft)	805.60	Shear (lb/sq ft)	0.03	0.34	0.10
Alpha	1.33	Stream Power (lb/ft s)	0.01	0.95	0.11
Frctn Loss (ft)		Cum Volume (acre-ft)	2.30	1.74	0.67
C & E Loss (ft)		Cum SA (acres)	2.11	0.51	0.56

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	811.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.120	0.050	0.056

W.S. Elev (ft)	811.56	Reach Len. (ft)	85.00	95.62	89.00
Crit W.S. (ft)	808.96	Flow Area (sq ft)	20.43	140.26	36.29
E.G. Slope (ft/ft)	0.001893	Area (sq ft)	20.43	140.26	36.29
Q Total (cfs)	520.00	Flow (cfs)	6.52	462.88	50.60
Top Width (ft)	106.32	Top Width (ft)	44.83	32.00	29.49
Vel Total (ft/s)	2.64	Avg. Vel. (ft/s)	0.32	3.30	1.39
Max Chl Dpth (ft)	5.96	Hydr. Depth (ft)	0.46	4.38	1.23
Conv. Total (cfs)	11952.9	Conv. (cfs)	149.8	10640.0	1163.1
Length Wtd. (ft)	95.62	Wetted Per. (ft)	44.84	34.39	29.59
Min Ch El (ft)	805.60	Shear (lb/sq ft)	0.05	0.48	0.14
Alpha	1.42	Stream Power (lb/ft s)	0.02	1.59	0.20
Frctn Loss (ft)		Cum Volume (acre-ft)	2.89	1.86	0.85
C & E Loss (ft)		Cum SA (acres)	2.18	0.51	0.60

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	811.93	Wt. n-Val.	0.120	0.050	0.057
Vel Head (ft)	0.20	Reach Len. (ft)	85.00	95.62	89.00
W.S. Elev (ft)	811.73	Flow Area (sq ft)	28.41	145.65	41.37
Crit W.S. (ft)	809.34	Area (sq ft)	28.41	145.65	41.37
E.G. Slope (ft/ft)	0.002437	Flow (cfs)	11.93	559.31	68.76
Q Total (cfs)	640.00	Top Width (ft)	49.89	32.00	30.84
Top Width (ft)	112.72	Avg. Vel. (ft/s)	0.42	3.84	1.66
Vel Total (ft/s)	2.97	Hydr. Depth (ft)	0.57	4.55	1.34
Max Chl Dpth (ft)	6.13	Conv. (cfs)	241.7	11330.2	1392.8
Conv. Total (cfs)	12964.7	Wetted Per. (ft)	49.90	34.39	30.94
Length Wtd. (ft)	95.62	Shear (lb/sq ft)	0.09	0.64	0.20
Min Ch El (ft)	805.60	Stream Power (lb/ft s)	0.04	2.47	0.34
Alpha	1.49	Cum Volume (acre-ft)	3.62	2.05	1.08
Frctn Loss (ft)		Cum SA (acres)	2.42	0.52	0.70
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	812.23	Wt. n-Val.	0.120	0.050	0.057
Vel Head (ft)	0.30	Reach Len. (ft)	85.00	95.62	89.00
W.S. Elev (ft)	811.93	Flow Area (sq ft)	39.08	152.10	47.75
Crit W.S. (ft)	809.87	Area (sq ft)	39.08	152.10	47.75
E.G. Slope (ft/ft)	0.003391	Flow (cfs)	22.19	709.25	98.57
Q Total (cfs)	830.00	Top Width (ft)	55.94	32.00	32.45
Top Width (ft)	120.39	Avg. Vel. (ft/s)	0.57	4.66	2.06
Vel Total (ft/s)	3.47	Hydr. Depth (ft)	0.70	4.75	1.47
Max Chl Dpth (ft)	6.33	Conv. (cfs)	381.0	12179.2	1692.6
Conv. Total (cfs)	14252.8	Wetted Per. (ft)	55.95	34.39	32.57
Length Wtd. (ft)	95.62	Shear (lb/sq ft)	0.15	0.94	0.31
Min Ch El (ft)	805.60	Stream Power (lb/ft s)	0.08	4.37	0.64
Alpha	1.58	Cum Volume (acre-ft)	4.61	2.25	1.42
Frctn Loss (ft)		Cum SA (acres)	2.49	0.52	0.80
C & E Loss (ft)					

INLINE WEIR RIVER: Main Channel  
 REACH: Upper RS: 120.5

INPUT

Description: cross-vane between x-sections 120 and 122

Distance from Upstream XS = 10  
 Deck/Roadway Width = 2  
 Weir Coefficient = 3  
 Weir Embankment Coordinates num = 2  

Sta	Elev	Sta	Elev
86	809.5	118	809.5

Upstream Embankment side slope = 4 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 1 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Weir crest shape = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT Profile #1

E.G. Elev (ft)	810.17	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	810.16	Wr Top Wdth (ft)	49.51
Q Total (cfs)	52.00	Total Gate Flow (cfs)	
Q Weir (cfs)	52.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	23.19	Gate Open Ht (ft)	
Weir Sta Lft (ft)	86.83	Gate #Open	
Weir Sta Rgt (ft)	136.34	Gate Area (sq ft)	
Weir Max Depth (ft)	0.67	Gate Submerg	
Weir Avg Depth (ft)	0.47	Gate Invert (ft)	
Weir Submerg	0.00		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	810.26	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	810.25	Wr Top Wdth (ft)	50.34
Q Total (cfs)	66.00	Total Gate Flow (cfs)	
Q Weir (cfs)	66.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	27.78	Gate Open Ht (ft)	
Weir Sta Lft (ft)	86.74	Gate #Open	
Weir Sta Rgt (ft)	137.08	Gate Area (sq ft)	
Weir Max Depth (ft)	0.76	Gate Submerg	
Weir Avg Depth (ft)	0.55	Gate Invert (ft)	
Weir Submerg	0.00		

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	810.34	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	810.33	Wr Top Wdth (ft)	51.02
Q Total (cfs)	80.00	Total Gate Flow (cfs)	
Q Weir (cfs)	80.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	31.63	Gate Open Ht (ft)	
Weir Sta Lft (ft)	86.66	Gate #Open	
Weir Sta Rgt (ft)	137.69	Gate Area (sq ft)	
Weir Max Depth (ft)	0.84	Gate Submerg	
Weir Avg Depth (ft)	0.62	Gate Invert (ft)	
Weir Submerg	0.00		

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	810.69	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	810.66	Wr Top Wdth (ft)	54.20
Q Total (cfs)	150.00	Total Gate Flow (cfs)	
Q Weir (cfs)	150.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	50.22	Gate Open Ht (ft)	
Weir Sta Lft (ft)	86.31	Gate #Open	
Weir Sta Rgt (ft)	140.51	Gate Area (sq ft)	
Weir Max Depth (ft)	1.19	Gate Submerg	
Weir Avg Depth (ft)	0.93	Gate Invert (ft)	
Weir Submerg	0.00		

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	810.93	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	810.89	Wr Top Wdth (ft)	56.35
Q Total (cfs)	210.00	Total Gate Flow (cfs)	
Q Weir (cfs)	210.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	63.41	Gate Open Ht (ft)	
Weir Sta Lft (ft)	86.07	Gate #Open	
Weir Sta Rgt (ft)	142.42	Gate Area (sq ft)	
Weir Max Depth (ft)	1.43	Gate Submerg	
Weir Avg Depth (ft)	1.13	Gate Invert (ft)	
Weir Submerg	0.09		

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	811.27	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	811.19	Wr Top Wdth (ft)	95.22
Q Total (cfs)	320.00	Total Gate Flow (cfs)	
Q Weir (cfs)	320.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	91.74	Gate Open Ht (ft)	
Weir Sta Lft (ft)	49.93	Gate #Open	
Weir Sta Rgt (ft)	145.15	Gate Area (sq ft)	
Weir Max Depth (ft)	1.77	Gate Submerg	
Weir Avg Depth (ft)	0.96	Gate Invert (ft)	
Weir Submerg	0.17		

INLINE WEIR/SPILLWAY OUTPUT Profile #50

E.G. Elev (ft)	811.49	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	811.38	Wr Top Wdth (ft)	103.48
Q Total (cfs)	410.00	Total Gate Flow (cfs)	
Q Weir (cfs)	410.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	113.33	Gate Open Ht (ft)	
Weir Sta Lft (ft)	43.41	Gate #Open	
Weir Sta Rgt (ft)	146.89	Gate Area (sq ft)	
Weir Max Depth (ft)	1.99	Gate Submerg	
Weir Avg Depth (ft)	1.10	Gate Invert (ft)	
Weir Submerg	0.22		

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	811.71	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	811.56	Wr Top Wdth (ft)	112.15
Q Total (cfs)	520.00	Total Gate Flow (cfs)	
Q Weir (cfs)	520.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	137.94	Gate Open Ht (ft)	
Weir Sta Lft (ft)	36.56	Gate #Open	
Weir Sta Rgt (ft)	148.72	Gate Area (sq ft)	
Weir Max Depth (ft)	2.21	Gate Submerg	
Weir Avg Depth (ft)	1.23	Gate Invert (ft)	
Weir Submerg	0.26		

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	811.93	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	811.73	Wr Top Wdth (ft)	120.50
Q Total (cfs)	640.00	Total Gate Flow (cfs)	
Q Weir (cfs)	640.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	163.50	Gate Open Ht (ft)	
Weir Sta Lft (ft)	29.97	Gate #Open	
Weir Sta Rgt (ft)	150.47	Gate Area (sq ft)	
Weir Max Depth (ft)	2.43	Gate Submerg	
Weir Avg Depth (ft)	1.36	Gate Invert (ft)	
Weir Submerg	0.29		

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	812.23	Min El Weir Flow (ft)	809.51
W.S. Elev (ft)	811.93	Wr Top Wdth (ft)	126.04
Q Total (cfs)	830.00	Total Gate Flow (cfs)	
Q Weir (cfs)	830.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	199.86	Gate Open Ht (ft)	
Weir Sta Lft (ft)	25.87	Gate #Open	
Weir Sta Rgt (ft)	151.91	Gate Area (sq ft)	
Weir Max Depth (ft)	2.73	Gate Submerg	
Weir Avg Depth (ft)	1.59	Gate Invert (ft)	
Weir Submerg	0.30		

CROSS SECTION RIVER: Main Channel

REACH: Upper

RS: 120

INPUT

Description:

Station Elevation Data num= 19									
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	17	813	54	811	85	810	144	809
146	808	147	807	148	806	150	805	156	804.8
169	805	173	806	177	807	181	809	186	810
193	811	200	813	210	814	242	815		

Manning's n Values num= 3					
Sta	n Val	Sta	n Val	Sta	n Val
0	.03	144	.05	181	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	144	181		66 60.99	51	.1	.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.92				
Vel Head (ft)	0.00	Wt. n-Val.		0.050	
W.S. Elev (ft)	808.92	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	805.50	Flow Area (sq ft)		114.95	
E.G. Slope (ft/ft)	0.000054	Area (sq ft)		114.95	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	36.68	Top Width (ft)		36.68	
Vel Total (ft/s)	0.45	Avg. Vel. (ft/s)		0.45	
Max Chl Dpth (ft)	4.12	Hydr. Depth (ft)		3.13	
Conv. Total (cfs)	7063.2	Conv. (cfs)		7063.2	
Length Wtd. (ft)	60.99	Wetted Per. (ft)		38.67	
Min Ch El (ft)	804.80	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.00	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.11	0.65	0.01
C & E Loss (ft)		Cum SA (acres)	0.50	0.37	0.09

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.03				
Vel Head (ft)	0.00	Wt. n-Val.	0.030	0.050	0.000
W.S. Elev (ft)	809.02	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	805.60	Flow Area (sq ft)	0.02	118.77	0.00
E.G. Slope (ft/ft)	0.000079	Area (sq ft)	0.02	118.77	0.00
Q Total (cfs)	66.00	Flow (cfs)	0.00	66.00	0.00
Top Width (ft)	38.51	Top Width (ft)	1.39	37.00	0.12
Vel Total (ft/s)	0.56	Avg. Vel. (ft/s)	0.02	0.56	0.01
Max Chl Dpth (ft)	4.22	Hydr. Depth (ft)	0.01	3.21	0.01
Conv. Total (cfs)	7413.1	Conv. (cfs)	0.0	7413.0	0.0
Length Wtd. (ft)	60.99	Wetted Per. (ft)	1.39	39.02	0.12
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.00	0.02	
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.01	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.19	0.73	0.03
C & E Loss (ft)		Cum SA (acres)	0.70	0.39	0.12

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.13				
Vel Head (ft)	0.01	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	809.12	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	805.70	Flow Area (sq ft)	0.42	122.33	0.04
E.G. Slope (ft/ft)	0.000105	Area (sq ft)	0.42	122.33	0.04
Q Total (cfs)	80.00	Flow (cfs)	0.03	79.97	0.00
Top Width (ft)	44.66	Top Width (ft)	7.06	37.00	0.60
Vel Total (ft/s)	0.65	Avg. Vel. (ft/s)	0.08	0.65	0.02
Max Chl Dpth (ft)	4.32	Hydr. Depth (ft)	0.06	3.31	0.06
Conv. Total (cfs)	7789.7	Conv. (cfs)	3.2	7786.4	0.1
Length Wtd. (ft)	60.99	Wetted Per. (ft)	7.06	39.02	0.61
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.00	0.02	0.00
Alpha	1.01	Stream Power (lb/ft s)	0.00	0.01	0.00

Frctn Loss (ft)	Cum Volume (acre-ft)	0.31	0.81	0.05
C & E Loss (ft)	Cum SA (acres)	0.78	0.40	0.16

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	809.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	809.47	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	806.09	Flow Area (sq ft)	6.49	135.25	0.55
E.G. Slope (ft/ft)	0.000258	Area (sq ft)	6.49	135.25	0.55
Q Total (cfs)	150.00	Flow (cfs)	1.96	147.99	0.04
Top Width (ft)	67.02	Top Width (ft)	27.67	37.00	2.34
Vel Total (ft/s)	1.05	Avg. Vel. (ft/s)	0.30	1.09	0.07
Max Chl Dpth (ft)	4.67	Hydr. Depth (ft)	0.23	3.66	0.23
Conv. Total (cfs)	9330.3	Conv. (cfs)	122.2	9205.6	2.6
Length Wtd. (ft)	60.99	Wetted Per. (ft)	27.67	39.02	2.39
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.00	0.06	0.00
Alpha	1.06	Stream Power (lb/ft s)	0.00	0.06	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	0.81	1.04	0.17
C & E Loss (ft)		Cum SA (acres)	1.64	0.43	0.35

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	809.70	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	809.67	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	806.35	Flow Area (sq ft)	13.41	142.85	1.14
E.G. Slope (ft/ft)	0.000407	Area (sq ft)	13.41	142.85	1.14
Q Total (cfs)	210.00	Flow (cfs)	6.49	203.37	0.14
Top Width (ft)	80.15	Top Width (ft)	39.78	37.00	3.37
Vel Total (ft/s)	1.33	Avg. Vel. (ft/s)	0.48	1.42	0.12
Max Chl Dpth (ft)	4.87	Hydr. Depth (ft)	0.34	3.86	0.34
Conv. Total (cfs)	10411.6	Conv. (cfs)	321.7	10083.1	6.7
Length Wtd. (ft)	60.99	Wetted Per. (ft)	39.79	39.02	3.44
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.01	0.09	0.01
Alpha	1.11	Stream Power (lb/ft s)	0.00	0.13	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	1.18	1.16	0.29
C & E Loss (ft)		Cum SA (acres)	1.81	0.43	0.42

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	810.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	809.97	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	806.78	Flow Area (sq ft)	27.57	153.67	2.34
E.G. Slope (ft/ft)	0.000683	Area (sq ft)	27.57	153.67	2.34
Q Total (cfs)	320.00	Flow (cfs)	21.98	297.56	0.46
Top Width (ft)	98.88	Top Width (ft)	57.04	37.00	4.83
Vel Total (ft/s)	1.74	Avg. Vel. (ft/s)	0.80	1.94	0.20
Max Chl Dpth (ft)	5.17	Hydr. Depth (ft)	0.48	4.15	0.48
Conv. Total (cfs)	12247.1	Conv. (cfs)	841.1	11388.4	17.6
Length Wtd. (ft)	60.99	Wetted Per. (ft)	57.05	39.02	4.93
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.02	0.17	0.02
Alpha	1.16	Stream Power (lb/ft s)	0.02	0.32	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	1.79	1.31	0.48
C & E Loss (ft)		Cum SA (acres)	1.95	0.44	0.49

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	810.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	810.15	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	807.08	Flow Area (sq ft)	38.56	160.37	3.32
E.G. Slope (ft/ft)	0.000906	Area (sq ft)	38.56	160.37	3.32
Q Total (cfs)	410.00	Flow (cfs)	41.18	368.00	0.82
Top Width (ft)	106.62	Top Width (ft)	63.58	37.00	6.04
Vel Total (ft/s)	2.03	Avg. Vel. (ft/s)	1.07	2.29	0.25

Max Chl Dpth (ft)	5.35	Hydr. Depth (ft)	0.61	4.33	0.55
Conv. Total (cfs)	13623.6	Conv. (cfs)	1368.5	12227.9	27.2
Length Wtd. (ft)	60.99	Wetted Per. (ft)	63.60	39.02	6.14
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.03	0.23	0.03
Alpha	1.18	Stream Power (lb/ft s)	0.04	0.53	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)	2.25	1.41	0.63
C & E Loss (ft)		Cum SA (acres)	2.01	0.44	0.52

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	810.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	810.33	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	807.40	Flow Area (sq ft)	51.00	167.29	4.57
E.G. Slope (ft/ft)	0.001168	Area (sq ft)	51.00	167.29	4.57
Q Total (cfs)	520.00	Flow (cfs)	70.29	448.32	1.39
Top Width (ft)	113.73	Top Width (ft)	69.38	37.00	7.34
Vel Total (ft/s)	2.33	Avg. Vel. (ft/s)	1.38	2.68	0.30
Max Chl Dpth (ft)	5.53	Hydr. Depth (ft)	0.74	4.52	0.62
Conv. Total (cfs)	15217.6	Conv. (cfs)	2057.0	13119.8	40.7
Length Wtd. (ft)	60.99	Wetted Per. (ft)	69.40	39.02	7.47
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.05	0.31	0.04
Alpha	1.18	Stream Power (lb/ft s)	0.07	0.84	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)	2.82	1.52	0.81
C & E Loss (ft)		Cum SA (acres)	2.07	0.44	0.56

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	810.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	810.52	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	807.72	Flow Area (sq ft)	64.34	174.12	6.04
E.G. Slope (ft/ft)	0.001425	Area (sq ft)	64.34	174.12	6.04
Q Total (cfs)	640.00	Flow (cfs)	108.46	529.33	2.20
Top Width (ft)	120.74	Top Width (ft)	75.11	37.00	8.64
Vel Total (ft/s)	2.62	Avg. Vel. (ft/s)	1.69	3.04	0.36
Max Chl Dpth (ft)	5.72	Hydr. Depth (ft)	0.86	4.71	0.70
Conv. Total (cfs)	16957.0	Conv. (cfs)	2873.8	14024.9	58.4
Length Wtd. (ft)	60.99	Wetted Per. (ft)	75.12	39.02	8.77
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.08	0.40	0.06
Alpha	1.19	Stream Power (lb/ft s)	0.13	1.21	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	3.53	1.70	1.03
C & E Loss (ft)		Cum SA (acres)	2.29	0.44	0.66

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	810.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.030	0.050	0.120
W.S. Elev (ft)	810.76	Reach Len. (ft)	66.00	60.99	51.00
Crit W.S. (ft)	808.20	Flow Area (sq ft)	83.40	183.07	8.33
E.G. Slope (ft/ft)	0.001813	Area (sq ft)	83.40	183.07	8.33
Q Total (cfs)	830.00	Flow (cfs)	177.01	649.22	3.77
Top Width (ft)	129.93	Top Width (ft)	82.60	37.00	10.33
Vel Total (ft/s)	3.02	Avg. Vel. (ft/s)	2.12	3.55	0.45
Max Chl Dpth (ft)	5.96	Hydr. Depth (ft)	1.01	4.95	0.81
Conv. Total (cfs)	19491.4	Conv. (cfs)	4156.7	15246.1	88.6
Length Wtd. (ft)	60.99	Wetted Per. (ft)	82.62	39.02	10.48
Min Ch El (ft)	804.80	Shear (lb/sq ft)	0.11	0.53	0.09
Alpha	1.18	Stream Power (lb/ft s)	0.24	1.88	0.04
Frctn Loss (ft)		Cum Volume (acre-ft)	4.49	1.88	1.36
C & E Loss (ft)		Cum SA (acres)	2.35	0.44	0.76

INLINE WEIR RIVER: Main Channel  
 REACH: Upper RS: 118.5

INPUT  
 Description: cross-vane between x-sections 118 and 120



Distance from Upstream XS = 11  
 Deck/Roadway Width = 2  
 Weir Coefficient = 3  
 Weir Embankment Coordinates num = 2  
 Sta Elev Sta Elev  
 144 808.3 181 808.3

Upstream Embankment side slope = 4 horiz. to 1.0 vertical  
 Downstream Embankment side slope = 1 horiz. to 1.0 vertical  
 Maximum allowable submergence for weir flow = .95  
 Elevation at which weir flow begins =  
 Weir crest shape = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT Profile #1

E.G. Elev (ft)	808.92	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	808.92	Wr Top Wdth (ft)	36.69
Q Total (cfs)	52.00	Total Gate Flow (cfs)	
Q Weir (cfs)	52.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	22.09	Gate Open Ht (ft)	
Weir Sta Lft (ft)	144.15	Gate #Open	
Weir Sta Rgt (ft)	180.85	Gate Area (sq ft)	
Weir Max Depth (ft)	0.62	Gate Submerg	
Weir Avg Depth (ft)	0.60	Gate Invert (ft)	
Weir Submerg	0.00		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	809.03	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	809.02	Wr Top Wdth (ft)	38.82
Q Total (cfs)	66.00	Total Gate Flow (cfs)	
Q Weir (cfs)	66.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	26.00	Gate Open Ht (ft)	
Weir Sta Lft (ft)	142.33	Gate #Open	
Weir Sta Rgt (ft)	181.14	Gate Area (sq ft)	
Weir Max Depth (ft)	0.73	Gate Submerg	
Weir Avg Depth (ft)	0.67	Gate Invert (ft)	
Weir Submerg	0.00		

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	809.13	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	809.12	Wr Top Wdth (ft)	45.08
Q Total (cfs)	80.00	Total Gate Flow (cfs)	
Q Weir (cfs)	80.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	30.10	Gate Open Ht (ft)	
Weir Sta Lft (ft)	136.55	Gate #Open	
Weir Sta Rgt (ft)	181.63	Gate Area (sq ft)	
Weir Max Depth (ft)	0.83	Gate Submerg	
Weir Avg Depth (ft)	0.67	Gate Invert (ft)	
Weir Submerg	0.00		

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	809.49	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	809.47	Wr Top Wdth (ft)	68.19
Q Total (cfs)	150.00	Total Gate Flow (cfs)	
Q Weir (cfs)	150.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	50.55	Gate Open Ht (ft)	
Weir Sta Lft (ft)	115.25	Gate #Open	
Weir Sta Rgt (ft)	183.44	Gate Area (sq ft)	
Weir Max Depth (ft)	1.19	Gate Submerg	
Weir Avg Depth (ft)	0.74	Gate Invert (ft)	
Weir Submerg	0.00		

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	809.70	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	809.67	Wr Top Wdth (ft)	82.11
Q Total (cfs)	210.00	Total Gate Flow (cfs)	
Q Weir (cfs)	210.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	66.90	Gate Open Ht (ft)	
Weir Sta Lft (ft)	102.41	Gate #Open	
Weir Sta Rgt (ft)	184.52	Gate Area (sq ft)	
Weir Max Depth (ft)	1.40	Gate Submerg	
Weir Avg Depth (ft)	0.81	Gate Invert (ft)	
Weir Submerg	0.05		

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	810.02	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	809.97	Wr Top Wdth (ft)	101.82
Q Total (cfs)	320.00	Total Gate Flow (cfs)	
Q Weir (cfs)	320.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	96.11	Gate Open Ht (ft)	
Weir Sta Lft (ft)	84.33	Gate #Open	
Weir Sta Rgt (ft)	186.15	Gate Area (sq ft)	
Weir Max Depth (ft)	1.72	Gate Submerg	
Weir Avg Depth (ft)	0.94	Gate Invert (ft)	
Weir Submerg	0.11		

INLINE WEIR/SPILLWAY OUTPUT Profile #50

E.G. Elev (ft)	810.22	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	810.15	Wr Top Wdth (ft)	109.48
Q Total (cfs)	410.00	Total Gate Flow (cfs)	
Q Weir (cfs)	410.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	117.40	Gate Open Ht (ft)	
Weir Sta Lft (ft)	78.08	Gate #Open	
Weir Sta Rgt (ft)	187.56	Gate Area (sq ft)	
Weir Max Depth (ft)	1.92	Gate Submerg	
Weir Avg Depth (ft)	1.07	Gate Invert (ft)	
Weir Submerg	0.13		

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	810.44	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	810.33	Wr Top Wdth (ft)	117.53
Q Total (cfs)	520.00	Total Gate Flow (cfs)	
Q Weir (cfs)	520.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	141.46	Gate Open Ht (ft)	
Weir Sta Lft (ft)	71.51	Gate #Open	
Weir Sta Rgt (ft)	189.05	Gate Area (sq ft)	
Weir Max Depth (ft)	2.14	Gate Submerg	
Weir Avg Depth (ft)	1.20	Gate Invert (ft)	
Weir Submerg	0.15		

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	810.65	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	810.52	Wr Top Wdth (ft)	125.54
Q Total (cfs)	640.00	Total Gate Flow (cfs)	
Q Weir (cfs)	640.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	167.06	Gate Open Ht (ft)	
Weir Sta Lft (ft)	64.98	Gate #Open	
Weir Sta Rgt (ft)	190.52	Gate Area (sq ft)	
Weir Max Depth (ft)	2.35	Gate Submerg	
Weir Avg Depth (ft)	1.33	Gate Invert (ft)	
Weir Submerg	0.17		

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	810.93	Min El Weir Flow (ft)	808.31
W.S. Elev (ft)	810.76	Wr Top Wdth (ft)	136.30
Q Total (cfs)	830.00	Total Gate Flow (cfs)	
Q Weir (cfs)	830.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	204.14	Gate Open Ht (ft)	
Weir Sta Lft (ft)	56.20	Gate #Open	
Weir Sta Rgt (ft)	192.50	Gate Area (sq ft)	
Weir Max Depth (ft)	2.63	Gate Submerg	
Weir Avg Depth (ft)	1.50	Gate Invert (ft)	
Weir Submerg	0.18		

CROSS SECTION RIVER: Main Channel  
 REACH: Upper RS: 118

INPUT

Description:

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	30	813	86	809	103	808	159	808
168	807.5	170	806	173	805.75	176	806	177	806.5
179	807	182	808.5	185	808.5	190	808	215	809
226	810	237	811	270	815				

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	168	.05	182	.09	237	.12

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
168	182	129 162.1	138	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	807.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.		0.050	
W.S. Elev (ft)	807.15	Reach Len. (ft)	129.00	162.10	138.00
Crit W.S. (ft)	807.09	Flow Area (sq ft)		10.23	
E.G. Slope (ft/ft)	0.033935	Area (sq ft)		10.23	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	10.83	Top Width (ft)		10.83	
Vel Total (ft/s)	5.08	Avg. Vel. (ft/s)		5.08	
Max Chl Dpth (ft)	1.40	Hydr. Depth (ft)		0.95	
Conv. Total (cfs)	282.3	Conv. (cfs)		282.3	
Length Wtd. (ft)	162.10	Wetted Per. (ft)		11.45	
Min Ch El (ft)	805.75	Shear (lb/sq ft)		1.89	
Alpha	1.00	Stream Power (lb/ft s)		9.63	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.11	0.56	0.01
C & E Loss (ft)		Cum SA (acres)	0.50	0.34	0.09

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	807.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.44	Wt. n-Val.		0.050	
W.S. Elev (ft)	807.34	Reach Len. (ft)	129.00	162.10	138.00
Crit W.S. (ft)	807.25	Flow Area (sq ft)		12.37	
E.G. Slope (ft/ft)	0.031587	Area (sq ft)		12.37	
Q Total (cfs)	66.00	Flow (cfs)		66.00	
Top Width (ft)	11.47	Top Width (ft)		11.47	
Vel Total (ft/s)	5.33	Avg. Vel. (ft/s)		5.33	
Max Chl Dpth (ft)	1.59	Hydr. Depth (ft)		1.08	
Conv. Total (cfs)	371.4	Conv. (cfs)		371.4	
Length Wtd. (ft)	162.10	Wetted Per. (ft)		12.19	
Min Ch El (ft)	805.75	Shear (lb/sq ft)		2.00	
Alpha	1.00	Stream Power (lb/ft s)		10.67	
Frctn Loss (ft)		Cum Volume (acre-ft)	0.19	0.64	0.03
C & E Loss (ft)		Cum SA (acres)	0.69	0.36	0.12

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.98	Wt. n-Val.		0.050	
Vel Head (ft)	0.58	Reach Len. (ft)	129.00	162.10	138.00
W.S. Elev (ft)	807.41	Flow Area (sq ft)		13.13	
Crit W.S. (ft)	807.41	Area (sq ft)		13.13	
E.G. Slope (ft/ft)	0.039181	Flow (cfs)		80.00	
Q Total (cfs)	80.00	Top Width (ft)		11.68	
Top Width (ft)	11.68	Avg. Vel. (ft/s)		6.09	
Vel Total (ft/s)	6.09	Hydr. Depth (ft)		1.12	
Max Chl Dpth (ft)	1.66	Conv. (cfs)		404.2	
Conv. Total (cfs)	404.2	Wetted Per. (ft)		12.45	
Length Wtd. (ft)	162.10	Shear (lb/sq ft)		2.58	
Min Ch El (ft)	805.75	Stream Power (lb/ft s)		15.72	
Alpha	1.00	Cum Volume (acre-ft)	0.31	0.72	0.05
Frctn Loss (ft)		Cum SA (acres)	0.77	0.37	0.16
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.49	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.23	Reach Len. (ft)	129.00	162.10	138.00
W.S. Elev (ft)	808.27	Flow Area (sq ft)	20.07	24.02	1.23
Crit W.S. (ft)	808.27	Area (sq ft)	20.07	24.02	1.23
E.G. Slope (ft/ft)	0.010891	Flow (cfs)	45.32	104.13	0.55
Q Total (cfs)	150.00	Top Width (ft)	69.51	13.53	9.28
Top Width (ft)	92.31	Avg. Vel. (ft/s)	2.26	4.34	0.45
Vel Total (ft/s)	3.31	Hydr. Depth (ft)	0.29	1.77	0.13
Max Chl Dpth (ft)	2.52	Conv. (cfs)	434.3	997.7	5.3
Conv. Total (cfs)	1437.3	Wetted Per. (ft)	69.53	14.53	9.29
Length Wtd. (ft)	162.10	Shear (lb/sq ft)	0.20	1.12	0.09
Min Ch El (ft)	805.75	Stream Power (lb/ft s)	0.44	4.87	0.04
Alpha	1.33	Cum Volume (acre-ft)	0.79	0.93	0.17
Frctn Loss (ft)		Cum SA (acres)	1.57	0.39	0.34
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.65	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.27	Reach Len. (ft)	129.00	162.10	138.00
W.S. Elev (ft)	808.38	Flow Area (sq ft)	28.23	25.60	2.54
Crit W.S. (ft)	808.38	Area (sq ft)	28.23	25.60	2.54
E.G. Slope (ft/ft)	0.012705	Flow (cfs)	84.84	123.60	1.56
Q Total (cfs)	210.00	Top Width (ft)	71.47	13.76	13.33
Top Width (ft)	98.56	Avg. Vel. (ft/s)	3.00	4.83	0.62
Vel Total (ft/s)	3.73	Hydr. Depth (ft)	0.40	1.86	0.19
Max Chl Dpth (ft)	2.63	Conv. (cfs)	752.7	1096.5	13.8
Conv. Total (cfs)	1863.1	Wetted Per. (ft)	71.50	14.79	13.35
Length Wtd. (ft)	162.10	Shear (lb/sq ft)	0.31	1.37	0.15
Min Ch El (ft)	805.75	Stream Power (lb/ft s)	0.94	6.63	0.09
Alpha	1.25	Cum Volume (acre-ft)	1.15	1.04	0.29
Frctn Loss (ft)		Cum SA (acres)	1.72	0.40	0.41
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	808.90	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.35	Reach Len. (ft)	129.00	162.10	138.00
W.S. Elev (ft)	808.55	Flow Area (sq ft)	40.51	27.94	5.41
Crit W.S. (ft)	808.55	Area (sq ft)	40.51	27.94	5.41
E.G. Slope (ft/ft)	0.014831	Flow (cfs)	162.99	152.70	4.31
Q Total (cfs)	320.00	Top Width (ft)	74.34	14.00	21.73
Top Width (ft)	110.07	Avg. Vel. (ft/s)	4.02	5.47	0.80
Vel Total (ft/s)	4.33	Hydr. Depth (ft)	0.54	2.00	0.25
Max Chl Dpth (ft)	2.80	Conv. (cfs)	1338.4	1253.9	35.4
Conv. Total (cfs)	2627.6	Wetted Per. (ft)	74.37	15.05	21.77
Length Wtd. (ft)	162.10	Shear (lb/sq ft)	0.50	1.72	0.23
Min Ch El (ft)	805.75	Stream Power (lb/ft s)	2.03	9.39	0.18
Alpha	1.20	Cum Volume (acre-ft)	1.74	1.18	0.48
Frctn Loss (ft)		Cum SA (acres)	1.85	0.40	0.48
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.08	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.40	Reach Len. (ft)	129.00	162.10	138.00
W.S. Elev (ft)	808.67	Flow Area (sq ft)	49.85	29.67	8.30
Crit W.S. (ft)	808.67	Area (sq ft)	49.85	29.67	8.30
E.G. Slope (ft/ft)	0.015356	Flow (cfs)	230.04	171.79	8.17
Q Total (cfs)	410.00	Top Width (ft)	76.44	14.00	24.83
Top Width (ft)	115.27	Avg. Vel. (ft/s)	4.61	5.79	0.98
Vel Total (ft/s)	4.67	Hydr. Depth (ft)	0.65	2.12	0.33
Max Chl Dpth (ft)	2.92	Conv. (cfs)	1856.4	1386.3	65.9
Conv. Total (cfs)	3308.6	Wetted Per. (ft)	76.48	15.05	24.87
Length Wtd. (ft)	162.10	Shear (lb/sq ft)	0.62	1.89	0.32
Min Ch El (ft)	805.75	Stream Power (lb/ft s)	2.88	10.94	0.31
Alpha	1.19	Cum Volume (acre-ft)	2.18	1.28	0.63
Frctn Loss (ft)		Cum SA (acres)	1.90	0.40	0.51
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.28	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.46	Reach Len. (ft)	129.00	162.10	138.00
W.S. Elev (ft)	808.82	Flow Area (sq ft)	61.11	31.70	12.16
Crit W.S. (ft)	808.82	Area (sq ft)	61.11	31.70	12.16
E.G. Slope (ft/ft)	0.015230	Flow (cfs)	314.93	191.03	14.04
Q Total (cfs)	520.00	Top Width (ft)	78.91	14.00	28.45
Top Width (ft)	121.36	Avg. Vel. (ft/s)	5.15	6.03	1.15
Vel Total (ft/s)	4.95	Hydr. Depth (ft)	0.77	2.26	0.43
Max Chl Dpth (ft)	3.07	Conv. (cfs)	2551.9	1547.9	113.8
Conv. Total (cfs)	4213.6	Wetted Per. (ft)	78.94	15.05	28.49
Length Wtd. (ft)	162.10	Shear (lb/sq ft)	0.74	2.00	0.41
Min Ch El (ft)	805.75	Stream Power (lb/ft s)	3.79	12.06	0.47
Alpha	1.20	Cum Volume (acre-ft)	2.73	1.38	0.80
Frctn Loss (ft)		Cum SA (acres)	1.96	0.40	0.54
C & E Loss (ft)					

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.47				
Vel Head (ft)	0.51	Wt. n-Val.	0.030	0.050	0.090
W.S. Elev (ft)	808.97	Reach Len. (ft)	129.00	162.10	138.00
Crit W.S. (ft)	808.97	Flow Area (sq ft)	72.93	33.77	16.62
E.G. Slope (ft/ft)	0.014852	Area (sq ft)	72.93	33.77	16.62
Q Total (cfs)	640.00	Flow (cfs)	408.92	209.55	21.54
Top Width (ft)	127.55	Top Width (ft)	81.41	14.00	32.14
Vel Total (ft/s)	5.19	Avg. Vel. (ft/s)	5.61	6.21	1.30
Max Chl Dpth (ft)	3.22	Hydr. Depth (ft)	0.90	2.41	0.52
Conv. Total (cfs)	5251.6	Conv. (cfs)	3355.4	1719.4	176.7
Length Wtd. (ft)	162.10	Wetted Per. (ft)	81.45	15.05	32.18
Min Ch El (ft)	805.75	Shear (lb/sq ft)	0.83	2.08	0.48
Alpha	1.22	Stream Power (lb/ft s)	4.65	12.91	0.62
Frctn Loss (ft)		Cum Volume (acre-ft)	3.42	1.56	1.01
C & E Loss (ft)		Cum SA (acres)	2.18	0.40	0.64

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	809.76				
Vel Head (ft)	0.60	Wt. n-Val.	0.030	0.050	0.090
W.S. Elev (ft)	809.16	Reach Len. (ft)	129.00	162.10	138.00
Crit W.S. (ft)	809.16	Flow Area (sq ft)	89.14	36.51	23.21
E.G. Slope (ft/ft)	0.014753	Area (sq ft)	89.14	36.51	23.21
Q Total (cfs)	830.00	Flow (cfs)	556.64	237.85	35.51
Top Width (ft)	133.03	Top Width (ft)	84.26	14.00	34.77
Vel Total (ft/s)	5.58	Avg. Vel. (ft/s)	6.24	6.52	1.53
Max Chl Dpth (ft)	3.41	Hydr. Depth (ft)	1.06	2.61	0.67
Conv. Total (cfs)	6833.4	Conv. (cfs)	4582.8	1958.2	292.4
Length Wtd. (ft)	162.10	Wetted Per. (ft)	84.30	15.05	34.82
Min Ch El (ft)	805.75	Shear (lb/sq ft)	0.97	2.23	0.61
Alpha	1.24	Stream Power (lb/ft s)	6.08	14.55	0.94
Frctn Loss (ft)		Cum Volume (acre-ft)	4.36	1.73	1.34
C & E Loss (ft)		Cum SA (acres)	2.23	0.40	0.73

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR RIVER: Main Channel  
 REACH: Upper RS: 116.5

INPUT

Description: cross-vane between 116 and 118

Distance from Upstream XS = 10

Deck/Roadway Width = 2

Weir Coefficient = 3

Weir Embankment Coordinates num = 2

Sta	Elev	Sta	Elev
150	807.68	169	807.68

Upstream Embankment side slope = 4 horiz. to 1.0 vertical

Downstream Embankment side slope = 1 horiz. to 1.0 vertical

Maximum allowable submergence for weir flow = .95

Elevation at which weir flow begins =

Weir crest shape = Broad Crested

INLINE WEIR/SPILLWAY OUTPUT Profile #1

E.G. Elev (ft)	807.55	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	807.15	Wr Top Wdth (ft)	11.10

Q Total (cfs)	52.00	Total Gate Flow (cfs)	
Q Weir (cfs)	52.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	14.42	Gate Open Ht (ft)	
Weir Sta Lft (ft)	169.00	Gate #Open	
Weir Sta Rgt (ft)	180.10	Gate Area (sq ft)	
Weir Max Depth (ft)	1.80	Gate Submerg	
Weir Avg Depth (ft)	1.30	Gate Invert (ft)	
Weir Submerg	0.20		

INLINE WEIR/SPILLWAY OUTPUT Profile #1.4

E.G. Elev (ft)	807.78	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	807.34	Wr Top Wdth (ft)	17.64
Q Total (cfs)	66.00	Total Gate Flow (cfs)	
Q Weir (cfs)	66.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	17.58	Gate Open Ht (ft)	
Weir Sta Lft (ft)	162.93	Gate #Open	
Weir Sta Rgt (ft)	180.56	Gate Area (sq ft)	
Weir Max Depth (ft)	2.03	Gate Submerg	
Weir Avg Depth (ft)	1.00	Gate Invert (ft)	
Weir Submerg	0.25		

INLINE WEIR/SPILLWAY OUTPUT Profile #2

E.G. Elev (ft)	807.98	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	807.41	Wr Top Wdth (ft)	21.64
Q Total (cfs)	80.00	Total Gate Flow (cfs)	
Q Weir (cfs)	80.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	21.51	Gate Open Ht (ft)	
Weir Sta Lft (ft)	159.33	Gate #Open	
Weir Sta Rgt (ft)	180.96	Gate Area (sq ft)	
Weir Max Depth (ft)	2.23	Gate Submerg	
Weir Avg Depth (ft)	0.99	Gate Invert (ft)	
Weir Submerg	0.27		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #5

E.G. Elev (ft)	808.49	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	808.27	Wr Top Wdth (ft)	104.55
Q Total (cfs)	150.00	Total Gate Flow (cfs)	
Q Weir (cfs)	150.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	66.77	Gate Open Ht (ft)	
Weir Sta Lft (ft)	94.64	Gate #Open	
Weir Sta Rgt (ft)	202.29	Gate Area (sq ft)	
Weir Max Depth (ft)	2.74	Gate Submerg	
Weir Avg Depth (ft)	0.64	Gate Invert (ft)	
Weir Submerg	0.21		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #10

E.G. Elev (ft)	808.65	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	808.38	Wr Top Wdth (ft)	114.32
Q Total (cfs)	210.00	Total Gate Flow (cfs)	
Q Weir (cfs)	210.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	84.39	Gate Open Ht (ft)	
Weir Sta Lft (ft)	91.94	Gate #Open	
Weir Sta Rgt (ft)	206.26	Gate Area (sq ft)	

Weir Max Depth (ft)	2.90	Gate Submerg
Weir Avg Depth (ft)	0.74	Gate Invert (ft)
Weir Submerg	0.21	

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #25

E.G. Elev (ft)	808.90	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	808.55	Wr Top Wdth (ft)	124.74
Q Total (cfs)	320.00	Total Gate Flow (cfs)	
Q Weir (cfs)	320.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	114.05	Gate Open Ht (ft)	
Weir Sta Lft (ft)	87.72	Gate #Open	
Weir Sta Rgt (ft)	212.47	Gate Area (sq ft)	
Weir Max Depth (ft)	3.15	Gate Submerg	
Weir Avg Depth (ft)	0.91	Gate Invert (ft)	
Weir Submerg	0.18		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #50

E.G. Elev (ft)	809.08	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	808.67	Wr Top Wdth (ft)	130.92
Q Total (cfs)	410.00	Total Gate Flow (cfs)	
Q Weir (cfs)	410.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	136.91	Gate Open Ht (ft)	
Weir Sta Lft (ft)	84.92	Gate #Open	
Weir Sta Rgt (ft)	215.85	Gate Area (sq ft)	
Weir Max Depth (ft)	3.33	Gate Submerg	
Weir Avg Depth (ft)	1.05	Gate Invert (ft)	
Weir Submerg	0.16		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #100

E.G. Elev (ft)	809.28	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	808.82	Wr Top Wdth (ft)	135.89
Q Total (cfs)	520.00	Total Gate Flow (cfs)	
Q Weir (cfs)	520.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	163.39	Gate Open Ht (ft)	
Weir Sta Lft (ft)	82.14	Gate #Open	
Weir Sta Rgt (ft)	218.03	Gate Area (sq ft)	
Weir Max Depth (ft)	3.53	Gate Submerg	
Weir Avg Depth (ft)	1.20	Gate Invert (ft)	
Weir Submerg	0.13		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past

the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #200

E.G. Elev (ft)	809.47	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	808.97	Wr Top Wdth (ft)	140.85



Q Total (cfs)	640.00	Total Gate Flow (cfs)
Q Weir (cfs)	640.00	Gate Group Q (cfs)
Wr Flw Area (sq ft)	190.87	Gate Open Ht (ft)
Weir Sta Lft (ft)	79.36	Gate #Open
Weir Sta Rgt (ft)	220.21	Gate Area (sq ft)
Weir Max Depth (ft)	3.72	Gate Submerg
Weir Avg Depth (ft)	1.36	Gate Invert (ft)
Weir Submerg	0.42	

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

INLINE WEIR/SPILLWAY OUTPUT Profile #500

E.G. Elev (ft)	809.76	Min El Weir Flow (ft)	805.76
W.S. Elev (ft)	809.16	Wr Top Wdth (ft)	147.94
Q Total (cfs)	830.00	Total Gate Flow (cfs)	
Q Weir (cfs)	830.00	Gate Group Q (cfs)	
Wr Flw Area (sq ft)	231.81	Gate Open Ht (ft)	
Weir Sta Lft (ft)	75.39	Gate #Open	
Weir Sta Rgt (ft)	223.33	Gate Area (sq ft)	
Weir Max Depth (ft)	4.01	Gate Submerg	
Weir Avg Depth (ft)	1.57	Gate Invert (ft)	
Weir Submerg	0.49		

Warning: Critical depth in the cross section upstream of the inline weir produced too much flow past the inline weir. This means there is not a valid subcritical answer. The upstream cross section defaulted to critical depth.

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 116

INPUT

Description:

Station Elevation Data		num=		19					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	30	813	86	809	103	808	155	808
156	807	158	806	159	805	161	804	165	803.5
170	804	172	805	174	806	176	807	178	808
215	809	226	810	237	811	270	815		

Manning's n Values		num=		4					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	155	.05	176	.09	237	.12		

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	155	176		125 126.41	122	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	806.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	806.32	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)		Flow Area (sq ft)		33.01	
E.G. Slope (ft/ft)	0.001306	Area (sq ft)		33.01	
Q Total (cfs)	52.00	Flow (cfs)		52.00	
Top Width (ft)	17.27	Top Width (ft)		17.27	
Vel Total (ft/s)	1.58	Avg. Vel. (ft/s)		1.58	
Max Chl Dpth (ft)	2.82	Hydr. Depth (ft)		1.91	
Conv. Total (cfs)	1438.7	Conv. (cfs)		1438.7	
Length Wtd. (ft)	126.39	Wetted Per. (ft)		18.59	
Min Ch El (ft)	803.50	Shear (lb/sq ft)		0.14	
Alpha	1.00	Stream Power (lb/ft s)		0.23	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	0.11	0.48	0.01
C & E Loss (ft)	0.00	Cum SA (acres)	0.50	0.29	0.09

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.53	Wt. n-Val.		0.050	
Vel Head (ft)	0.05	Reach Len. (ft)	125.00	126.41	122.00
W.S. Elev (ft)	806.48	Flow Area (sq ft)		35.90	
Crit W.S. (ft)		Area (sq ft)		35.90	
E.G. Slope (ft/ft)	0.001676	Flow (cfs)		66.00	
Q Total (cfs)	66.00	Top Width (ft)		17.92	
Top Width (ft)	17.92	Avg. Vel. (ft/s)		1.84	
Vel Total (ft/s)	1.84	Hydr. Depth (ft)		2.00	
Max Chl Dpth (ft)	2.98	Conv. (cfs)		1612.1	
Conv. Total (cfs)	1612.1	Wetted Per. (ft)		19.33	
Length Wtd. (ft)	126.29	Shear (lb/sq ft)		0.19	
Min Ch El (ft)	803.50	Stream Power (lb/ft s)		0.36	
Alpha	1.00	Cum Volume (acre-ft)	0.19	0.55	0.03
Frctn Loss (ft)	0.25	Cum SA (acres)	0.69	0.30	0.12
C & E Loss (ft)	0.00				

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.69	Wt. n-Val.		0.050	
Vel Head (ft)	0.07	Reach Len. (ft)	125.00	126.41	122.00
W.S. Elev (ft)	806.62	Flow Area (sq ft)		38.50	
Crit W.S. (ft)		Area (sq ft)		38.50	
E.G. Slope (ft/ft)	0.002037	Flow (cfs)		80.00	
Q Total (cfs)	80.00	Top Width (ft)		18.49	
Top Width (ft)	18.49	Avg. Vel. (ft/s)		2.08	
Vel Total (ft/s)	2.08	Hydr. Depth (ft)		2.08	
Max Chl Dpth (ft)	3.12	Conv. (cfs)		1772.5	
Conv. Total (cfs)	1772.5	Wetted Per. (ft)		19.97	
Length Wtd. (ft)	126.18	Shear (lb/sq ft)		0.25	
Min Ch El (ft)	803.50	Stream Power (lb/ft s)		0.51	
Alpha	1.00	Cum Volume (acre-ft)	0.31	0.62	0.05
Frctn Loss (ft)	0.26	Cum SA (acres)	0.77	0.31	0.16
C & E Loss (ft)	0.01				

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.18	Wt. n-Val.		0.050	0.000
Vel Head (ft)	0.16	Reach Len. (ft)	125.00	126.41	122.00
W.S. Elev (ft)	807.02	Flow Area (sq ft)		46.08	0.00
Crit W.S. (ft)		Area (sq ft)		46.08	0.00
E.G. Slope (ft/ft)	0.004388	Flow (cfs)		150.00	0.00
Q Total (cfs)	150.00	Top Width (ft)		20.02	0.03
Top Width (ft)	20.05	Avg. Vel. (ft/s)		3.26	0.04
Vel Total (ft/s)	3.26	Hydr. Depth (ft)		2.30	0.01
Max Chl Dpth (ft)	3.52	Conv. (cfs)		2264.3	0.0
Conv. Total (cfs)	2264.3	Wetted Per. (ft)		21.67	0.04
Length Wtd. (ft)	126.04	Shear (lb/sq ft)		0.58	
Min Ch El (ft)	803.50	Stream Power (lb/ft s)		1.90	
Alpha	1.00	Cum Volume (acre-ft)	0.76	0.80	0.17
Frctn Loss (ft)	0.46	Cum SA (acres)	1.46	0.33	0.33
C & E Loss (ft)	0.03				

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.51	Wt. n-Val.		0.050	0.090
Vel Head (ft)	0.27	Reach Len. (ft)	125.00	126.41	122.00
W.S. Elev (ft)	807.25	Flow Area (sq ft)		50.69	0.06
Crit W.S. (ft)		Area (sq ft)		50.69	0.06
E.G. Slope (ft/ft)	0.006385	Flow (cfs)		209.98	0.02
Q Total (cfs)	210.00	Top Width (ft)		20.25	0.49
Top Width (ft)	20.74	Avg. Vel. (ft/s)		4.14	0.30
Vel Total (ft/s)	4.14	Hydr. Depth (ft)		2.50	0.12
Max Chl Dpth (ft)	3.75	Conv. (cfs)		2627.8	0.2
Conv. Total (cfs)	2628.0	Wetted Per. (ft)		22.00	0.55
Length Wtd. (ft)	125.95				

Min Ch El (ft)	803.50	Shear (lb/sq ft)		0.92	0.04
Alpha	1.00	Stream Power (lb/ft s)		3.81	0.01
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	1.11	0.90	0.28
C & E Loss (ft)	0.06	Cum SA (acres)	1.62	0.34	0.39

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

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	808.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.		0.050	0.090
W.S. Elev (ft)	807.50	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)		Flow Area (sq ft)		55.85	0.25
E.G. Slope (ft/ft)	0.010956	Area (sq ft)		55.85	0.25
Q Total (cfs)	320.00	Flow (cfs)		319.84	0.16
Top Width (ft)	21.50	Top Width (ft)		20.50	1.00
Vel Total (ft/s)	5.70	Avg. Vel. (ft/s)		5.73	0.64
Max Chl Dpth (ft)	4.00	Hydr. Depth (ft)		2.72	0.25
Conv. Total (cfs)	3057.2	Conv. (cfs)		3055.7	1.5
Length Wtd. (ft)	125.86	Wetted Per. (ft)		22.36	1.12
Min Ch El (ft)	803.50	Shear (lb/sq ft)		1.71	0.15
Alpha	1.01	Stream Power (lb/ft s)		9.79	0.10
Frctn Loss (ft)	0.66	Cum Volume (acre-ft)	1.68	1.03	0.47
C & E Loss (ft)	0.12	Cum SA (acres)	1.74	0.34	0.44

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

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	808.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.77	Wt. n-Val.		0.050	0.090
W.S. Elev (ft)	807.61	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)	807.06	Flow Area (sq ft)		58.04	0.37
E.G. Slope (ft/ft)	0.015951	Area (sq ft)		58.04	0.37
Q Total (cfs)	410.00	Flow (cfs)		409.68	0.32
Top Width (ft)	21.82	Top Width (ft)		20.61	1.21
Vel Total (ft/s)	7.02	Avg. Vel. (ft/s)		7.06	0.87
Max Chl Dpth (ft)	4.11	Hydr. Depth (ft)		2.82	0.30
Conv. Total (cfs)	3246.3	Conv. (cfs)		3243.7	2.5
Length Wtd. (ft)	125.81	Wetted Per. (ft)		22.51	1.35
Min Ch El (ft)	803.50	Shear (lb/sq ft)		2.57	0.27
Alpha	1.01	Stream Power (lb/ft s)		18.13	0.24
Frctn Loss (ft)	0.76	Cum Volume (acre-ft)	2.11	1.12	0.61
C & E Loss (ft)	0.20	Cum SA (acres)	1.79	0.34	0.46

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

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

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	808.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.28	Wt. n-Val.		0.050	0.090
W.S. Elev (ft)	807.57	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)	807.49	Flow Area (sq ft)		57.28	0.32
E.G. Slope (ft/ft)	0.026734	Area (sq ft)		57.28	0.32
Q Total (cfs)	520.00	Flow (cfs)		519.65	0.35
Top Width (ft)	21.71	Top Width (ft)		20.57	1.14
Vel Total (ft/s)	9.03	Avg. Vel. (ft/s)		9.07	1.08
Max Chl Dpth (ft)	4.07	Hydr. Depth (ft)		2.78	0.28
Conv. Total (cfs)	3180.3	Conv. (cfs)		3178.2	2.1
Length Wtd. (ft)	125.77	Wetted Per. (ft)		22.45	1.27
Min Ch El (ft)	803.50	Shear (lb/sq ft)		4.26	0.42
Alpha	1.01	Stream Power (lb/ft s)		38.63	0.46

Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	2.64	1.21	0.78
C & E Loss (ft)	0.34	Cum SA (acres)	1.84	0.34	0.49

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 OUTPUT Profile #200

E.G. Elev (ft)	809.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.61	Wt. n-Val.	0.030	0.050	0.090
W.S. Elev (ft)	808.57	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)	808.57	Flow Area (sq ft)	32.27	78.18	8.10
E.G. Slope (ft/ft)	0.010170	Area (sq ft)	32.27	78.18	8.10
Q Total (cfs)	640.00	Flow (cfs)	104.67	528.65	6.68
Top Width (ft)	105.67	Top Width (ft)	61.65	21.00	23.01
Vel Total (ft/s)	5.40	Avg. Vel. (ft/s)	3.24	6.76	0.82
Max Chl Dpth (ft)	5.07	Hydr. Depth (ft)	0.52	3.72	0.35
Conv. Total (cfs)	6346.3	Conv. (cfs)	1037.9	5242.1	66.2
Length Wtd. (ft)	125.61	Wetted Per. (ft)	61.67	23.06	23.25
Min Ch El (ft)	803.50	Shear (lb/sq ft)	0.33	2.15	0.22
Alpha	1.36	Stream Power (lb/ft s)	1.08	14.55	0.18
Frctn Loss (ft)	0.64	Cum Volume (acre-ft)	3.27	1.35	0.97
C & E Loss (ft)	0.14	Cum SA (acres)	1.96	0.34	0.55

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: 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 OUTPUT Profile #500

E.G. Elev (ft)	809.50	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.66	Wt. n-Val.	0.030	0.050	0.090
W.S. Elev (ft)	808.84	Reach Len. (ft)	125.00	126.41	122.00
Crit W.S. (ft)	808.84	Flow Area (sq ft)	49.64	83.88	15.72
E.G. Slope (ft/ft)	0.010552	Area (sq ft)	49.64	83.88	15.72
Q Total (cfs)	830.00	Flow (cfs)	208.28	605.56	16.16
Top Width (ft)	120.33	Top Width (ft)	66.27	21.00	33.06
Vel Total (ft/s)	5.56	Avg. Vel. (ft/s)	4.20	7.22	1.03
Max Chl Dpth (ft)	5.34	Hydr. Depth (ft)	0.75	3.99	0.48
Conv. Total (cfs)	8079.8	Conv. (cfs)	2027.6	5895.0	157.3
Length Wtd. (ft)	125.49	Wetted Per. (ft)	66.30	23.06	33.31
Min Ch El (ft)	803.50	Shear (lb/sq ft)	0.49	2.40	0.31
Alpha	1.37	Stream Power (lb/ft s)	2.07	17.30	0.32
Frctn Loss (ft)	0.64	Cum Volume (acre-ft)	4.15	1.51	1.28
C & E Loss (ft)	0.14	Cum SA (acres)	2.00	0.34	0.62

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  
REACH: Upper

RIVER: Main Channel  
RS: 114

INPUT

Description:

Station Elevation Data		num= 19							
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	815	85	807	127	806	153	806	166	806
172	805	174	804	179	802.75	180	803	181	804
181	805	182	806	184	807	189	806	201	806
226	807	236	808	240	809	257	815		

Manning's n Values		num= 4			
Sta	n Val	Sta	n Val	Sta	n Val
0	.03	166	.05	184	.09
				226	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	166	184		254	324.5	260	.1
							.3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.13		0.030	0.050	0.090
Vel Head (ft)	0.05	Wt. n-Val.	0.030	0.050	0.090
W.S. Elev (ft)	806.08	Reach Len. (ft)	254.00	324.50	260.00
Crit W.S. (ft)	804.53	Flow Area (sq ft)	3.12	26.48	1.01
E.G. Slope (ft/ft)	0.002550	Area (sq ft)	3.12	26.48	1.01
Q Total (cfs)	52.00	Flow (cfs)	1.37	50.48	0.14
Top Width (ft)	72.68	Top Width (ft)	42.22	16.15	14.30
Vel Total (ft/s)	1.70	Avg. Vel. (ft/s)	0.44	1.91	0.14
Max Chl Dpth (ft)	3.33	Hydr. Depth (ft)	0.07	1.64	0.07
Conv. Total (cfs)	1029.7	Conv. (cfs)	27.2	999.6	2.8
Length Wtd. (ft)	323.54	Wetted Per. (ft)	42.23	18.50	14.31
Min Ch El (ft)	802.75	Shear (lb/sq ft)	0.01	0.23	0.01
Alpha	1.22	Stream Power (lb/ft s)	0.01	0.43	0.00
Frctn Loss (ft)	2.28	Cum Volume (acre-ft)	0.10	0.39	0.01
C & E Loss (ft)	0.05	Cum SA (acres)	0.43	0.24	0.07

Warning: Divided flow computed for this cross-section.

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

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

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	806.28		0.030	0.050	0.090
Vel Head (ft)	0.05	Wt. n-Val.	0.030	0.050	0.090
W.S. Elev (ft)	806.23	Reach Len. (ft)	254.00	324.50	260.00
Crit W.S. (ft)	804.73	Flow Area (sq ft)	10.18	29.01	3.59
E.G. Slope (ft/ft)	0.002403	Area (sq ft)	10.18	29.01	3.59
Q Total (cfs)	66.00	Flow (cfs)	8.69	56.35	0.96
Top Width (ft)	84.16	Top Width (ft)	48.74	16.46	18.96
Vel Total (ft/s)	1.54	Avg. Vel. (ft/s)	0.85	1.94	0.27
Max Chl Dpth (ft)	3.48	Hydr. Depth (ft)	0.21	1.76	0.19
Conv. Total (cfs)	1346.4	Conv. (cfs)	177.3	1149.5	19.5
Length Wtd. (ft)	319.75	Wetted Per. (ft)	48.74	18.85	18.99
Min Ch El (ft)	802.75	Shear (lb/sq ft)	0.03	0.23	0.03
Alpha	1.39	Stream Power (lb/ft s)	0.03	0.45	0.01
Frctn Loss (ft)	2.15	Cum Volume (acre-ft)	0.18	0.45	0.02
C & E Loss (ft)	0.05	Cum SA (acres)	0.62	0.25	0.09

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.

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

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

CROSS SECTION OUTPUT		Profile #2		Left OB	Channel	Right OB
E.G. Elev (ft)	806.43	Element				
Vel Head (ft)	0.04	Wt. n-Val.	0.030	0.050	0.090	
W.S. Elev (ft)	806.39	Reach Len. (ft)	254.00	324.50	260.00	
Crit W.S. (ft)	804.90	Flow Area (sq ft)	18.16	31.57	6.86	
E.G. Slope (ft/ft)	0.002007	Area (sq ft)	18.16	31.57	6.86	
Q Total (cfs)	80.00	Flow (cfs)	19.21	58.57	2.22	
Top Width (ft)	95.54	Top Width (ft)	55.20	16.77	23.57	
Vel Total (ft/s)	1.41	Avg. Vel. (ft/s)	1.06	1.86	0.32	
Max Chl Dpth (ft)	3.64	Hydr. Depth (ft)	0.33	1.88	0.29	
Conv. Total (cfs)	1785.6	Conv. (cfs)	428.7	1307.2	49.7	
Length Wtd. (ft)	316.18	Wetted Per. (ft)	55.20	19.19	23.61	
Min Ch El (ft)	802.75	Shear (lb/sq ft)	0.04	0.21	0.04	
Alpha	1.40	Stream Power (lb/ft s)	0.04	0.38	0.01	
Frctn Loss (ft)	1.94	Cum Volume (acre-ft)	0.28	0.52	0.04	
C & E Loss (ft)	0.06	Cum SA (acres)	0.70	0.26	0.13	

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.

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

CROSS SECTION OUTPUT		Profile #5		Left OB	Channel	Right OB
E.G. Elev (ft)	806.70	Element				
Vel Head (ft)	0.07	Wt. n-Val.	0.030	0.050	0.090	
W.S. Elev (ft)	806.62	Reach Len. (ft)	254.00	324.50	260.00	
Crit W.S. (ft)	805.74	Flow Area (sq ft)	32.57	35.64	13.36	
E.G. Slope (ft/ft)	0.003059	Area (sq ft)	32.57	35.64	13.36	
Q Total (cfs)	150.00	Flow (cfs)	56.14	86.88	6.98	
Top Width (ft)	113.24	Top Width (ft)	65.24	17.25	30.75	
Vel Total (ft/s)	1.84	Avg. Vel. (ft/s)	1.72	2.44	0.52	
Max Chl Dpth (ft)	3.87	Hydr. Depth (ft)	0.50	2.07	0.43	
Conv. Total (cfs)	2712.3	Conv. (cfs)	1015.1	1570.9	126.3	
Length Wtd. (ft)	299.96	Wetted Per. (ft)	65.25	19.73	30.82	
Min Ch El (ft)	802.75	Shear (lb/sq ft)	0.10	0.34	0.08	
Alpha	1.35	Stream Power (lb/ft s)	0.16	0.84	0.04	
Frctn Loss (ft)	1.86	Cum Volume (acre-ft)	0.71	0.68	0.15	
C & E Loss (ft)	0.02	Cum SA (acres)	1.37	0.28	0.28	

Warning: Divided flow computed for this cross-section.

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

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

CROSS SECTION OUTPUT		Profile #10		Left OB	Channel	Right OB
E.G. Elev (ft)	806.92	Element				
Vel Head (ft)	0.08	Wt. n-Val.	0.030	0.050	0.090	
W.S. Elev (ft)	806.84	Reach Len. (ft)	254.00	324.50	260.00	
Crit W.S. (ft)	806.38	Flow Area (sq ft)	47.26	39.32	20.50	
E.G. Slope (ft/ft)	0.003081	Area (sq ft)	47.26	39.32	20.50	
Q Total (cfs)	210.00	Flow (cfs)	96.25	101.11	12.64	
Top Width (ft)	128.84	Top Width (ft)	74.10	17.67	37.07	
Vel Total (ft/s)	1.96	Avg. Vel. (ft/s)	2.04	2.57	0.62	
Max Chl Dpth (ft)	4.09	Hydr. Depth (ft)	0.64	2.23	0.55	
Conv. Total (cfs)	3783.5	Conv. (cfs)	1734.2	1821.6	227.7	
Length Wtd. (ft)	293.31	Wetted Per. (ft)	74.11	20.20	37.17	
Min Ch El (ft)	802.75	Shear (lb/sq ft)	0.12	0.37	0.11	
Alpha	1.33	Stream Power (lb/ft s)	0.25	0.96	0.07	
Frctn Loss (ft)	1.87	Cum Volume (acre-ft)	1.04	0.77	0.25	

C & E Loss (ft)	0.03	Cum SA (acres)	1.51	0.28	0.33
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Warning: Divided flow computed for this cross-section.  
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.22	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.10	Reach Len. (ft)	254.00	324.50	260.00
W.S. Elev (ft)	807.12	Flow Area (sq ft)	70.12	44.48	32.28
Crit W.S. (ft)	806.60	Area (sq ft)	70.12	44.48	32.28
E.G. Slope (ft/ft)	0.003070	Flow (cfs)	172.88	122.48	24.64
Q Total (cfs)	320.00	Top Width (ft)	82.32	18.00	43.24
Top Width (ft)	143.56	Avg. Vel. (ft/s)	2.47	2.75	0.76
Vel Total (ft/s)	2.18	Hydr. Depth (ft)	0.85	2.47	0.75
Max Chl Dpth (ft)	4.37	Conv. (cfs)	3120.3	2210.6	444.7
Conv. Total (cfs)	5775.6	Wetted Per. (ft)	82.33	20.57	43.36
Length Wtd. (ft)	286.79	Shear (lb/sq ft)	0.16	0.41	0.14
Min Ch El (ft)	802.75	Stream Power (lb/ft s)	0.40	1.14	0.11
Alpha	1.31	Cum Volume (acre-ft)	1.58	0.88	0.42
Frctn Loss (ft)	1.89	Cum SA (acres)	1.63	0.28	0.38
C & E Loss (ft)	0.03				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.41	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.12	Reach Len. (ft)	254.00	324.50	260.00
W.S. Elev (ft)	807.30	Flow Area (sq ft)	84.38	47.57	39.84
Crit W.S. (ft)	806.71	Area (sq ft)	84.38	47.57	39.84
E.G. Slope (ft/ft)	0.003170	Flow (cfs)	235.71	139.17	35.12
Q Total (cfs)	410.00	Top Width (ft)	84.14	18.00	44.95
Top Width (ft)	147.09	Avg. Vel. (ft/s)	2.79	2.93	0.88
Vel Total (ft/s)	2.39	Hydr. Depth (ft)	1.00	2.64	0.89
Max Chl Dpth (ft)	4.55	Conv. (cfs)	4186.7	2472.0	623.8
Conv. Total (cfs)	7282.4	Wetted Per. (ft)	84.16	20.57	45.09
Length Wtd. (ft)	283.17	Shear (lb/sq ft)	0.20	0.46	0.17
Min Ch El (ft)	802.75	Stream Power (lb/ft s)	0.55	1.34	0.15
Alpha	1.31	Cum Volume (acre-ft)	1.98	0.96	0.56
Frctn Loss (ft)	1.90	Cum SA (acres)	1.67	0.28	0.40
C & E Loss (ft)	0.03				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m) between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	807.64	Wt. n-Val.	0.030	0.050	0.090
Vel Head (ft)	0.13	Reach Len. (ft)	254.00	324.50	260.00
W.S. Elev (ft)	807.51	Flow Area (sq ft)	102.33	51.35	49.52
Crit W.S. (ft)	806.88	Area (sq ft)	102.33	51.35	49.52
E.G. Slope (ft/ft)	0.003086	Flow (cfs)	315.17	156.04	48.79
Q Total (cfs)	520.00	Top Width (ft)	86.37	18.00	47.06
Top Width (ft)	151.43	Avg. Vel. (ft/s)	3.08	3.04	0.99
Vel Total (ft/s)	2.56	Hydr. Depth (ft)	1.18	2.85	1.05
Max Chl Dpth (ft)	4.76	Conv. (cfs)	5673.2	2808.8	878.3
Conv. Total (cfs)	9360.3	Wetted Per. (ft)	86.41	20.57	47.20
Length Wtd. (ft)	280.34	Shear (lb/sq ft)	0.23	0.48	0.20
Min Ch El (ft)	802.75				

Alpha	1.31	Stream Power (lb/ft s)	0.70	1.46	0.20
Frctn Loss (ft)	1.91	Cum Volume (acre-ft)	2.49	1.06	0.71
C & E Loss (ft)	0.03	Cum SA (acres)	1.72	0.28	0.42

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

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	807.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.030	0.050	0.090
W.S. Elev (ft)	807.71	Reach Len. (ft)	254.00	324.50	260.00
Crit W.S. (ft)	807.05	Flow Area (sq ft)	120.18	55.03	59.34
E.G. Slope (ft/ft)	0.003040	Area (sq ft)	120.18	55.03	59.34
Q Total (cfs)	640.00	Flow (cfs)	402.22	173.78	64.00
Top Width (ft)	155.64	Top Width (ft)	88.54	18.00	49.10
Vel Total (ft/s)	2.73	Avg. Vel. (ft/s)	3.35	3.16	1.08
Max Chl Dpth (ft)	4.96	Hydr. Depth (ft)	1.36	3.06	1.21
Conv. Total (cfs)	11607.1	Conv. (cfs)	7294.7	3151.7	1160.8
Length Wtd. (ft)	278.16	Wetted Per. (ft)	88.59	20.57	49.25
Min Ch El (ft)	802.75	Shear (lb/sq ft)	0.26	0.51	0.23
Alpha	1.32	Stream Power (lb/ft s)	0.86	1.60	0.25
Frctn Loss (ft)	1.92	Cum Volume (acre-ft)	3.05	1.15	0.88
C & E Loss (ft)	0.04	Cum SA (acres)	1.75	0.28	0.45

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.

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	808.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.18	Wt. n-Val.	0.030	0.050	0.091
W.S. Elev (ft)	808.00	Reach Len. (ft)	254.00	324.50	260.00
Crit W.S. (ft)	807.21	Flow Area (sq ft)	146.69	60.32	74.22
E.G. Slope (ft/ft)	0.002967	Area (sq ft)	146.69	60.32	74.22
Q Total (cfs)	830.00	Flow (cfs)	541.19	200.07	88.74
Top Width (ft)	161.69	Top Width (ft)	91.67	18.00	52.02
Vel Total (ft/s)	2.95	Avg. Vel. (ft/s)	3.69	3.32	1.20
Max Chl Dpth (ft)	5.25	Hydr. Depth (ft)	1.60	3.35	1.43
Conv. Total (cfs)	15238.7	Conv. (cfs)	9936.2	3673.3	1629.2
Length Wtd. (ft)	275.63	Wetted Per. (ft)	91.73	20.57	52.19
Min Ch El (ft)	802.75	Shear (lb/sq ft)	0.30	0.54	0.26
Alpha	1.34	Stream Power (lb/ft s)	1.09	1.80	0.31
Frctn Loss (ft)	1.93	Cum Volume (acre-ft)	3.87	1.30	1.15
C & E Loss (ft)	0.04	Cum SA (acres)	1.78	0.28	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: Main Channel  
REACH: Upper RS: 112

INPUT

Description:

Station	Elevation	Data	num=	18					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	812	24	810	62	805	90	804	140	804
149	803.75	151	802	153	801.75	156	802	157	802.5
159	803	162	804.5	165	804.5	170	804	172	804
185	805	192	806	211	810				

Manning's n Values num= 4



Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	90	.09	149	.05	165	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	149	162		124 159.7	124	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	803.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.52	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.29	Reach Len. (ft)	124.00	159.70	124.00
Crit W.S. (ft)	803.29	Flow Area (sq ft)		10.23	
E.G. Slope (ft/ft)	0.040504	Area (sq ft)		10.23	
Q Total (cfs)	59.00	Flow (cfs)		59.00	
Top Width (ft)	10.06	Top Width (ft)		10.06	
Vel Total (ft/s)	5.77	Avg. Vel. (ft/s)		5.77	
Max Chl Dpth (ft)	1.54	Hydr. Depth (ft)		1.02	
Conv. Total (cfs)	293.2	Conv. (cfs)		293.2	
Length Wtd. (ft)	152.94	Wetted Per. (ft)		10.81	
Min Ch El (ft)	801.75	Shear (lb/sq ft)		2.39	
Alpha	1.00	Stream Power (lb/ft s)		13.80	
Frctn Loss (ft)	1.00	Cum Volume (acre-ft)	0.09	0.26	0.01
C & E Loss (ft)	0.14	Cum SA (acres)	0.31	0.14	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 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 OUTPUT Profile #1.4

E.G. Elev (ft)	804.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.59	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.50	Reach Len. (ft)	124.00	159.70	124.00
Crit W.S. (ft)	803.50	Flow Area (sq ft)		12.38	
E.G. Slope (ft/ft)	0.039077	Area (sq ft)		12.38	
Q Total (cfs)	76.00	Flow (cfs)		76.00	
Top Width (ft)	10.71	Top Width (ft)		10.71	
Vel Total (ft/s)	6.14	Avg. Vel. (ft/s)		6.14	
Max Chl Dpth (ft)	1.75	Hydr. Depth (ft)		1.16	
Conv. Total (cfs)	384.5	Conv. (cfs)		384.5	
Length Wtd. (ft)	150.42	Wetted Per. (ft)		11.59	
Min Ch El (ft)	801.75	Shear (lb/sq ft)		2.61	
Alpha	1.00	Stream Power (lb/ft s)		16.00	
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)	0.15	0.30	0.01
C & E Loss (ft)	0.17	Cum SA (acres)	0.48	0.15	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 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 OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	804.42	Element			
Vel Head (ft)	0.67	Wt. n-Val.		0.050	
W.S. Elev (ft)	803.75	Reach Len. (ft)	124.00	159.70	124.00
Crit W.S. (ft)	803.75	Flow Area (sq ft)		15.18	
E.G. Slope (ft/ft)	0.038049	Area (sq ft)		15.18	
Q Total (cfs)	100.00	Flow (cfs)		100.00	
Top Width (ft)	11.50	Top Width (ft)		11.50	
Vel Total (ft/s)	6.59	Avg. Vel. (ft/s)		6.59	
Max Chl Dpth (ft)	2.00	Hydr. Depth (ft)		1.32	
Conv. Total (cfs)	512.7	Conv. (cfs)		512.7	
Length Wtd. (ft)	149.21	Wetted Per. (ft)		12.54	
Min Ch El (ft)	801.75	Shear (lb/sq ft)		2.88	
Alpha	1.00	Stream Power (lb/ft s)		18.94	
Frctn Loss (ft)	0.74	Cum Volume (acre-ft)	0.23	0.34	0.02
C & E Loss (ft)	0.19	Cum SA (acres)	0.53	0.16	0.06

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 OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	804.82	Element			
Vel Head (ft)	0.31	Wt. n-Val.	0.079	0.050	0.120
W.S. Elev (ft)	804.51	Reach Len. (ft)	124.00	159.70	124.00
Crit W.S. (ft)	804.51	Flow Area (sq ft)	34.88	24.51	4.04
E.G. Slope (ft/ft)	0.014810	Area (sq ft)	34.88	24.51	4.04
Q Total (cfs)	180.00	Flow (cfs)	49.89	127.43	2.68
Top Width (ft)	102.92	Top Width (ft)	73.29	13.00	16.63
Vel Total (ft/s)	2.84	Avg. Vel. (ft/s)	1.43	5.20	0.66
Max Chl Dpth (ft)	2.76	Hydr. Depth (ft)	0.48	1.89	0.24
Conv. Total (cfs)	1479.1	Conv. (cfs)	410.0	1047.1	22.0
Length Wtd. (ft)	142.20	Wetted Per. (ft)	73.30	14.22	16.68
Min Ch El (ft)	801.75	Shear (lb/sq ft)	0.44	1.59	0.22
Alpha	2.45	Stream Power (lb/ft s)	0.63	8.29	0.15
Frctn Loss (ft)	0.64	Cum Volume (acre-ft)	0.51	0.46	0.10
C & E Loss (ft)	0.08	Cum SA (acres)	0.97	0.16	0.14

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 OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	805.02	Element			
Vel Head (ft)	0.33	Wt. n-Val.	0.076	0.050	0.112
W.S. Elev (ft)	804.69	Reach Len. (ft)	124.00	159.70	124.00
Crit W.S. (ft)	804.69	Flow Area (sq ft)	48.48	26.84	7.24
E.G. Slope (ft/ft)	0.015922	Area (sq ft)	48.48	26.84	7.24
Q Total (cfs)	250.00	Flow (cfs)	89.72	153.76	6.52
Top Width (ft)	110.28	Top Width (ft)	78.31	13.00	18.97
Vel Total (ft/s)	3.03	Avg. Vel. (ft/s)	1.85	5.73	0.90

Max Chl Dpth (ft)	2.94	Hydr. Depth (ft)	0.62	2.06	0.38
Conv. Total (cfs)	1981.3	Conv. (cfs)	711.1	1218.5	51.7
Length Wtd. (ft)	139.87	Wetted Per. (ft)	78.33	14.22	19.02
Min Ch El (ft)	801.75	Shear (lb/sq ft)	0.62	1.88	0.38
Alpha	2.34	Stream Power (lb/ft s)	1.14	10.75	0.34
Frctn Loss (ft)	0.71	Cum Volume (acre-ft)	0.76	0.52	0.17
C & E Loss (ft)	0.09	Cum SA (acres)	1.07	0.17	0.17

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 OUTPUT Profile #25

E.G. Elev (ft)	805.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.40	Wt. n-Val.	0.073	0.050	0.107
W.S. Elev (ft)	804.90	Reach Len. (ft)	124.00	159.70	124.00
Crit W.S. (ft)	804.90	Flow Area (sq ft)	65.68	29.59	11.54
E.G. Slope (ft/ft)	0.018527	Area (sq ft)	65.68	29.59	11.54
Q Total (cfs)	370.00	Flow (cfs)	160.51	195.14	14.36
Top Width (ft)	118.95	Top Width (ft)	84.24	13.00	21.72
Vel Total (ft/s)	3.46	Avg. Vel. (ft/s)	2.44	6.59	1.24
Max Chl Dpth (ft)	3.15	Hydr. Depth (ft)	0.78	2.28	0.53
Conv. Total (cfs)	2718.3	Conv. (cfs)	1179.2	1433.6	105.5
Length Wtd. (ft)	137.65	Wetted Per. (ft)	84.26	14.22	21.78
Min Ch El (ft)	801.75	Shear (lb/sq ft)	0.90	2.41	0.61
Alpha	2.13	Stream Power (lb/ft s)	2.20	15.87	0.76
Frctn Loss (ft)	0.83	Cum Volume (acre-ft)	1.19	0.61	0.29
C & E Loss (ft)	0.10	Cum SA (acres)	1.14	0.17	0.19

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.

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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 OUTPUT Profile #50

E.G. Elev (ft)	805.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.41	Wt. n-Val.	0.071	0.050	0.105
W.S. Elev (ft)	805.07	Reach Len. (ft)	124.00	159.70	124.00
Crit W.S. (ft)	805.07	Flow Area (sq ft)	80.64	31.84	15.48
E.G. Slope (ft/ft)	0.018442	Area (sq ft)	80.64	31.84	15.48
Q Total (cfs)	470.00	Flow (cfs)	227.49	220.01	22.50
Top Width (ft)	124.09	Top Width (ft)	87.57	13.00	23.52
Vel Total (ft/s)	3.67	Avg. Vel. (ft/s)	2.82	6.91	1.45
Max Chl Dpth (ft)	3.32	Hydr. Depth (ft)	0.92	2.45	0.66
Conv. Total (cfs)	3460.9	Conv. (cfs)	1675.1	1620.1	165.7
Length Wtd. (ft)	136.22	Wetted Per. (ft)	87.59	14.22	23.59
Min Ch El (ft)	801.75	Shear (lb/sq ft)	1.06	2.58	0.76
Alpha	1.95	Stream Power (lb/ft s)	2.99	17.82	1.10
Frctn Loss (ft)	0.86	Cum Volume (acre-ft)	1.50	0.67	0.39
C & E Loss (ft)	0.10	Cum SA (acres)	1.17	0.17	0.19

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 OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	805.69	Wt. n-Val.	0.068	0.050	0.104
Vel Head (ft)	0.47	Reach Len. (ft)	124.00	159.70	124.00
W.S. Elev (ft)	805.22	Flow Area (sq ft)	93.57	33.75	19.01
Crit W.S. (ft)	805.22	Area (sq ft)	93.57	33.75	19.01
E.G. Slope (ft/ft)	0.020472	Flow (cfs)	311.92	255.41	32.67
Q Total (cfs)	600.00	Top Width (ft)	88.68	13.00	24.55
Top Width (ft)	126.23	Avg. Vel. (ft/s)	3.33	7.57	1.72
Vel Total (ft/s)	4.10	Hydr. Depth (ft)	1.06	2.60	0.77
Max Chl Dpth (ft)	3.47	Conv. (cfs)	2180.1	1785.0	228.3
Conv. Total (cfs)	4193.4	Wetted Per. (ft)	88.72	14.22	24.63
Length Wtd. (ft)	135.11	Shear (lb/sq ft)	1.35	3.03	0.99
Min Ch El (ft)	801.75	Stream Power (lb/ft s)	4.49	22.96	1.70
Alpha	1.80	Cum Volume (acre-ft)	1.92	0.74	0.50
Frctn Loss (ft)	0.91	Cum SA (acres)	1.21	0.17	0.21
C & E Loss (ft)	0.12				

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 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 OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	805.90	Wt. n-Val.	0.067	0.050	0.104
Vel Head (ft)	0.53	Reach Len. (ft)	124.00	159.70	124.00
W.S. Elev (ft)	805.37	Flow Area (sq ft)	106.42	35.63	22.62
Crit W.S. (ft)	805.37	Area (sq ft)	106.42	35.63	22.62
E.G. Slope (ft/ft)	0.022033	Flow (cfs)	405.76	289.93	44.31
Q Total (cfs)	740.00	Top Width (ft)	89.78	13.00	25.56
Top Width (ft)	128.34	Avg. Vel. (ft/s)	3.81	8.14	1.96
Vel Total (ft/s)	4.49	Hydr. Depth (ft)	1.19	2.74	0.89
Max Chl Dpth (ft)	3.62	Conv. (cfs)	2733.6	1953.2	298.5
Conv. Total (cfs)	4985.3	Wetted Per. (ft)	89.82	14.22	25.65
Length Wtd. (ft)	134.27	Shear (lb/sq ft)	1.63	3.45	1.21
Min Ch El (ft)	801.75	Stream Power (lb/ft s)	6.21	28.05	2.38
Alpha	1.69	Cum Volume (acre-ft)	2.39	0.82	0.64
Frctn Loss (ft)	0.97	Cum SA (acres)	1.23	0.17	0.23
C & E Loss (ft)	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 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.

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CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	806.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.61	Wt. n-Val.	0.065	0.050	0.103
W.S. Elev (ft)	805.60	Reach Len. (ft)	124.00	159.70	124.00
Crit W.S. (ft)	805.60	Flow Area (sq ft)	127.45	38.64	28.74
E.G. Slope (ft/ft)	0.023401	Area (sq ft)	127.45	38.64	28.74
Q Total (cfs)	980.00	Flow (cfs)	572.25	342.11	65.64
Top Width (ft)	131.72	Top Width (ft)	91.54	13.00	27.18
Vel Total (ft/s)	5.03	Avg. Vel. (ft/s)	4.49	8.85	2.28
Max Chl Dpth (ft)	3.85	Hydr. Depth (ft)	1.39	2.97	1.06
Conv. Total (cfs)	6406.4	Conv. (cfs)	3740.8	2236.4	429.1
Length Wtd. (ft)	133.20	Wetted Per. (ft)	91.60	14.22	27.29
Min Ch El (ft)	801.75	Shear (lb/sq ft)	2.03	3.97	1.54
Alpha	1.56	Stream Power (lb/ft s)	9.13	35.15	3.51
Frctn Loss (ft)	1.04	Cum Volume (acre-ft)	3.07	0.93	0.85
C & E Loss (ft)	0.15	Cum SA (acres)	1.24	0.17	0.27

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: Main Channel  
 REACH: Upper RS: 110

INPUT

Description:

Station	Elevation	Data	num=	16					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	809	26	808	59	807	85	804	121	802
149	802	229	802	230	801	233	800.25	235	800.25
237	800	239	801	240	802	241	802.25	255	802
278	810								

Manning's n Values	num=	4					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.03	149	.09	229	.05	255	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff	Contr.	Expan.
229	241	49	64.6	52	.1	.3	

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	802.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.	0.059	0.050	0.051
W.S. Elev (ft)	802.32	Reach Len. (ft)	49.00	64.60	52.00
Crit W.S. (ft)		Flow Area (sq ft)	35.53	19.10	2.88
E.G. Slope (ft/ft)	0.002551	Area (sq ft)	35.53	19.10	2.88
Q Total (cfs)	59.00	Flow (cfs)	20.93	36.66	1.41
Top Width (ft)	140.69	Top Width (ft)	113.77	12.00	14.92
Vel Total (ft/s)	1.03	Avg. Vel. (ft/s)	0.59	1.92	0.49
Max Chl Dpth (ft)	2.32	Hydr. Depth (ft)	0.31	1.59	0.19
Conv. Total (cfs)	1168.1	Conv. (cfs)	414.4	725.7	27.9
Length Wtd. (ft)	61.58	Wetted Per. (ft)	113.78	13.20	14.98
Min Ch El (ft)	800.00	Shear (lb/sq ft)	0.05	0.23	0.03
Alpha	2.30	Stream Power (lb/ft s)	0.03	0.44	0.01
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	0.04	0.20	0.00
C & E Loss (ft)	0.01	Cum SA (acres)	0.15	0.10	0.01

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

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.52	Wt. n-Val.	0.058	0.050	0.051
Vel Head (ft)	0.03	Reach Len. (ft)	49.00	64.60	52.00
W.S. Elev (ft)	802.49	Flow Area (sq ft)	55.07	21.13	5.45
Crit W.S. (ft)		Area (sq ft)	55.07	21.13	5.45
E.G. Slope (ft/ft)	0.001804	Flow (cfs)	36.15	36.49	3.36
Q Total (cfs)	76.00	Top Width (ft)	116.82	12.00	15.41
Top Width (ft)	144.23	Avg. Vel. (ft/s)	0.66	1.73	0.62
Vel Total (ft/s)	0.93	Hydr. Depth (ft)	0.47	1.76	0.35
Max Chl Dpth (ft)	2.49	Conv. (cfs)	851.0	859.1	79.1
Conv. Total (cfs)	1789.2	Wetted Per. (ft)	116.83	13.20	15.49
Length Wtd. (ft)	60.26	Shear (lb/sq ft)	0.05	0.18	0.04
Min Ch El (ft)	800.00	Stream Power (lb/ft s)	0.03	0.31	0.02
Alpha	1.91	Cum Volume (acre-ft)	0.07	0.24	0.00
Frctn Loss (ft)	0.21	Cum SA (acres)	0.32	0.11	0.01
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.64	Wt. n-Val.	0.058	0.050	0.052
Vel Head (ft)	0.03	Reach Len. (ft)	49.00	64.60	52.00
W.S. Elev (ft)	802.61	Flow Area (sq ft)	69.34	22.58	7.34
Crit W.S. (ft)		Area (sq ft)	69.34	22.58	7.34
E.G. Slope (ft/ft)	0.001845	Flow (cfs)	53.28	41.23	5.49
Q Total (cfs)	100.00	Top Width (ft)	119.00	12.00	15.76
Top Width (ft)	146.75	Avg. Vel. (ft/s)	0.77	1.83	0.75
Vel Total (ft/s)	1.01	Hydr. Depth (ft)	0.58	1.88	0.47
Max Chl Dpth (ft)	2.61	Conv. (cfs)	1240.4	959.8	127.9
Conv. Total (cfs)	2328.0	Wetted Per. (ft)	119.01	13.20	15.86
Length Wtd. (ft)	58.75	Shear (lb/sq ft)	0.07	0.20	0.05
Min Ch El (ft)	800.00	Stream Power (lb/ft s)	0.05	0.36	0.04
Alpha	1.69	Cum Volume (acre-ft)	0.13	0.27	0.01
Frctn Loss (ft)	0.21	Cum SA (acres)	0.37	0.11	0.03
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.93	Wt. n-Val.	0.057	0.050	0.052
Vel Head (ft)	0.03	Reach Len. (ft)	49.00	64.60	52.00
W.S. Elev (ft)	802.90	Flow Area (sq ft)	104.22	26.02	11.98
Crit W.S. (ft)		Area (sq ft)	104.22	26.02	11.98
E.G. Slope (ft/ft)	0.002127	Flow (cfs)	111.07	56.07	12.86
Q Total (cfs)	180.00	Top Width (ft)	124.16	12.00	16.58
Top Width (ft)	152.74	Avg. Vel. (ft/s)	1.07	2.15	1.07
Vel Total (ft/s)	1.27	Hydr. Depth (ft)	0.84	2.17	0.72
Max Chl Dpth (ft)	2.90	Conv. (cfs)	2408.2	1215.8	278.9
Conv. Total (cfs)	3902.8	Wetted Per. (ft)	124.19	13.20	16.74
Length Wtd. (ft)	56.49	Shear (lb/sq ft)	0.11	0.26	0.10
Min Ch El (ft)	800.00	Stream Power (lb/ft s)	0.12	0.56	0.10
Alpha	1.39	Cum Volume (acre-ft)	0.32	0.36	0.08
Frctn Loss (ft)	0.24	Cum SA (acres)	0.69	0.12	0.10
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.11	Wt. n-Val.	0.057	0.050	0.052
Vel Head (ft)	0.04	Reach Len. (ft)	49.00	64.60	52.00
W.S. Elev (ft)	803.07	Flow Area (sq ft)	125.74	28.08	14.86
Crit W.S. (ft)		Area (sq ft)	125.74	28.08	14.86
E.G. Slope (ft/ft)	0.002465				

Q Total (cfs)	250.00	Flow (cfs)	162.09	68.51	19.40
Top Width (ft)	156.32	Top Width (ft)	127.24	12.00	17.07
Vel Total (ft/s)	1.48	Avg. Vel. (ft/s)	1.29	2.44	1.31
Max Chl Dpth (ft)	3.07	Hydr. Depth (ft)	0.99	2.34	0.87
Conv. Total (cfs)	5035.6	Conv. (cfs)	3264.8	1379.9	390.8
Length Wtd. (ft)	55.34	Wetted Per. (ft)	127.27	13.20	17.26
Min Ch El (ft)	800.00	Shear (lb/sq ft)	0.15	0.33	0.13
Alpha	1.29	Stream Power (lb/ft s)	0.20	0.80	0.17
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	0.52	0.42	0.14
C & E Loss (ft)	0.02	Cum SA (acres)	0.77	0.12	0.12

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

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.37	Wt. n-Val.	0.057	0.050	0.053
Vel Head (ft)	0.06	Reach Len. (ft)	49.00	64.60	52.00
W.S. Elev (ft)	803.31	Flow Area (sq ft)	156.39	30.92	18.98
Crit W.S. (ft)		Area (sq ft)	156.39	30.92	18.98
E.G. Slope (ft/ft)	0.002930	Flow (cfs)	251.39	87.71	30.90
Q Total (cfs)	370.00	Top Width (ft)	131.51	12.00	17.75
Top Width (ft)	161.26	Avg. Vel. (ft/s)	1.61	2.84	1.63
Vel Total (ft/s)	1.79	Hydr. Depth (ft)	1.19	2.58	1.07
Max Chl Dpth (ft)	3.31	Conv. (cfs)	4644.4	1620.5	570.9
Conv. Total (cfs)	6835.8	Wetted Per. (ft)	131.54	13.20	17.98
Length Wtd. (ft)	54.21	Shear (lb/sq ft)	0.22	0.43	0.19
Min Ch El (ft)	800.00	Stream Power (lb/ft s)	0.35	1.22	0.31
Alpha	1.21	Cum Volume (acre-ft)	0.87	0.49	0.25
Frctn Loss (ft)	0.28	Cum SA (acres)	0.83	0.12	0.13
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.56	Wt. n-Val.	0.056	0.050	0.053
Vel Head (ft)	0.07	Reach Len. (ft)	49.00	64.60	52.00
W.S. Elev (ft)	803.48	Flow Area (sq ft)	180.09	33.06	22.19
Crit W.S. (ft)		Area (sq ft)	180.09	33.06	22.19
E.G. Slope (ft/ft)	0.003156	Flow (cfs)	327.53	101.76	40.71
Q Total (cfs)	470.00	Top Width (ft)	134.71	12.00	18.27
Top Width (ft)	164.98	Avg. Vel. (ft/s)	1.82	3.08	1.83
Vel Total (ft/s)	2.00	Hydr. Depth (ft)	1.34	2.75	1.21
Max Chl Dpth (ft)	3.48	Conv. (cfs)	5830.3	1811.5	724.6
Conv. Total (cfs)	8366.4	Wetted Per. (ft)	134.75	13.20	18.52
Length Wtd. (ft)	53.69	Shear (lb/sq ft)	0.26	0.49	0.24
Min Ch El (ft)	800.00	Stream Power (lb/ft s)	0.48	1.52	0.43
Alpha	1.17	Cum Volume (acre-ft)	1.13	0.55	0.34
Frctn Loss (ft)	0.29	Cum SA (acres)	0.85	0.12	0.14
C & E Loss (ft)	0.02				

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

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.79	Wt. n-Val.	0.056	0.050	0.053
Vel Head (ft)	0.09	Reach Len. (ft)	49.00	64.60	52.00
W.S. Elev (ft)	803.70	Flow Area (sq ft)	209.70	35.66	26.22
Crit W.S. (ft)		Area (sq ft)	209.70	35.66	26.22
E.G. Slope (ft/ft)	0.003308	Flow (cfs)	428.21	118.19	53.60
Q Total (cfs)	600.00	Top Width (ft)	138.61	12.00	18.89
Top Width (ft)	169.50	Avg. Vel. (ft/s)	2.04	3.31	2.04
Vel Total (ft/s)	2.21	Hydr. Depth (ft)	1.51	2.97	1.39
Max Chl Dpth (ft)	3.70	Conv. (cfs)	7445.6	2055.1	932.0
Conv. Total (cfs)	10432.7				

Length Wtd. (ft)	53.56	Wetted Per. (ft)	138.66	13.20	19.18
Min Ch El (ft)	800.00	Shear (lb/sq ft)	0.31	0.56	0.28
Alpha	1.13	Stream Power (lb/ft s)	0.64	1.85	0.58
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	1.49	0.61	0.44
C & E Loss (ft)	0.03	Cum SA (acres)	0.88	0.12	0.15

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	803.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.055	0.050	0.054
W.S. Elev (ft)	803.89	Reach Len. (ft)	49.00	64.60	52.00
Crit W.S. (ft)		Flow Area (sq ft)	236.21	37.93	29.84
E.G. Slope (ft/ft)	0.003550	Area (sq ft)	236.21	37.93	29.84
Q Total (cfs)	740.00	Flow (cfs)	536.92	135.70	67.38
Top Width (ft)	173.45	Top Width (ft)	142.01	12.00	19.43
Vel Total (ft/s)	2.43	Avg. Vel. (ft/s)	2.27	3.58	2.26
Max Chl Dpth (ft)	3.89	Hydr. Depth (ft)	1.66	3.16	1.54
Conv. Total (cfs)	12419.5	Conv. (cfs)	9011.1	2277.5	1130.9
Length Wtd. (ft)	53.21	Wetted Per. (ft)	142.07	13.20	19.75
Min Ch El (ft)	800.00	Shear (lb/sq ft)	0.37	0.64	0.33
Alpha	1.11	Stream Power (lb/ft s)	0.84	2.28	0.76
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)	1.90	0.68	0.56
C & E Loss (ft)	0.04	Cum SA (acres)	0.90	0.12	0.16

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	804.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.055	0.050	0.054
W.S. Elev (ft)	804.17	Reach Len. (ft)	49.00	64.60	52.00
Crit W.S. (ft)		Flow Area (sq ft)	276.05	41.24	35.32
E.G. Slope (ft/ft)	0.003881	Area (sq ft)	276.05	41.24	35.32
Q Total (cfs)	980.00	Flow (cfs)	726.43	163.17	90.40
Top Width (ft)	177.67	Top Width (ft)	145.44	12.00	20.23
Vel Total (ft/s)	2.78	Avg. Vel. (ft/s)	2.63	3.96	2.56
Max Chl Dpth (ft)	4.17	Hydr. Depth (ft)	1.90	3.44	1.75
Conv. Total (cfs)	15731.8	Conv. (cfs)	11661.3	2619.3	1451.2
Length Wtd. (ft)	52.79	Wetted Per. (ft)	145.51	13.20	20.60
Min Ch El (ft)	800.00	Shear (lb/sq ft)	0.46	0.76	0.42
Alpha	1.08	Stream Power (lb/ft s)	1.21	2.99	1.06
Frctn Loss (ft)	0.42	Cum Volume (acre-ft)	2.50	0.78	0.76
C & E Loss (ft)	0.04	Cum SA (acres)	0.90	0.12	0.20

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: Main Channel  
REACH: Upper RS: 108

INPUT

Description:

Station Elevation Data	num=	17
Sta Elev Sta Elev Sta Elev Sta Elev Sta Elev		
0 807 44 806 62 805 88 803 125 802		
144 802 205 802 214 801.5 216 800 218 799.75		
221 800 222 800.5 224 801 227 802.5 230 802.5		
235 802 269 810		

Manning's n Values	num=	4
Sta n Val Sta n Val Sta n Val Sta n Val		
0 .03 144 .09 214 .05 227 .12		

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



214 227 91 113.6 83 .1 .3

CROSS SECTION OUTPUT Profile #1

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.08	Wt. n-Val.	0.090	0.050	
Vel Head (ft)	0.18	Reach Len. (ft)	91.00	113.60	83.00
W.S. Elev (ft)	801.90	Flow Area (sq ft)	1.47	17.23	
Crit W.S. (ft)	801.28	Area (sq ft)	1.47	17.23	
E.G. Slope (ft/ft)	0.008635	Flow (cfs)	0.77	58.23	
Q Total (cfs)	59.00	Top Width (ft)	7.27	11.81	
Top Width (ft)	19.07	Avg. Vel. (ft/s)	0.53	3.38	
Vel Total (ft/s)	3.16	Hydr. Depth (ft)	0.20	1.46	
Max Chl Dpth (ft)	2.15	Conv. (cfs)	8.3	626.6	
Conv. Total (cfs)	634.9	Wetted Per. (ft)	7.28	12.73	
Length Wtd. (ft)	109.89	Shear (lb/sq ft)	0.11	0.73	
Min Ch El (ft)	799.75	Stream Power (lb/ft s)	0.06	2.47	
Alpha	1.13	Cum Volume (acre-ft)	0.02	0.18	
Frctn Loss (ft)	1.37	Cum SA (acres)	0.08	0.08	
C & E Loss (ft)	0.00				

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.28	Wt. n-Val.	0.072	0.050	0.120
Vel Head (ft)	0.21	Reach Len. (ft)	91.00	113.60	83.00
W.S. Elev (ft)	802.07	Flow Area (sq ft)	8.22	19.17	0.03
Crit W.S. (ft)	801.48	Area (sq ft)	8.22	19.17	0.03
E.G. Slope (ft/ft)	0.009753	Flow (cfs)	3.42	72.58	0.00
Q Total (cfs)	76.00	Top Width (ft)	91.45	12.13	0.94
Top Width (ft)	104.52	Avg. Vel. (ft/s)	0.42	3.79	0.13
Vel Total (ft/s)	2.77	Hydr. Depth (ft)	0.09	1.58	0.03
Max Chl Dpth (ft)	2.32	Conv. (cfs)	34.6	734.9	0.0
Conv. Total (cfs)	769.6	Wetted Per. (ft)	91.46	13.09	0.95
Length Wtd. (ft)	108.68	Shear (lb/sq ft)	0.05	0.89	0.02
Min Ch El (ft)	799.75	Stream Power (lb/ft s)	0.02	3.38	0.00
Alpha	1.78	Cum Volume (acre-ft)	0.04	0.21	0.00
Frctn Loss (ft)	1.46	Cum SA (acres)	0.20	0.09	0.00
C & E Loss (ft)	0.00				

Warning: Divided flow computed for this cross-section.  
 Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.41	Wt. n-Val.	0.066	0.050	0.120
Vel Head (ft)	0.20	Reach Len. (ft)	91.00	113.60	83.00
W.S. Elev (ft)	802.20	Flow Area (sq ft)	20.94	20.83	0.29
Crit W.S. (ft)	801.76	Area (sq ft)	20.94	20.83	0.29
E.G. Slope (ft/ft)	0.009899	Flow (cfs)	17.21	82.71	0.08
Q Total (cfs)	100.00	Top Width (ft)	96.46	12.40	2.87
Top Width (ft)	111.74	Avg. Vel. (ft/s)	0.82	3.97	0.26
Vel Total (ft/s)	2.38	Hydr. Depth (ft)	0.22	1.68	0.10
Max Chl Dpth (ft)	2.45	Conv. (cfs)	173.0	831.3	0.8
Conv. Total (cfs)	1005.1	Wetted Per. (ft)	96.48	13.39	2.91
Length Wtd. (ft)	106.41	Shear (lb/sq ft)	0.13	0.96	0.06
Min Ch El (ft)	799.75	Stream Power (lb/ft s)	0.11	3.82	0.02
Alpha	2.33	Cum Volume (acre-ft)	0.08	0.24	0.00
Frctn Loss (ft)	1.45	Cum SA (acres)	0.24	0.09	0.02
C & E Loss (ft)	0.00				

Warning: Divided flow computed for this cross-section.

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.  
 Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.66				
Vel Head (ft)	0.24	Wt. n-Val.	0.062	0.050	0.120
W.S. Elev (ft)	802.42	Reach Len. (ft)	91.00	113.60	83.00
Crit W.S. (ft)	802.42	Flow Area (sq ft)	42.76	23.58	1.25
E.G. Slope (ft/ft)	0.013122	Area (sq ft)	42.76	23.58	1.25
Q Total (cfs)	180.00	Flow (cfs)	65.12	114.26	0.62
Top Width (ft)	123.30	Top Width (ft)	104.49	12.84	5.97
Vel Total (ft/s)	2.66	Avg. Vel. (ft/s)	1.52	4.85	0.50
Max Chl Dpth (ft)	2.67	Hydr. Depth (ft)	0.41	1.84	0.21
Conv. Total (cfs)	1571.4	Conv. (cfs)	568.4	997.5	5.4
Length Wtd. (ft)	101.50	Wetted Per. (ft)	104.51	13.88	6.04
Min Ch El (ft)	799.75	Shear (lb/sq ft)	0.34	1.39	0.17
Alpha	2.22	Stream Power (lb/ft s)	0.51	6.74	0.08
Frctn Loss (ft)	1.11	Cum Volume (acre-ft)	0.23	0.33	0.07
C & E Loss (ft)	0.01	Cum SA (acres)	0.56	0.10	0.08

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 OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.83				
Vel Head (ft)	0.23	Wt. n-Val.	0.061	0.050	0.120
W.S. Elev (ft)	802.60	Reach Len. (ft)	91.00	113.60	83.00
Crit W.S. (ft)	802.55	Flow Area (sq ft)	61.76	25.86	2.76
E.G. Slope (ft/ft)	0.012833	Area (sq ft)	61.76	25.86	2.76
Q Total (cfs)	250.00	Flow (cfs)	117.72	130.70	1.58
Top Width (ft)	134.55	Top Width (ft)	111.02	13.00	10.53
Vel Total (ft/s)	2.77	Avg. Vel. (ft/s)	1.91	5.05	0.57
Max Chl Dpth (ft)	2.85	Hydr. Depth (ft)	0.56	1.99	0.26
Conv. Total (cfs)	2206.9	Conv. (cfs)	1039.1	1153.8	13.9
Length Wtd. (ft)	100.42	Wetted Per. (ft)	111.04	14.06	10.62
Min Ch El (ft)	799.75	Shear (lb/sq ft)	0.45	1.47	0.21
Alpha	1.97	Stream Power (lb/ft s)	0.85	7.45	0.12
Frctn Loss (ft)	1.43	Cum Volume (acre-ft)	0.41	0.38	0.13
C & E Loss (ft)	0.00	Cum SA (acres)	0.64	0.10	0.10

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

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.08				
Vel Head (ft)	0.22	Wt. n-Val.	0.059	0.050	0.120
W.S. Elev (ft)	802.85	Reach Len. (ft)	91.00	113.60	83.00
Crit W.S. (ft)	802.72	Flow Area (sq ft)	91.55	29.21	5.61
E.G. Slope (ft/ft)	0.011667	Area (sq ft)	91.55	29.21	5.61
Q Total (cfs)	370.00	Flow (cfs)	212.79	152.63	4.59
Top Width (ft)	145.16	Top Width (ft)	120.54	13.00	11.62
Vel Total (ft/s)	2.93	Avg. Vel. (ft/s)	2.32	5.23	0.82
Max Chl Dpth (ft)	3.10	Hydr. Depth (ft)	0.76	2.25	0.48
Conv. Total (cfs)	3425.5	Conv. (cfs)	1970.0	1413.0	42.5
Length Wtd. (ft)	98.63	Wetted Per. (ft)	120.56	14.06	11.75
Min Ch El (ft)	799.75	Shear (lb/sq ft)	0.55	1.51	0.35
Alpha	1.68	Stream Power (lb/ft s)	1.29	7.91	0.28
Frctn Loss (ft)	1.46	Cum Volume (acre-ft)	0.73	0.45	0.23
C & E Loss (ft)	0.01	Cum SA (acres)	0.69	0.10	0.11

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

CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.25	Element			
Vel Head (ft)	0.24	Wt. n-Val.	0.058	0.050	0.120
W.S. Elev (ft)	803.01	Reach Len. (ft)	91.00	113.60	83.00
Crit W.S. (ft)	802.85	Flow Area (sq ft)	110.79	31.23	7.48
E.G. Slope (ft/ft)	0.011785	Area (sq ft)	110.79	31.23	7.48
Q Total (cfs)	470.00	Flow (cfs)	291.29	171.54	7.16
Top Width (ft)	151.39	Top Width (ft)	126.11	13.00	12.29
Vel Total (ft/s)	3.14	Avg. Vel. (ft/s)	2.63	5.49	0.96
Max Chl Dpth (ft)	3.26	Hydr. Depth (ft)	0.88	2.40	0.61
Conv. Total (cfs)	4329.4	Conv. (cfs)	2683.3	1580.2	66.0
Length Wtd. (ft)	97.77	Wetted Per. (ft)	126.13	14.06	12.43
Min Ch El (ft)	799.75	Shear (lb/sq ft)	0.65	1.63	0.44
Alpha	1.55	Stream Power (lb/ft s)	1.70	8.98	0.42
Frctn Loss (ft)	1.48	Cum Volume (acre-ft)	0.97	0.50	0.32
C & E Loss (ft)	0.01	Cum SA (acres)	0.71	0.10	0.12

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

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.40	Element			
Vel Head (ft)	0.40	Wt. n-Val.	0.058	0.050	0.120
W.S. Elev (ft)	803.00	Reach Len. (ft)	91.00	113.60	83.00
Crit W.S. (ft)	803.00	Flow Area (sq ft)	109.83	31.13	7.38
E.G. Slope (ft/ft)	0.019658	Area (sq ft)	109.83	31.13	7.38
Q Total (cfs)	600.00	Flow (cfs)	370.54	220.38	9.07
Top Width (ft)	151.26	Top Width (ft)	126.01	13.00	12.25
Vel Total (ft/s)	4.04	Avg. Vel. (ft/s)	3.37	7.08	1.23
Max Chl Dpth (ft)	3.25	Hydr. Depth (ft)	0.87	2.39	0.60
Conv. Total (cfs)	4279.4	Conv. (cfs)	2642.8	1571.8	64.7
Length Wtd. (ft)	97.08	Wetted Per. (ft)	126.04	14.06	12.39
Min Ch El (ft)	799.75	Shear (lb/sq ft)	1.07	2.72	0.73
Alpha	1.56	Stream Power (lb/ft s)	3.61	19.24	0.90
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	1.31	0.56	0.42
C & E Loss (ft)	0.06	Cum SA (acres)	0.73	0.10	0.13

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.57	Element			
Vel Head (ft)	0.45	Wt. n-Val.	0.057	0.050	0.120
W.S. Elev (ft)	803.12	Reach Len. (ft)	91.00	113.60	83.00
Crit W.S. (ft)	803.12	Flow Area (sq ft)	124.35	32.62	8.81
E.G. Slope (ft/ft)	0.021368	Area (sq ft)	124.35	32.62	8.81
Q Total (cfs)	740.00	Flow (cfs)	479.24	248.38	12.38
Top Width (ft)	153.24	Top Width (ft)	127.50	13.00	12.74
Vel Total (ft/s)	4.46	Avg. Vel. (ft/s)	3.85	7.61	1.40
Max Chl Dpth (ft)	3.37	Hydr. Depth (ft)	0.98	2.51	0.69
Conv. Total (cfs)	5062.3	Conv. (cfs)	3278.4	1699.2	84.7
Length Wtd. (ft)	96.26	Wetted Per. (ft)	127.53	14.06	12.89

Min Ch El (ft)	799.75	Shear (lb/sq ft)	1.30	3.10	0.91
Alpha	1.46	Stream Power (lb/ft s)	5.01	23.57	1.28
Frctn Loss (ft)	0.83	Cum Volume (acre-ft)	1.70	0.63	0.54
C & E Loss (ft)	0.09	Cum SA (acres)	0.75	0.10	0.14

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #500

E.G. Elev (ft)	803.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.	0.055	0.050	0.120
W.S. Elev (ft)	803.29	Reach Len. (ft)	91.00	113.60	83.00
Crit W.S. (ft)	803.29	Flow Area (sq ft)	146.59	34.87	11.08
E.G. Slope (ft/ft)	0.023690	Area (sq ft)	146.59	34.87	11.08
Q Total (cfs)	980.00	Flow (cfs)	669.38	292.25	18.38
Top Width (ft)	156.22	Top Width (ft)	129.75	13.00	13.47
Vel Total (ft/s)	5.09	Avg. Vel. (ft/s)	4.57	8.38	1.66
Max Chl Dpth (ft)	3.54	Hydr. Depth (ft)	1.13	2.68	0.82
Conv. Total (cfs)	6367.1	Conv. (cfs)	4348.9	1898.7	119.4
Length Wtd. (ft)	95.45	Wetted Per. (ft)	129.78	14.06	13.65
Min Ch El (ft)	799.75	Shear (lb/sq ft)	1.67	3.67	1.20
Alpha	1.36	Stream Power (lb/ft s)	7.63	30.74	1.99
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	2.26	0.73	0.73
C & E Loss (ft)	0.13	Cum SA (acres)	0.75	0.10	0.18

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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: Main Channel  
REACH: Upper RS: 106

INPUT

Description:

Station Elevation Data		num=		17					
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	802	25	801	48	800	79	801	140	801
152	801	153	800	156	799.25	158	799.25	160	799
162	800	163	801	164	801.25	168	801	176	802
183	803	213	812						

Manning's n Values

Sta n Val		Sta n Val		Sta n Val		Sta n Val	
0	.03	79	.09	152	.05	176	.12

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
152	164	148	205.3	182	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	800.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.030	0.050	
W.S. Elev (ft)	800.50	Reach Len. (ft)	148.00	205.30	182.00

Crit W.S. (ft)	800.50	Flow Area (sq ft)	6.77	10.13
E.G. Slope (ft/ft)	0.019502	Area (sq ft)	6.77	10.13
Q Total (cfs)	59.00	Flow (cfs)	18.60	40.40
Top Width (ft)	37.04	Top Width (ft)	27.04	10.00
Vel Total (ft/s)	3.49	Avg. Vel. (ft/s)	2.75	3.99
Max Chl Dpth (ft)	1.50	Hydr. Depth (ft)	0.25	1.01
Conv. Total (cfs)	422.5	Conv. (cfs)	133.2	289.3
Length Wtd. (ft)	196.27	Wetted Per. (ft)	27.06	10.76
Min Ch El (ft)	799.00	Shear (lb/sq ft)	0.30	1.15
Alpha	1.09	Stream Power (lb/ft s)	0.84	4.57
Frctn Loss (ft)	1.90	Cum Volume (acre-ft)	0.01	0.14
C & E Loss (ft)	0.03	Cum SA (acres)	0.05	0.06

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 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 OUTPUT Profile #1.4

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.82	Wt. n-Val.	0.030	0.050	
Vel Head (ft)	0.22	Reach Len. (ft)	148.00	205.30	182.00
W.S. Elev (ft)	800.60	Flow Area (sq ft)	9.59	11.09	
Crit W.S. (ft)	800.60	Area (sq ft)	9.59	11.09	
E.G. Slope (ft/ft)	0.019608	Flow (cfs)	29.66	46.34	
Q Total (cfs)	76.00	Top Width (ft)	32.18	10.19	
Top Width (ft)	42.37	Avg. Vel. (ft/s)	3.09	4.18	
Vel Total (ft/s)	3.67	Hydr. Depth (ft)	0.30	1.09	
Max Chl Dpth (ft)	1.60	Conv. (cfs)	211.8	331.0	
Conv. Total (cfs)	542.8	Wetted Per. (ft)	32.20	11.03	
Length Wtd. (ft)	194.08	Shear (lb/sq ft)	0.36	1.23	
Min Ch El (ft)	799.00	Stream Power (lb/ft s)	1.13	5.14	
Alpha	1.06	Cum Volume (acre-ft)	0.02	0.17	
Frctn Loss (ft)	1.84	Cum SA (acres)	0.07	0.06	
C & E Loss (ft)	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: Divided flow computed for this cross-section.

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

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 OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.95	Wt. n-Val.	0.030	0.050	
Vel Head (ft)	0.25	Reach Len. (ft)	148.00	205.30	182.00
W.S. Elev (ft)	800.70	Flow Area (sq ft)	13.31	12.19	
Crit W.S. (ft)	800.70	Area (sq ft)	13.31	12.19	
E.G. Slope (ft/ft)	0.019932	Flow (cfs)	46.31	53.69	
Q Total (cfs)	100.00	Top Width (ft)	37.92	10.40	
Top Width (ft)	48.32	Avg. Vel. (ft/s)	3.48	4.40	
Vel Total (ft/s)	3.92	Hydr. Depth (ft)	0.35	1.17	
Max Chl Dpth (ft)	1.70	Conv. (cfs)	328.0	380.3	
Conv. Total (cfs)	708.3	Wetted Per. (ft)	37.95	11.33	
Length Wtd. (ft)	191.05	Shear (lb/sq ft)	0.44	1.34	
Min Ch El (ft)	799.00				

Alpha	1.04	Stream Power (lb/ft s)	1.52	5.90	
Frctn Loss (ft)	1.75	Cum Volume (acre-ft)	0.04	0.20	0.00
C & E Loss (ft)	0.03	Cum SA (acres)	0.10	0.06	0.02

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 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 OUTPUT Profile #5

E.G. Elev (ft)	801.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.030	0.050	0.050
W.S. Elev (ft)	801.04	Reach Len. (ft)	148.00	205.30	182.00
Crit W.S. (ft)	801.04	Flow Area (sq ft)	32.57	15.86	0.02
E.G. Slope (ft/ft)	0.014026	Area (sq ft)	32.57	15.86	0.02
Q Total (cfs)	180.00	Flow (cfs)	114.06	65.93	0.01
Top Width (ft)	140.31	Top Width (ft)	128.09	11.17	1.05
Vel Total (ft/s)	3.72	Avg. Vel. (ft/s)	3.50	4.16	0.27
Max Chl Dpth (ft)	2.04	Hydr. Depth (ft)	0.25	1.42	0.02
Conv. Total (cfs)	1519.9	Conv. (cfs)	963.1	556.7	0.1
Length Wtd. (ft)	182.26	Wetted Per. (ft)	128.13	12.35	1.05
Min Ch El (ft)	799.00	Shear (lb/sq ft)	0.22	1.12	0.02
Alpha	1.02	Stream Power (lb/ft s)	0.78	4.67	0.01
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)	0.16	0.28	0.07
C & E Loss (ft)	0.03	Cum SA (acres)	0.31	0.07	0.08

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 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 OUTPUT Profile #10

E.G. Elev (ft)	801.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.033	0.050	0.050
W.S. Elev (ft)	801.16	Reach Len. (ft)	148.00	205.30	182.00
Crit W.S. (ft)	801.16	Flow Area (sq ft)	48.01	17.22	0.32
E.G. Slope (ft/ft)	0.015850	Area (sq ft)	48.01	17.22	0.32
Q Total (cfs)	250.00	Flow (cfs)	171.45	78.33	0.22
Top Width (ft)	146.63	Top Width (ft)	131.07	11.65	3.91
Vel Total (ft/s)	3.81	Avg. Vel. (ft/s)	3.57	4.55	0.70
Max Chl Dpth (ft)	2.16	Hydr. Depth (ft)	0.37	1.48	0.08
Conv. Total (cfs)	1985.8	Conv. (cfs)	1361.8	622.2	1.8
Length Wtd. (ft)	178.34	Wetted Per. (ft)	131.11	12.84	3.92
Min Ch El (ft)	799.00	Shear (lb/sq ft)	0.36	1.33	0.08
Alpha	1.05	Stream Power (lb/ft s)	1.29	6.03	0.06
Frctn Loss (ft)	0.97	Cum Volume (acre-ft)	0.30	0.32	0.13
C & E Loss (ft)	0.04	Cum SA (acres)	0.39	0.07	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: Divided flow computed for this cross-section.  
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less

than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

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 OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.60	Wt. n-Val.	0.035	0.050	0.050
Vel Head (ft)	0.30	Reach Len. (ft)	148.00	205.30	182.00
W.S. Elev (ft)	801.30	Flow Area (sq ft)	66.26	18.85	1.06
Crit W.S. (ft)	801.30	Area (sq ft)	66.26	18.85	1.06
E.G. Slope (ft/ft)	0.019538	Flow (cfs)	269.37	99.31	1.33
Q Total (cfs)	370.00	Top Width (ft)	134.51	12.00	6.40
Top Width (ft)	152.91	Avg. Vel. (ft/s)	4.07	5.27	1.25
Vel Total (ft/s)	4.29	Hydr. Depth (ft)	0.49	1.57	0.17
Max Chl Dpth (ft)	2.30	Conv. (cfs)	1927.1	710.4	9.5
Conv. Total (cfs)	2647.0	Wetted Per. (ft)	134.55	13.20	6.43
Length Wtd. (ft)	173.79	Shear (lb/sq ft)	0.60	1.74	0.20
Min Ch El (ft)	799.00	Stream Power (lb/ft s)	2.44	9.17	0.25
Alpha	1.06	Cum Volume (acre-ft)	0.57	0.39	0.23
Frctn Loss (ft)	0.76	Cum SA (acres)	0.43	0.07	0.09
C & E Loss (ft)	0.07				

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.75	Wt. n-Val.	0.037	0.050	0.050
Vel Head (ft)	0.34	Reach Len. (ft)	148.00	205.30	182.00
W.S. Elev (ft)	801.41	Flow Area (sq ft)	81.80	20.23	1.85
Crit W.S. (ft)	801.41	Area (sq ft)	81.80	20.23	1.85
E.G. Slope (ft/ft)	0.020303	Flow (cfs)	353.08	113.81	3.11
Q Total (cfs)	470.00	Top Width (ft)	137.37	12.00	7.32
Top Width (ft)	156.68	Avg. Vel. (ft/s)	4.32	5.63	1.69
Vel Total (ft/s)	4.52	Hydr. Depth (ft)	0.60	1.69	0.25
Max Chl Dpth (ft)	2.41	Conv. (cfs)	2477.9	798.7	21.8
Conv. Total (cfs)	3298.5	Wetted Per. (ft)	137.41	13.20	7.35
Length Wtd. (ft)	171.48	Shear (lb/sq ft)	0.75	1.94	0.32
Min Ch El (ft)	799.00	Stream Power (lb/ft s)	3.26	10.93	0.54
Alpha	1.06	Cum Volume (acre-ft)	0.77	0.43	0.31
Frctn Loss (ft)	0.66	Cum SA (acres)	0.43	0.07	0.10
C & E Loss (ft)	0.08				

Warning: The energy equation could not be balanced within the specified number of iterations. The program selected the water surface that had the least amount of error between computed and assumed values.

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 OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.03				

Vel Head (ft)	0.20	Wt. n-Val.	0.040	0.050	0.050
W.S. Elev (ft)	801.83	Reach Len. (ft)	148.00	205.30	182.00
Crit W.S. (ft)		Flow Area (sq ft)	141.57	25.25	5.61
E.G. Slope (ft/ft)	0.008910	Area (sq ft)	141.57	25.25	5.61
Q Total (cfs)	600.00	Flow (cfs)	480.61	109.16	10.23
Top Width (ft)	170.51	Top Width (ft)	147.84	12.00	10.67
Vel Total (ft/s)	3.48	Avg. Vel. (ft/s)	3.39	4.32	1.82
Max Chl Dpth (ft)	2.83	Hydr. Depth (ft)	0.96	2.10	0.53
Conv. Total (cfs)	6356.4	Conv. (cfs)	5091.6	1156.5	108.4
Length Wtd. (ft)	168.78	Wetted Per. (ft)	147.90	13.20	10.73
Min Ch El (ft)	799.00	Shear (lb/sq ft)	0.53	1.06	0.29
Alpha	1.05	Stream Power (lb/ft s)	1.81	4.60	0.53
Frctn Loss (ft)	0.49	Cum Volume (acre-ft)	1.05	0.49	0.41
C & E Loss (ft)	0.04	Cum SA (acres)	0.45	0.07	0.11

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

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.41	Wt. n-Val.	0.042	0.050	0.050
Vel Head (ft)	0.14	Reach Len. (ft)	148.00	205.30	182.00
W.S. Elev (ft)	802.26	Flow Area (sq ft)	206.49	30.41	10.90
Crit W.S. (ft)		Area (sq ft)	206.49	30.41	10.90
E.G. Slope (ft/ft)	0.004637	Flow (cfs)	612.79	107.31	19.90
Q Total (cfs)	740.00	Top Width (ft)	152.00	12.00	13.84
Top Width (ft)	177.84	Avg. Vel. (ft/s)	2.97	3.53	1.83
Vel Total (ft/s)	2.99	Hydr. Depth (ft)	1.36	2.53	0.79
Max Chl Dpth (ft)	3.26	Conv. (cfs)	8999.4	1575.9	292.2
Conv. Total (cfs)	10867.6	Wetted Per. (ft)	152.32	13.20	13.93
Length Wtd. (ft)	167.02	Shear (lb/sq ft)	0.39	0.67	0.23
Min Ch El (ft)	799.00	Stream Power (lb/ft s)	1.16	2.35	0.41
Alpha	1.03	Cum Volume (acre-ft)	1.35	0.55	0.52
Frctn Loss (ft)	0.37	Cum SA (acres)	0.46	0.07	0.12
C & E Loss (ft)	0.02				

Warning: The cross-section end points had to be extended vertically for the computed water surface.  
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	803.04	Wt. n-Val.	0.043	0.050	0.052
Vel Head (ft)	0.11	Reach Len. (ft)	148.00	205.30	182.00
W.S. Elev (ft)	802.92	Flow Area (sq ft)	306.70	38.32	21.55
Crit W.S. (ft)		Area (sq ft)	306.70	38.32	21.55
E.G. Slope (ft/ft)	0.002381	Flow (cfs)	829.99	113.06	36.95
Q Total (cfs)	980.00	Top Width (ft)	152.00	12.00	18.46
Top Width (ft)	182.46	Avg. Vel. (ft/s)	2.71	2.95	1.71
Vel Total (ft/s)	2.67	Hydr. Depth (ft)	2.02	3.19	1.17
Max Chl Dpth (ft)	3.92	Conv. (cfs)	17009.6	2317.0	757.2
Conv. Total (cfs)	20083.8	Wetted Per. (ft)	152.98	13.20	18.59
Length Wtd. (ft)	165.44	Shear (lb/sq ft)	0.30	0.43	0.17
Min Ch El (ft)	799.00	Stream Power (lb/ft s)	0.81	1.27	0.30
Alpha	1.02	Cum Volume (acre-ft)	1.79	0.63	0.70
Frctn Loss (ft)	0.28	Cum SA (acres)	0.46	0.07	0.15
C & E Loss (ft)	0.01				

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

CROSS SECTION RIVER: Main Channel  
REACH: Upper RS: 104

INPUT

Description:

Station	Elevation	Data	num=	19						
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	
0	800	81	799	103	798	116	798.26	122	797	



124	796	129	794.75	130	795	131	796	131	797
132	798	134	799	142	798.25	168	799	172	800
174	801	176	802	192	803	257	808		

Manning's n Values		num=		5					
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	103	.09	116	.05	134	.09	192	.12

Bank Sta:	Left	Right	Lengths:	Left Channel	Right	Coeff Contr.	Expan.
	116	134		0	0	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	797.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.12	Wt. n-Val.		0.050	
W.S. Elev (ft)	797.76	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)		21.30	
E.G. Slope (ft/ft)	0.005750	Area (sq ft)		21.30	
Q Total (cfs)	59.00	Flow (cfs)		59.00	
Top Width (ft)	13.40	Top Width (ft)		13.40	
Vel Total (ft/s)	2.77	Avg. Vel. (ft/s)		2.77	
Max Chl Dpth (ft)	3.01	Hydr. Depth (ft)		1.59	
Conv. Total (cfs)	778.1	Conv. (cfs)		778.1	
Length Wtd. (ft)	82.50	Wetted Per. (ft)		15.63	
Min Ch El (ft)	794.75	Shear (lb/sq ft)		0.49	
Alpha	1.00	Stream Power (lb/ft s)		1.36	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)		0.07	
C & E Loss (ft)	0.03	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	798.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.097	0.050	
W.S. Elev (ft)	798.12	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	0.54	26.49	
E.G. Slope (ft/ft)	0.005549	Area (sq ft)	0.54	26.49	
Q Total (cfs)	76.00	Flow (cfs)	0.09	75.91	
Top Width (ft)	24.39	Top Width (ft)	8.80	15.59	
Vel Total (ft/s)	2.81	Avg. Vel. (ft/s)	0.18	2.87	
Max Chl Dpth (ft)	3.37	Hydr. Depth (ft)	0.06	1.70	
Conv. Total (cfs)	1020.2	Conv. (cfs)	1.3	1018.9	
Length Wtd. (ft)	82.50	Wetted Per. (ft)	8.81	17.98	
Min Ch El (ft)	794.75	Shear (lb/sq ft)	0.02	0.51	
Alpha	1.04	Stream Power (lb/ft s)	0.00	1.46	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.00	0.08	
C & E Loss (ft)	0.03	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	798.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.097	0.050	0.090
W.S. Elev (ft)	798.46	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	6.71	32.11	1.04
E.G. Slope (ft/ft)	0.005221	Area (sq ft)	6.71	32.11	1.04
Q Total (cfs)	100.00	Flow (cfs)	3.29	96.43	0.28
Top Width (ft)	49.85	Top Width (ft)	23.21	16.93	9.71
Vel Total (ft/s)	2.51	Avg. Vel. (ft/s)	0.49	3.00	0.27
Max Chl Dpth (ft)	3.71	Hydr. Depth (ft)	0.29	1.90	0.11
Conv. Total (cfs)	1384.0	Conv. (cfs)	45.6	1334.5	3.9
Length Wtd. (ft)	82.50	Wetted Per. (ft)	23.22	19.42	9.72
Min Ch El (ft)	794.75	Shear (lb/sq ft)	0.09	0.54	0.03
Alpha	1.38	Stream Power (lb/ft s)	0.05	1.62	0.01

Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.01	0.10	0.00
C & E Loss (ft)	0.03	Cum SA (acres)			

Warning: Divided flow computed for this cross-section.

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

CROSS SECTION OUTPUT Profile #5

E.G. Elev (ft)	799.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.101	0.050	0.090
W.S. Elev (ft)	799.27	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	34.43	46.24	21.90
E.G. Slope (ft/ft)	0.003535	Area (sq ft)	34.43	46.24	21.90
Q Total (cfs)	180.00	Flow (cfs)	24.30	140.01	15.69
Top Width (ft)	109.53	Top Width (ft)	56.47	18.00	35.06
Vel Total (ft/s)	1.75	Avg. Vel. (ft/s)	0.71	3.03	0.72
Max Chl Dpth (ft)	4.52	Hydr. Depth (ft)	0.61	2.57	0.62
Conv. Total (cfs)	3027.2	Conv. (cfs)	408.7	2354.7	263.9
Length Wtd. (ft)	82.50	Wetted Per. (ft)	56.50	20.62	35.14
Min Ch El (ft)	794.75	Shear (lb/sq ft)	0.13	0.50	0.14
Alpha	2.35	Stream Power (lb/ft s)	0.09	1.50	0.10
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.04	0.13	0.02
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #10

E.G. Elev (ft)	799.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.105	0.050	0.090
W.S. Elev (ft)	799.76	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	72.36	55.16	39.77
E.G. Slope (ft/ft)	0.002727	Area (sq ft)	72.36	55.16	39.77
Q Total (cfs)	250.00	Flow (cfs)	49.16	164.98	35.86
Top Width (ft)	151.65	Top Width (ft)	96.61	18.00	37.04
Vel Total (ft/s)	1.49	Avg. Vel. (ft/s)	0.68	2.99	0.90
Max Chl Dpth (ft)	5.01	Hydr. Depth (ft)	0.75	3.06	1.07
Conv. Total (cfs)	4787.5	Conv. (cfs)	941.4	3159.4	686.7
Length Wtd. (ft)	82.50	Wetted Per. (ft)	96.64	20.62	37.18
Min Ch El (ft)	794.75	Shear (lb/sq ft)	0.13	0.46	0.18
Alpha	2.74	Stream Power (lb/ft s)	0.09	1.36	0.16
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	0.09	0.15	0.04
C & E Loss (ft)	0.00	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #25

E.G. Elev (ft)	800.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.110	0.050	0.090
W.S. Elev (ft)	800.45	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	150.46	67.64	66.20
E.G. Slope (ft/ft)	0.001890	Area (sq ft)	150.46	67.64	66.20
Q Total (cfs)	370.00	Flow (cfs)	109.60	192.98	67.42
Top Width (ft)	172.91	Top Width (ft)	116.00	18.00	38.91
Vel Total (ft/s)	1.30	Avg. Vel. (ft/s)	0.73	2.85	1.02
Max Chl Dpth (ft)	5.70	Hydr. Depth (ft)	1.30	3.76	1.70
Conv. Total (cfs)	8509.9	Conv. (cfs)	2520.9	4438.5	1550.6
Length Wtd. (ft)	82.50	Wetted Per. (ft)	116.49	20.62	39.18
Min Ch El (ft)	794.75	Shear (lb/sq ft)	0.15	0.39	0.20
Alpha	2.71	Stream Power (lb/ft s)	0.11	1.10	0.20
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.20	0.18	0.09
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	801.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.111	0.050	0.090
W.S. Elev (ft)	800.94	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	206.57	76.35	85.26
E.G. Slope (ft/ft)	0.001566	Area (sq ft)	206.57	76.35	85.26
Q Total (cfs)	470.00	Flow (cfs)	163.18	214.95	91.87
Top Width (ft)	173.88	Top Width (ft)	116.00	18.00	39.88
Vel Total (ft/s)	1.28	Avg. Vel. (ft/s)	0.79	2.82	1.08
Max Chl Dpth (ft)	6.19	Hydr. Depth (ft)	1.78	4.24	2.14
Conv. Total (cfs)	11875.0	Conv. (cfs)	4123.0	5430.9	2321.1
Length Wtd. (ft)	82.50	Wetted Per. (ft)	116.97	20.62	40.27
Min Ch El (ft)	794.75	Shear (lb/sq ft)	0.17	0.36	0.21
Alpha	2.50	Stream Power (lb/ft s)	0.14	1.02	0.22
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.28	0.21	0.13
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	801.49	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.112	0.050	0.090
W.S. Elev (ft)	801.43	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	263.48	85.18	105.06
E.G. Slope (ft/ft)	0.001440	Area (sq ft)	263.48	85.18	105.06
Q Total (cfs)	600.00	Flow (cfs)	230.14	247.32	122.53
Top Width (ft)	174.86	Top Width (ft)	116.00	18.00	40.86
Vel Total (ft/s)	1.32	Avg. Vel. (ft/s)	0.87	2.90	1.17
Max Chl Dpth (ft)	6.68	Hydr. Depth (ft)	2.27	4.73	2.57
Conv. Total (cfs)	15811.9	Conv. (cfs)	6065.0	6517.8	3229.2
Length Wtd. (ft)	82.50	Wetted Per. (ft)	117.46	20.62	41.36
Min Ch El (ft)	794.75	Shear (lb/sq ft)	0.20	0.37	0.23
Alpha	2.31	Stream Power (lb/ft s)	0.18	1.08	0.27
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.36	0.23	0.18
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	802.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.113	0.050	0.090
W.S. Elev (ft)	801.95	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	323.77	94.53	126.57
E.G. Slope (ft/ft)	0.001301	Area (sq ft)	323.77	94.53	126.57
Q Total (cfs)	740.00	Flow (cfs)	304.37	279.68	155.95
Top Width (ft)	175.90	Top Width (ft)	116.00	18.00	41.90
Vel Total (ft/s)	1.36	Avg. Vel. (ft/s)	0.94	2.96	1.23
Max Chl Dpth (ft)	7.20	Hydr. Depth (ft)	2.79	5.25	3.02
Conv. Total (cfs)	20516.4	Conv. (cfs)	8438.7	7754.0	4323.7
Length Wtd. (ft)	82.50	Wetted Per. (ft)	117.98	20.62	42.52
Min Ch El (ft)	794.75	Shear (lb/sq ft)	0.22	0.37	0.24
Alpha	2.16	Stream Power (lb/ft s)	0.21	1.10	0.30
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	0.45	0.25	0.23
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	802.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.113	0.050	0.090
W.S. Elev (ft)	802.67	Reach Len. (ft)	82.50	82.50	82.50
Crit W.S. (ft)		Flow Area (sq ft)	407.73	107.56	160.57

E.G. Slope (ft/ft)	0.001281	Area (sq ft)	407.73	107.56	160.57
Q Total (cfs)	980.00	Flow (cfs)	438.16	344.18	197.67
Top Width (ft)	186.75	Top Width (ft)	116.00	18.00	52.75
Vel Total (ft/s)	1.45	Avg. Vel. (ft/s)	1.07	3.20	1.23
Max Chl Dpth (ft)	7.92	Hydr. Depth (ft)	3.51	5.98	3.04
Conv. Total (cfs)	27379.4	Conv. (cfs)	12241.2	9615.7	5522.4
Length Wtd. (ft)	82.50	Wetted Per. (ft)	118.70	20.62	53.41
Min Ch El (ft)	794.75	Shear (lb/sq ft)	0.27	0.42	0.24
Alpha	2.10	Stream Power (lb/ft s)	0.30	1.34	0.30
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	0.57	0.29	0.32
C & E Loss (ft)	0.01	Cum SA (acres)			

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

CROSS SECTION RIVER: Main Channel  
 REACH: Lower RS: 102

INPUT

Description:

Station Elevation Data		num=	19
Sta	Elev	Sta	Elev
0	810	30	800
94	796	99	795
114	797	117	798
212	804	228	805

Manning's n Values		num=	4
Sta	n Val	Sta	n Val
0	.12	89	.05
		120	.09
		187	.12

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
89	120	124 120.73	112	.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	797.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
W.S. Elev (ft)	797.68	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)		48.83	
E.G. Slope (ft/ft)	0.000934	Area (sq ft)		48.83	
Q Total (cfs)	66.00	Flow (cfs)		66.00	
Top Width (ft)	26.07	Top Width (ft)		26.07	
Vel Total (ft/s)	1.35	Avg. Vel. (ft/s)		1.35	
Max Chl Dpth (ft)	2.98	Hydr. Depth (ft)		1.87	
Conv. Total (cfs)	2159.2	Conv. (cfs)		2159.2	
Length Wtd. (ft)	120.73	Wetted Per. (ft)		26.91	
Min Ch El (ft)	794.70	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.14	
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)		0.13	
C & E Loss (ft)	0.00	Cum SA (acres)		0.07	

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	798.07	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.120	0.050	
W.S. Elev (ft)	798.04	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	0.01	58.70	
E.G. Slope (ft/ft)	0.000930	Area (sq ft)	0.01	58.70	
Q Total (cfs)	85.00	Flow (cfs)	0.00	85.00	
Top Width (ft)	28.70	Top Width (ft)	0.58	28.12	
Vel Total (ft/s)	1.45	Avg. Vel. (ft/s)	0.03	1.45	
Max Chl Dpth (ft)	3.34	Hydr. Depth (ft)	0.02	2.09	
Conv. Total (cfs)	2786.7	Conv. (cfs)	0.0	2786.7	
Length Wtd. (ft)	120.73	Wetted Per. (ft)	0.58	29.08	
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.00	0.12	
Alpha	1.00	Stream Power (lb/ft s)	0.00	0.17	
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	0.00	0.16	
C & E Loss (ft)	0.00	Cum SA (acres)	0.00	0.07	

CROSS SECTION OUTPUT Profile #2

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	798.42	Wt. n-Val.	0.120	0.050	
Vel Head (ft)	0.04	Reach Len. (ft)	124.00	120.73	112.00
W.S. Elev (ft)	798.38	Flow Area (sq ft)	1.00	68.37	
Crit W.S. (ft)		Area (sq ft)	1.00	68.37	
E.G. Slope (ft/ft)	0.000981	Flow (cfs)	0.13	109.87	
Q Total (cfs)	110.00	Top Width (ft)	5.30	29.14	
Top Width (ft)	34.44	Avg. Vel. (ft/s)	0.13	1.61	
Vel Total (ft/s)	1.59	Hydr. Depth (ft)	0.19	2.35	
Max Chl Dpth (ft)	3.68	Conv. (cfs)	4.1	3507.7	
Conv. Total (cfs)	3511.8	Wetted Per. (ft)	5.32	30.15	
Length Wtd. (ft)	120.63	Shear (lb/sq ft)	0.01	0.14	
Min Ch El (ft)	794.70	Stream Power (lb/ft s)	0.00	0.22	
Alpha	1.03	Cum Volume (acre-ft)	0.00	0.18	0.02
Frctn Loss (ft)	0.12	Cum SA (acres)	0.03	0.08	0.07
C & E Loss (ft)	0.00				

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.21	Wt. n-Val.	0.120	0.050	0.090
Vel Head (ft)	0.07	Reach Len. (ft)	124.00	120.73	112.00
W.S. Elev (ft)	799.13	Flow Area (sq ft)	9.28	91.21	0.30
Crit W.S. (ft)		Area (sq ft)	9.28	91.21	0.30
E.G. Slope (ft/ft)	0.001319	Flow (cfs)	2.50	197.47	0.03
Q Total (cfs)	200.00	Top Width (ft)	20.03	31.00	4.49
Top Width (ft)	55.53	Avg. Vel. (ft/s)	0.27	2.17	0.10
Vel Total (ft/s)	1.98	Hydr. Depth (ft)	0.46	2.94	0.07
Max Chl Dpth (ft)	4.43	Conv. (cfs)	68.7	5436.5	0.8
Conv. Total (cfs)	5506.0	Wetted Per. (ft)	20.07	32.11	4.49
Length Wtd. (ft)	120.26	Shear (lb/sq ft)	0.04	0.23	0.01
Min Ch El (ft)	794.70	Stream Power (lb/ft s)	0.01	0.51	0.00
Alpha	1.18	Cum Volume (acre-ft)	0.06	0.24	0.07
Frctn Loss (ft)	0.14	Cum SA (acres)	0.12	0.08	0.08
C & E Loss (ft)	0.01				

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.69	Wt. n-Val.	0.120	0.050	0.090
Vel Head (ft)	0.10	Reach Len. (ft)	124.00	120.73	112.00
W.S. Elev (ft)	799.59	Flow Area (sq ft)	23.29	105.49	5.93
Crit W.S. (ft)		Area (sq ft)	23.29	105.49	5.93
E.G. Slope (ft/ft)	0.001525	Flow (cfs)	7.75	270.55	1.70
Q Total (cfs)	280.00	Top Width (ft)	40.77	31.00	19.93
Top Width (ft)	91.70	Avg. Vel. (ft/s)	0.33	2.56	0.29
Vel Total (ft/s)	2.08	Hydr. Depth (ft)	0.57	3.40	0.30
Max Chl Dpth (ft)	4.89	Conv. (cfs)	198.4	6928.5	43.6
Conv. Total (cfs)	7170.5	Wetted Per. (ft)	40.81	32.11	19.94
Length Wtd. (ft)	120.13	Shear (lb/sq ft)	0.05	0.31	0.03
Min Ch El (ft)	794.70	Stream Power (lb/ft s)	0.02	0.80	0.01
Alpha	1.47	Cum Volume (acre-ft)	0.12	0.28	0.11
Frctn Loss (ft)	0.15	Cum SA (acres)	0.15	0.08	0.11
C & E Loss (ft)	0.01				

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.37	Wt. n-Val.	0.120	0.050	0.090
Vel Head (ft)	0.13	Reach Len. (ft)	124.00	120.73	112.00
W.S. Elev (ft)	800.25	Flow Area (sq ft)	58.14	125.70	26.03
Crit W.S. (ft)		Area (sq ft)	58.14	125.70	26.03
E.G. Slope (ft/ft)	0.001663	Flow (cfs)	28.81	378.40	12.79
Q Total (cfs)	420.00	Top Width (ft)	59.74	31.00	41.76
Top Width (ft)	132.50	Avg. Vel. (ft/s)	0.50	3.01	0.49
Vel Total (ft/s)	2.00	Hydr. Depth (ft)	0.97	4.05	0.62
Max Chl Dpth (ft)	5.55	Conv. (cfs)	706.4	9278.4	313.5
Conv. Total (cfs)	10298.3	Wetted Per. (ft)	59.83	32.11	41.78
Length Wtd. (ft)	119.98				

Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.10	0.41	0.06
Alpha	2.04	Stream Power (lb/ft s)	0.05	1.22	0.03
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.23	0.33	0.20
C & E Loss (ft)	0.02	Cum SA (acres)	0.18	0.08	0.14

CROSS SECTION OUTPUT Profile #50

E.G. Elev (ft)	800.86	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	800.72	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	86.89	140.44	49.67
E.G. Slope (ft/ft)	0.001658	Area (sq ft)	86.89	140.44	49.67
Q Total (cfs)	540.00	Flow (cfs)	55.26	454.52	30.22
Top Width (ft)	149.86	Top Width (ft)	61.17	31.00	57.69
Vel Total (ft/s)	1.95	Avg. Vel. (ft/s)	0.64	3.24	0.61
Max Chl Dpth (ft)	6.02	Hydr. Depth (ft)	1.42	4.53	0.86
Conv. Total (cfs)	13260.9	Conv. (cfs)	1357.1	11161.7	742.1
Length Wtd. (ft)	119.86	Wetted Per. (ft)	61.33	32.11	57.72
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.15	0.45	0.09
Alpha	2.34	Stream Power (lb/ft s)	0.09	1.47	0.05
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.32	0.37	0.27
C & E Loss (ft)	0.02	Cum SA (acres)	0.18	0.08	0.16

CROSS SECTION OUTPUT Profile #100

E.G. Elev (ft)	801.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	801.21	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	117.38	155.71	81.56
E.G. Slope (ft/ft)	0.001602	Area (sq ft)	117.38	155.71	81.56
Q Total (cfs)	680.00	Flow (cfs)	88.19	530.59	61.23
Top Width (ft)	162.25	Top Width (ft)	62.64	31.00	68.61
Vel Total (ft/s)	1.92	Avg. Vel. (ft/s)	0.75	3.41	0.75
Max Chl Dpth (ft)	6.51	Hydr. Depth (ft)	1.87	5.02	1.19
Conv. Total (cfs)	16990.3	Conv. (cfs)	2203.5	13257.1	1529.8
Length Wtd. (ft)	119.71	Wetted Per. (ft)	62.89	32.11	68.65
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.19	0.48	0.12
Alpha	2.50	Stream Power (lb/ft s)	0.14	1.65	0.09
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.41	0.41	0.35
C & E Loss (ft)	0.02	Cum SA (acres)	0.19	0.08	0.19

CROSS SECTION OUTPUT Profile #200

E.G. Elev (ft)	801.88	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	801.74	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	150.67	171.97	118.60
E.G. Slope (ft/ft)	0.001531	Area (sq ft)	150.67	171.97	118.60
Q Total (cfs)	850.00	Flow (cfs)	128.46	612.17	109.38
Top Width (ft)	167.76	Top Width (ft)	64.22	31.00	72.55
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)	0.85	3.56	0.92
Max Chl Dpth (ft)	7.04	Hydr. Depth (ft)	2.35	5.55	1.63
Conv. Total (cfs)	21723.4	Conv. (cfs)	3283.0	15645.1	2795.3
Length Wtd. (ft)	119.51	Wetted Per. (ft)	64.55	32.11	72.63
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.22	0.51	0.16
Alpha	2.52	Stream Power (lb/ft s)	0.19	1.82	0.14
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.51	0.45	0.46
C & E Loss (ft)	0.02	Cum SA (acres)	0.19	0.08	0.21

CROSS SECTION OUTPUT Profile #500

E.G. Elev (ft)	802.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.120	0.050	0.090
W.S. Elev (ft)	802.47	Reach Len. (ft)	124.00	120.73	112.00
Crit W.S. (ft)		Flow Area (sq ft)	198.31	194.59	173.51
E.G. Slope (ft/ft)	0.001455	Area (sq ft)	198.31	194.59	173.51
Q Total (cfs)	1120.00	Flow (cfs)	193.39	733.26	193.35

Top Width (ft)	175.42	Top Width (ft)	66.41	31.00	78.02
Vel Total (ft/s)	1.98	Avg. Vel. (ft/s)	0.98	3.77	1.11
Max Chl Dpth (ft)	7.77	Hydr. Depth (ft)	2.99	6.28	2.22
Conv. Total (cfs)	29359.2	Conv. (cfs)	5069.4	19221.4	5068.3
Length Wtd. (ft)	119.28	Wetted Per. (ft)	66.85	32.11	78.14
Min Ch El (ft)	794.70	Shear (lb/sq ft)	0.27	0.55	0.20
Alpha	2.47	Stream Power (lb/ft s)	0.26	2.07	0.22
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	0.65	0.51	0.63
C & E Loss (ft)	0.02	Cum SA (acres)	0.20	0.08	0.24

CROSS SECTION RIVER: Main Channel  
 REACH: Lower RS: 100

INPUT

Description:

Station Elevation Data		num= 17		Sta Elev		Sta Elev		Sta Elev	
Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	810	42	799	104	798	105	797	107	796
108	795	113	794	117	795	121	796	127	797
130	798	158	798	163	798	181	798	203	801
235	802	263	805						

Manning's n Values		num= 5		Sta n Val		Sta n Val		Sta n Val	
Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
0	.12	104	.05	130	.09	163	.12	203	.12

Bank Sta:	Left	Right	Coeff	Contr.	Expan.
	104	130		.1	.3

CROSS SECTION OUTPUT Profile #1

E.G. Elev (ft)	797.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.		0.050	
W.S. Elev (ft)	797.56	Reach Len. (ft)			
Crit W.S. (ft)	795.68	Flow Area (sq ft)		46.91	
E.G. Slope (ft/ft)	0.001001	Area (sq ft)		46.91	
Q Total (cfs)	66.00	Flow (cfs)		66.00	
Top Width (ft)	24.23	Top Width (ft)		24.23	
Vel Total (ft/s)	1.41	Avg. Vel. (ft/s)		1.41	
Max Chl Dpth (ft)	3.56	Hydr. Depth (ft)		1.94	
Conv. Total (cfs)	2085.7	Conv. (cfs)		2085.7	
Length Wtd. (ft)		Wetted Per. (ft)		25.63	
Min Ch El (ft)	794.00	Shear (lb/sq ft)		0.11	
Alpha	1.00	Stream Power (lb/ft s)		0.16	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #1.4

E.G. Elev (ft)	797.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.050	
W.S. Elev (ft)	797.92	Reach Len. (ft)			
Crit W.S. (ft)	795.87	Flow Area (sq ft)		55.99	
E.G. Slope (ft/ft)	0.001001	Area (sq ft)		55.99	
Q Total (cfs)	85.00	Flow (cfs)		85.00	
Top Width (ft)	25.69	Top Width (ft)		25.69	
Vel Total (ft/s)	1.52	Avg. Vel. (ft/s)		1.52	
Max Chl Dpth (ft)	3.92	Hydr. Depth (ft)		2.18	
Conv. Total (cfs)	2686.0	Conv. (cfs)		2686.0	
Length Wtd. (ft)		Wetted Per. (ft)		27.30	
Min Ch El (ft)	794.00	Shear (lb/sq ft)		0.13	
Alpha	1.00	Stream Power (lb/ft s)		0.19	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #2

E.G. Elev (ft)	798.30	Element	Left OB	Channel	Right OB
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Vel Head (ft)	0.04	Wt. n-Val.	0.120	0.050	0.099
W.S. Elev (ft)	798.26	Reach Len. (ft)			
Crit W.S. (ft)	796.11	Flow Area (sq ft)	2.07	64.71	13.41
E.G. Slope (ft/ft)	0.001001	Area (sq ft)	2.07	64.71	13.41
Q Total (cfs)	110.00	Flow (cfs)	0.21	107.24	2.56
Top Width (ft)	94.90	Top Width (ft)	16.01	26.00	52.89
Vel Total (ft/s)	1.37	Avg. Vel. (ft/s)	0.10	1.66	0.19
Max Chl Dpth (ft)	4.26	Hydr. Depth (ft)	0.13	2.49	0.25
Conv. Total (cfs)	3477.0	Conv. (cfs)	6.5	3389.7	80.8
Length Wtd. (ft)		Wetted Per. (ft)	16.01	27.65	52.91
Min Ch El (ft)	794.00	Shear (lb/sq ft)	0.01	0.15	0.02
Alpha	1.42	Stream Power (lb/ft s)	0.00	0.24	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

CROSS SECTION OUTPUT Profile #5

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.06	Wt. n-Val.	0.120	0.050	0.099
Vel Head (ft)	0.05	Reach Len. (ft)			
W.S. Elev (ft)	799.01	Flow Area (sq ft)	31.76	84.32	55.38
Crit W.S. (ft)	796.76	Area (sq ft)	31.76	84.32	55.38
E.G. Slope (ft/ft)	0.001000	Flow (cfs)	7.96	166.66	25.38
Q Total (cfs)	200.00	Top Width (ft)	62.05	26.00	58.42
Top Width (ft)	146.47	Avg. Vel. (ft/s)	0.25	1.98	0.46
Vel Total (ft/s)	1.17	Hydr. Depth (ft)	0.51	3.24	0.95
Max Chl Dpth (ft)	5.01	Conv. (cfs)	251.6	5268.9	802.5
Conv. Total (cfs)	6323.1	Wetted Per. (ft)	62.06	27.65	58.49
Length Wtd. (ft)		Shear (lb/sq ft)	0.03	0.19	0.06
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.01	0.38	0.03
Alpha	2.41	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #10

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	799.53	Wt. n-Val.	0.120	0.050	0.099
Vel Head (ft)	0.06	Reach Len. (ft)			
W.S. Elev (ft)	799.48	Flow Area (sq ft)	61.09	96.43	83.40
Crit W.S. (ft)	797.18	Area (sq ft)	61.09	96.43	83.40
E.G. Slope (ft/ft)	0.001000	Flow (cfs)	23.22	208.45	48.34
Q Total (cfs)	280.00	Top Width (ft)	63.83	26.00	61.84
Top Width (ft)	151.67	Avg. Vel. (ft/s)	0.38	2.16	0.58
Vel Total (ft/s)	1.16	Hydr. Depth (ft)	0.96	3.71	1.35
Max Chl Dpth (ft)	5.48	Conv. (cfs)	734.1	6590.1	1528.2
Conv. Total (cfs)	8852.3	Wetted Per. (ft)	63.90	27.65	61.94
Length Wtd. (ft)		Shear (lb/sq ft)	0.06	0.22	0.08
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.02	0.47	0.05
Alpha	2.63	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #25

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.20	Wt. n-Val.	0.120	0.050	0.100
Vel Head (ft)	0.06	Reach Len. (ft)			
W.S. Elev (ft)	800.14	Flow Area (sq ft)	104.07	113.60	125.84
Crit W.S. (ft)	797.73	Area (sq ft)	104.07	113.60	125.84
E.G. Slope (ft/ft)	0.001000	Flow (cfs)	54.93	273.87	91.19
Q Total (cfs)	420.00	Top Width (ft)	66.35	26.00	66.68
Top Width (ft)	159.03	Avg. Vel. (ft/s)	0.53	2.41	0.72
Vel Total (ft/s)	1.22	Hydr. Depth (ft)	1.57	4.37	1.89
Max Chl Dpth (ft)	6.14	Conv. (cfs)	1737.0	8659.7	2883.4
Conv. Total (cfs)	13280.0	Wetted Per. (ft)	66.50	27.65	66.83
Length Wtd. (ft)		Shear (lb/sq ft)	0.10	0.26	0.12
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.05	0.62	0.09
Alpha	2.64	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					



CROSS SECTION OUTPUT Profile #50

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	800.68	Wt. n-Val.	0.120	0.050	0.100
Vel Head (ft)	0.07	Reach Len. (ft)			
W.S. Elev (ft)	800.62	Flow Area (sq ft)	136.34	126.08	158.68
Crit W.S. (ft)	798.46	Area (sq ft)	136.34	126.08	158.68
E.G. Slope (ft/ft)	0.001000	Flow (cfs)	84.57	325.80	129.63
Q Total (cfs)	540.00	Top Width (ft)	68.18	26.00	70.20
Top Width (ft)	164.38	Avg. Vel. (ft/s)	0.62	2.58	0.82
Vel Total (ft/s)	1.28	Hydr. Depth (ft)	2.00	4.85	2.26
Max Chl Dpth (ft)	6.62	Conv. (cfs)	2674.1	10301.8	4099.0
Conv. Total (cfs)	17074.9	Wetted Per. (ft)	68.40	27.65	70.38
Length Wtd. (ft)		Shear (lb/sq ft)	0.12	0.28	0.14
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.08	0.74	0.12
Alpha	2.58	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #100

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.18	Wt. n-Val.	0.120	0.050	0.101
Vel Head (ft)	0.07	Reach Len. (ft)			
W.S. Elev (ft)	801.11	Flow Area (sq ft)	170.52	138.93	194.44
Crit W.S. (ft)	798.82	Area (sq ft)	170.52	138.93	194.44
E.G. Slope (ft/ft)	0.001001	Flow (cfs)	120.51	383.09	176.40
Q Total (cfs)	680.00	Top Width (ft)	70.07	26.00	76.61
Top Width (ft)	172.68	Avg. Vel. (ft/s)	0.71	2.76	0.91
Vel Total (ft/s)	1.35	Hydr. Depth (ft)	2.43	5.34	2.54
Max Chl Dpth (ft)	7.11	Conv. (cfs)	3810.0	12111.2	5576.8
Conv. Total (cfs)	21497.9	Wetted Per. (ft)	70.35	27.65	76.81
Length Wtd. (ft)		Shear (lb/sq ft)	0.15	0.31	0.16
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.11	0.87	0.14
Alpha	2.52	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #200

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	801.72	Wt. n-Val.	0.120	0.050	0.101
Vel Head (ft)	0.08	Reach Len. (ft)			
W.S. Elev (ft)	801.64	Flow Area (sq ft)	207.91	152.61	239.18
Crit W.S. (ft)	799.15	Area (sq ft)	207.91	152.61	239.18
E.G. Slope (ft/ft)	0.001001	Flow (cfs)	164.56	448.20	237.24
Q Total (cfs)	850.00	Top Width (ft)	72.08	26.00	93.45
Top Width (ft)	191.52	Avg. Vel. (ft/s)	0.79	2.94	0.99
Vel Total (ft/s)	1.42	Hydr. Depth (ft)	2.88	5.87	2.56
Max Chl Dpth (ft)	7.64	Conv. (cfs)	5200.3	14163.4	7497.1
Conv. Total (cfs)	26860.7	Wetted Per. (ft)	72.42	27.65	93.66
Length Wtd. (ft)		Shear (lb/sq ft)	0.18	0.34	0.16
Min Ch El (ft)	794.00	Stream Power (lb/ft s)	0.14	1.01	0.16
Alpha	2.46	Cum Volume (acre-ft)			
Frctn Loss (ft)		Cum SA (acres)			
C & E Loss (ft)					

CROSS SECTION OUTPUT Profile #500

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	802.46	Wt. n-Val.	0.120	0.050	0.102
Vel Head (ft)	0.08	Reach Len. (ft)			
W.S. Elev (ft)	802.37	Flow Area (sq ft)	261.67	171.64	314.56
Crit W.S. (ft)	799.49	Area (sq ft)	261.67	171.64	314.56
E.G. Slope (ft/ft)	0.001001	Flow (cfs)	235.17	545.02	339.81
Q Total (cfs)	1120.00	Top Width (ft)	74.87	26.00	108.46
Top Width (ft)	209.33	Avg. Vel. (ft/s)	0.90	3.18	1.08
Vel Total (ft/s)	1.50	Hydr. Depth (ft)	3.50	6.60	2.90
Max Chl Dpth (ft)	8.37	Conv. (cfs)	7433.0	17226.5	10740.4
Conv. Total (cfs)	35399.9				

Length Wtd. (ft)		Wetted Per. (ft)	75.31	27.65	108.70
Min Ch El (ft)	794.00	Shear (lb/sq ft)	0.22	0.39	0.18
Alpha	2.42	Stream Power (lb/ft s)	0.20	1.23	0.20
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Tributary

Reach	River Sta.	n1	n2	n3	n4
Reach 1	206	.12	.05	.12	
Reach 1	204	.12	.05	.12	
Reach 1	202	.12	.05	.12	.03
Reach 1	200	.12	.05	.12	.03

River:Main Channel

Reach	River Sta.	n1	n2	n3	n4	n5	n6
Upper	142	.03	.12	.05	.12		
Upper	140	.03	.05	.05	.12		
Upper	138	.12	.05	.12			
Upper	136	.12	.05	.12			
Upper	134.5	Inline Weir					
Upper	134	.12	.05	.09	.12		
Upper	132.5	Inline Weir					
Upper	132	.03	.12	.05	.12	.09	.12
Upper	130.5	Inline Weir					
Upper	130	.03	.12	.05	.09	.12	
Upper	128.5	Inline Weir					
Upper	128	.03	.12	.05	.12	.03	.012
Upper	126.2	Inline Weir					
Upper	126	.03	.12	.05	.12		
Upper	124.5	Inline Weir					
Upper	124	.12	.05	.12			
Upper	122.5	Inline Weir					
Upper	122	.12	.05	.12			
Upper	120.5	Inline Weir					
Upper	120	.03	.05	.12			
Upper	118.5	Inline Weir					
Upper	118	.03	.05	.09	.12		
Upper	116.5	Inline Weir					
Upper	116	.03	.05	.09	.12		
Upper	114	.03	.05	.09	.12		
Upper	112	.03	.09	.05	.12		
Upper	110	.03	.09	.05	.12		
Upper	108	.03	.09	.05	.12		
Upper	106	.03	.09	.05	.12		
Upper	104	.12	.09	.05	.09	.12	
Lower	102	.12	.05	.09	.12		
Lower	100	.12	.05	.09	.12	.12	

SUMMARY OF REACH LENGTHS

River: Tributary

Reach	River Sta.	Left	Channel	Right
Reach 1	206	137	146.15	145
Reach 1	204	125	133.28	133
Reach 1	202	219	240.43	214
Reach 1	200			

River: Main Channel

Reach	River Sta.	Left	Channel	Right
Upper	142	73	77.35	71
Upper	140	122	117.16	112
Upper	138	119	119.41	117
Upper	136	63	102.79	80
Upper	134.5	Inline Weir		
Upper	134	41	77.12	53
Upper	132.5	Inline Weir		
Upper	132	59	64.73	67
Upper	130.5	Inline Weir		
Upper	130	94	96.36	30
Upper	128.5	Inline Weir		
Upper	128	127	138.25	48
Upper	126.2	Inline Weir		
Upper	126	71	114.63	143
Upper	124.5	Inline Weir		
Upper	124	84	112.09	66
Upper	122.5	Inline Weir		
Upper	122	85	95.62	89
Upper	120.5	Inline Weir		
Upper	120	66	60.99	51
Upper	118.5	Inline Weir		
Upper	118	129	162.1	138
Upper	116.5	Inline Weir		
Upper	116	125	126.41	122
Upper	114	254	324.5	260
Upper	112	124	159.7	124
Upper	110	49	64.6	52
Upper	108	91	113.6	83
Upper	106	148	205.3	182
Upper	104	0	0	0
Lower	102	124	120.73	112
Lower	100			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Tributary

Reach	River Sta.	Contr.	Expan.
Reach 1	206	.1	.3
Reach 1	204	.1	.3
Reach 1	202	.1	.3
Reach 1	200	.1	.3

River: Main Channel

Reach	River Sta.	Contr.	Expan.
Upper	142	.1	.3
Upper	140	.1	.3
Upper	138	.1	.3
Upper	136	.1	.3
Upper	134.5	Inline Weir	
Upper	134	.1	.3
Upper	132.5	Inline Weir	
Upper	132	.1	.3
Upper	130.5	Inline Weir	
Upper	130	.1	.3
Upper	128.5	Inline Weir	
Upper	128	.1	.3
Upper	126.2	Inline Weir	

Upper	126	.1	.3
Upper	124.5	Inline Weir	
Upper	124	.1	.3
Upper	122.5	Inline Weir	
Upper	122	.1	.3
Upper	120.5	Inline Weir	
Upper	120	.1	.3
Upper	118.5	Inline Weir	
Upper	118	.1	.3
Upper	116.5	Inline Weir	
Upper	116	.1	.3
Upper	114	.1	.3
Upper	112	.1	.3
Upper	110	.1	.3
Upper	108	.1	.3
Upper	106	.1	.3
Upper	104	.1	.3
Lower	102	.1	.3
Lower	100	.1	.3

# Appendix C

Stream Channel Classification (Level II) 0000

Stream NAME: UT to Lyle Creek  
 Basin NAME: Catawba Drainage AREA: 316 Ac. 0.5 SqMi.  
 Location: Mainstem channel Upstream Sinuous  
 Twp: \_\_\_\_\_ Rge: \_\_\_\_\_ Sec: \_\_\_\_\_ Qtr: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_  
 Observers: Grant + Billy Date: \_\_\_\_\_

Bankfull WIDTH ( $W_{bkf}$ ) 11.6 Ft.  
 WIDTH of the stream channel, at bankfull stage elevation, in a riffle section.

Mean DEPTH ( $d_{bkf}$ ) 1.3 Ft.  
 Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section. ( $d_{bkf} = A / W_{bkf}$ )

Bnkfl. X-Section AREA ( $A_{bkf}$ ) 15.2 Sq.Ft.  
 AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.

Width / Depth RATIO ( $W_{bkf} / d_{bkf}$ ) 9.2  
 Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.

Maximum DEPTH ( $d_{mbkf}$ ) 2.0 Ft.  
 Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and thalweg elevations, in a riffle section.

WIDTH of Flood-Prone Area ( $W_{fpa}$ ) 24.8 Ft.  
 Twice maximum DEPTH, or ( $2 \times d_{mbkf}$ ) = the stage/elevation at which flood-prone area WIDTH is determined. (riffle section)

Entrenchment Ratio (ER) 2.3  
 The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH. ( $W_{fpa} / W_{bkf}$ ) (riffle section)

Channel Materials (Particle Size Index) D50 4.0 mm.  
 The D50 particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and thalweg elevations.

Water Surface SLOPE (S) 0.009 Ft./Ft.  
 Channel slope = "rise" over "run" for a reach approximately 20 - 30 bankfull channel widths in length, with the "riffle to riffle" water surface slope representing the gradient at bankfull stage.

Channel SINUOSITY (K) 1.7  
 Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL/VL); or estimated from a ratio of valley slope divided by channel slope (VS/S).

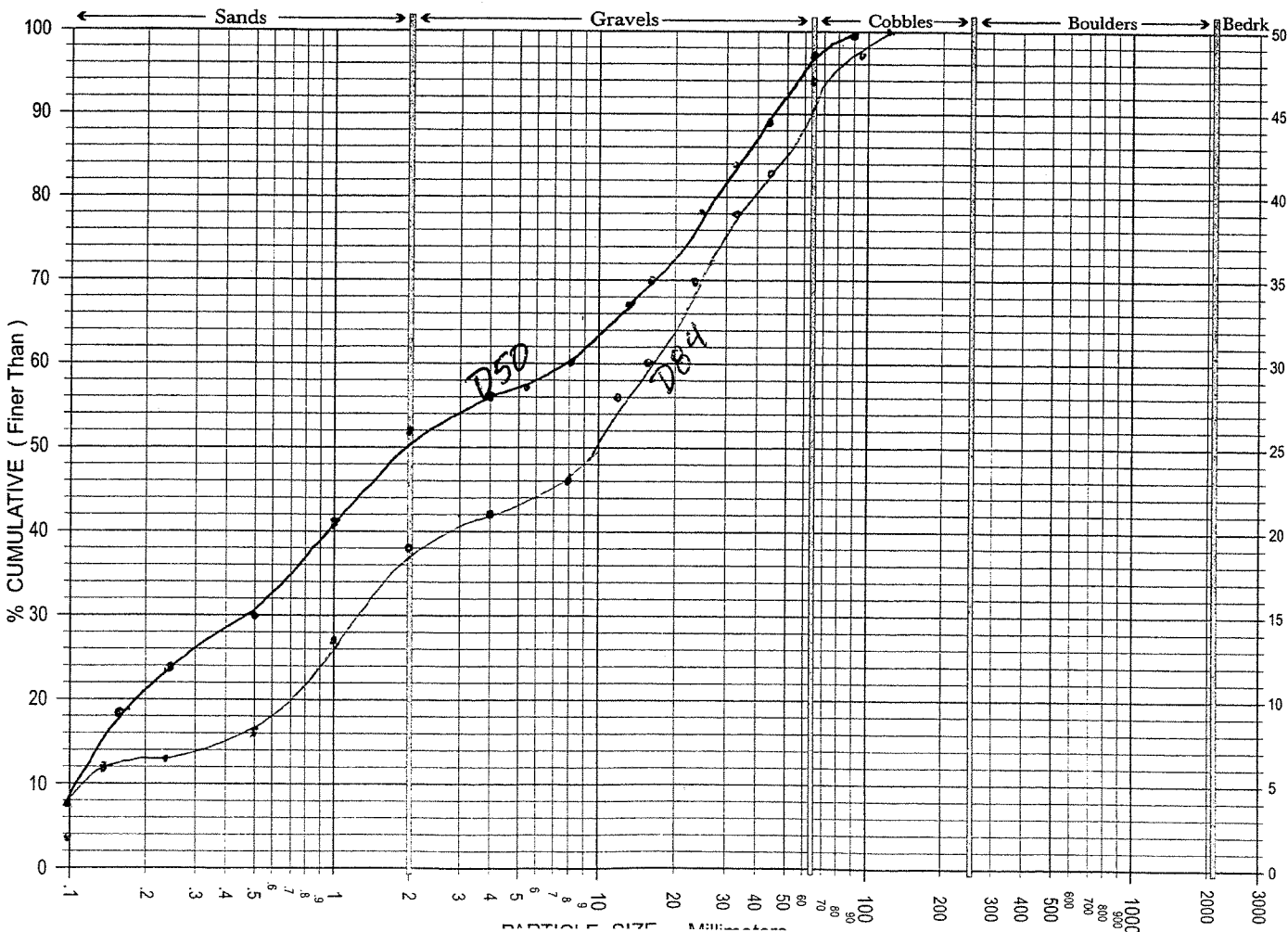
Stream Type

G/F<sub>c</sub> 4/5

For reference, note:  
 p184, StreamType Chart  
 p185, Classification Key

PEBBLE COUNT

Site: <i>Lyle Creek</i>			Reach: <i>Sinuus Reach</i>					Reach: <i>J84</i>			Reach:					
Party: <i>Billy + Grant</i>			Date: <i>6/25/01</i>					Date: <i>J84</i>			Date:					
Inches	PARTICLE	Millimeters	PARTICLE COUNT					TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM
	Silt/Clay	< .062	00	00	00	00	00	8	8	8	4	5	5			
	Very Fine	.062 - .125	00	00	00	00	12	12	19	5	7	12				
	Fine	.125 - .25	00	00	00	00	5	5	24	1	1	13				
	Medium	.25 - .50	00	00	00	00	6	6	30	2	3	16				
	Coarse	.50 - 1.0	00	00	00	00	12	12	41	8	11	27				
.04 - .08	Very Coarse	1.0 - 2	00	00	00	00	12	12	52	8	11	38				
.08 - .16	Very Fine	2 - 4	00	00	00	00	4	4	56	3	4	42				
.16 - .22	Fine	4 - 5.7	00	00	00	00	1	1	57							
.22 - .31	Fine	5.7 - 8	00	00	00	00	3	3	60	3	4	46				
.31 - .44	Medium	8 - 11.3	00	00	00	00	7	7	67	7	10	56				
.44 - .63	Medium	11.3 - 16	00	00	00	00	3	3	70	3	4	60				
.63 - .89	Coarse	16 - 22.6	00	00	00	00	8	8	78	7	10	70				
.89 - 1.26	Coarse	22.6 - 32	00	00	00	00	6	6	84	6	8	78				
1.26 - 1.77	Very Coarse	32 - 45	00	00	00	00	5	5	89	4	5	83				
1.77 - 2.5	Very Coarse	45 - 64	00	00	00	00	8	8	97	8	11	94				
2.5 - 3.5	Small	64 - 90	00	00	00	00	2	2	99	2	3	97				
3.5 - 5.0	Small	90 - 128	00	00	00	00	2	2	101	2	3	100				
5.0 - 7.1	Large	128 - 180	00	00	00	00										
7.1 - 10.1	Large	180 - 256	00	00	00	00										
10.1 - 14.3	Small	256 - 362	00	00	00	00										
14.3 - 20	Small	362 - 512	00	00	00	00										
20 - 40	Medium	512 - 1024	00	00	00	00										
40 - 80	Large-Vry Large	1024 - 2048	00	00	00	00										
	Bedrock		Riff Pool							101						
TOTALS →							104	104	101	73	100					



GAGE: \_\_\_\_\_  
 Reach: \_\_\_\_\_  
 No: \_\_\_\_\_  
 Date: \_\_\_\_\_

## Stream Channel Classification (Level II) ○○○○

Stream NAME: UT to Lyle Creek  
 Basin NAME: Catawba Drainage AREA: 316 Ac. 0.5 SqMi.  
 Location: Mainstem channel Downstream Straightened  
 Twp: \_\_\_\_\_ Rge: \_\_\_\_\_ Sec: \_\_\_\_\_ Qtr: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_  
 Observers: Grant & Billy Date: \_\_\_\_\_

Bankfull WIDTH ( $W_{bkf}$ ) 10.3 Ft.  
 WIDTH of the stream channel, at bankfull stage elevation, in a riffle section.

Mean DEPTH ( $d_{bkf}$ ) 1.8 Ft.  
 Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section. ( $d_{bkf} = A / W_{bkf}$ )

Bnkfl. X-Section AREA ( $A_{bkf}$ ) 17.1 Sq.Ft.  
 AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.

Width / Depth RATIO ( $W_{bkf} / d_{bkf}$ ) 6.5  
 Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.

Maximum DEPTH ( $d_{mbkf}$ ) 2.2 Ft.  
 Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and thalweg elevations, in a riffle section.

WIDTH of Flood-Prone Area ( $W_{fpa}$ ) 12.8 Ft.  
 Twice maximum DEPTH, or ( $2 \times d_{mbkf}$ ) = the stage/elevation at which flood-prone area WIDTH is determined. (riffle section)

Entrenchment Ratio (ER) 1.2  
 The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH. ( $W_{fpa} / W_{bkf}$ ) (riffle section)

Channel Materials (Particle Size Index) D50 1.9 mm.  
 The D50 particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and thalweg elevations.

Water Surface SLOPE (S) 0.0091 Ft./Ft.  
 Channel slope = "rise" over "run" for a reach approximately 20 - 30 bankfull channel widths in length, with the "riffle to riffle" water surface slope representing the gradient at bankfull stage.

Channel SINUOSITY (K) 1.1  
 Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL/VL); or estimated from a ratio of valley slope divided by channel slope (VS/S).

Stream Type

G 4/5

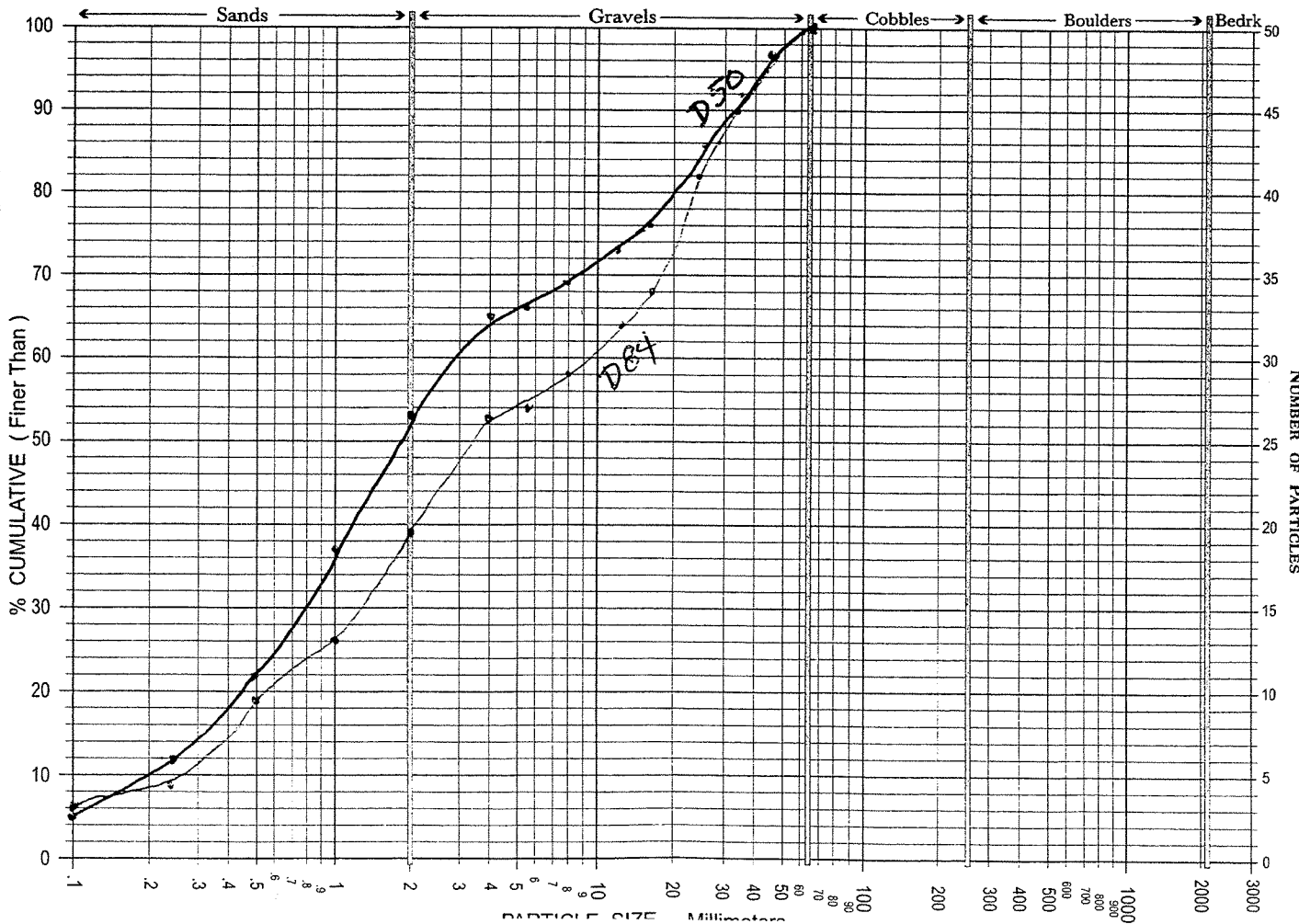
For reference, note:  
 p184, StreamType Chart  
 p185, Classification Key



PEBBLE COUNT

Site: <u>Lyle Creek</u>			Reach: <u>Downstream Straight</u>			Reach: <u>D84</u>			Reach:					
Party: <u>Billy &amp; Grant</u>			Date: <u>6/25/01</u>			Date: <u>D84</u>			Date:					
Inches	PARTICLE	Millimeters	PARTICLE COUNT			TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM
	Silt / Clay	< .062	1	0	0	5	5	5	4	6	6			
	Very Fine	.062 - .125	0	1	0	7	7	12	2	3	9			
	Fine	.125 - .25	0	0	0	10	10	22	7	10	19			
	Medium	.25 - .50	0	0	0	15	15	37	5	7	26			
	Coarse	.50 - 1.0	0	0	0	16	16	53	9	13	39			
.04 - .08	Very Coarse	1.0 - 2	0	0	0									
.08 - .16	Very Fine	2 - 4	0	0	0	12	12	65	10	14	53			
.16 - .22	Fine	4 - 5.7	0	0	0	1	1	66	1	1	54			
.22 - .31	Fine	5.7 - 8	0	0	0	3	3	69	3	4	58			
.31 - .44	Medium	8 - 11.3	0	0	0	4	4	73	4	6	64			
.44 - .63	Medium	11.3 - 16	0	0	0	3	3	76	3	4	68			
.63 - .89	Coarse	16 - 22.6	0	0	0	10	10	86	10	14	82			
.89 - 1.26	Coarse	22.6 - 32	0	0	0	6	6	92	6	8	90			
1.26 - 1.77	Very Coarse	32 - 45	0	0	0	5	5	97	5	7	97			
1.77 - 2.5	Very Coarse	45 - 64	0	0	0	2	2	99	1	1	98			
2.5 - 3.5	Small	64 - 90	0	0	0	2	2	101	1	1	99			
3.5 - 5.0	Small	90 - 128												
5.0 - 7.1	Large	128 - 180												
7.1 - 10.1	Large	180 - 256												
10.1 - 14.3	Small	256 - 362												
14.3 - 20	Small	362 - 512												
20 - 40	Medium	512 - 1024												
40 - 80	Large-Vry Large	1024 - 2048												
	Bedrock													
TOTALS →						101			71	99				

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GAGE: \_\_\_\_\_  
 Reach: \_\_\_\_\_  
 No.: \_\_\_\_\_  
 Date: \_\_\_\_\_

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## Stream Channel Classification (Level II) .....

Stream NAME: UT to Lyle Creek  
 Basin NAME: Catawba Drainage AREA: 135 Ac. 0.2 SqMi.  
 Location: Secondary Tributary  
 Twp: \_\_\_\_\_ Rge: \_\_\_\_\_ Sec: \_\_\_\_\_ Qtr: \_\_\_\_\_ Lat: \_\_\_\_\_ Long: \_\_\_\_\_  
 Observers: Billy and Grant Date: \_\_\_\_\_

Bankfull WIDTH ( $W_{bkf}$ ) 9.4 Ft.  
 WIDTH of the stream channel, at bankfull stage elevation, in a riffle section.

Mean DEPTH ( $d_{bkf}$ ) 1.1 Ft.  
 Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section. ( $d_{bkf} = A / W_{bkf}$ )

Bnkfl. X-Section AREA ( $A_{bkf}$ ) 9.6 Sq.Ft.  
 AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.

Width / Depth RATIO ( $W_{bkf} / d_{bkf}$ ) 9  
 Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.

Maximum DEPTH ( $d_{mbkf}$ ) 1.8 Ft.  
 Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and thalweg elevations, in a riffle section.

WIDTH of Flood-Prone Area ( $W_{fpa}$ ) 13.4 Ft.  
 Twice maximum DEPTH, or ( $2 \times d_{mbkf}$ ) = the stage/elevation at which flood-prone area WIDTH is determined. (riffle section)

Entrenchment Ratio (ER) 1.4  
 The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH. ( $W_{fpa} / W_{bkf}$ ) (riffle section)

Channel Materials (Particle Size Index) D50 2.5 mm.  
 The D50 particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and thalweg elevations.

Water Surface SLOPE (S) 0.1 Ft./Ft.  
 Channel slope = "rise" over "run" for a reach approximately 20 - 30 bankfull channel widths in length, with the "riffle to riffle" water surface slope representing the gradient at bankfull stage.

Channel SINUOSITY (K) 1.2  
 Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (SL/VL); or estimated from a ratio of valley slope divided by channel slope (VS/S).

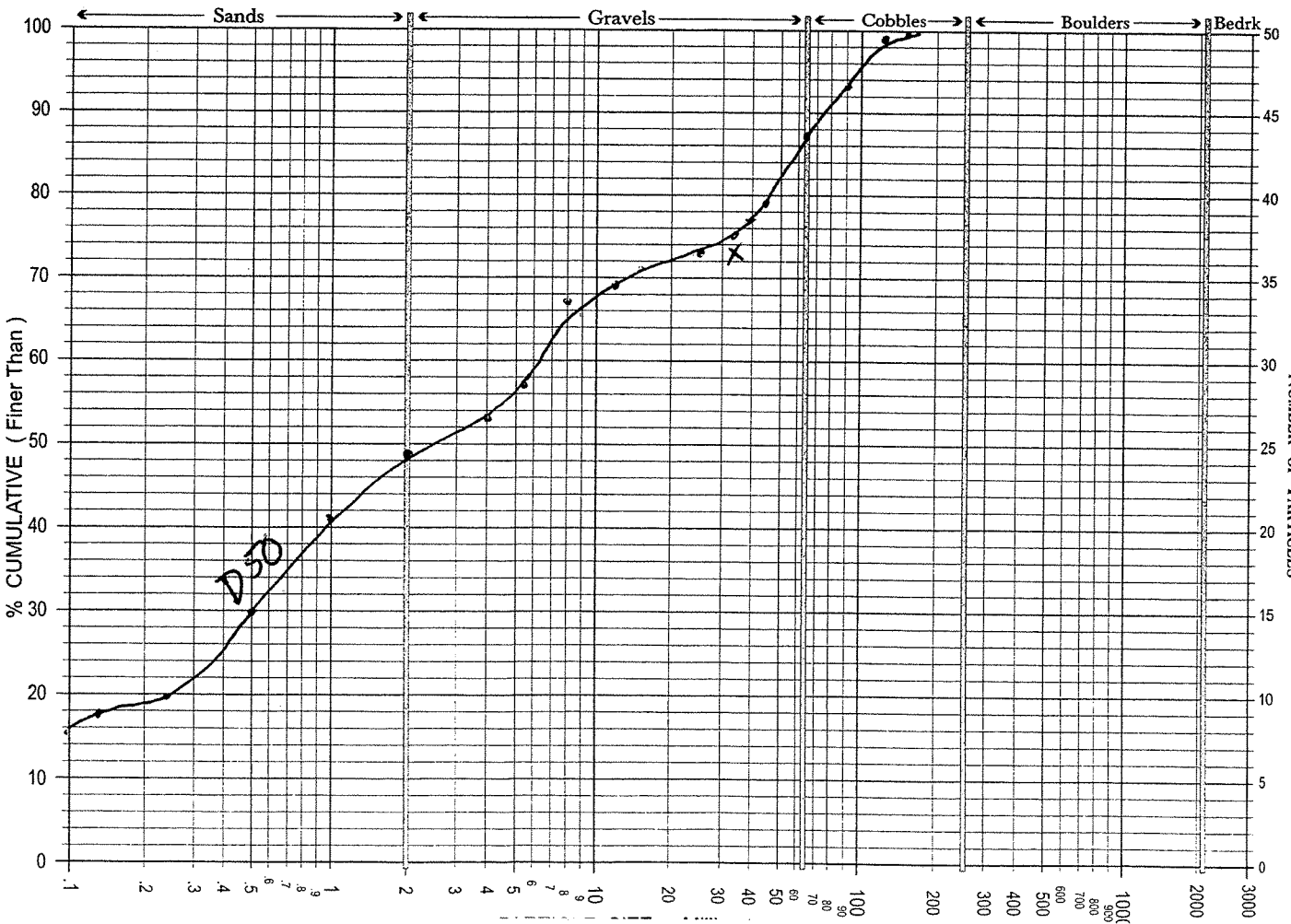
Stream Type

G 4/5

For reference, note:  
 p184, StreamType Chart  
 p185, Classification Key

PEBBLE COUNT

Site: <i>Lyle Creek</i>			Reach: <i>Smaller Tributary</i>			Reach:			Reach:					
Party: <i>Billy + Grant</i>			Date: <i>6/25/01</i>			Date:			Date:					
Inches	PARTICLE	Millimeters	PARTICLE COUNT			TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM
			1	2	3									
	Silt / Clay	< .062	8			9	16	16						
	Very Fine	.062 - .125		1		1	2	18						
	Fine	.125 - .25		1		1	2	20						
	Medium	.25 - .50		5		5	10	30						
	Coarse	.50 - 1.0		6		6	12	41						
.04 - .08	Very Coarse	1.0 - 2		4		4	8	49						
.08 - .16	Very Fine	2 - 4		2		2	4	53						
.16 - .22	Fine	4 - 5.7		2		2	4	57						
.22 - .31	Fine	5.7 - 8		5		5	10	67						
.31 - .44	Medium	8 - 11.3		1		1	2	69						
.44 - .63	Medium	11.3 - 16		1		1	2	71						
.63 - .89	Coarse	16 - 22.6		1		1	2	73						
.89 - 1.26	Coarse	22.6 - 32		1		1	2	75						
1.26 - 1.77	Very Coarse	32 - 45		2		2	4	79						
1.77 - 2.5	Very Coarse	45 - 64		4		4	8	87						
2.5 - 3.5	Small	64 - 90		3		3	6	93						
3.5 - 5.0	Small	90 - 128		3		3	6	99						
5.0 - 7.1	Large	128 - 180		1		1	2	101						
7.1 - 10.1	Large	180 - 256												
10.1 - 14.3	Small	256 - 362												
14.3 - 20	Small	362 - 512												
20 - 40	Medium	512 - 1024												
40 - 80	Large-Vry Large	1024 - 2048												
	Bedrock													
TOTALS →						52	101							



GAGE: \_\_\_\_\_  
 Reach: \_\_\_\_\_  
 No: \_\_\_\_\_  
 Date: \_\_\_\_\_

## Stream Channel Classification (Level II) ○○○○

Stream NAME: UT to Catawba River "Reference"  
 Basin NAME: \_\_\_\_\_ Drainage AREA: \_\_\_\_\_ Ac. 1.6 SqMi.  
 Location: Reference  
 Twp: \_\_\_\_\_ Rge: \_\_\_\_\_ Sec:        Qtr: \_\_\_\_\_ Lat. \_\_\_\_\_ Long. \_\_\_\_\_  
 Observers: Billy Grant Date: \_\_\_\_\_

Bankfull WIDTH (  $W_{bkf}$  ) 10.3 Ft.

WIDTH of the stream channel, at bankfull stage elevation, in a riffle section.

Mean DEPTH (  $d_{bkf}$  ) 1.1 Ft.

Mean DEPTH of the stream channel cross-section, at bankfull stage elevation, in a riffle section. (  $d_{bkf} = A / W_{bkf}$  )

Bnkfl. X-Section AREA (  $A_{bkf}$  ) 10.9 Sq.Ft.

AREA of the stream channel cross-section, at bankfull stage elevation, in a riffle section.

Width / Depth RATIO (  $W_{bkf} / d_{bkf}$  ) 10

Bankfull WIDTH divided by bankfull mean DEPTH, in a riffle section.

Maximum DEPTH (  $d_{mbkf}$  ) 1.7 Ft.

Maximum depth of the bankfull channel cross-section, or distance between the bankfull stage and thalweg elevations, in a riffle section.

WIDTH of Flood-Prone Area (  $W_{fpa}$  ) 232 Ft.

Twice maximum DEPTH, or (  $2 \times d_{mbkf}$  ) = the stage/elevation at which flood-prone area WIDTH is determined. (riffle section)

Entrenchment Ratio ( ER ) 24

The ratio of flood-prone area WIDTH divided by bankfull channel WIDTH. (  $W_{fpa} / W_{bkf}$  ) (riffle section)

Channel Materials (Particle Size Index) D50 2mmmm.

The D50 particle size index represents the mean diameter of channel materials, as sampled from the channel surface, between the bankfull stage and thalweg elevations.

Water Surface SLOPE ( S ) 0.0028 Ft./Ft.

Channel slope = "rise" over "run" for a reach approximately 20 - 30 bankfull channel widths in length, with the "riffle to riffle" water surface slope representing the gradient at bankfull stage.

Channel SINUOSITY ( K ) 1.4

Sinuosity is an index of channel pattern, determined from a ratio of stream length divided by valley length (  $SL / VL$  ); or estimated from a ratio of valley slope divided by channel slope (  $VS / S$  ).

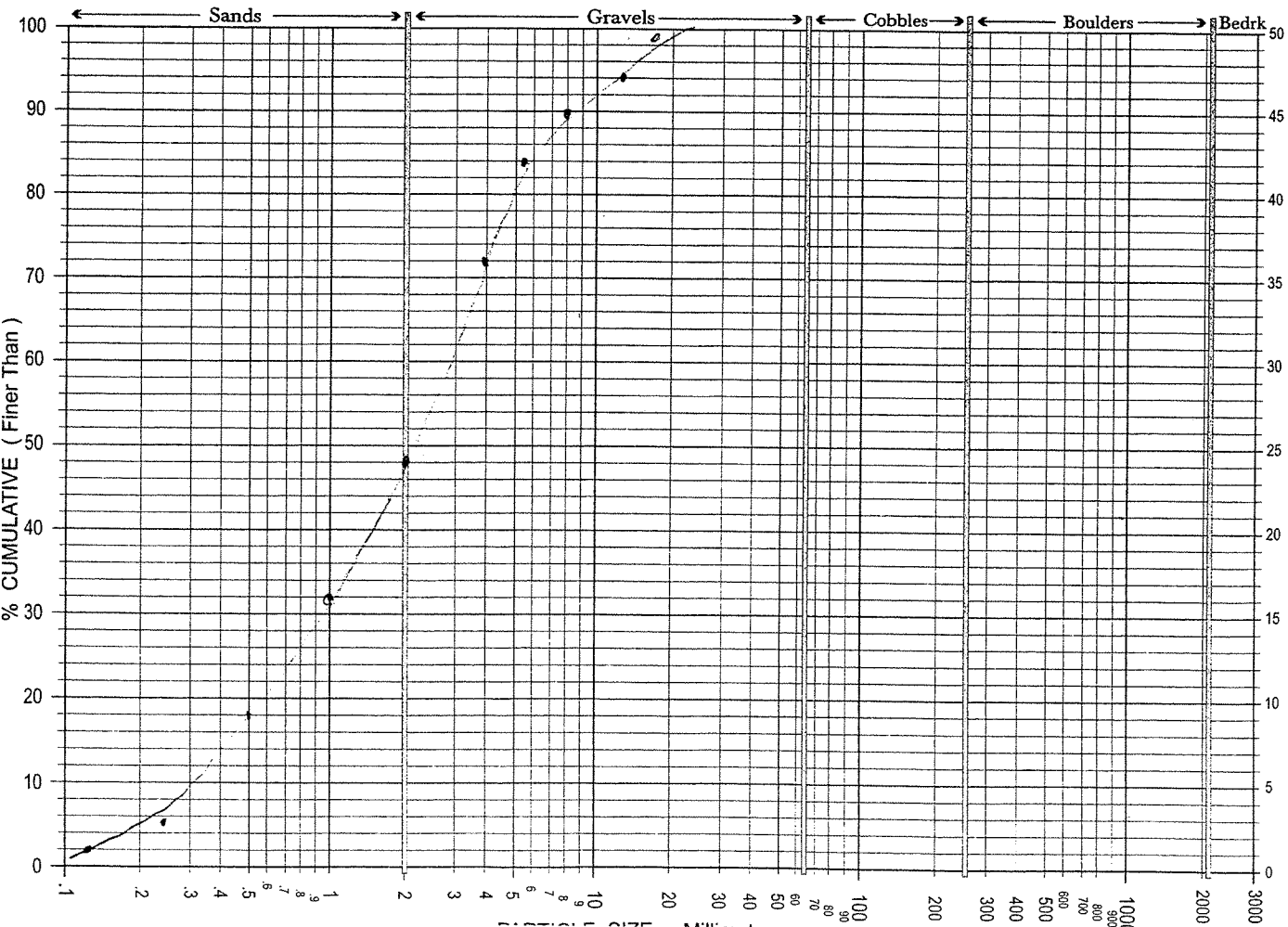
Stream Type

E 4/5

For reference, note:  
 p184, StreamType Chart  
 p185, Classification Key

PEBBLE COUNT

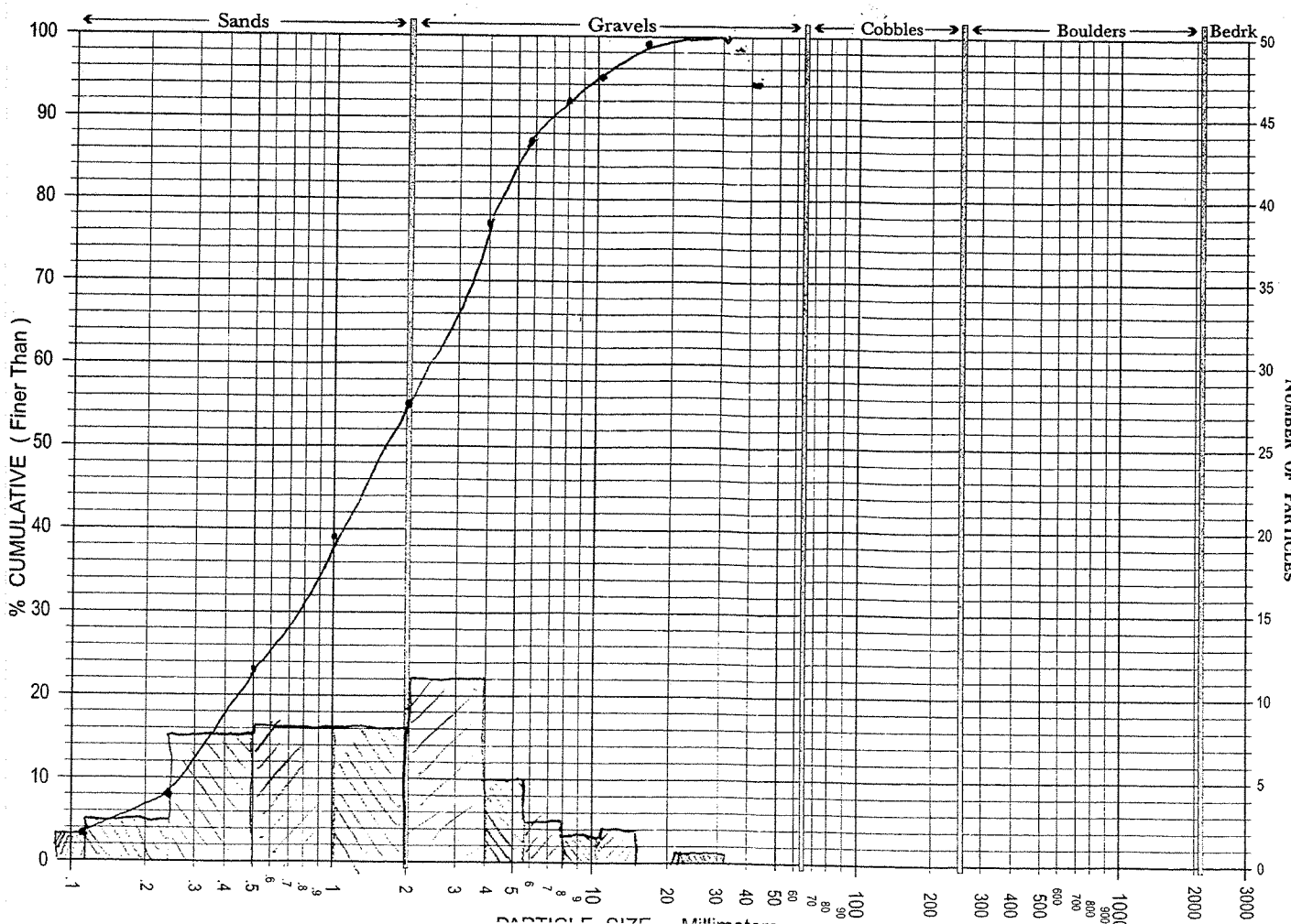
Site:			Reach: <i>Lyle Cr Reference D84</i>			Reach:			Reach:					
Party:			Date:			Date:			Date:					
Inches	PARTICLE	Millimeters	PARTICLE COUNT			TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM
	Silt / Clay	< .062	1	2	3									
	Very Fine	.062 - .125				2	2	2						
	Fine	.125 - .25				3	3	5						
	Medium	.25 - .50				13	13	18						
	Coarse	.50 - 1.0				14	14	32						
.04 - .08	Very Coarse	1.0 - 2				16	16	48						
.08 - .16	Very Fine	2 - 4				24	24	72						
.16 - .22	Fine	4 - 5.7				12	12	84						
.22 - .31	Fine	5.7 - 8				6	6	90						
.31 - .44	Medium	8 - 11.3				4	4	94						
.44 - .63	Medium	11.3 - 16				5	5	99						
.63 - .89	Coarse	16 - 22.6												
.89 - 1.26	Coarse	22.6 - 32				1	1	100						
1.26 - 1.77	Very Coarse	32 - 45												
1.77 - 2.5	Very Coarse	45 - 64												
2.5 - 3.5	Small	64 - 90												
3.5 - 5.0	Small	90 - 128												
5.0 - 7.1	Large	128 - 180												
7.1 - 10.1	Large	180 - 256												
10.1 - 14.3	Small	256 - 362												
14.3 - 20	Small	362 - 512												
20 - 40	Medium	512 - 1024												
40 - 80	Large-Vry Large	1024 - 2048												
	Bedrock													
TOTALS →						100								



GAGE: \_\_\_\_\_  
 Reach: \_\_\_\_\_  
 No: \_\_\_\_\_  
 Date: \_\_\_\_\_

PEBBLE COUNT

Site: Lyle Creek Ref Stream			Reach: Lyle Creek Ref Stream					Reach:			Reach:			
Party: Billy			Date: 5/29/01					Date:			Date:			
Inches	PARTICLE	Millimeters	PARTICLE COUNT			TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM	TOT #	ITEM %	% CUM
	Silt / Clay	<.062	1	2	3									
	Very Fine	.062 - .125	..	..	..	4	3	3						
	Fine	.125 - .25	..	..	..	6	5	8						
	Medium	.25 - .50	☒	☒	☒	18	15	23						
	Coarse	.50 - 1.0	☒	☒	☒	19	16	39						
.04 - .08	Very Coarse	1.0 - 2	☒	☒	☒	19	16	55						
.08 - .16	Very Fine	2 - 4	☒	☒	☒	26	22	77						
.16 - .22	Fine	4 - 5.7	☒	☒	☒	12	10	87						
.22 - .31	Fine	5.7 - 8	☒	☒	☒	6	5	92						
.31 - .44	Medium	8 - 11.3	☒	☒	☒	4	3	95						
.44 - .63	Medium	11.3 - 16	☒	☒	☒	5	4	99						
.63 - .89	Coarse	16 - 22.6												
.89 - 1.26	Coarse	22.6 - 32				1	1	100						
1.26 - 1.77	Very Coarse	32 - 45												
1.77 - 2.5	Very Coarse	45 - 64												
2.5 - 3.5	Small	64 - 90												
3.5 - 5.0	Small	90 - 128												
5.0 - 7.1	Large	128 - 180												
7.1 - 10.1	Large	180 - 256												
10.1 - 14.3	Small	256 - 362												
14.3 - 20	Small	362 - 512												
20 - 40	Medium	512 - 1024												
40 - 80	Large-Vry Large	1024 - 2048												
	Bedrock													
TOTALS →						120	100							



GAGE: \_\_\_\_\_  
 Reach: \_\_\_\_\_  
 No: \_\_\_\_\_  
 Date: \_\_\_\_\_

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# Velocity Comparison Form

Class Lyle creek Reference

Date \_\_\_\_\_ Team \_\_\_\_\_

Stream UT to Catawba R. Location Downstream from Shoals Dam

Input Variables		Output Variables	
Bankfull Cross Sectional Area ( $A_{BKF}$ )	10.5 ft <sup>2</sup>	Bankfull Mean Depth $D_{BKF} = (A_{BKF}/W_{BKF})$	1.01 ft
Bankfull Width ( $W_{BKF}$ )	9.9 ft	Wetted Perimeter (WP) $(\sim(2*D_{BKF})+W_{BKF})$	12.01 ft
D84	5.7 mm	D84 (mm/304.8)	0.019 ft
Bankfull Slope	0.0028 ft/ft	Hydraulic Radius (R) $(A_{BKF}/WP)$	0.87 ft
Gravity	32.13 ft/s <sup>2</sup>	R/D84 (use D84 in FEET)	45.79 ft/ft

R/D84, $u/u^*$ , Mannings n	
$u/u^*$ (using R/D84: see Reference Reach Field Book: p188, River Field Book:p233)	12.6 ft/s/ft/s
Mannings n: (Reference Reach Field Book: p189, River Field Book:p236)	0.025 ft <sup>1/6</sup>
Velocity: from Manning's equation: $u=1.49R^{2/3}S^{1/2}/n$ <small><math>1 \times 0.05</math></small>	2.7 ft/s

$Q = 28$

$u/u^*=2.83+5.7\log R/D84$	
$u^*: u^*=(gRS)^{0.5}$	0.28 ft/s
Velocity: $u=u^*(2.83+5.7\log R/D84)$	3.4 ft/s

$Q = 35.7$   
use

Mannings n by Stream Type	
Stream Type	E 4/5
Mannings n: (Reference Reach Field Book: p187, River Field Book:p237)	0.032 ft <sup>1/6</sup>
Velocity: from Manning's equation $u=1.49R^{2/3}S^{1/2}/n$ <small><math>1 \times 0.5</math></small>	2.1 ft/s

$Q = 22.1$   
no

Continuity Equation	
$Q_{BKF}$ (cfs) from regional curve or stream gage calibration	cfs
Velocity ( $u=Q/A$ or from stream gage hydraulic geometry)	ft/s