HYDROLOGY AND HYDRAULICS REPORT FOR HOUGHTON ROAD

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August 21, 2008

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HYDROLOGY AND HYDRAULICS REPORT
FOR
HOUGHTON ROAD

Location:
This project is located within
Township 14 South, Range 15 East, Sections 24, 25, and 36
And Township 15 South, Range 15 East, Sections 01, 12, and 13;
Within the City of Tucson
Pima County, Arizona

Prepared for:
City of Tucson
Department of Transportation
201 N. Stone Avenue
Tucson, AZ 85701

August 21, 2008

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2	Hydraulic Analysis (Existing and Developed Conditions)
3	Pantano Wash Bridge HEC-RAS Model

1.0 INTRODUCTION

The following text will serve as the Hydrology and Hydraulics Report for the Houghton Road. The Houghton Road project for the City of Tucson consists of roadway improvements for Houghton Road from 22nd Street to Valencia Road for approximately 6 miles bounded by Sections 24, 25, and 36 of Township 14 and Range 15 and Sections 1, 12 and 13 of Township 15 and Range 15 (Figure 1). Houghton Road is currently a two to four-lane roadway from N. Synder Road to W. Camino Aurelia Road. The proposed new roadway alignment will be six-lanes along with adjacent bike and pedestrian travel lanes separated by a depressed vegetated median featuring native desert landscape. Houghton Road will service existing and prospective residential and commercial developments in the area.

The Pantano Wash Bridge is also included in the project scope. This bridge was constructed in 1989. There are numerous smaller watercourses that cross the proposed alignment, primarily in shallow channels and as sheet flow and through existing culverts. The washes typically flow to the northwest. Modifications to the bridge and existing culverts are also being proposed based on the hydraulic analysis and the corresponding traffic study.

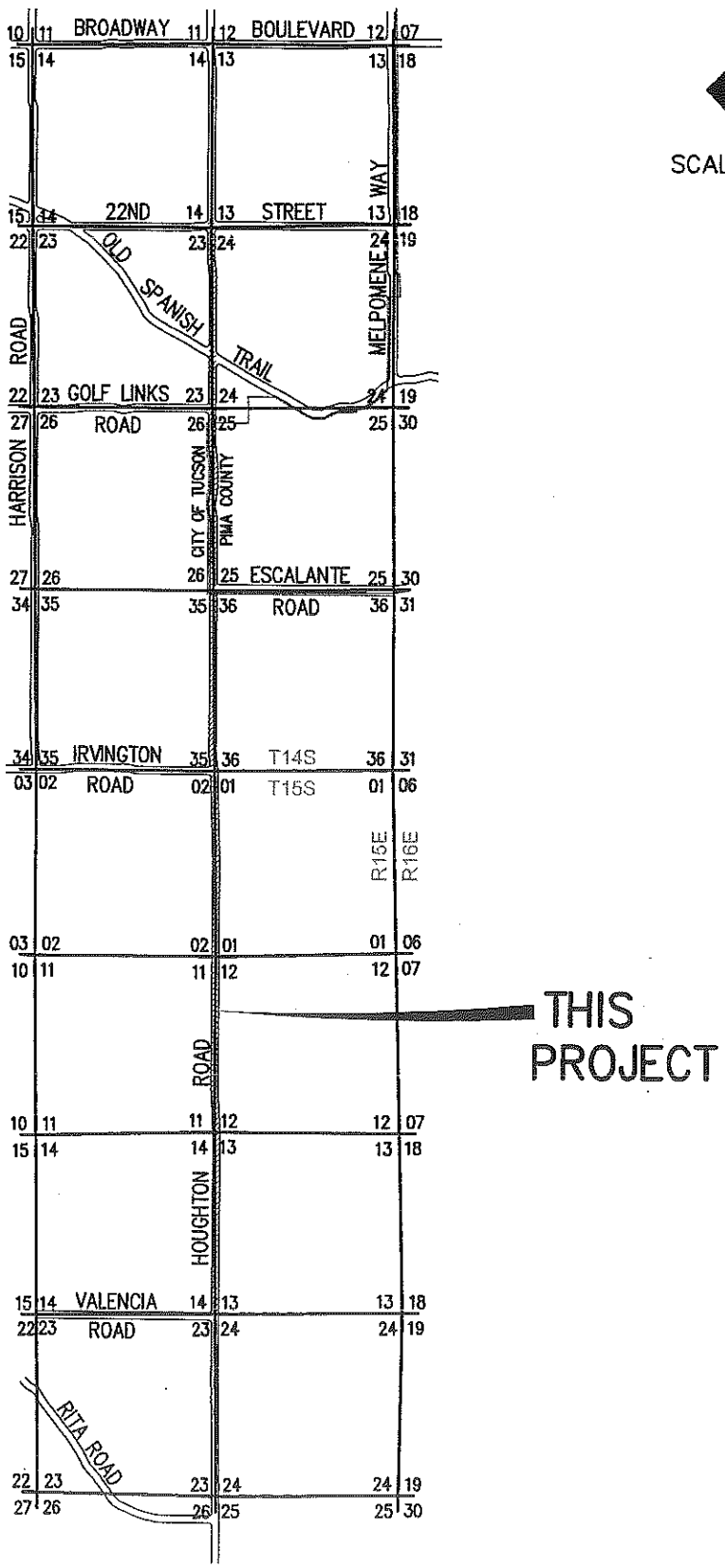
2.0 OBJECTIVES

The intent of this report is to provide a drainage scheme which conveys storm water runoff safely and efficiently through the project limits.

The following tasks were completed as part of the drainage study for Houghton Road:

- Peak discharges for both onsite and offsite watersheds were calculated per Pima County standards outlined in the Hydrology Manual for Engineering Design, Pima County (Reference 1).
- Drainage structures were located and sized for the safe and efficient conveyance of cross-drainage on-site runoff.
- Bridge scour analysis based on HEC-18 was conducted to analyze the potential scour at the existing structure across the Pantano Wash.

The remainder of this report describes the proposed drainage for the on-site and off-site drainage systems impacted by the proposed project. Figures and calculations depicting existing and developed conditions are provided as technical support.



SCALE: 1" = 1 Mile

LOCATION MAP

Sections 23, 24, 25, 26, 35 and 36 of Township 14 South, Range 15 East
Sections 01, 02, 11, 12, 13 and 14 of Township 15 South, Range 15 East
City of Tucson, Pima County, Arizona

3.0 EXISTING CONDITIONS

3.1 Hydrologic Analysis

Based on the existing drainage pattern, twenty six watersheds (Watersheds 1-19), including subwatersheds, were found to impact the proposed alignment for Houghton Road. Twenty three of these watersheds generate discharges in excess of 100 cfs. The hydrologic information was obtained from three sources. Where available Tucson Stormwater Management Study (TSMS) Node Data was utilized. Discharges from existing approved development drainage reports were utilized where available. These watersheds are in most cases shown as truncated at the end of the section topo. Their actual watershed delineations can be found in the referenced drainage reports and TSMS models. In areas without TSMS or approved drainage reports, a hydrologic analysis was performed using the Pima County Rational Method as most watersheds originate within Pima County.

The Pima County Rational Method procedures are outlined in the Pima County Hydrology Manual for Engineering Design and Floodplain Management (Reference 2). The Pima County methodology was utilized due to the offsite watersheds originating in Pima County. A comparison between the methodologies for CP2 showed the Pima County methodology as more conservative than the City of Tucson methodology. The variables used in this analysis were obtained as follows:

Precipitation data was obtained from the NOAA Atlas 14. The upper bound of the 90% confidence interval of the point precipitation frequency estimates was utilized to generate precipitation depths at the project site (Reference 2).

The off-site watersheds were delineated on a 1-foot contour interval digital topographic Pima Association of Governments (PAG) map. Additional topography was collected by Psomas survey crews in the vicinity of the bridge to provide a greater level of detail for the hydraulics analysis.

Soil classification was obtained from the SCS Soils Study for Pima County. The vegetative type and density were determined from field investigations and review of recent aerial photographs. Hydrologic Soil Groups were primarily of B and D soils.

Peak discharge values for individual watersheds were generated using the Pima County Modified Rational Method. These values were then routed using HEC-HMS to estimate flows considering attenuation. Offsite watershed delineations shown on 5' contour intervals to clarify the image are depicted on Figure 2, Existing Conditions Map. Under existing conditions, the roadway is uncurbed. Pavement drainage has therefore not been analyzed separately. Table 1 summarizes existing undeveloped watershed results for the onsite and offsite existing conditions hydrologic analysis.

BOLD – TSMS NODE
REG – CALCULATED

Table 1: Summary of Hydrologic Analysis (Offsite Existing Conditions)

Concentration Point	Approximate Station	Area (ac)	Length (ft)	Mean Slope (%)	Weighted Basin Factor (n_{bw100})	Watershed Peak Discharge Q_{100} (cfs)
1	268+00	231.92	5698.9	0.0198	0.035	**1106**
2	284+00	23.48	1867.4	0.1847	0.035	202
3a	289+00	206.9	5506	0.0209	0.035	**759**
3b	290+00	11.7	1529	0.0229	0.035	96
3.5	307+50	32.1	3124	0.0218	0.035	213
4	320+00	37.4	2522	0.0242	0.035	271
5	324+00	35.8	2179	0.0312	0.035	279
6	340+00	40.1	3623	0.0199	0.035	258
7	342+00	326.2	6468.3	0.017	0.035	**2029**
7.2	353+50	22.1	2884	0.0229	0.035	113
7.4	358+50	513.9	14.767	0.0190	0.035	1216
7.6*	365+00	38.2	3570	0.0157	0.035	166
7.8	374+00	21.7	2276	0.0255	0.035	119
8a	381+00	35.9	2320	0.0302	0.035	201
8b	395+50	33.4	2304	0.0521	0.035	209
9	406+00	899.87	22648.5	0.0172	0.035	**31000**
10	424+00	120.3	6456.5	0.0093	0.035	347
11	428+50	200.93	7686.6	0.0111	0.035	*488*
12	455+00	173.49	4340.7	0.0115	0.035	**726**
13	475+00	47.51	2945	0.0068	0.035	*107*
14	486+00	22.31	1694.8	0.0059	0.035	*89*
15	503+00	70.26	3030.9	0.0066	0.035	*83*
16	524+00	13.19	1687.5	0.003	0.035	*112*
17*	531+50	688.6	25350	0.0085	0.035	776
18	549+50	111.0	8590	0.0070	0.035	235
19	555+00	546.88	9621	0.0052	0.035	**1689**

Qs from by City of Tucson TSMS data. Direct summation used for Q values.
Qs from development drainage reports.
Qs from PCQ
* Watersheds have been subdivided into smaller sub-watersheds for calculation purposes.

3.2 Existing Drainage Structures

Existing drainage structures are currently in placed at 21 roadway and wash intersections along Houghton Road. The previously mentioned Pantano Wash Bridge will also be analyzed per the discussion in section 3.4. Further analysis of the system at approximately station 320+00 where Eckerd Drugstore is located, south of Golf Links, will be conducted as part of the roadway drainage design.

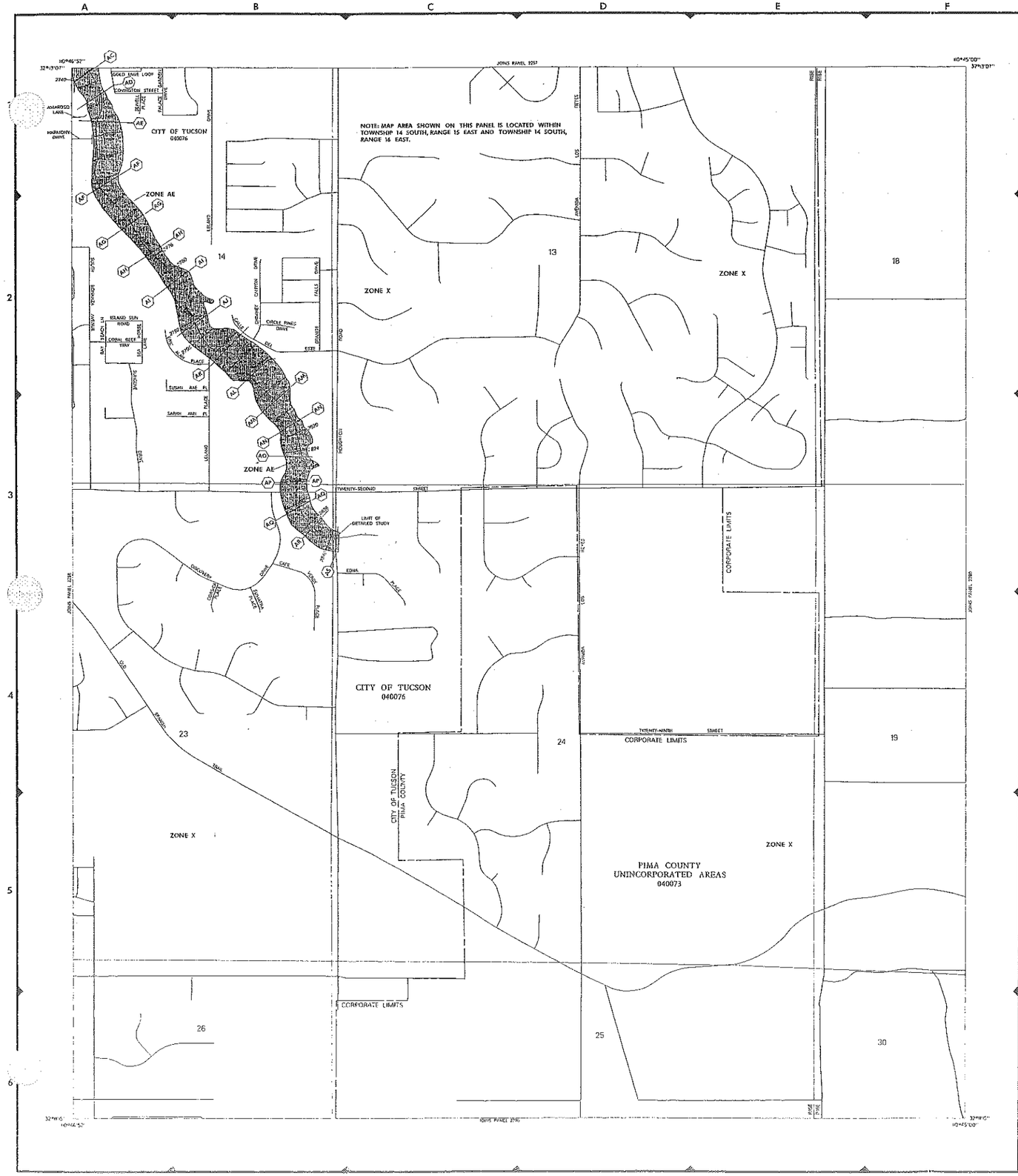
Table 2: Summary of Existing Culverts

CP	Approximate Station	Wash Name	Location	Type
1	267+50	Este Wash	South of 22nd	Dip Section
2	284+50	Hidden Hills Wash	North of Discovery Dr.	Dip Section
4	307+50	Eastview Wash	North of Golf Links	CMP 30"
4	319+50	Unnamed Wash	South of Golf Links	3-44" x 27" CMP
5	323+50	Unnamed Wash	North of Corte Madera Final	36" CMP
6	341+50	Old Spanish Trail Wash	North of Emily Dr.	2-8'x5'
7.2	353+50	Unnamed	North of Sky Castle Way	36" CMP
7.4	359+00	Escalante Wash	South of Sky Castle Way	2- 72" CMP
7.6	365+00	Unnamed Wash	North of Escalante	24" CMP
7.6	366+00	Unnamed Wash	North of Escalante	36" CMP
8	369+00	Unnamed Wash	South of Escalante	18" CMP
8	374+00	Unnamed Wash	North of Boulderfield Dr.	36" CMP
8	380+00	Unnamed Wash	South of Boulderfield Dr.	3- 24" RCP
9	405+00	Pantano Wash	North of Irvington	Bridge
10	422+00	Unnamed Wash	Under Irvington intersection	36" CMP
12	455+00	Mesquite Ranch Wash	South of Seven Generations Way	10"x8' RCB
16	523+00	Unnamed Wash	North of Poorman Rd	2 CMP
17	532+50	Unnamed Wash	North of Poorman Rd	24"x36" CMP
17	540+50	Unnamed Wash	North of Poorman Rd	Unknown
18	549+50	Unnamed Wash	North of Poorman Rd	Unknown
19	554+50	Atterbury Wash	North of Valencia	Dip Section

CMP = Corrugated Metal Pipe
RCP = Reinforced Concrete Pipe
RCB = Reinforced Concrete Box Culvert

3.3 Existing Floodplains

Per the Federal Emergency Management Agency (FEMA), Houghton Road is located within Zone X (unshaded) and Zone AE (FIRM Panel 04019C2259K, Effective Date February 2, 1999 and FIRM Panel 04019C2270K, Effective Date February 8, 1999). Per the FIRM Panel legend, Zone X (unshaded) denotes areas outside of the 500-year floodplain and Zone AE denotes base flood elevations have been determined. The majority of the project lies within Zone X with the exceptions of the Este Wash and Pantano Wash which are Zone AE. The FEMA limits are depicted on Figure 3, FEMA FIRM Panel.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A — No base flood elevations determined

ZONE AE — Base flood elevations determined

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined

ZONE A99 — To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined

ZONE V — Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE — Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X — Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood

OTHER AREAS

ZONE X — Areas determined to be outside 500-year floodplain

ZONE D — Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

Montlimit 1983 — Montlimit 1990 — Otherwise Protected Area

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Areas and Showing Limits of Different Coastal Base Flood Developed Within Special Flood Hazard Zones

513 — Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum.

(D)—(D) — Cross Section Line

(EL 987) — Base Flood Elevation in Feet. Water Surface Elevation. See Map Index for Elevation Datum

BM7 — Elevation Reference Mark

RM2 — River Mile

37°07'30", 32°22'30" — Positional Coordinates Based on North American Datum of 1927 (NAD 27) Projection

NOTES

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size or in undeveloped areas. Persons outside Special Flood Hazard Areas may experience flooding. The community map repository should be consulted for more detailed data on BFEs, and for any information on floodway delineations prior to use of this map for property purchase or mortgage purposes.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, A99, AO, A99, V, VE and VI-V30.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table where floodway width is shown as 100 feet.

Elevations shown represent sea level (NGVD, unless otherwise specified). Elevations may also differ significantly from those published by the National Weather Service for nearbye evaluation gauging.

Coastal lines shown on current as of the date of this map. The user should contact appropriate community officials to determine if additional flood hazard information in the absence of this map.

This map may incorporate approximate boundaries of Coastal Barrier Resources System Units and/or Otherwise Protected Areas established under the Coastal Barrier Improvement Act of 1990 (P.L. 101-591).

For communities with multiple flood zones, see community mapping, see Section 4.0 of the Flood Insurance Study Report.

For adjoining map panels and other map sheets see separately printed Map Index.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP
FEBRUARY 8 1989

EFFECTIVE DATE(S) OF REVISION(S) TO THIS PANEL:

Prior to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on this map in addition, some additional areas apply to structures in zones where conditions or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800)638-6620.

APPROXIMATE SCALE IN FEET
500 0 500

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

PIMA COUNTY,
ARIZONA AND
INCORPORATED AREAS

PANEL 2259 OF 4700
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY NUMBER	PANEL	SUFFIX
TUCSON, CITY OF	[illegible]	[illegible]
PIMA COUNTY UNINCORPORATED AREAS	[illegible]	[illegible]

MAP NUMBER
04019C2259 K

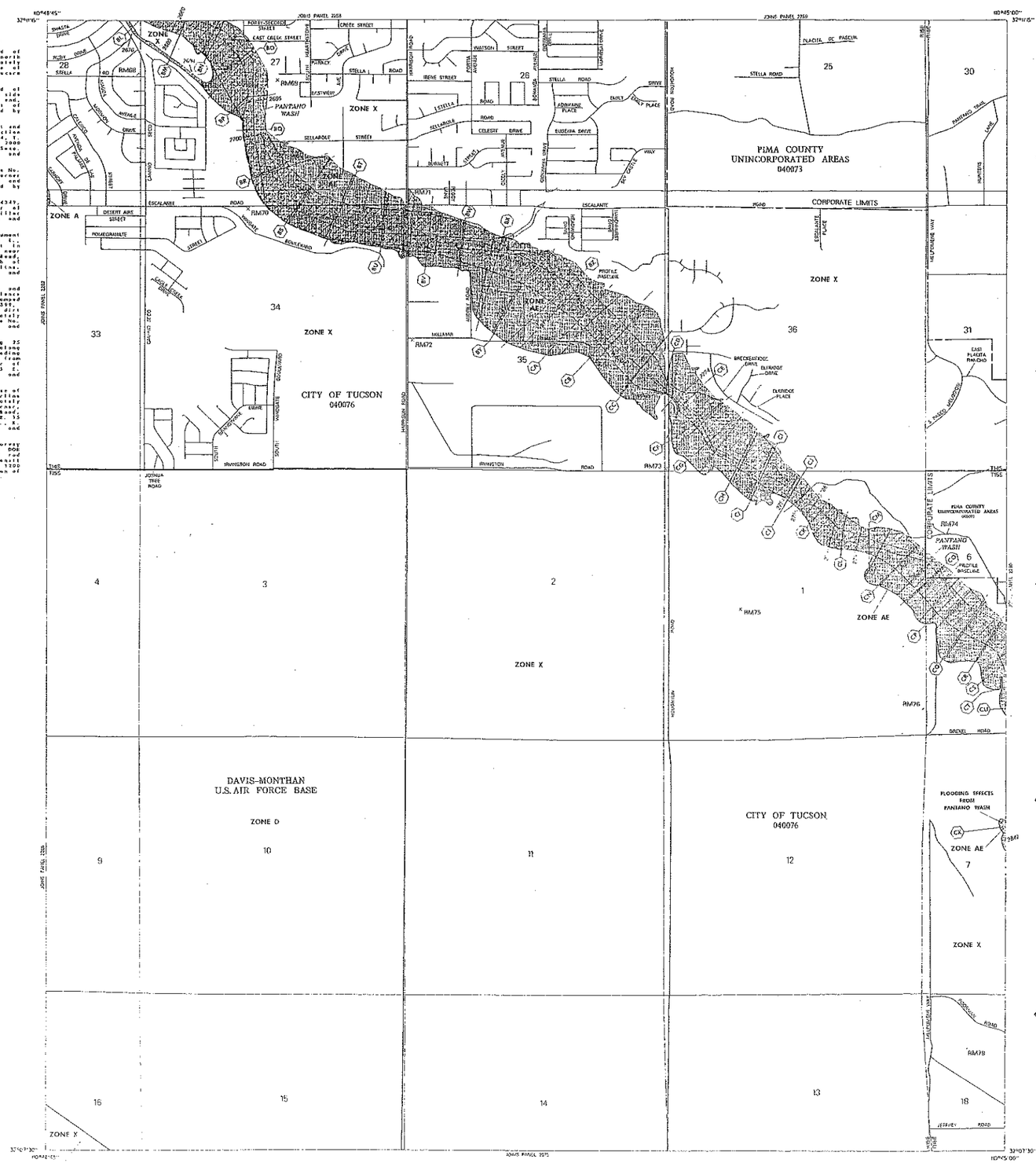
EFFECTIVE DATE:
FEBRUARY 8 1989

Federal Emergency Management Agency

FIGURE 3
8

ELEVATION REFERENCE MARKS

REFERENCE ELEVATION MARK	EFFECT NGVD	DESCRIPTION OF LOCATION
RM68	2686.66	Chiselled square on west end of concrete curbing. Located north side of Stella Road, approximately 80 feet west of centerline of Camino Seco. Established by Kucera and Associates Inc.
RM69	2703.32	Chiselled square on west end of concrete curb, located south side of Stella Road at west end, approximately 125 feet west of Thimmonn Place. Established by Kucera and Associates Inc.
RM70	2708.69	Railroad spike in pole at east end of powerline located near section line between sections 27 and 34, T. 14 S., R. 13 E., approximately 2000 feet east of Camino Seco. Established by Kucera and Associates Inc.
RM71	2737.73	Twin 20d spikes in power pole No. 3797, located at northeast corner of intersection of Harrison and Miller Roads. Established by Kucera and Associates Inc.
RM72	2741.46	A 40d spike in power pole No. 4349, located at northwest corner of intersection of Harrison and Miller Roads. Established by Kucera and Associates Inc.
RM73	2797.53	Brass disk with concrete monument stamped FCDO T. 14 S., R. 13 E., R. 15 S., 15/3 34/1, set in section corner, located near centerline of Houghton Road, approximately 45 feet north of Irvington Road centerline. Established by Kucera and Associates Inc.
RM74	2814.53	Iron pipe set in concrete and projecting 2 inches inside lease corner with aluminum cap stamped 1/16 Cor. Sec. 1 Sec. ELE 4397, located southeast of 4-way dirt drive intersection, approximately 33 feet west of power pole No. 11399. Established by Kucera and Associates Inc.
RM75	2848.05	Top of rail iron projecting 25 inches above surface, located along south edge of dirt road leading west, approximately 1300 feet from Houghton Road, west center of section 1, T. 15 S., R. 13 E. Established by Kucera and Associates Inc.
RM76	2841.59	Chiselled square on concrete base of southwest leg of steel powerline tower No. 56, located approximately 300 feet north of section corner, 500 feet north of Rogers Road, between sec. 1 T. 15 S., R. 13 E. and sec. 6 T. 15 S., R. 12 E. Established by Kucera and Associates Inc.
RM78	2893.40	U.S. Coast and Geodetic Survey standard tablet stamped 3 DOE 1975, set on approximated rod enclosed by 4-inch white tubular pipe, located approximately 1300 feet southeast of intersection of Freeman Road and Mojamone Way.



LEGEND

SPECIAL FLOOD HAZARD AREAS INUNDATED BY 100-YEAR FLOOD

ZONE A — No base flood elevations determined.

ZONE AE — Base flood elevations determined.

ZONE AH — Flood depths of 1 to 3 feet (usually areas of ponding); base flood elevations determined.

ZONE AO — Flood depths of 1 to 3 feet (usually sheet flow on sloping terrain); average depths determined. For areas of alluvial fan flooding, velocities also determined.

ZONE AR — To be protected from 100-year flood by Federal flood protection system under construction; no base flood elevations determined.

ZONE V — Coastal flood with velocity hazard (wave action); no base flood elevations determined.

ZONE VE — Coastal flood with velocity hazard (wave action); base flood elevations determined.

FLOODWAY AREAS IN ZONE AE

OTHER FLOOD AREAS

ZONE X — Areas of 500-year flood; areas of 100-year flood with average depths of less than 1 foot or with drainage areas less than 1 square mile; and areas protected by levees from 100-year flood.

OTHER AREAS

ZONE X — Areas determined to be outside 500-year floodplain.

ZONE D — Areas in which flood hazards are undetermined.

UNDEVELOPED COASTAL BARRIERS

OPA 90 1990 — Minimal Prohibited — Otherwise Protected Areas

Coastal barrier areas are normally located within or adjacent to Special Flood Hazard Areas.

Floodplain Boundary

Floodway Boundary

Zone D Boundary

Boundary Dividing Special Flood Hazard Areas and Boundary Dividing Areas of Different Coastal Base Flood Elevations Within Special Flood Hazard Areas

513 — Base Flood Elevation Line; Elevation in Feet. See Map Index for Elevation Datum

D — D — Cross Section Line

(EL 987) — Water Surface Elevation in Feet (Varies Within Zone). See Map Index for Elevation Datum.

RM7 × — Elevation Reference Mark

• 532 — River Mile

93°03'30", 32°22'30" — Horizontal Coordinates Based on North American Datum of 1927 (NAD 27) Projection

NOTES

This map is for use in administering the National Flood Insurance Program. It does not necessarily identify all areas subject to flooding, particularly from local drainage sources of small size or all drainages. Features outside Special Flood Hazard Areas may nevertheless be flooding. Users should consult more detailed data on FIS p., and for any information on floodway delineations, look to use of this map for property purchase or construction purposes.

Areas of Special Flood Hazard (100-year flood) include Zones A, AE, AH, AO, AR, A0, A99, V, VE and V1-V30.

Certain areas not in Special Flood Hazard Areas may be protected by flood control structures.

Boundaries of the floodways were computed at cross sections and interpolated between cross sections. The floodways were based on hydraulic considerations with regard to requirements of the Federal Emergency Management Agency.

Floodway widths in some areas may be too narrow to show to scale. Refer to Floodway Data Table whose floodway width is shown as 100 feet.

Coastal flood elevations apply only inland of the MHHW and include the effects of wave action. Wave elevations may vary either significantly from those developed by the National Weather Service for hurricane evacuation planning.

Elevations shown shown are current as of the date of this map. They were obtained primarily approximate elevations although in sufficient levels have changed subsequent to the issuance of this map.

This map incorporates horizontal coordinates of Coastal Barrier Resource System areas and the Otherwise Protected Areas established under the Coastal Barrier Resources Act of 1982 (PL 97-348).

For community map revision history prior to countywide mapping, see Section 6.0 of the Flood Insurance Study Report.

For additional map panels and data, this source are separately printed Map Notes.

MAP REPOSITORY
Refer to Repository Listing on Map Index

EFFECTIVE DATE OF
COUNTYWIDE FLOOD INSURANCE RATE MAP:
FEBRUARY 8, 1999

EFFECTIVE DATES OF REVISIONS TO THIS PANEL:

Refer to the FLOOD INSURANCE RATE MAP EFFECTIVE DATE shown on the map to determine when structural codes apply to structures in zones where elevations or depths have been established.

To determine if flood insurance is available, contact an insurance agent or call the National Flood Insurance Program at (800)638-6620.

APPROXIMATE SCALE IN FEET
1000 0 1000

NATIONAL FLOOD INSURANCE PROGRAM

FIRM
FLOOD INSURANCE RATE MAP

PIMA COUNTY,
ARIZONA AND
INCORPORATED AREAS

PANEL 2270 OF 4700
(SEE MAP INDEX FOR PANELS NOT PRINTED)

COMMUNITY NUMBER	PANEL	SUFFIX
PIMA COUNTY UNINCORPORATED AREAS 040073	2270	K
CITY OF TUCSON 040076	2270	K

MAP NUMBER
04019C2270 K

EFFECTIVE DATE:
FEBRUARY 8, 1999

Federal Emergency Management Agency

FIGURE 3
9

3.4 Hydraulic Analysis

A HEC-RAS model was developed to analyze channel hydraulics and associated bridge scour at the Pantano Wash Bridge. The bridge was constructed in 1989 and modifications to the bridge are being proposed based on the hydraulic analysis and the corresponding traffic study. Recent Topographic and Aerial imagery (2007) was collected for the immediate roadway area while Pima Association of Governments (PAG) topographic information (2005) was utilized for the remainder of the reach. Some cross-sections utilized both PAG and 2007 data collected for the project. Further survey data on the bridge and channel flow path topography were collected by Psomas survey personnel.

The Design Storm (36,000 cfs), 100-year storm (31,000 cfs) and 50-year storm (24,490 cfs) were used in analyzing the scour and freeboard of the Pantano Wash Bridge. The Design Storm and 100-year storm data sets are from the Floodplain Management Ordinance No. 1985-FC1 for Pima County, Arizona. The 50-year storm was calculated using the suburban ratio ($Q_{50} = 0.79 \times Q_{100}$) relating more frequent floods to the 100-year flood found in Table 4.5 of the City of Tucson Standards Manual for Drainage Design and Floodplain Management in Tucson, Arizona (Reference 3). The 100-year storm was utilized in the calculation bridge freeboard while the Design Storm was used in the calculation of scour. Manning's values were estimated based on site conditions, contraction and expansion coefficients were based on recommended values in HEC RAS, and reach and bank lengths were measured and input into the model.

The Existing Conditions Pantano Wash Bridge characteristics were modeled in HEC-RAS based on the As-Built plans obtained from City of Tucson Department of Transportation Map Center. The bridge low cord elevation was also surveyed and this value was used in the model. Floating debris that extends 2 feet laterally from each pier and 4 feet vertically was included in this analysis.

Scour was analyzed using City of Tucson Standards Manual for Drainage Design and Floodplain Management in Tucson, Arizona (COT SMDDFM) equations in Section 6 Erosion and Sedimentation. Total pier scour was determined by summing low flow depth, general scour, pier scour and long term scour and then adding by a 30% factor of safety. Scour on the existing spur dike and existing bridge abutments was then calculated by summing low flow depth, long term

scour and general scour and then adding by a 30% factor of safety. These results show that the total pier scour would be 26 feet and total abutment scour would be 9 feet in the Design Storm (36,000 cfs) scenario. This depth is above both the maximum scour depth of the bridge (2727.33 feet) and the tipping elevation of the bridge (2696.33 feet). Long term scour over a 50 year period (1936 to 1986) was approximated to be 2 feet per the Pantano Wash Bed Profile 1936 vs. 1986 Pima county Department of Transportation and Flood Control District Maps. Long term scour is still being investigated. The channel slope is 0.8%. An estimate was based on channel inverts from the As-Built (1982) and 2007 survey data.

Due to the differences that exist between the As-built plans and the physical bridge, the last submittal stated the actual erosion depth would be verified by a field investigation. Therefore, test pits were excavated on September 14, 2007 to determine the depth to the soil cement bank protection. From the field investigation it was determined that the remaining toe down ranged from 7 to 6.5 feet at the upstream end of the spur dike on the north and south sides respectively and 4 to 6 feet further downstream just east of the bridge on the north and south sides respectively. With the field investigation confirming the scour depth and remaining toe down at the spur dike embankment reinforcement of soil cement is recommended as well as the implementation of a grade control structure to account for long term scour. Scour by the pier based on the field investigations shows the magnitude of scour occurring at the piers is less than that occurring at the spur dike, where the large contraction occurs. Thus the piers previous determination as scour stable for long term conditions under the condition that the spur dikes remain maintained.

Freeboard calculations were completed using both the City of Tucson methodologies and Arizona Department of Transportation (ADOT) Roadway Design Guidelines. In the existing bridge conditions the available freeboard to the low chord of the bridge meets the City of Tucson and the ADOT freeboard requirement. An option to consider in the design phase is the FEMA recommended 4 feet of freeboard at bridges. Multiple proposed bridge alternatives were modeled to calculate available freeboard. Table 3 below summarizes these results.

Table 3: Summary of Bridge Freeboard and Alternatives

Existing Bridge Information

Low Chord 2773.72 feet

Storm	Cross-Section Information			Freeboard Required		Available Freeboard* (= Bridge Chord – WSEL)
	Q	V	WSEL	COT	ADOT	Low Chord
	(cfs)	(ft/s)	(feet)	(ft)	(ft)	(ft)
Q_{100}	31,000	14.29	2771.80	2.2	3	**1.92**

* A negative value implies the chord has been over topped.

Proposed Bridge Alternatives

Design Alternative*** (Q_{100} year storm)	Cross-Section Information				Freeboard Required		Available Freeboard* (= Bridge Chord – WSEL)	
	Proposed Low Chord	V @ New Bridge	WSEL @ Existing Bridge	WSEL @ New Bridge	COT	ADOT	Low Chord @ Exist. Bridge	Low Chord @ New Bridge
	(ft)	(ft/s)	(ft)	(ft)	(ft)	(ft)	(ft)	(ft)
1	2773.72	N/A	2771.80	N/A	2.2	3	**1.92**	**N/A**
2**	2775.72	11.52	2771.80	2773.55	2.2	3	**1.92**	**2.17**
2a	2775.72	11.25	2771.39	2774.20	2.2	3	**2.33**	**1.52**
3	2775.72	11.52	2771.80	2773.55	2.2	3	**3.92**	**2.17**
3a	2775.72	11.25	2771.39	2774.20	2.2	3	**4.33**	**1.52**
4	2776.00	11.52	N/A	2773.55	2.2	3	**N/A**	**2.45**

* A negative value implies the chord has been over topped.
** Preferred Alternatives

**Design Alternative Descriptions

Alternative #	Design Alternatives Description
1	Widen existing bridge
2**	**Existing bridge with new bridge upstream 2' higher (3 pier bridge)**
2a	Existing bridge with new bridge upstream 2' higher (combined to 5 pier bridge)
3	Raise existing bridge and add new bridge upstream at same elevation (3 pier bridge)
3a	Raise existing bridge and add new bridge upstream at same elevation (combined to 5 pier bridge)
4	Two new bridges at same elevation

4.0 DEVELOPED CONDITIONS

4.1 Hydrologic Analysis

The offsite existing do not change in the developed conditions. Based on the existing drainage pattern, twenty six watersheds (Watersheds 1-19), including subwatersheds, were found to impact the proposed alignment for Houghton Road. Twenty three of these watersheds generate discharges in excess of 100 cfs. The hydrologic information was obtained from three sources. Where available, Tucson Stormwater Management Study (TSMS) Node Data was utilized. Discharges from existing approved development drainage reports were utilized where available. These watersheds are in most cases shown as truncated at the end of the section topo. Their actual watershed delineations can be found in the referenced drainage reports and TSMS models. In areas without TSMS or approved drainage reports, a hydrologic analysis was performed using the Pima County Rational Method as most watersheds originate within Pima County. The same Pima County methodologies used to calculate the existing conditions discharges are valid for the developed conditions discharges.

4.2 Roadway Drainage Design

Pavement runoff will be drained through proposed scuppers to swales along the proposed roadway of via stormdrain systems and discharged outside the project Right-of-Way. Inlets were located per spread criteria and location of profile breaks, intersections and median changes. The spread criteria require that the drainage design allow for ten feet in each travel direction to remain free of ponding during the 10-year storm. Houghton Road will be curbed from Irvington Road northwards. The median will be recessed to harvest and retain the rainwater that naturally falls on it. This will be used to sustain the native vegetation planted in this corridor and add to the aesthetic of a "desert parkway". This system will conform to the approved roadway alignment and will be constructed in accordance with City of Tucson Regulations with emphasis on the flow spread within a public roadway. Erosion protection will be sized for outlet protection. Pavement drainage, including preliminary side street drainage, are summarized in Table 4 to Table 5 below. Inlets for both Houghton Pavement and preliminary side streets are provided in Table 7 to Table 8. The watersheds and developed conditions are shown on Figure 4, Developed Conditions.

Table 4:

Summary of Pavement Drainage Design

C.P.	From Station	To Station	L (ft)	W (ft)	Area (ac)	Q_{10} (cfs)
1A	283+65	288+00	435	Varies	0.57	3.58
1B	275+00	283+65	865	Varies	0.69	4.34
2	275+00	288+00	1300	Varies	0.52	3.93
3A	283+65	288+00	435	Varies	0.64	4.02
3B	275+00	283+65	865	Varies	0.57	3.58
4	288+00	300+19	1219	Varies	1.34	8.42
5	288+00	300+19	1219	Varies	0.39	2.95
6	288+00	300+19	1219	Varies	1.57	9.86
7A	300+20	307+04	684	Varies	1.06	6.66
7B	307+04	312+43	539	Varies	0.70	4.37
8	300+19	314+45	1426	Varies	0.66	4.99
9A	300+19	307+04	685	Varies	0.85	5.34
9B	307+04	312+43	539	Varies	0.40	2.51
10A	312+43	319+40	473	Varies	0.84	5.28
10B	319+40	330+20	1268	Varies	1.48	9.30
11	314+45	331+86	1741	Varies	0.57	4.31
12A	312+43	319+18	473	Varies	0.68	4.27
12B	319+18	330+20	1741	Varies	1.59	9.99
13	330+20	348+57	1671	Varies	1.77	11.12
14	330+20	348+57	1671	Varies	0.56	4.23
15	330+20	348+57	1671	Varies	1.91	12.00
16	347+50	348+57	107	Varies	0.01	0.08
18	348+57	349+50	93	Varies	0.01	0.08
19	348+57	352+15	358	Varies	0.06	0.45
21A	358+61	361+59	298	Varies	0.26	1.63
21B	348+64	358+61	997	Varies	1.43	9.00
21C	361+59	368+16	657	Varies	0.77	4.84
22	352+40	367+55	1515	Varies	0.55	4.16
23A	358+61	361+59	298	Varies	0.26	1.63
23B	348+64	358+61	997	Varies	1.26	7.92
23C	361+59	368+16	657	Varies	1.01	2.60
24A	368+18	379+71	1153	Varies	0.92	5.78
24B	379+71	397+13	1742	Varies	1.79	11.25
24C	368+18	371+00	282	Varies	0.45	2.83
25	368+18	382+09	1391	Varies	0.23	1.74
26A	371+00	379+71	871	Varies	0.88	5.53
26B	379+71	397+13	1742	Varies	1.87	11.75
26C	368+18	371+00	282	Varies	0.32	2.01
27	377+13	328+09	496	Varies	0.13	0.98
28	381+55	397+13	1558	Varies	0.41	3.10
29A	397+13	404+45	732	Varies	0.85	5.34
29B	404+45	421+81	1863	Varies	1.97	12.38

C.P.	From Station	To Station	L (ft)	W (ft)	Area (ac)	Q_{10} (cfs)
30	397+78	420+88	2310	Varies	0.79	5.97
31A	397+13	404+45	732	Varies	0.65	4.08
31B	403+18	421+82	1864	Varies	2.55	16.02
32A	426+34	447+76	2142	Varies	2.30	14.45
32B	421+82	426+34	452	Varies	0.65	4.08
33	421+82	447+76	2594	Varies	1.04	7.86
34A	426+34	447+76	2142	Varies	2.31	14.51
34B	421+82	426+34	542	Varies	0.45	2.83
35A	454+53	468+99	1446	Varies	1.33	8.36
35B	447+76	454+53	677	Varies	0.93	5.84
35C	468+99	475+00	1005	Varies	1.24	7.79
35D	475+00	485+43	639	Varies	0.64	4.02
35E	494+99	500+96	597	Varies	0.74	4.65
35F	485+43	494+99	956	Varies	0.96	6.03
36	447+76	473+51	2575	Varies	0.97	7.33
37A	454+53	468+99	1446	Varies	1.33	8.36
37B	447+79	454+53	677	Varies	0.71	4.46
37C	468+99	475+00	1005	Varies	1.38	8.67
37D	475+00	485+43	639	Varies	0.75	4.71
37E	494+99	500+96	597	Varies	0.91	5.72
37F	485+43	494+99	956	Varies	1.11	6.97
38	473+21	475+39	218	Varies	0.05	0.38
39	455+07	499+97	4490	Varies	0.69	5.22
40A	500+96	502+47	151	Varies	2.02	13.82
40B	502+37	522+20	1983	Varies	2.42	15.21
40C	531+59	553+76	2217	Varies	0.30	1.88
40D	522+20	531+59	939	Varies	1.01	6.35
41	500+96	526+15	2519	Varies	1.0	7.56
42A	500+96	502+70	151	Varies	2.60	16.34
42B	502+70	522+20	1983	Varies	2.16	13.57
42C	531+59	553+76	2217	Varies	0.15	0.94
42D	522+20	531+59	939	Varies	1.01	6.35
43	528+94	528+05	211	Varies	0.05	0.38
44	527+75	553+02	2527	Varies	0.66	4.99
45	553+76	560+00	624	Varies	0.69	4.34
46	553+76	560+00	624	Varies	0.21	1.59
47	553+76	560+00	624	Varies	0.62	3.90

Table 5:
Summary of Side Street Pavement Drainage Design

C.P.	To Station	From Station	L (ft)	W (ft)	Area (ac)	Q_{10} (cfs)
Old Spanish Trail						
SS1	27+41	20+70	671	Varies	0.54	3.47
SS3	27+41	20+70	671	Varies	0.44	2.83
SS4	21+88	20+70	118	Varies	0.06	0.29
SS5	22+10	20+70	140	Varies	0.08	0.51
SS6	19+10	15+00	410	Varies	0.30	1.93
SS8	19+10	15+00	410	Varies	0.38	2.44
Golf Links Road						
SS12	26+48	20+69	579	Varies	0.31	1.99
SS14	26+48	20+69	579	Varies	0.17	1.09
SS15	19+07	15+00	407	Varies	0.27	1.74
SS17	19+07	15+00	407	Varies	0.56	3.60
SS18	15+00	8+87	613	Varies	0.44	2.83
SS19	15+00	8+87	613	Varies	0.48	3.09
Irvington Road						
SS22	19+15	15+96	319	Varies	0.25	1.61
SS24	19+15	15+96	319	Varies	0.33	2.12
SS25	15+96	15+00	96	Varies	0.08	0.39
SS27	15+96	15+00	96	Varies	0.08	0.51
Bilby Road						
SS28	22+30	20+60	170	Varies	0.46	2.96
SS29	22+30	20+60	170	Varies	0.46	2.96
SS30	22+30	20+60	170	Varies	0.04	0.19

4.3 Cross Drainage

4.3.1 Culverts

The proposed culvert crossings for this project were analyzed using the CulvertMaster® v3.0 computer program developed by Haestad Methods, Inc. The culverts were sized based solely on available headwater. The calculations are based on a headwater 1' below the edge of pavement to ensure the pavement section remains free of ponding. The program methodology is based on the Federal Highway Administration's Hydraulic Design Series Number 5 nomographs. Drainage structures were located and sized for the safe and efficient conveyance of on-site runoff. The culvert design alternatives are presented below in Table 6.

Table 6: Summary of Proposed Culverts

Concentration Point	Approximate Station	Discharge (cfs)	Type	Length (ft)	Slope (ft/ft)	Velocity (fps)	Required Headwater (ft)
2*	283+66	961	4-10' x 4' Box	199	0.012	13.83	4.84
3.5	307+04	213	3-48" Circular	260	0.026	16.15	4.19
4	319+50	271	3-44" x 27" Ellipse	175	0.008	13.96	7.81
5	323+53	279	2- 6' x 4' Box	213	0.030	17.75	4.74
7**	341+58	2287	3-12' x 8' Box	175	0.010	17.01	8.76
7.2	352+83	113	2-48" Circular	223	0.012	11.45	3.65
7.4	358+53	1216	5-10' x 4' Box	184	0.035	19.28	4.75
7.6	364+29	19	1-36" Circular	224	0.061	15.53	2.21
7.6	365+58	147	3-36" Circular	261	0.045	18.19	3.96
7.8	373+53	119	2-48" Circular	305	0.044	18.65	3.76
8a	379+34	201	3-48" Circular	211	0.030	16.46	4.05
9	405+00	31000	**Bridge Crossing**				
12	454+47	726	2-10' x 6' Box	195	0.005	12.10	6.38
13	477+62	107	3-36" Circular	164	0.003	7.37	3.18
14	485+00	89	2-36" Circular	200	0.022	13.55	3.71
15	Existing for North Crossing across Bilby Road	83	3-30" Circular	125	0.015	10.34	3.05
15***	Existing for South Crossing across Forest Glen Road	42	3-24" Circular	108	0.015	8.83	2.25
16	522+87	112	2-48" Circular	210	0.004	7.69	3.62
17****	Proposed for North Crossing at Poorman	75	4-24" Circular	85	0.005	7.14	2.75
17	531+60	776	4-10' x 4' Box	162	0.005	10.00	4.20
18	548+62	235	1-10' x 4' Box	188	0.006	11.22	4.77
19	554+10	1689	6-10' x 5' Box	187	0.003	9.68	5.34

* **Combined with flows from 3a**
** **Combined with flows from 6**
*** **Sub-watershed of 15**
**** **Sub-watershed of 17**

4.3.2 Bridge

Currently six alternatives are being considered for the Pantano Wash Bridge to determine the optimum proposed bridge. These alternatives include widening the existing bridge to 4 lanes, widen existing bridge to 3 lanes and build 3 new addition lanes on an adjacent bridge (3 pier and 5 pier options), as described prior but increase deck elevation to allow for additional freeboard (3 pier and 5 pier options) and lastly construct a completely new bridge. The preferred alternative based on a combination of roadway, structural and hydraulic parameters is Alternative 2, keeping the existing bridge and adding an new bridge upstream 3' higher than the existing bridge.

4.4 Pavement Drainage Inlet Design

Each inlet structure was designed to convey the 10-year event with the depth of ponding in the roadway less than 0.5 foot and to meet spread criteria per Pima County Methodology. The spread is designed to keep a minimum of ten feet in each travel direction free of ponding during the 10 year event. The design assumed that the ponding for the 100-year event at the same inlet would therefore be less than 1.0 foot in the road.

The primary goal of the pavement drainage analysis is to control the spread of water onto travel lanes at all locations during the 10-year storm. The spread and depth of flow in the gutter, and inlet structure analysis were calculated using the Federal Highway Administration's Visual Urban drainage design program is based on HEC-22. The inlets are placed at locations where either the maximum spread is approached or reached. At superelevation transitions and intersections, the inlets are designed for 100% interception in order to limit the amount of runoff crossing travel lanes. Tables 7 and 8 show the inlet design for Houghton Road and the sidestreets to which we are proposing tie-ins. The calculation sheets for the inlet design are provided in Appendix 2. Inlets and storm drain pipes are depicted on Figure 4.

Table 7:

Summary of Pavement Inlet Drainage Design

C.P.	Inlet ID	Station	DA (ac)	Q_{10} (cfs)	Inlet Type	Q_i (cfs)	So Long. (ft/ft)	Sx Cross (ft/ft)	D Pond (ft)	Spread (ft)	Q_{bypass} (cfs)
1A	CB1a	284+65	0.57	3.58	16' Catch Basin	3.72	0.005	0.02	0.27	13.7	0.19
1B	CB1b	279+16	0.44	2.78	20' Catch Basin	2.97	0.005	0.02	0.25	12.4	0.00
3A	CB3a	284+00	0.64	4.02	20' Catch Basin	4.7	0.005	0.02	0.29	14.7	0.04
3B	I3b	279+16	0.56	3.52	20' Scupper	3.66	0.005	0.02	0.27	13.4	0.00
4	CB4	289+30	1.34	8.42	32' Catch Basin	8.09	0.015	0.02	0.3	14.9	0.33
6	I6	289+00	1.57	9.86	32' Scupper	9.17	0.015	0.02	0.32	15.8	0.69
7A	CB7a	306+60	1.06	6.66	28' Catch Basin	6.16	0.020	0.02	0.26	12.9	0.50
7B	CB7b	308+67	0.7	4.37	4' Catch Basin	4.88	0.020	0.02	0.5	20.8	0.00
9A	CB9a	306+60	0.85	5.34	28' Catch Basin	5.17	0.020	0.02	0.24	11.9	0.17
9B	I9b	308+67	0.4	2.51	4' Scupper	2.68	0.020	0.02	0.37	14.3	0.00
10A	CB10a	319+40	0.84	5.28	28' Catch Basin	5.12	0.020	0.02	0.24	11.8	0.16
10B	CB10b	321+75	1.48	9.3	12' Catch Basin	9.46	0.020	0.02	0.5	20.6	0.00
12A	CB12a	318+80	0.68	4.27	24' Catch Basin	4.07	0.020	0.02	0.22	10.9	0.20
12B	I12b	321+75	1.59	9.99	12' Scupper	10.19	0.020	0.02	0.51	21.3	0.00
13	CB13	341+10	1.77	11.12	12' Catch Basin	11.36	0.023	0.02	0.55	23.2	0.00
15	CB15	341+10	1.91	12	12' Catch Basin	12.11	0.023	0.02	0.57	24.2	0.00
21A	CB21a	359+00	0.26	1.63	4' Catch Basin	1.63	0.015	0.02	0.3	10.3	0.00
21B	CB21b	352+40	1.43	9	12' Catch Basin	9.29	0.015	0.02	0.49	20.3	0.00
21C	CB21c	363+71	0.77	4.84	4' Catch Basin	4.84	0.015	ja	0.51	21.1	0.00
23A	CB23a	359+00	0.26	1.63	4' Catch Basin	4.23	0.015	0.02	0.47	19.4	0.00
23B	CB23b	352+40	1.26	7.92	12' Catch Basin	10.52	0.015	0.02	0.52	22	0.00
23C	CB23c	363+71	1.01	6.35	8' Catch Basin	8.95	0.015	0.02	0.57	24.1	0.00
24A	CB24a	379+50	0.92	6.72	32' Catch Basin	5.6	0.030	0.02	0.23	11.3	0.18
24B	CB24b	396+80	1.79	11.25	12' Catch Basin	11.77	0.010	0.02	0.56	23.7	0.00
24C	CB24c	368+60	0.45	2.83	16' Catch Basin	2.83	0.030	0.02	0.17	8.7	0.00
26A	I26a	379+50	0.88	5.53	24' Scupper	4.7	0.030	0.02	0.22	11.1	0.83
26B	CB26b	396+80	1.87	11.75	16' Catch Basin	11.98	0.030	0.02	0.48	19.8	0.00
26C	I26c	368+60	0.32	2.01	20' Scupper	2	0.030	0.02	0.15	7.6	0.01
29A	CB29a	398+20	0.85	5.34	4' Catch Basin	5.34	0.020	0.02	0.54	22.7	0.00
29B	CB29b	411+88	1.97	12.38	12' Catch Basin	12.84	0.020	0.02	0.6	25.1	0.00
31A	CB31a	398+20	0.65	4.08	4' Catch Basin	4.08	0.020	0.02	0.46	19.0	0.00
31B	CB31b	411+88	2.55	16.02	16' Catch Basin	16.65	0.020	0.02	0.58	24.7	0.00
32A	CB32a	443+00	0.23	1.45	12' Catch Basin	1.34	0.0150	0.02	0.15	7.7	0.11
32B	CB32b	422+40	0.04	4.08	24' Catch Basin	3.62	0.040	0.02	0.19	9.4	0.46
34A	CB34a	443+00	0.23	1.45	12' Catch Basin	1.34	0.0150	0.02	0.15	7.7	0.11
34B	CB34b	422+90	0.45	2.83	16' Catch Basin	2.2	0.040	0.02	0.16	8.2	0.63
35B	CB35b	449+66	0.93	5.84	4' Catch Basin	5.84	0.015	0.02	0.57	24.1	0.00
35C	CB35c	469+30	1.24	7.79	20' Catch Basin	5.48	0.022	0.02	0.27	13.4	2.31
35D	CB35d	475+00	0.64	4.02	20' Catch Basin	6.39	0.005	0.02	0.28	13.8	0.00
35E	CB35e	494+99	0.74	4.65	20' Catch Basin	4.45	0.008	0.02	0.27	24.2	0.20
37B	CB37b	449+66	0.71	4.46	4' Catch Basin	4.46	0.015	0.02	0.49	20.1	0.00
37C	CB37c	469+30	1.38	8.67	28' Catch Basin	7.4	0.022	0.02	0.28	14	1.27
37D	CB37d	475+00	0.75	4.71	16' Catch Basin	4.301	0.005	0.02	0.29	14.7	0.41
37E	CB37e	494+99	0.91	5.72	28' Catch Basin	5.72	0.008	0.02	0.29	14.5	0.00
40B	CB40b	505+20	3.46	15.21	16' Catch Basin	15.21	0.007	0.02	0.55	23.2	0.00

C.P.	Inlet ID	Station	DA (ac)	Q_{10} (cfs)	Inlet Type	Q_i (cfs)	So Long. (ft/ft)	Sx Cross (ft/ft)	D Pond (ft)	Spread (ft)	Q_{bypass} (cfs)
40D	CB40d	525+97	0.60	3.77	4' Catch Basin	4.20	0.005	0.02	0.42	19.3	0.00
40E	CB40e	526+20	0.41	2.58	12' Catch Basin	2.15	0.010	0.02	0.21	10.3	0.43
42B	CB42b	505+20	3.17	13.57	16' Catch Basin	13.57	0.007	0.02	0.51	21.5	0.00
42D	CB42d	525+97	0.60	3.77	4' Catch Basin	4.20	0.005	0.02	0.42	19.3	0.00
42E	CB42e	526+20	0.41	2.58	12' Catch Basin	2.15	0.010	0.02	0.21	10.3	0.43

Table 8:

Summary of Side Street Pavement Inlet Drainage Design

C.P.	Inlet ID	Station	DA (ac)	Q_{10} (cfs)	Inlet Type	Q_i (cfs)	So Long. (ft/ft)	Sx Cross (ft/ft)	D Pond (ft)	Spread (ft)	Q_{bypass} (cfs)
Old Spanish Trail											
SS1	ISS1	20+80	0.54	3.47	12' Scupper	3.47	0.0220	0.020	0.29	10.5	0.00
SS3	ISS3	22+70	0.44	2.83	8' Scupper	2.83	0.0220	0.020	0.31	11.2	0.00
Golf Links Road											
SS12	ISS12	20+69	0.31	1.99	4' Catch Basin	1.99	0.0070	0.020	0.32	11.7	0.00
SS14	ISS14	20+69	0.17	1.09	4' Catch Basin	1.09	0.0070	0.020	0.24	7.9	0.00
SS15	ISS15	15+00	0.27	1.74	16' Catch Basin	1.62	0.0300	0.020	0.14	7.2	0.11
SS17	ISS17	15+00	0.56	3.60	24' Catch Basin	3.41	0.0300	0.020	0.19	9.5	0.19
Irvington Road											
SS22	ISS22	18+00	0.25	1.61	4' Scupper	1.61	0.0100	0.020	0.29	10.2	0.00
SS24	ISS24	18+00	0.33	2.12	4' Depressed Curb	2.12	0.0100	0.020	0.33	12.2	0.00

4.5 Channel Design

The collector channels which transport pavement drainage to cross-culverts also collect flow from the watersheds that would otherwise pond against the roadway and direct it as well into the cross-culverts. To keep the channels within the existing right-of-way the channel top widths were kept under 12'. The channels are summarized in Table 9. Adjacent to channel 10S and 11S an underground box storm drain system is proposed to transport flow from the watersheds and pavement drainage to the Pantano Wash. As flow is collected along watershed 11 the channel inlets into the storm drain 3 times, each time at the point where the capacity of the channel reaches the 12' maximum top width. There the channel stops and inlets into the storm drain. The channel then restarts until it reaches channel capacity at a 12' top width and again inlets into the storm drain and repeats. This is so the top width does not exceed the right-of-way. An additional inlet is provided at the northern extent of watershed 10. These inlets are described in Table 7 and 8 and visible in Figure 4. The stormdrain system is summarized in Table 11 in section 4.8.

Table 9:

Summary of Channel Design

Channel Number	Q_{des} (cfs)	Manning's n	Depth (ft)	Total Depth (ft)	Flow Velocity (ft/s)	Slope (%)	Side Slope (H:V)	Bottom Width (ft)	Channel Top Width (ft)
2N	27	0.03	1.19	1.41	2.97	0.5	3 to 1	4	11.13
2S	3	0.03	0.39	0.46	1.61	0.5	3 to 1	4	6.34
3a S	3	0.03	0.29	0.35	2.35	1.5	3 to 1	4	5.74
3b N	47	0.03	1.2	1.47	5.17	1.5	3 to 1	4	11.20
3b S	17	0.03	0.72	0.88	3.92	1.5	3 to 1	4	8.33
3.5 N	22	0.03	0.71	0.89	5.01	2.5	3 to 1	4	8.24
3.5 S	8	0.03	0.54	0.65	2.72	1.0	3 to 1	4	7.21
4N	7	0.03	0.58	0.69	2.01	0.5	3 to 1	4	7.50
4S	5	0.03	0.43	0.52	2.41	1.0	3 to 1	4	6.58
5N	3	0.03	0.31	0.37	2.01	1.0	3 to 1	4	5.88
5S	13	0.03	0.5	0.64	4.56	3.0	3 to 1	4	7.03
6N	37	0.03	0.97	1.21	5.46	2.1	3 to 1	4	9.85
7N	8	0.03	0.62	0.73	2.08	0.5	3 to 1	4	7.73
7S	17	0.03	0.64	0.80	4.36	2.1	3 to 1	4	7.86
7.2 N	2	0.03	0.19	0.23	1.89	1.6	3 to 1	4	5.13
7.2 S	4	0.03	0.33	0.40	2.63	1.6	3 to 1	4	5.99
7.4 N	2	0.03	0.27	0.32	1.31	0.5	3 to 1	4	5.63
7.4 S	2	0.03	0.26	0.31	1.28	0.5	3 to 1	4	5.57
7.6 N	5	0.03	0.48	0.57	1.82	0.5	3 to 1	4	6.90
7.6 S	147	0.03	3.00	3.63	7.00	1.0	1 to 1	4	10.00
7.8 N	75	0.03	1.56	1.94	6.71	1.8	2 to 1	4	10.26
7.8 S	11	0.03	0.54	0.66	3.65	1.8	3 to 1	4	7.21
8a N	6	0.03	0.38	0.47	2.99	1.8	3 to 1	4	6.26
8a S	1	0.03	0.14	0.17	1.66	1.8	3 to 1	4	4.82
8b S	189	0.03	3.08	3.69	6.04	0.7	2 to 1	4	16.32
10S*	30	0.03	1.47	1.74	2.93	0.5	2 to 1	4	9.89
11S*	54	0.03	1.98	2.34	3.44	0.5	2 to 1	4	11.91
12N	15	0.03	0.73	0.88	3.23	1.0	3 to 1	4	8.40
12S	15	0.03	0.59	0.74	4.27	2.2	3 to 1	4	7.57
13S	18	0.03	0.93	1.11	2.85	0.6	3 to 1	4	9.57
14S	91	0.03	2.47	2.97	5.69	0.8	1 to 1	4	8.94
15S	7	0.03	0.61	0.72	2.07	0.5	3 to 1	4	7.66
16S	134	0.03	3.42	4.06	5.29	0.5	1 to 1	4	10.84
17N	75	0.03	2.53	3.01	4.55	0.5	1 to 1	4	9.05
17S	47	0.03	1.54	1.84	4.29	0.8	2 to 1	4	10.15
18S	171	0.03	3.87	4.60	5.63	0.5	1 to 1	4	11.74
19S	34	0.03	1.21	1.45	3.66	0.8	3 to 1	4	11.23

Note: Total Depth =Depth of flow + freeboard. Top width is at depth of flow

* These channels include inlets to the storm drain system. Detail shown in storm drain system.

4.6 Erosion Protection

Erosion protection will be provided at the culvert outlets in order to mitigate the effects of increased downstream velocities. The calculated velocity for the culvert design dictates whether the erosion protection will consist of dumped or wire-tied riprap. For the analysis, it was assumed that all outlet protection would consist of splash pads. The splash pads were designed using WEST Consultant's software program, which is based on the Army Corps of Engineers HEC-11 design guidelines. Table 10a and b summarize the splash pad design for the cross-drainage culverts and scuppers. Table 10c provides the splash pad design for the stormdrain systems. However, erosion protection for the stormdrain outlet for System 1 (Civano Stormdrain System) will be addressed in the spur dike erosion mitigation design in the following submittal. Splash pad calculation sheets are provided in Appendix 2.

Table 10a:

Summary of Splash Pad Analysis for Cross-Drainage

Concentration Point	Q_{100} (cfs)	Structure Location	D_{50} (in)	Length (ft)	Width♦ (ft)	Thickness (ft)
2*	961	Culvert Outlet	9	36	10	1.5
3.5	213	Culvert Outlet	6	27	12	1.0
4	271	Culvert Outlet	16	52	12	3.0
5	279	Culvert Outlet	9	35	6	1.5
7**	2287	Culvert Outlet	16	68	12	3.0
7.2	113	Culvert Outlet	6	22	12	1.0
7.4	1216	Culvert Outlet	12	37	10	2.0
7.6	19	Culvert Outlet	6	11	9	1.0
7.6	147	Culvert Outlet	9	29	9	1.5
7.8	119	Culvert Outlet	6	23	12	1.0
8a	201	Culvert Outlet	6	26	12	1.0
12	726	Culvert Outlet	12	45	10	2.0
13	107	Culvert Outlet	9	33	9	1.5
14	89	Culvert Outlet	6	26	9	1.0
15	83	Culvert Outlet	6	22	7.5	1.0
15***	42	Culvert Outlet	6	15	6	1.0
16	112	Culvert Outlet	6	21	12	1.0
17****	75	Culvert Outlet	6	21	6	1.0
17	776	Culvert Outlet	9	30	10	1.5
18	235	Culvert Outlet	12	36	10	2.0
19	1689	Culvert Outlet	12	38	10	2.0

♦Note: All splash pads will be underlined with filter fabric and flared out at 2:1 within constraints. Design is given per culvert. Width will be 3 times the culvert diameter per culvert or to wing wall extents for a box culvert.

Table 10b:

Summary of Splash Pad Analysis for Scuppers

Inlet ID	Q_{100} (cfs)	Structure Location	D_{50} (in)	Length (ft)	Width* (ft)	Thickness (ft)
I3b	4	Scupper	6	1	24	1
I6	9	Scupper	6	2	36	1
I9b	3	Scupper	6	4	8	1
I12b	10	Scupper	6	4	16	1
I26a	5	Scupper	6	5	28	1
I26c	2	Scupper	6	1	24	1
ISS1	4	Scupper	6	2	16	1
ISS3	3	Scupper	6	2	12	1
ISS24	2	Depressed Curb	6	3	8	1

*Note: All splash pads will be underlined with filter fabric and flared out at 2:1 within constraints. Design is given per culvert. Width will be 2 feet larger than the scupper on each side (4 feet total).

Table 10c:

Summary of Splash Pad Analysis for Stormdrains

Concentration Point	Q_{100} (cfs)	Structure Location	D_{50} (in)	Length (ft)	Width* (ft)	Thickness (ft)
System 1 Outfall	1442	Stormdrain	**	**	**	**
System 2 Outfall	100	Stormdrain	9	38	12	1.5
CB1a system	3.72	Stormdrain	6	4	6	1
CB1b system	2.97	Stormdrain	6	4	6	1
CB4 system	8.09	Stormdrain	6	9	6	1
CB7a system	6.16	Stormdrain	6	7	6	1
CB7b system	4.88	Stormdrain	6	6	6	1
CB10a system	5.12	Stormdrain	6	6	6	1
CB10b system	9.46	Stormdrain	6	10	6	1
CB13 system	11.36	Stormdrain	6	12	6	1
CB21a system	1.63	Stormdrain	6	2	6	1
CB21b system	9.29	Stormdrain	6	10	6	1
CB21c system	4.84	Stormdrain	6	6	6	1
CB23b system	10.52	Stormdrain	6	12	6	1
CB24a system	5.60	Stormdrain	6	6	6	1
CB24b system	33.17	Stormdrain	6	13	12	1
CB24c system	2.83	Stormdrain	6	3	6	1
CB29b system	29.49	Stormdrain	6	23	8	1
CB32a system	2.68	Stormdrain	6	3	6	1
CB32b system	3.62	Stormdrain	6	4	6	1
CB34b system	2.20	Stormdrain	6	3	6	1
CB35b system	5.84	Stormdrain	6	7	6	1
CB35c system	12.88	Stormdrain	6	14	6	1
CB35d system	10.39	Stormdrain	6	11	6	1
CB35e system	10.17	Stormdrain	6	11	6	1
CB40b system	28.78	Stormdrain	6	22	8	1
CB40d system	8.40	Stormdrain	6	9	6	1
CB40e system	4.30	Stormdrain	6	5	6	1
SS12 system	3.08	Stormdrain	6	4	6	1
SS15 system	5.03	Stormdrain	6	6	6	1

*Note: All splash pads will be underlined with filter fabric and flared out at 2:1 within constraints. Design is given per culvert. Width will be 3 times the culvert diameter per culvert or to wing wall extents for a box culvert.
**System 1 design will be included in the spur dike erosion mitigation design of the next submittal.

4.7 Stormwater Harvesting Design

The median of Houghton Road will be graded to form sunken basins. These basins will act as stormwater harvesting basins. The City of Tucson is working with the Landscape Architect to develop a native plant pallet in conjunction with the desert parkway ascetics.

4.8 Stormdrain Design

Since there are no existing storm drains servicing the Houghton roadway, storm drain systems will be constructed within this project in order to convey the onsite generated discharges in areas which it is not feasible to use channels within in the right-of-way. All of the storm drains designed will outfall into either existing or proposed drainage structures within or adjacent to the roadway. Per Pima County guidelines, all of the storm drains will be designed for the 10-year event. Storm drains were designed utilizing Hydraflow® software by Intelisolve.

The hydraulic grade line calculations with the profile view of the storm drains are provided in Appendix 8.3. The storm drain hydraulic grade lines (HGL's) were analyzed utilizing the software package Hydraflow by Intelisolve. The methodologies incorporated into the software are based on an energy based Standard Step method to compute the hydraulic profile for the storm drain. This methodology is an iterative procedure that applies Bernoulli's energy equation between the downstream and upstream ends of each line in the system. Manning's equation is used to determine head losses due to pipe friction.

The calculation sheets for the storm drain design, including the HGL calculations are provided in Appendix 2 and the storm drain locations are shown in Figure 4.

Table 11:

Summary of Storm Drain System Design

Pipe	C.P. Downstream	C.P. Upstream	Pipe Diameter	Pipe Length	Inlet Length	Q_{des} (cfs)	Slope (%)	V_{pipe} (fps)
System 1 (Civano Stormdrain System)								
1	Outfall	G1	8' x 5' Box	1442	2 grates*	223	0.5	10.80
2	G1	G2	8' x 5' Box	548	2 grates	177	0.5	7.13
3	G2	G3	4' x 5' Box	1049	3 grates	147	0.5	9.67
4	G3	G4	4' x 5' Box	1049	3 grates	98	0.5	6.11
5	G4	G5	4' x 5' Box	1049	3 grates	49	0.5	4.30
System 2 (CP 3b 289+00 Stormdrain System)								
1	Outfall	MH	48" RCP	486	MH	100	1.0	10.02
2	MH	Grates	48" RCP	19	5 grates	96	1.0	9.27
3	MH	CB3b	24" RCP	12	20'	4	1.0	3.13
CB1a system								
1a	Outfall	CB1a	24" RCP	18	16'	3.72	0.5	3.89
CB1b system								
1b	Outfall	CB1b	24" RCP	14	20'	2.97	0.5	3.62
CB3a system								
44	Outfall	CB3a	24" RCP	25	20'	4.70	11.4	4.23
CB4 system								
2	Outfall	CB4	24" RCP	5	32'	8.09	0.5	5.10
CB7a system								
3	Outfall	CB7a	24" RCP	15	28'	6.16	0.5	4.63
CB7b system								
4	Outfall	CB7b	24" RCP	147	4'	4.88	0.5	4.28
CB9a system								
45	Outfall	CB9a	24" RCP	14	28'	5.17	60.7	4.37
CB10a system								
5	Outfall	CB10a	24" RCP	8.5	28'	5.12	0.5	4.35
CB10b system								
6	Outfall	CB10b	24" RCP	162	12'	9.46	0.5	5.30
CB12a system								
46	Outfall	CB12a	24" RCP	5	24'	4.07	163.0	4.04
CB13 system								
7	Outfall	CB13	24" RCP	18	12'	11.36	0.5	5.53
CB15 system								
47	Outfall	CB15	24" RCP	18	12'	12.11	32.8	5.96
CB21a System								
8	Outfall	CB21a	24" RCP	16	4'	1.63	0.5	3.06
CB21b system								
9	Outfall	CB21b	24" RCP	42	12'	9.29	0.5	5.28
CB21c system								
10	Outfall	CB21c	24" RCP	40	4'	4.84	0.5	4.27

Pipe	C.P. Downstream	C.P. Upstream	Pipe Diameter	Pipe Length	Inlet Length	Q_{des} (cfs)	Slope (%)	V_{pipe} (fps)
CB23a system								
48	Outfall	CB23a	24" RCP	15	4'	4.23	30.3	4.09
CB23b system								
11	Outfall	CB23b	24" RCP	60	12'	10.52	0.5	5.43
CB23c system								
49	Outfall	CB23c	24" RCP	59	8'	8.95	14.4	5.30
CB24a system								
12	Outfall	CB24a	24" RCP	15.5	32'	5.60	0.5	4.49
CB24b system								
13	CB26b	CB24b	30" RCP	103	12'	11.77	0.5	2.40
14	CB31a	CB26b	30" RCP	119	16'	23.75	0.5	4.84
15	CB31a	CB29a	24" RCP	103	4'	5.34	0.5	1.70
16	MH	CB31a	48" RCP	18	4'	33.17	0.5	7.05
17	Outfall	MH	48" RCP	488	---	33.17	0.5	6.50
CB24c system								
18	Outfall	CB24c	24" RCP	256	16'	2.83	0.5	3.60
CB29b system								
19	CB29b	CB31b	30" RCP	118	16'	16.65	0.5	3.49
20	Outfall	CB29b	30" RCP	34	12'	29.49	0.5	6.73
CB32a system								
21	CB32a	CB34a	24" RCP	107	12'	1.34	0.5	1.77
22	Outfall	CB32a	24" RCP	40	12'	2.68	0.5	3.55
CB32b system								
23	Outfall	CB32b	24" RCP	13	24'	3.62	0.5	3.89
CB34b system								
24	Outfall	CB34b	24" RCP	139	16'	2.20	0.5	3.34
CB35b system								
25	CB37b	CB35b	24" RCP	131	4'	5.84	0.5	2.27
26	MH	CB37b	24" RCP	5	4'	10.30	0.5	4.01
27	Outfall	MH	24" RCP	440	---	10.30	0.5	5.41
CB35c system								
28	CB37c	CB35c	24" RCP	107	20'	5.48	0.5	2.18
29	Outfall	CB37c	24" RCP	19	28'	12.88	0.5	5.78
CB35d system								
30	CB37d	CB35d	24" RCP	135	20'	6.39	0.5	2.15
31	Outfall	CB37d	24" RCP	179	16'	10.39	0.5	5.46
CB35e system								
32	CB37e	CB35e	24" RCP	123	20'	4.45	0.5	2.09
33	Outfall	CB37e	24" RCP	12	28'	10.17	0.5	5.39
CB40b system								
34	CB42b	CB40b	30" RCP	124	16'	15.21	0.5	3.23
35	Outfall	CB42b	30" RCP	12	16'	28.78	0.5	6.73

Pipe	C.P. Downstream	C.P. Upstream	Pipe Diameter	Pipe Length	Inlet Length	Q_{des} (cfs)	Slope (%)	V_{pipe} (fps)
CB40d system								
36	CB42d	CB40d	24" RCP	116	4'	4.20	0.5	2.28
37	Outfall	CB42d	24" RCP	12	4'	8.40	0.5	5.15
CB40e system								
38	CB42e	CB40e	24" RCP	127	12'	2.15	0.5	1.93
39	Outfall	CB42e	24" RCP	8	12'	4.30	0.5	4.11
SS12 system								
40	SS14	SS12	24" RCP	85	4'	1.99	0.5	2.34
41	Outfall	SS14	24" RCP	14	4'	3.08	0.5	3.70
SS15 system								
42	SS17	SS15	24" RCP	85	24'	3.41	0.5	2.41
43	Outfall	SS15	24" RCP	14	16'	5.03	0.5	4.33

*From combined CP29B and CP31B flows

4.9 404 Compliance Statement

A Jurisdictional Delineation has been prepared by Logan Simpson Associates and submitted to the U.S. Army Corps of Engineers for review. The roadway design will minimize disturbance to any potential 404 washes.

5.0 CONCLUSION

The Houghton Road project for the City of Tucson consists of roadway improvements for Houghton Road from 22nd Street to Valencia Road for approximately 6 miles bounded by Sections 24, 25, and 36 of Township 14 and Range 15 and Sections 01, 12, and 13 of Township 15 and Range 15. The Pantano Wash Bridge is also included in the project scope.

Hydrologic and Hydraulic analyses have been performed for Houghton Road. Hydraulic structures were sized and located to convey flow safely and effectively under the roadway. Proposed culverts have been sized based solely on available headwater. Habitat conductivity has also been taken into account though the use of culverts as wildlife crossings and a wildlife fence. Pavement drainage and stormdrain systems have also been proposed.

HEC-RAS was used to for the hydraulic analysis to model the existing bridge as well as the proposed bridge alternatives. A scour analysis was conducted using the Design Storm (36,000 cfs) and analysis information from the HEC RAS model of the existing conditions. Pier scour

was found to be 26 feet and soil cement scour was found to be 9 feet. Long term scour over a 50 year period (1936 to 1986) was approximated to be 2 feet per the Pantano Wash Bed Profile 1936 vs. 1986 Pima county Department of Transportation and Flood Control District Maps.

Due to the differences that exist between the As-built plans and the physical bridge, the last submittal stated the actual erosion depth would be verified by a field investigation. Therefore, test pits were excavated on September 14, 2007 to determine the depth to the soil cement bank protection. From the field investigation it was determined that the remaining toe down ranged from 7 to 6.5 feet at the upstream end of the spur dike on the north and south sides respectively and 4 to 6 feet further downstream just east of the bridge on the north and south sides respectively. With the field investigation confirming the scour depth and remaining toe down at the spur dike embankment reinforcement of soil cement is recommended as well as the implementation of a grade control structure to account for long term scour. Scour by the pier based on the field investigations shows the magnitude of scour occurring at the piers is less than that occurring at the spur dike, where the large contraction occurs. Thus the piers previous determination as scour stable for long term conditions under the condition that the spur dikes remain maintained.

There are currently 6 alternatives which are being evaluated and a final design will be selected for the next phase of submittal. Freeboard was calculated using the 100-year storm (31,000 cfs) for both the existing bridge (1.92 feet to the Low Chord) as well as the 6 alternatives as shown below.

Alternative Number	Freeboard to Low Chord (feet)
1	N/A
2	2.17
2a	1.52
3	2.17
3a	1.52
4	2.42

The City of Tucson equation results in a recommendation of 2.2 feet of freeboard. An option to consider in the design phase is raiding the proposed bridge to the FEMA recommended 4 feet

The measures discussed in this report and presented on the Roadway Plan were designed in accordance with City of Tucson Standards.

6.0 REFERENCES

1) Pima County Storm Drain Design, Guidelines and Standard Plans. March 23, 1981.

2) Pima County Department of Transportation and Flood Control District; Hydrology Manual for Engineering Design and Floodplain Management within Pima County, Arizona, September 1979.

3) Standards Manual for Drainage Design and Floodplain Management in Tucson, Arizona. December 1989. Revised July 1998.

4) NOAA Atlas 14 Precipitation Data. http://hdsc.nws.noaa.gov/hdsc/pfds/sa/az_pfds.html.

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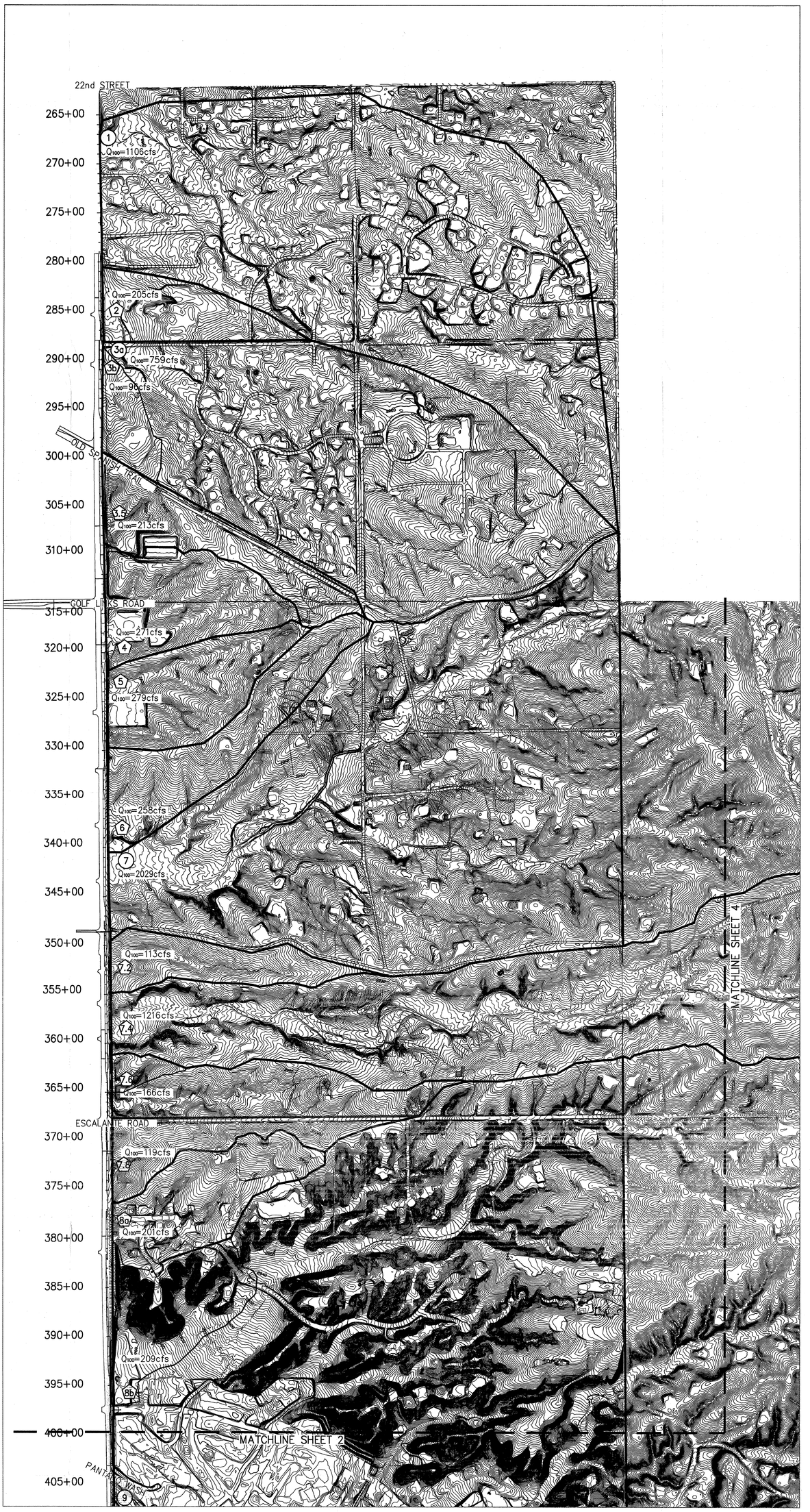

LEGEND

- WATERSHED BOUNDARY
- (9) CONCENTRATION POINT (City of Tucson Data)
- [11] CONCENTRATION POINT (Design Report Data)
- (19) CONCENTRATION POINT (PCQ Data)
- MATCHLINE

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EXISTING CONDITIONS MAP
FOR
HOUGHTON ROAD

Figure 2

PROJ NO:	06099-01	SCALE: HORIZ 1" =	500'
DATE:	08/2008	VERT 1" =	N/A

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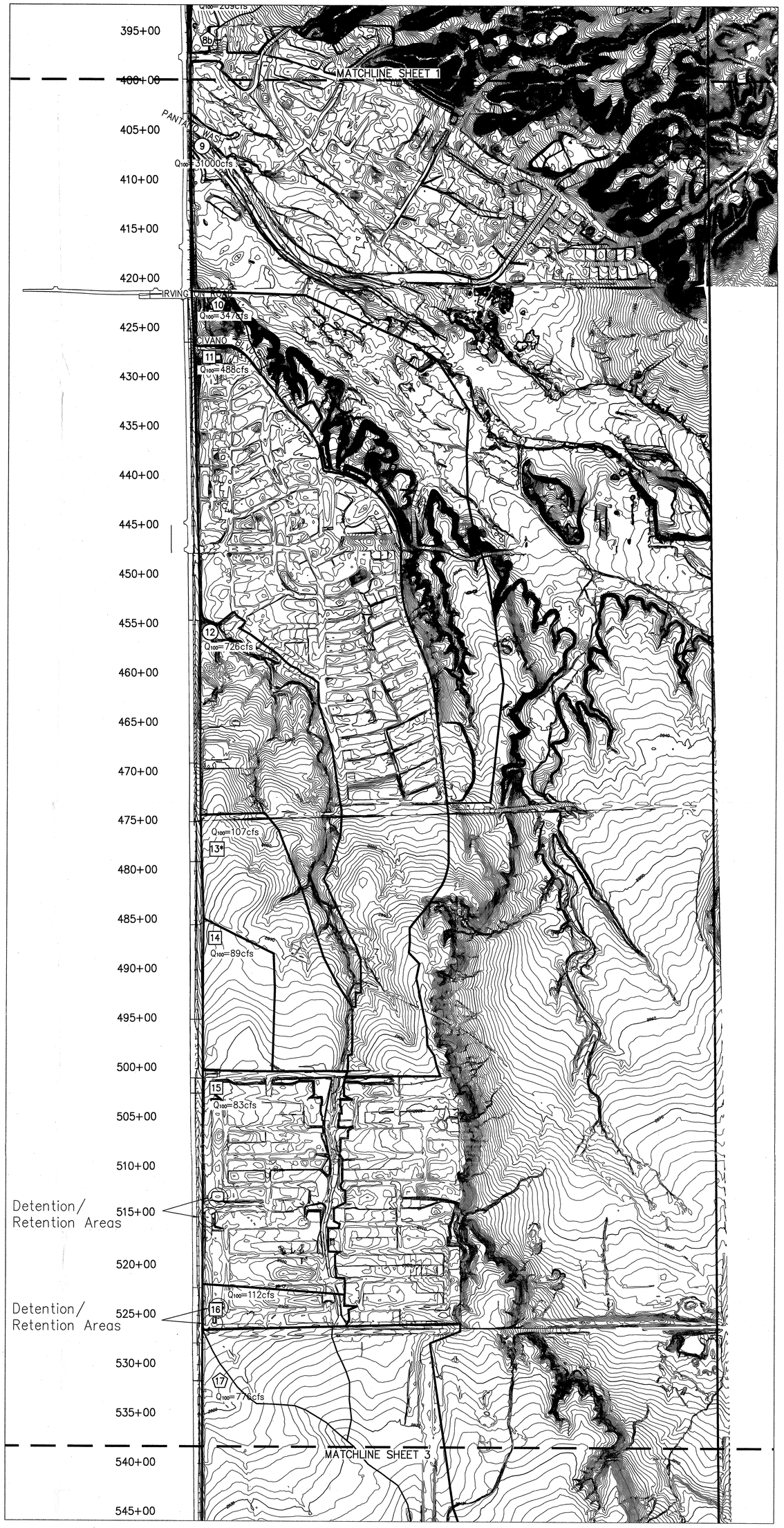

LEGEND

- WATERSHED BOUNDARY
- (9) CONCENTRATION POINT (City of Tucson Data)
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EXISTING CONDITIONS MAP
FOR
HOUGHTON ROAD

Figure 2

PROJ NO: 06099-01	SCALE: HORIZ 1" = 500'		
DATE: 07/2008	VERT 1" = N/A		2 OF 6

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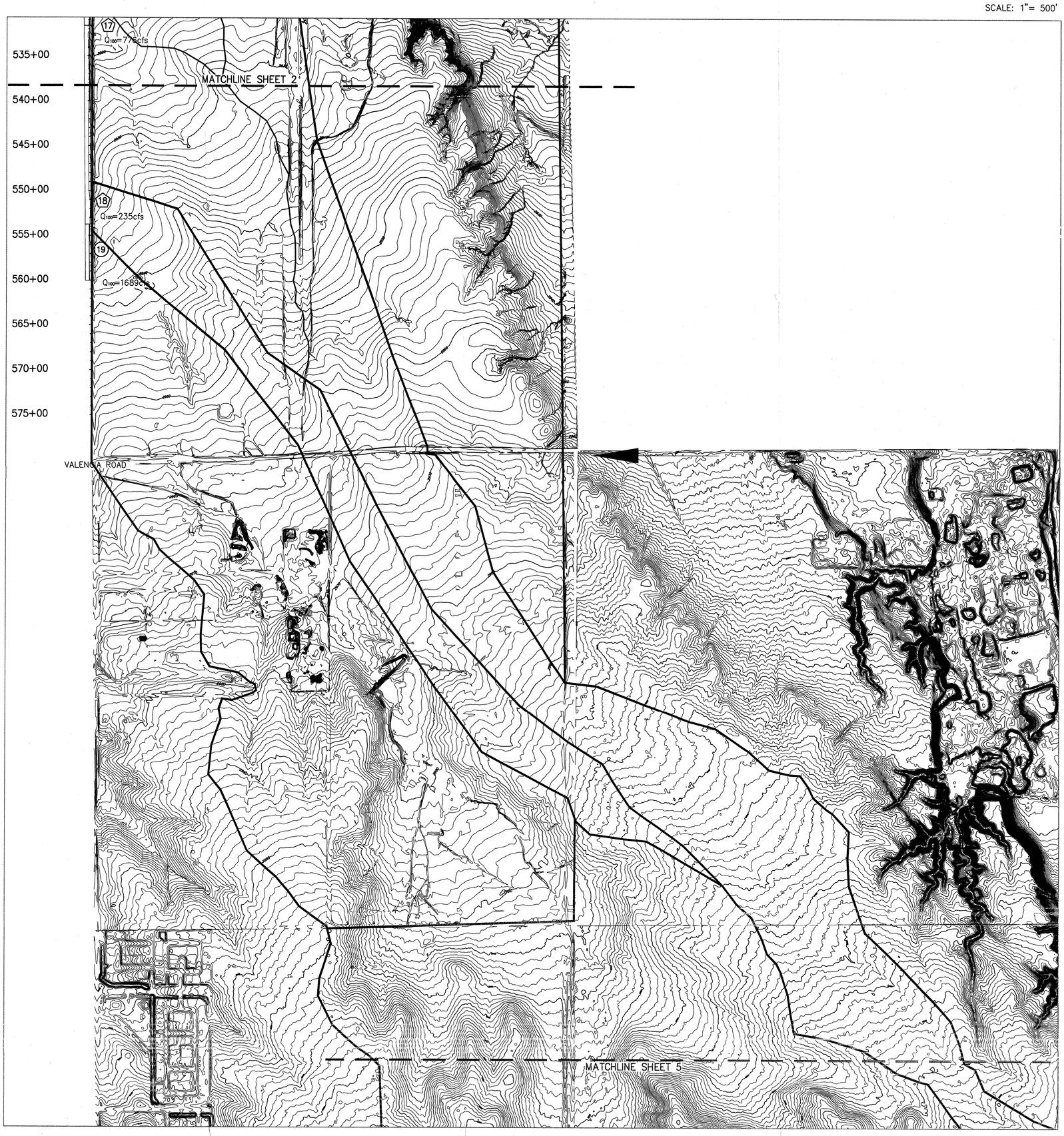
SCALE: 1"= 500'



LEGEND

- WATERSHED BOUNDARY
- (9) CONCENTRATION POINT (City of Tucson Data)
- [11] CONCENTRATION POINT (Design Report Data)
- (19) CONCENTRATION POINT (PCQ Data)
- MATCHLINE

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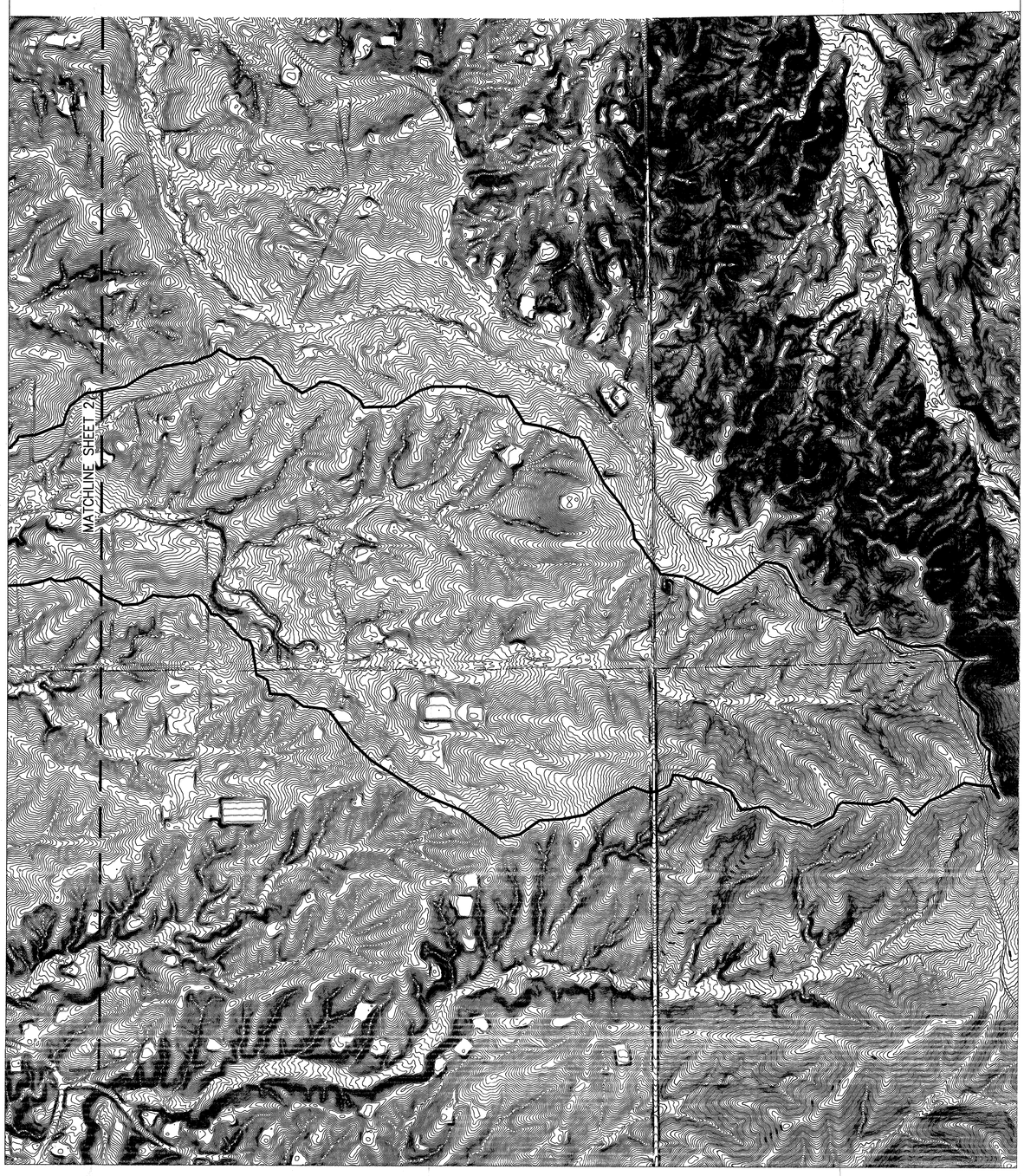
EXISTING CONDITIONS MAP
FOR
HOUGHTON ROAD

Figure 2

PROJ NO: 06099-01
DATE: 07/2008
SCALE: HORIZ 1" = 500'
VERT 1" = N/A

G:\06000\06099 - Houghton Road\01\Drawings\Houghton Road Watersheds.dwg SHEET 3 Chelsi Romme Thu, 07 Aug 2008, 10:17am Last Saved By: Cromme

SCALE: 1"= 500'



LEGEND

- WATERSHED BOUNDARY
- (9) CONCENTRATION POINT (City of Tucson Data)
- [11] CONCENTRATION POINT (Design Report Data)
- ⟨19⟩ CONCENTRATION POINT (PCQ Data)
- MATCHLINE

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EXISTING CONDITIONS MAP
FOR
HOUGHTON ROAD

Figure 2

PROJ NO: 06099-01 SCALE: HORIZ 1" = 500'
DATE: 08/2008 VERT 1" = N/A

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LEGEND

- WATERSHED BOUNDARY
- (9) CONCENTRATION POINT (City of Tucson Data)
- [11] CONCENTRATION POINT (Design Report Data)
- (19) CONCENTRATION POINT (PCQ Data)
- MATCHLINE

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EXISTING CONDITIONS MAP
FOR
HOUGHTON ROAD

Figure 2

PROJ NO: 06099-01
DATE: 08/2008
SCALE: HORIZ 1" = 500'
VERT 1" = N/A

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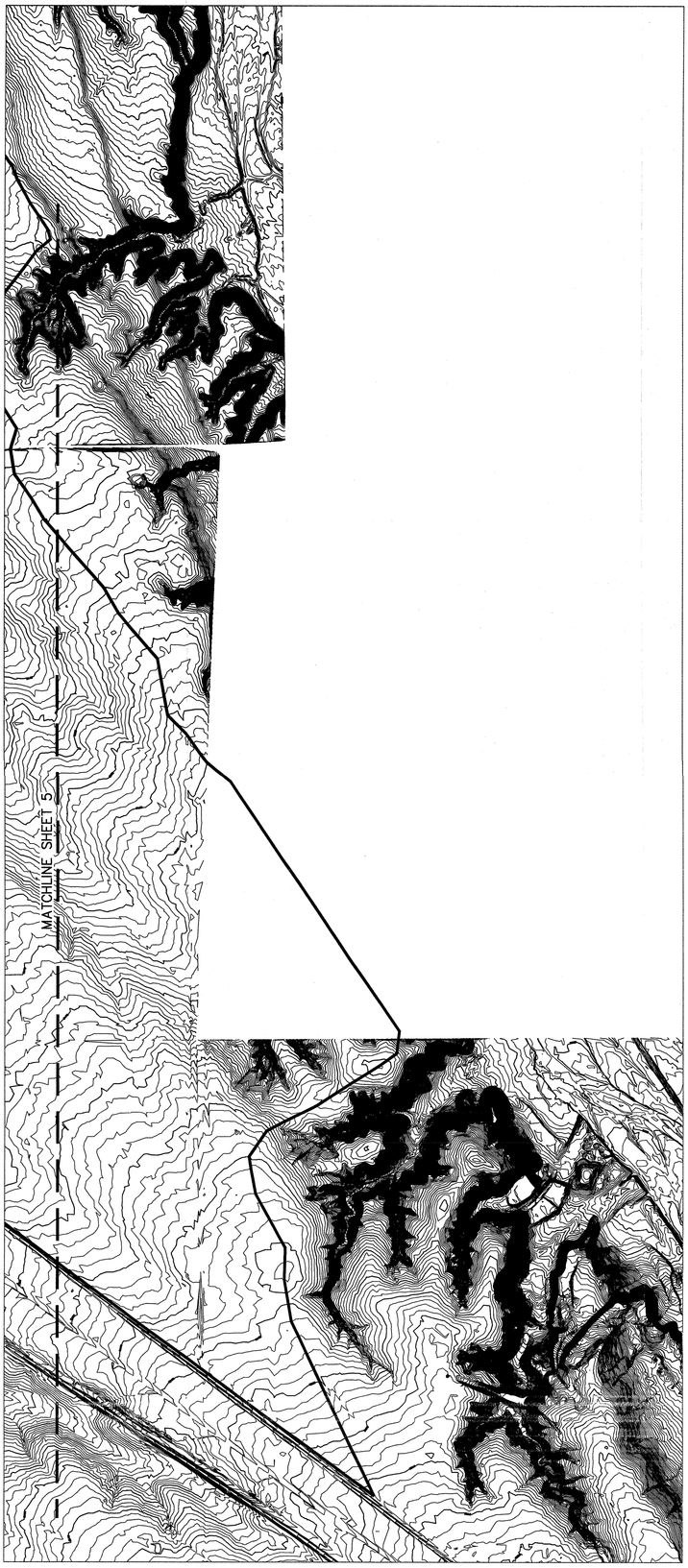

SCALE: 1"= 500'

LEGEND

- WATERSHED BOUNDARY
- (9) CONCENTRATION POINT (City of Tucson Data)
- [11] CONCENTRATION POINT (Design Report Data)
- (19) CONCENTRATION POINT (PCQ Data)
- MATCHLINE

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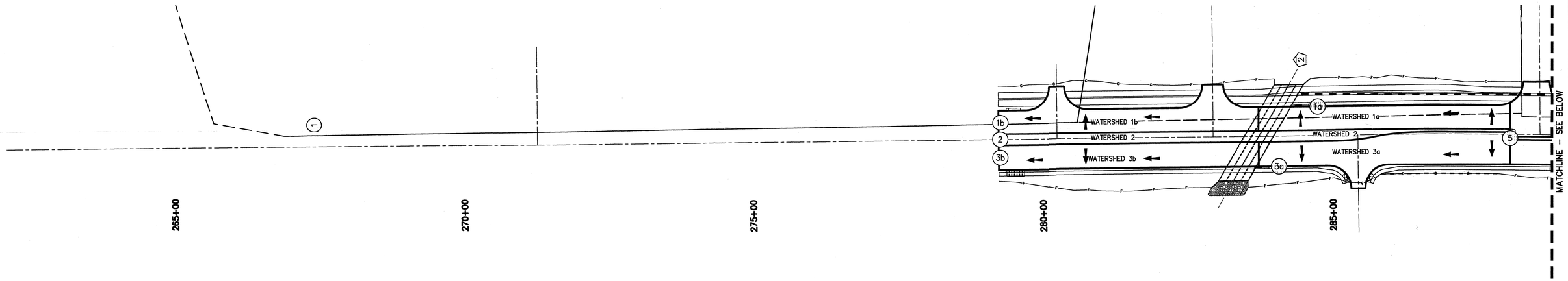
EXISTING CONDITIONS MAP
FOR
HOUGHTON ROAD

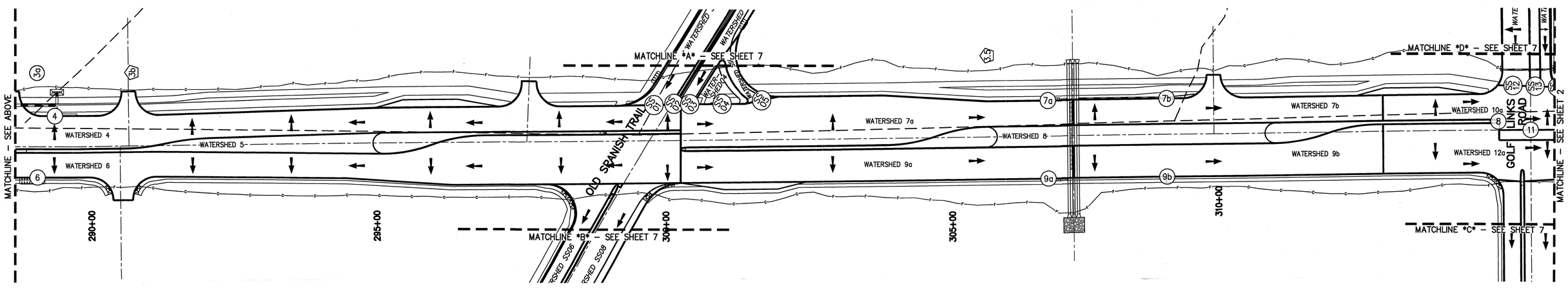
Figure 2

PROJ NO: 06099-01	SCALE: HORIZ 1" = 500'		
DATE: 08/2008	VERT 1" = N/A		6 OF 6

G:\06000\06099 - Houghton Road\01\Drawings\HoughtonRoad_NotesAndexhibits.dwg SHEET 6 Chris Remme Thu, 07 Aug 2008, 10:18am Last Saved By: Cremme



HOUGHTON ROAD



HOUGHTON ROAD

SCALE: 1"=80'

LEGEND

- WATERSHED BOUNDARY
- WATERSHED 2 WATERSHED ID
- DEVELOPED CONDTIONS FLOW ARROW
- (4) ONSITE CONCENTRATION POINT
- (SS 05) SIDE STREET CONCENTRATION POINT
- EXISTING CULVERT (See Roadway Plans)
- OFFSITE WATERSHED BOUNDARY
- (9) (10) (11) OFFSITE CONCENTRATION POINT

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PAVEMENT DRAINAGE
FOR
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FIGURE 4

PROJ NO: 06099-01 SCALE: HORIZ 1" = 80'
DATE: 08/2008

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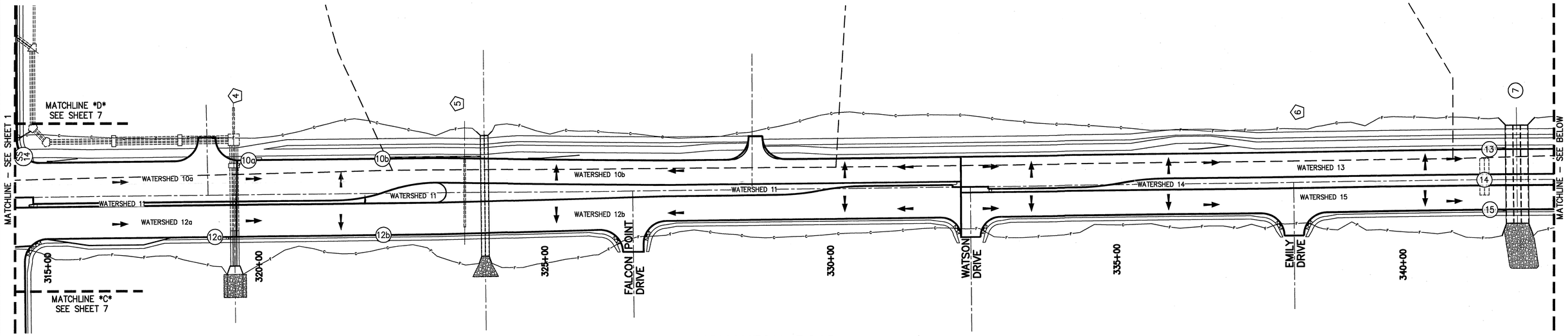
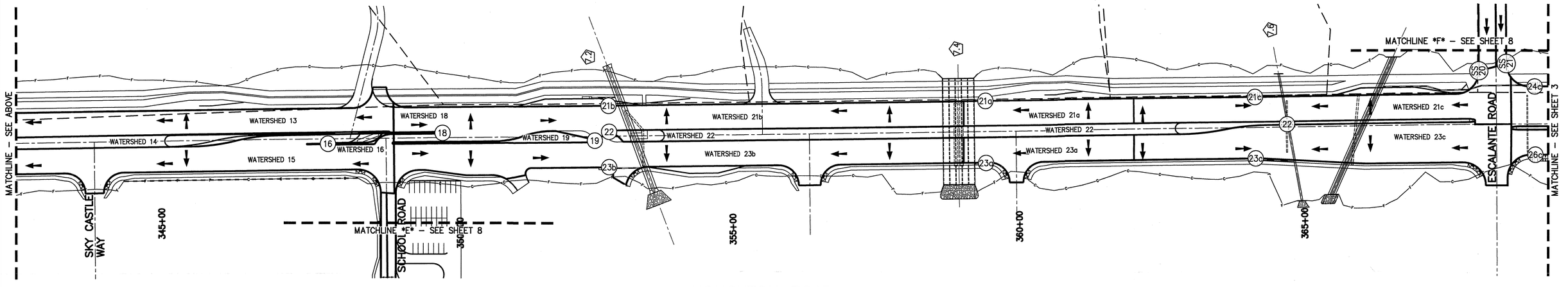


HOUGHTON ROAD



HOUGHTON ROAD

SCALE: 1"=80'

LEGEND

- WATERSHED BOUNDARY
- WATERSHED 2 — WATERSHED ID
- DEVELOPED CONDTIONS FLOW ARROW
- (4) — ONSITE CONCENTRATION POINT
- (SS 05) — SIDE STREET CONCENTRATION POINT
- EXISTING CULVERT (See Roadway Plans)
- OFFSITE WATERSHED BOUNDARY
- (9) (10) (11) — OFFSITE CONCENTRATION POINT

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PAVEMENT DRAINAGE
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FIGURE 4

PROJ NO: 06099-01 SCALE: HORIZ 1" = 80'
DATE: 08/2008

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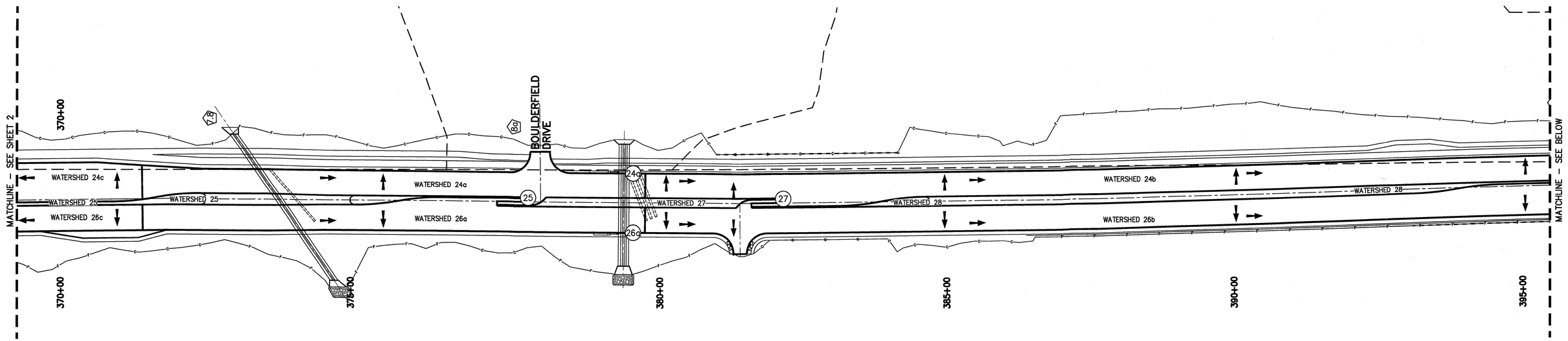

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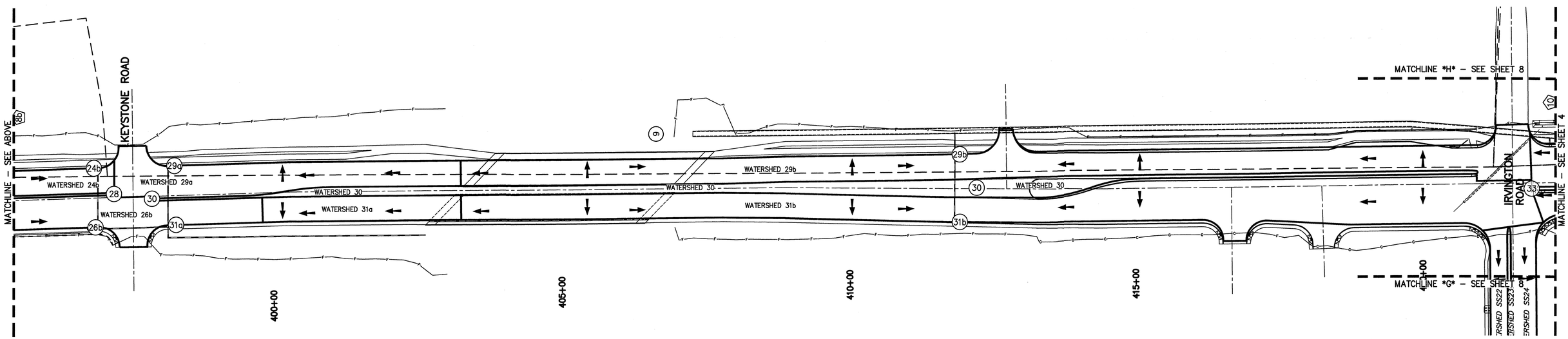

HOUGHTON ROAD

SCALE: 1"=80'

LEGEND

- WATERSHED BOUNDARY
- WATERSHED 2 WATERSHED ID
- DEVELOPED CONDTIONS FLOW ARROW
- (4) ONSITE CONCENTRATION POINT
- (SS 05) SIDE STREET CONCENTRATION POINT
- EXISTING CULVERT (See Roadway Plans)
- OFFSITE WATERSHED BOUNDARY
- (9) (110) (11) OFFSITE CONCENTRATION POINT

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PAVEMENT DRAINAGE
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FIGURE 4

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DATE: 08/2008

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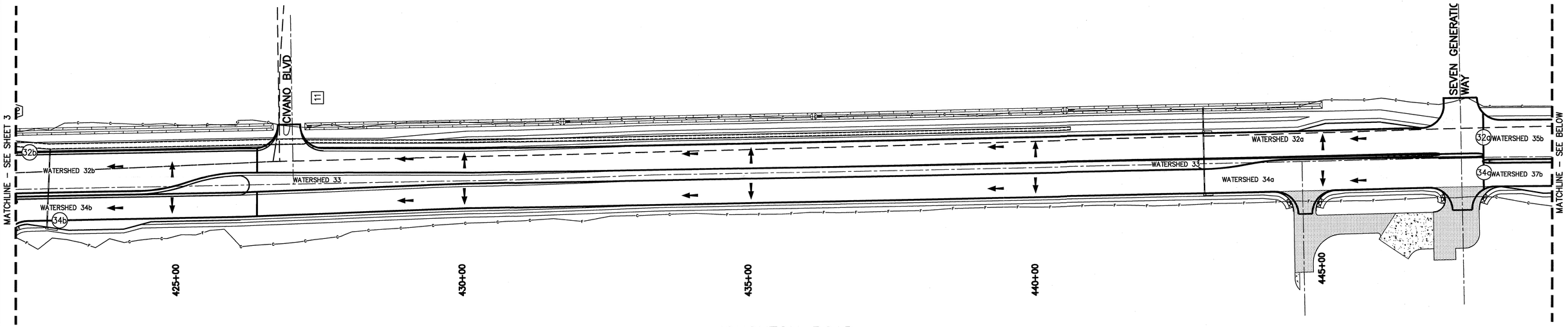

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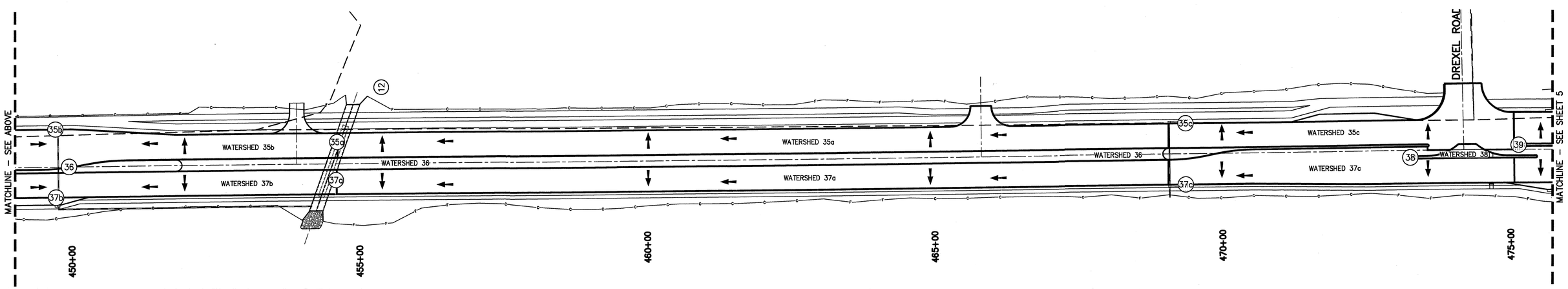

HOUGHTON ROAD

SCALE: 1"=80'

LEGEND

- WATERSHED BOUNDARY
- WATERSHED 2 WATERSHED ID
- DEVELOPED CONDTIONS FLOW ARROW
- (4) ONSITE CONCENTRATION POINT
- (SS 05) SIDE STREET CONCENTRATION POINT
- EXISTING CULVERT (See Roadway Plans)
- OFFSITE WATERSHED BOUNDARY
- (9) (10) [11] OFFSITE CONCENTRATION POINT

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PAVEMENT DRAINAGE
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FIGURE 4

PROJ NO: 06099-01 SCALE: HORIZ 1" = 80'
DATE: 08/2008

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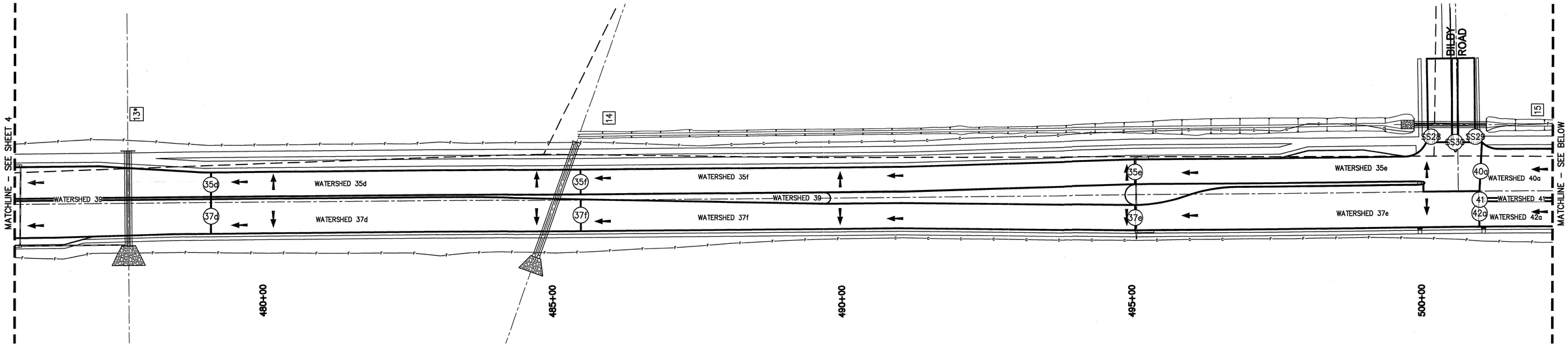

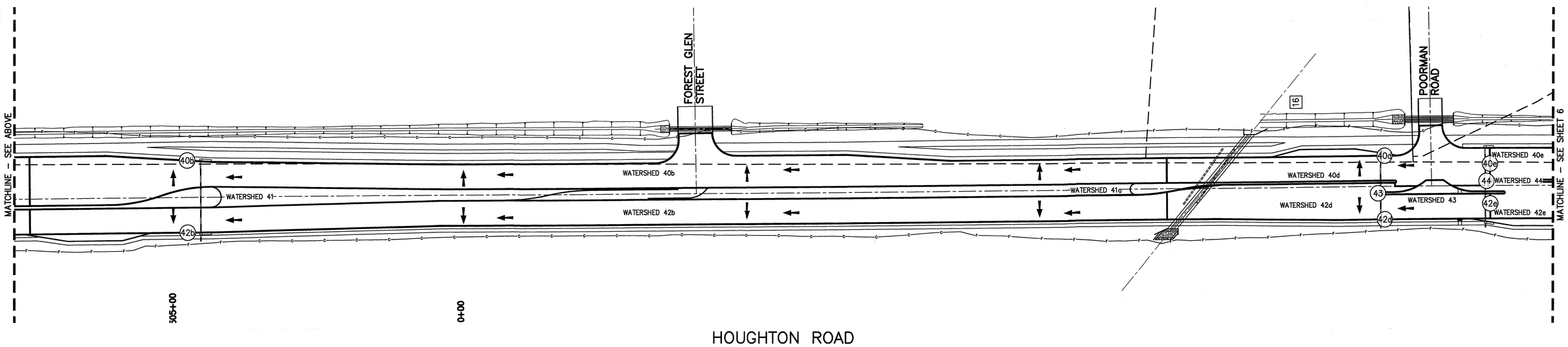

SCALE: 1"=80'

LEGEND

- WATERSHED BOUNDARY
- WATERSHED 2 WATERSHED ID
- DEVELOPED CONDTIONS FLOW ARROW
- (4) ONSITE CONCENTRATION POINT
- (SS 06) SIDE STREET CONCENTRATION POINT
- ========== EXISTING CULVERT (See Roadway Plans)
- — — — OFFSITE WATERSHED BOUNDARY
- (9) (10) [11] OFFSITE CONCENTRATION POINT

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PAVEMENT DRAINAGE
FOR
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FIGURE 4

PROJ NO: 06099-01 SCALE: HORIZ 1" = 80'
DATE: 08/2008

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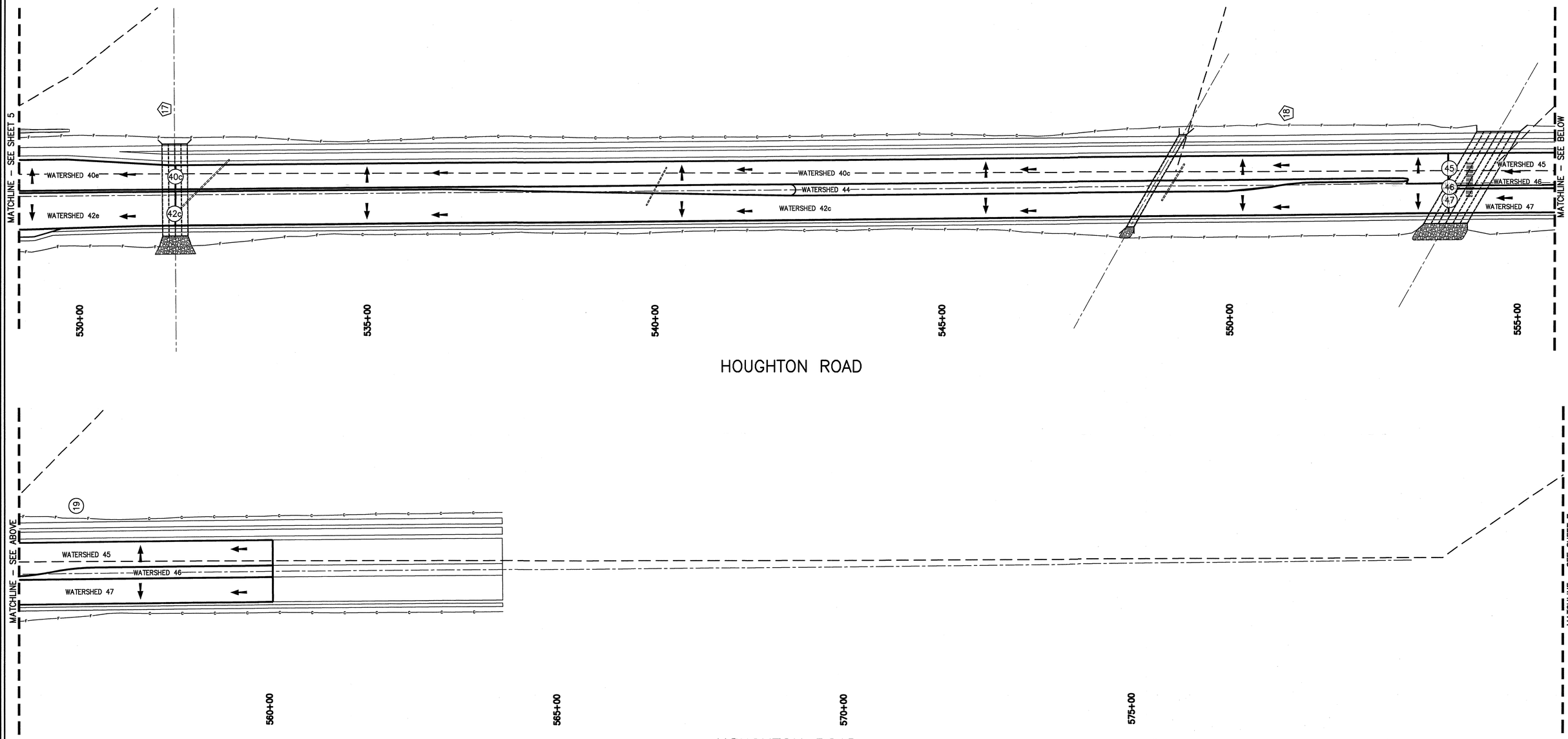

SCALE: 1"=80'

LEGEND

- WATERSHED BOUNDARY
- WATERSHED 2 — WATERSHED ID
- DEVELOPED CONDTIONS FLOW ARROW
- (4) ONSITE CONCENTRATION POINT
- (SS 05) SIDE STREET CONCENTRATION POINT
- ========== EXISTING CULVERT (See Roadway Plans)
- — — — OFFSITE WATERSHED BOUNDARY
- (9) (10) [11] OFFSITE CONCENTRATION POINT

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PAVEMENT DRAINAGE
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FIGURE 4

PROJ NO: 06099-01 SCALE: HORIZ 1" = 80'
DATE: 08/2008

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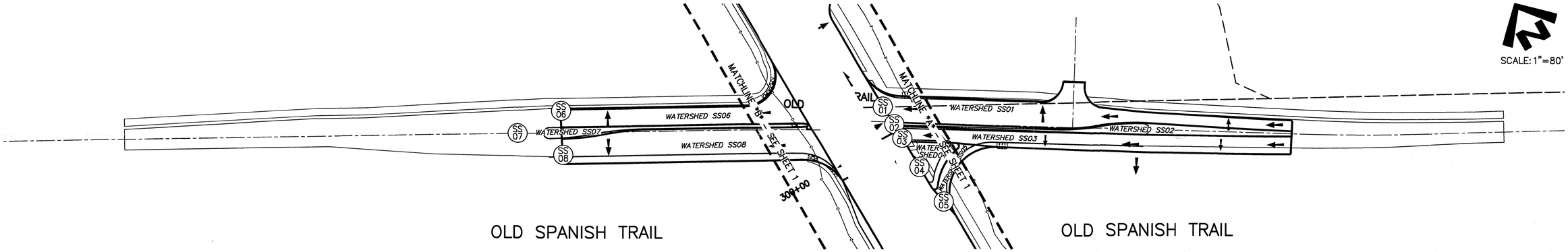

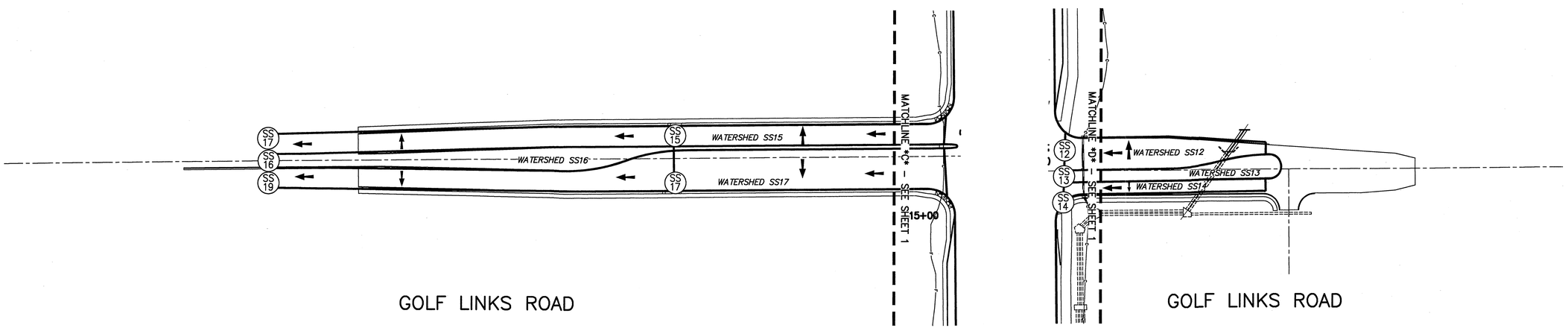

LEGEND

- WATERSHED BOUNDARY
- WATERSHED 2 — WATERSHED ID
- DEVELOPED CONDTIONS FLOW ARROW
- (4) ONSITE CONCENTRATION POINT
- (SS 05) SIDE STREET CONCENTRATION POINT
- EXISTING CULVERT (See Roadway Plans)
- OFFSITE WATERSHED BOUNDARY
- (9) ⟨10⟩ [11] OFFSITE CONCENTRATION POINT

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PAVEMENT DRAINAGE
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FIGURE 4

PROJ NO: 06099-01 SCALE: HORIZ 1" = 80'
DATE: 08/2008

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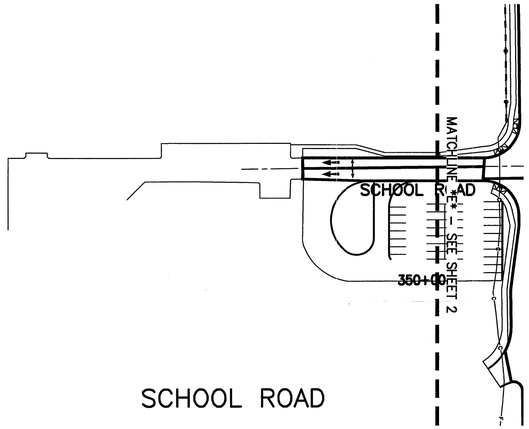
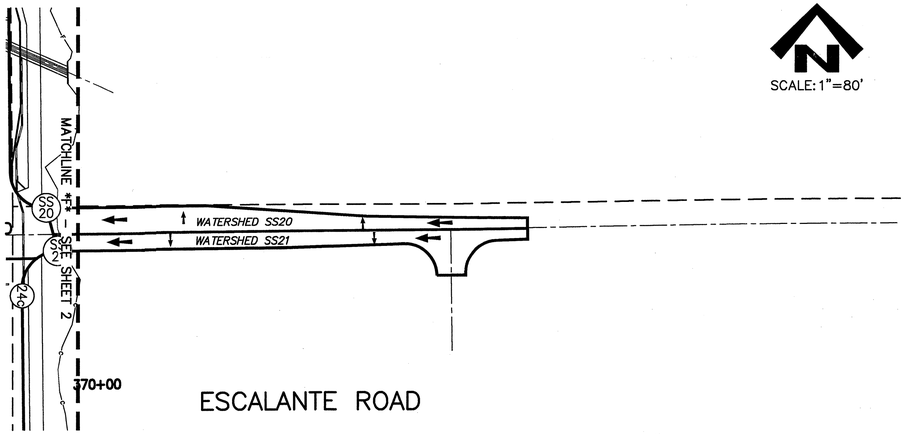


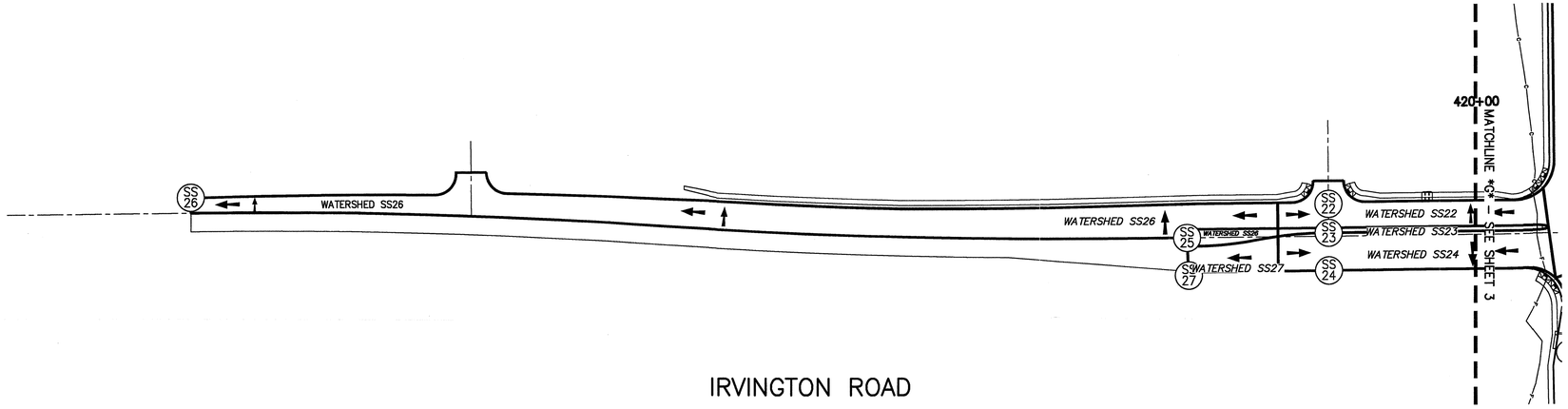
SCALE: 1"=80'

SCHOOL ROAD



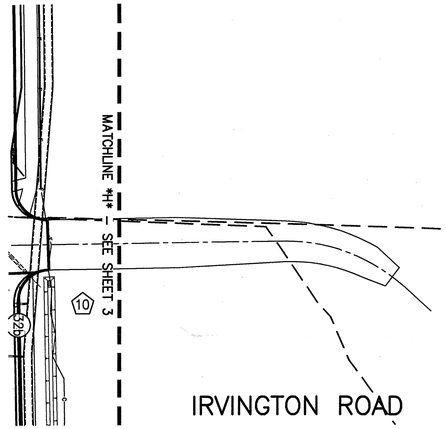
SCALE: 1"=80'

ESCALANTE ROAD



SCALE: 1"=80'

IRVINGTON ROAD



IRVINGTON ROAD

LEGEND

- WATERSHED BOUNDARY
- WATERSHED 2 WATERSHED ID
- DEVELOPED CONDTIONS FLOW ARROW
- (4) ONSITE CONCENTRATION POINT
- (SS 05) SIDE STREET CONCENTRATION POINT
- EXISTING CULVERT (See Roadway Plans)
- OFFSITE WATERSHED BOUNDARY
- OFFSITE CONCENTRATION POINT

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PAVEMENT DRAINAGE
FOR
HOUGHTON ROAD

FIGURE 4

PROJ NO: 06099-01 SCALE: HORIZ 1" = 80'
DATE: 08/2008

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APPENDIX 1
HYDROLOGIC ANALYSIS
(EXISTING CONDITIONS)

PRECIPITATION DATA

POINT PRECIPITATION FREQUENCY ESTIMATES FROM NOAA ATLAS 14

Arizona 32.145 N 110.758 W 2831 feet

from "Precipitation-Frequency Atlas of the United States" NOAA Atlas 14, Volume 1, Version 4
G.M. Bonnin, D. Martin, B. Lin, T. Parzybok, M.Yekta, and D. Riley
NOAA, National Weather Service, Silver Spring, Maryland, 2006

Extracted: Mon Dec 3 2007

Confidence Limits | Seasonality | Location Maps | Other Info. | GIS data | Maps | Help | D

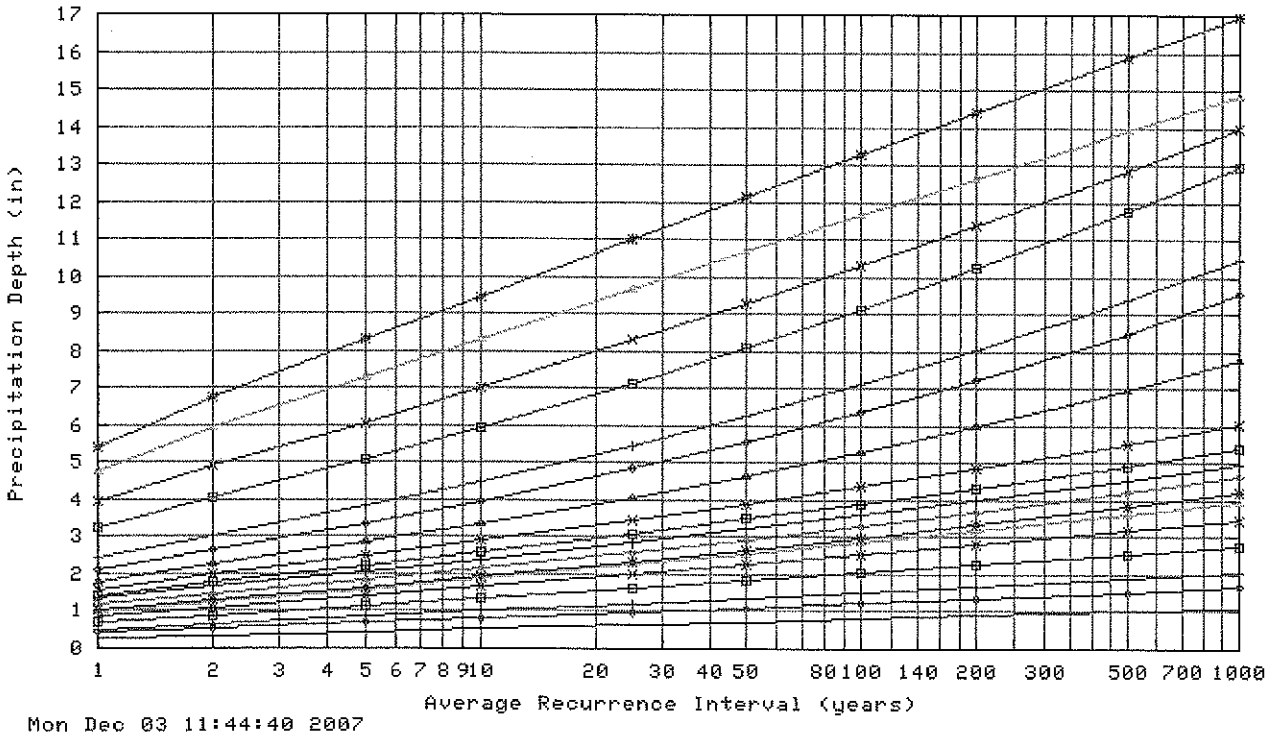
Precipitation Frequency Estimates (inches)

ARI* (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.27	0.41	0.50	0.68	0.84	0.96	1.02	1.16	1.32	1.43	1.58	1.80	2.11	2.42	3.22	3.92	4.76	5.41
2	0.34	0.52	0.65	0.87	1.08	1.23	1.28	1.45	1.65	1.78	1.98	2.26	2.65	3.02	4.03	4.89	5.94	6.75
5	0.45	0.69	0.85	1.14	1.42	1.59	1.64	1.83	2.06	2.23	2.48	2.85	3.35	3.81	5.08	6.06	7.29	8.29
10	0.53	0.81	1.00	1.35	1.67	1.87	1.93	2.14	2.39	2.59	2.89	3.35	3.96	4.48	5.94	7.00	8.32	9.46
25	0.64	0.97	1.21	1.63	2.02	2.26	2.33	2.58	2.85	3.09	3.45	4.07	4.84	5.44	7.14	8.29	9.67	11.01
50	0.72	1.10	1.36	1.84	2.27	2.56	2.65	2.92	3.21	3.49	3.90	4.66	5.58	6.24	8.11	9.30	10.68	12.16
100	0.81	1.23	1.52	2.05	2.54	2.87	2.99	3.29	3.59	3.90	4.37	5.30	6.38	7.10	9.14	10.33	11.68	13.29
200	0.89	1.36	1.68	2.27	2.81	3.19	3.34	3.67	3.98	4.33	4.85	5.98	7.24	8.03	10.23	11.40	12.65	14.41
500	1.00	1.53	1.90	2.55	3.16	3.62	3.83	4.20	4.52	4.91	5.50	6.96	8.50	9.37	11.75	12.84	13.92	15.86
1000	1.09	1.66	2.06	2.77	3.43	3.96	4.21	4.63	4.95	5.37	6.02	7.76	9.54	10.47	12.98	13.97	14.86	16.94

Text version of table

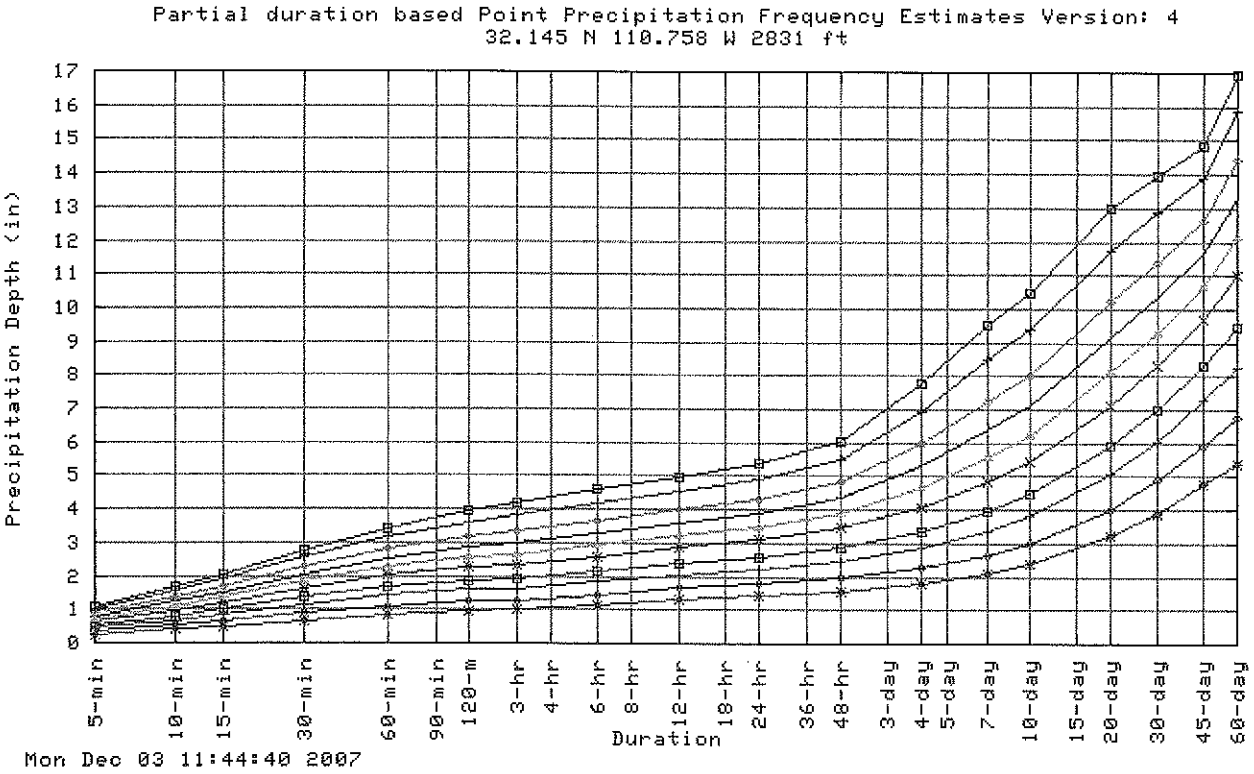
* These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval. Please refer to the documentation for more information. NOTE: Formatting forces estimates near zero to appear as zero.

Partial duration based Point Precipitation Frequency Estimates Version: 4
32.145 N 110.758 W 2831 ft



Mon Dec 03 11:44:40 2007

Duration			
5-min	120-m	48-hr	30-day
10-min	3-hr	4-day	45-day
15-min	6-hr	7-day	60-day
30-min	12-hr	10-day	
60-min	24-hr	20-day	



Confidence Limits -

* Upper bound of the 90% confidence interval Precipitation Frequency Estimates (inches)																		
ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.30	0.46	0.57	0.77	0.95	1.08	1.14	1.31	1.48	1.56	1.73	1.99	2.33	2.65	3.53	4.27	5.16	5.86
2	0.39	0.59	0.73	0.99	1.22	1.38	1.44	1.64	1.85	1.95	2.16	2.49	2.91	3.32	4.42	5.32	6.45	7.32
5	0.51	0.77	0.96	1.29	1.60	1.79	1.85	2.06	2.30	2.43	2.71	3.14	3.68	4.18	5.57	6.60	7.91	8.98
10	0.60	0.91	1.13	1.52	1.88	2.10	2.16	2.40	2.67	2.83	3.15	3.69	4.34	4.92	6.51	7.63	9.03	10.26
25	0.72	1.09	1.36	1.83	2.26	2.52	2.61	2.88	3.18	3.38	3.77	4.50	5.33	5.99	7.85	9.06	10.52	11.95
50	0.81	1.24	1.54	2.07	2.56	2.86	2.97	3.27	3.60	3.83	4.27	5.17	6.16	6.90	8.95	10.18	11.64	13.24
100	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31	4.81	5.92	7.09	7.89	10.13	11.37	12.79	14.54
200	1.01	1.54	1.91	2.58	3.19	3.59	3.77	4.14	4.50	4.81	5.38	6.73	8.14	9.00	11.43	12.62	13.95	15.84
500	1.15	1.75	2.17	2.93	3.62	4.12	4.37	4.79	5.17	5.52	6.19	7.94	9.69	10.64	13.29	14.39	15.48	17.64
1000	1.26	1.92	2.38	3.21	3.97	4.54	4.86	5.33	5.71	6.09	6.86	8.95	11.04	12.06	14.86	15.81	16.68	19.03

* The upper bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are greater than.
** These precipitation frequency estimates are based on a partial duration series. ARI is the Average Recurrence Interval.
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

*** Lower bound of the 90% confidence interval**

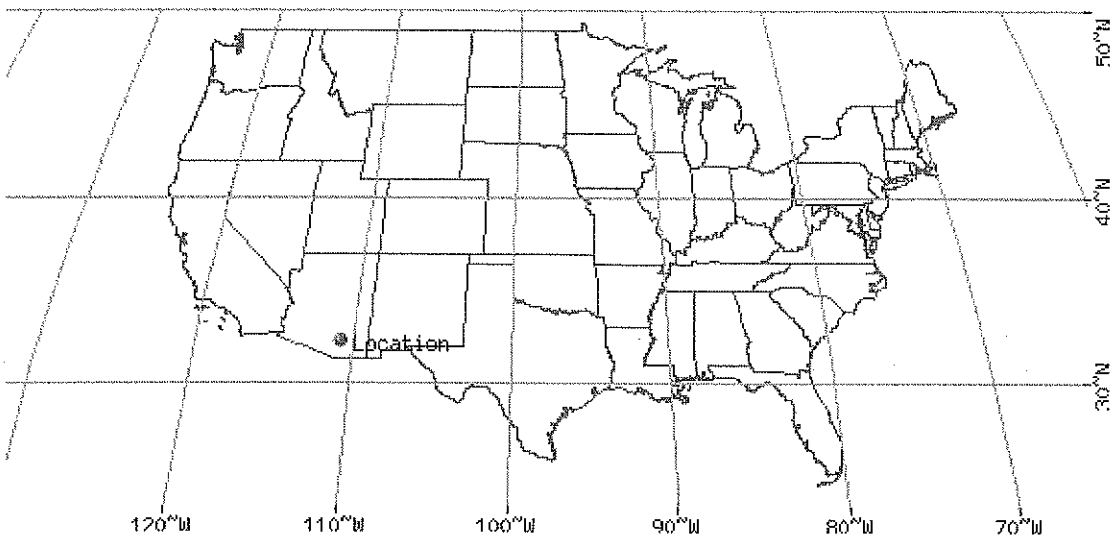
Precipitation Frequency Estimates (inches)

ARI** (years)	5 min	10 min	15 min	30 min	60 min	120 min	3 hr	6 hr	12 hr	24 hr	48 hr	4 day	7 day	10 day	20 day	30 day	45 day	60 day
1	0.24	0.36	0.45	0.60	0.75	0.86	0.91	1.04	1.19	1.32	1.46	1.66	1.94	2.22	2.95	3.61	4.40	5.01
2	0.31	0.47	0.58	0.78	0.96	1.10	1.15	1.30	1.49	1.65	1.83	2.07	2.42	2.76	3.69	4.50	5.49	6.24
5	0.40	0.61	0.75	1.01	1.26	1.41	1.47	1.63	1.84	2.05	2.29	2.60	3.06	3.48	4.63	5.56	6.73	7.66
10	0.47	0.71	0.88	1.19	1.47	1.65	1.71	1.90	2.13	2.38	2.66	3.04	3.59	4.07	5.39	6.42	7.67	8.74
25	0.56	0.85	1.05	1.42	1.76	1.98	2.05	2.25	2.51	2.82	3.15	3.66	4.35	4.90	6.44	7.56	8.87	10.11
50	0.62	0.95	1.18	1.58	1.96	2.22	2.30	2.52	2.80	3.15	3.52	4.15	4.95	5.56	7.25	8.42	9.75	11.12
100	0.69	1.04	1.30	1.75	2.16	2.45	2.54	2.80	3.08	3.48	3.90	4.65	5.59	6.25	8.06	9.26	10.58	12.08
200	0.75	1.14	1.41	1.90	2.35	2.68	2.79	3.07	3.36	3.82	4.27	5.17	6.25	6.96	8.91	10.12	11.38	13.00
500	0.82	1.25	1.55	2.09	2.58	2.97	3.11	3.42	3.73	4.27	4.75	5.86	7.16	7.92	10.02	11.21	12.37	14.14
1000	0.88	1.33	1.65	2.23	2.75	3.18	3.34	3.69	4.00	4.61	5.13	6.40	7.89	8.66	10.88	12.01	13.07	14.95

* The lower bound of the confidence interval at 90% confidence level is the value which 5% of the simulated quantile values for a given frequency are less than.
** These precipitation frequency estimates are based on a partial duration maxima series. ARI is the Average Recurrence Interval.

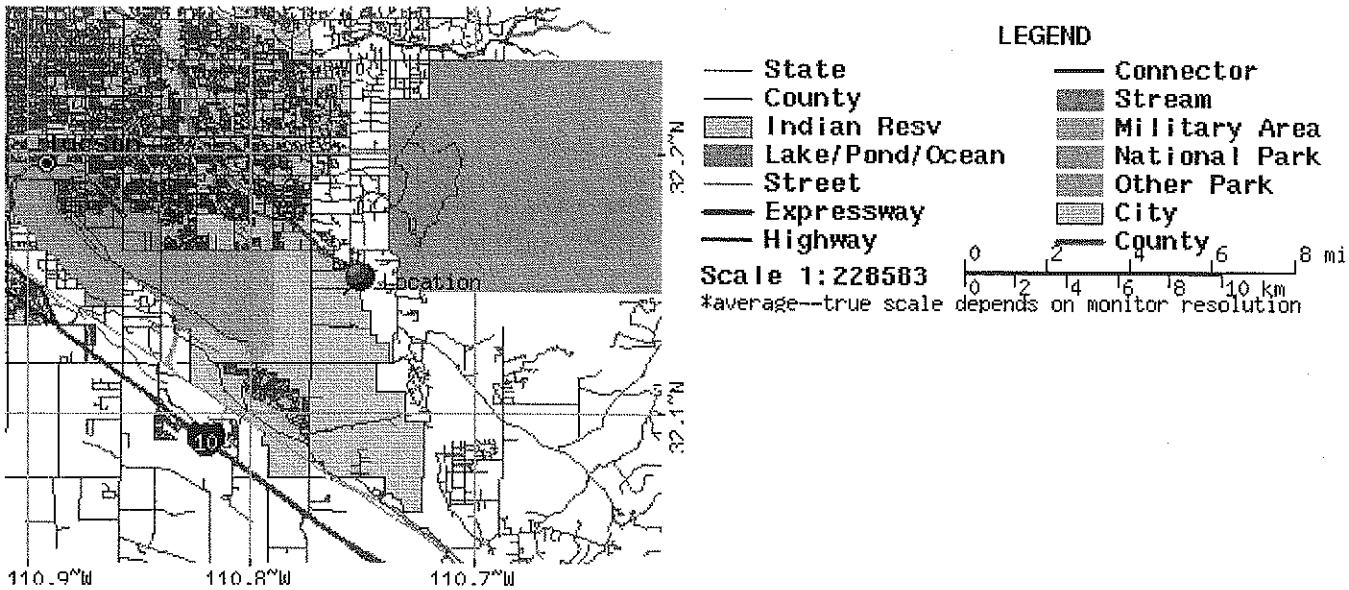
Please refer to the documentation for more information. NOTE: Formatting prevents estimates near zero to appear as zero.

Maps -



These maps were produced using a direct map request from the U.S. Census Bureau Mapping and Cartographic Resources Tiger Map Server.

Please read disclaimer for more information.



Other Maps/Photographs -

View USGS digital orthophoto quadrangle (DOQ) covering this location from TerraServer; **USGS Aerial Photograph** may also be available
from this site. A DOQ is a computer-generated image of an aerial photograph in which image displacement caused by terrain relief and camera tilts has been removed. It combines the image characteristics of a photograph with the geometric qualities of a map. Visit the USGS for more information.

Watershed/Stream Flow Information -

Find the Watershed for this location using the U.S. Environmental Protection Agency's site.

Climate Data Sources -

Precipitation frequency results are based on data from a variety of sources, but largely NCDC. The following links provide general information
about observing sites in the area, regardless of if their data was used in this study. For detailed information about the stations used in this study,
please refer to our documentation.

Using the **National Climatic Data Center's (NCDC)** station search engine, locate other climate stations within:

+/-30 minutes ...OR... +/-1 degree of this location (32.145/-110.758). Digital ASCII data can be obtained directly from NCDC.

Find Natural Resources Conservation Service (NRCS) SNOTEL (SNOwpack TELemetry) stations by visiting the **Western Regional Climate Center's state-specific SNOTEL station maps**.

Hydrometeorological Design Studies Center
DOC/NOAA/National Weather Service
1325 East-West Highway
Silver Spring, MD 20910

(301) 713-1669
Questions?: HDSC.Questions@noaa.gov

Disclaimer

HYDROLOGIC ANALYSIS

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP2 Job #: 06099-01

Watershed Area: 23.5 ac Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	345.0	1,867	0.1847	.035

Length of Watercourse (Lc): 1,867 feet Mean Slope: 0.1847

Length to Cen. of Gravity (Lca): 934 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: Manual Input of Rainfal Depths by User

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	10	83.	87.48	0.579
C	0	88.	91.21	0.686
D	90	91.	93.47	0.758
Imp.	20	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.784

Time of Concentration: 5.0 min

Rainfall Intensity (i) @ Tc: 10.92 in/hr

Runoff Supply Rate (q) @ Tc: 8.56 in/hr

PEAK DISCHARGE: 203 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	41
5-year	0.30	61
10-year	0.45	91
25-year	0.65	132
50-year	0.85	172

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP3b Job #: 06099-01

Watershed Area: 11.7 ac Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	35.0	1,529	0.0229	.035

Length of Watercourse (Lc): 1,529 feet Mean Slope: 0.0229

Length to Cen. of Gravity (Lca): 765 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	10	83.	87.48	0.579
C	0	88.	91.21	0.686
D	90	91.	93.47	0.758
Imp.	15	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.773

Time of Concentration: 5.5 min

Rainfall Intensity (i) @ Tc: 10.49 in/hr

Runoff Supply Rate (q) @ Tc: 8.10 in/hr

PEAK DISCHARGE: 96 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	19
5-year	0.30	29
10-year	0.45	43
25-year	0.65	62
50-year	0.85	81

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP3.5 Job #: 06099-01

Watershed Area: 32.1 ac Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	68.0	3,124	0.0218	.035

Length of Watercourse (Lc): 3,124 feet Mean Slope: 0.0218

Length to Cen. of Gravity (Lca): 1,562 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	10	83.	87.48	0.579
C	0	88.	91.21	0.686
D	90	91.	93.47	0.758
Imp.	15	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.773

Time of Concentration: 9.3 min

Rainfall Intensity (i) @ Tc: 8.54 in/hr

Runoff Supply Rate (q) @ Tc: 6.60 in/hr

PEAK DISCHARGE: 213 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	43
5-year	0.30	64
10-year	0.45	96
25-year	0.65	139
50-year	0.85	181

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP4 Job #: 06099-01

Watershed Area: 37.4 ac Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	61.0	2,522	0.0242	.035

Length of Watercourse (Lc): 2,522 feet Mean Slope: 0.0242

Length to Cen. of Gravity (Lca): 1,261 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	10	83.	87.48	0.579
C	0	88.	91.21	0.686
D	90	91.	93.47	0.758
Imp.	20	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.784

Time of Concentration: 7.6 min

Rainfall Intensity (i) @ Tc: 9.17 in/hr

Runoff Supply Rate (q) @ Tc: 7.19 in/hr

PEAK DISCHARGE: 271 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	54
5-year	0.30	81
10-year	0.45	122
25-year	0.65	176
50-year	0.85	230

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client:

Prepared by: DB

Project Name: Houghton Road

Date: 1/29/2007

Concentration Point: CP5

Job #: 06099-01

Watershed Area: 35.8 ac

Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	68.0	2,179	0.0312	.035

Length of Watercourse (Lc): 2,179 feet

Mean Slope: 0.0312

Length to Cen. of Gravity (Lca): 1,090 feet

Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush

Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	10	83.	87.48	0.579
C	0	88.	91.21	0.686
D	90	91.	93.47	0.758
Imp.	15	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.773

Time of Concentration: 6.1 min

Rainfall Intensity (i) @ Tc: 10.01 in/hr

Runoff Supply Rate (q) @ Tc: 7.73 in/hr

PEAK DISCHARGE: 279 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	56
5-year	0.30	84
10-year	0.45	126
25-year	0.65	181
50-year	0.85	237

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client:

Prepared by: DB

Project Name: Houghton Road

Date: 1/29/2007

Concentration Point: CP6

Job #: 06099-01

Watershed Area: 40.1 ac

Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	72.0	3,623	0.0199	.035

Length of Watercourse (Lc): 3,623 feet

Mean Slope: 0.0199

Length to Cen. of Gravity (Lca): 1,182 feet

Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush

Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	10	83.	87.48	0.579
C	0	88.	91.21	0.686
D	90	91.	93.47	0.758
Imp.	5	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.751

Time of Concentration: 9.4 min

Rainfall Intensity (i) @ Tc: 8.51 in/hr

Runoff Supply Rate (q) @ Tc: 6.39 in/hr

PEAK DISCHARGE: 258 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	52
5-year	0.30	78
10-year	0.45	116
25-year	0.65	168
50-year	0.85	220

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client:

Prepared by: DB

Project Name: Houghton Road

Date: 1/29/2007

Concentration Point: CP7.2

Job #: 06099-01

Watershed Area: 22.1 ac

Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	66.0	2,884	0.0229	.035

Length of Watercourse (Lc): 2,884 feet

Mean Slope: 0.0229

Length to Cen. of Gravity (Lca): 1,442 feet

Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush

Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	88.	91.21	0.686
D	0	91.	93.47	0.758
Imp.	5	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.598

Time of Concentration: 9.7 min

Rainfall Intensity (i) @ Tc: 8.43 in/hr

Runoff Supply Rate (q) @ Tc: 5.05 in/hr

PEAK DISCHARGE: 113 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	23
5-year	0.30	34
10-year	0.45	51
25-year	0.65	73
50-year	0.85	96

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client:

Prepared by: DB

Project Name: Houghton Road

Date: 1/29/2007

Concentration Point: CP7.4

Job #: 06099-01

Watershed Area: 513.9 ac

Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	280.0	14,767	0.0190	.035

Length of Watercourse (Lc): 14,767 feet

Mean Slope: 0.0190

Length to Cen. of Gravity (Lca): 7,384 feet

Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush

Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	88.	91.21	0.686
D	0	91.	93.47	0.758
Imp.	5	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.598

Time of Concentration: 37.6 min

Rainfall Intensity (i) @ Tc: 3.92 in/hr

Runoff Supply Rate (q) @ Tc: 2.35 in/hr

PEAK DISCHARGE: 1,216 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	243
5-year	0.30	365
10-year	0.45	547
25-year	0.65	790
50-year	0.85	1,034

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP7.6 Job #: 06099-01

Watershed Area: 38.2 ac Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	56.0	3,570	0.0157	.035

Length of Watercourse (Lc): 3,570 feet Mean Slope: 0.0157

Length to Cen. of Gravity (Lca): 1,785 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	88.	91.21	0.686
D	0	91.	93.47	0.758
Imp.	5	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.598

Time of Concentration: 13.6 min

Rainfall Intensity (i) @ Tc: 7.18 in/hr

Runoff Supply Rate (q) @ Tc: 4.29 in/hr

PEAK DISCHARGE: 166 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	33
5-year	0.30	50
10-year	0.45	74
25-year	0.65	108
50-year	0.85	141

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client:

Prepared by: DB

Project Name: Houghton Road

Date: 1/29/2007

Concentration Point: CP7.8

Job #: 06099-01

Watershed Area: 21.7 ac

Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	58.0	2,276	0.0255	.035

Length of Watercourse (Lc): 2,276 feet

Mean Slope: 0.0255

Length to Cen. of Gravity (Lca): 1,138 feet

Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush

Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	88.	91.21	0.686
D	0	91.	93.47	0.758
Imp.	5	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.598

Time of Concentration: 7.8 min

Rainfall Intensity (i) @ Tc: 9.07 in/hr

Runoff Supply Rate (q) @ Tc: 5.43 in/hr

PEAK DISCHARGE: 119 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	24
5-year	0.30	36
10-year	0.45	53
25-year	0.65	77
50-year	0.85	101

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP8a Job #: 06099-01

Watershed Area: 35.9 ac Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	70.0	2,320	0.0302	.035

Length of Watercourse (Lc): 2,320 feet Mean Slope: 0.0302

Length to Cen. of Gravity (Lca): 1,160 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	88.	91.21	0.686
D	0	91.	93.47	0.758
Imp.	5	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.598

Time of Concentration: 7.3 min

Rainfall Intensity (i) @ Tc: 9.30 in/hr

Runoff Supply Rate (q) @ Tc: 5.56 in/hr

PEAK DISCHARGE: 201 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	40
5-year	0.30	60
10-year	0.45	91
25-year	0.65	131
50-year	0.85	171

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP8b Job #: 06099-01

Watershed Area: 33.4 ac Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	120.0	2,304	0.0521	.035

Length of Watercourse (Lc): 2,304 feet Mean Slope: 0.0521

Length to Cen. of Gravity (Lca): 1,152 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	88.	91.21	0.686
D	0	91.	93.47	0.758
Imp.	5	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.598

Time of Concentration: 5.6 min

Rainfall Intensity (i) @ Tc: 10.38 in/hr

Runoff Supply Rate (q) @ Tc: 6.21 in/hr

PEAK DISCHARGE: **209** **cfs**

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	42
5-year	0.30	63
10-year	0.45	94
25-year	0.65	136
50-year	0.85	178

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client:

Prepared by: DB

Project Name: Houghton Road

Date: 1/29/2007

Concentration Point: CP10

Job #: 06099-01

Watershed Area: 120.3 ac

Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	60.0	6,457	0.0093	.035

Length of Watercourse (Lc): 6,457 feet

Mean Slope: 0.0093

Length to Cen. of Gravity (Lca): 3,228 feet

Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush

Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	88.	91.21	0.686
D	0	91.	93.47	0.758
Imp.	5	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.598

Time of Concentration: 28.2 min

Rainfall Intensity (i) @ Tc: 4.79 in/hr

Runoff Supply Rate (q) @ Tc: 2.86 in/hr

PEAK DISCHARGE: 347 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	69
5-year	0.30	104
10-year	0.45	156
25-year	0.65	226
50-year	0.85	295

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP12subwatershed Job #: 06099-01

Watershed Area: 2.1 ac Watershed Type: Medium Density Urbanized

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	16.0	593	0.0270	.035

Length of Watercourse (Lc): 593 feet Mean Slope: 0.0270

Length to Cen. of Gravity (Lca): 297 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	.	.	0.000
D	0	.	.	0.000
Imp.	10	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.617

Time of Concentration: 5.0 min

Rainfall Intensity (i) @ Tc: 10.92 in/hr

Runoff Supply Rate (q) @ Tc: 6.74 in/hr

PEAK DISCHARGE: 14 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	2.9
5-year	0.30	4.3
10-year	0.45	6.5
25-year	0.65	9.4
50-year	0.85	12

HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP17 Job #: 06099-01

Watershed Area: 688.6 ac Watershed Type: Undeveloped-Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	215.0	25,350	0.0085	.035

Length of Watercourse (Lc): 25,350 feet Mean Slope: 0.0085

Length to Cen. of Gravity (Lca): 12,675 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	.	.	0.000
D	0	.	.	0.000
Imp.	1	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.583

Time of Concentration: 1.6 hrs

Rainfall Intensity (i) @ Tc: 1.92 in/hr

Runoff Supply Rate (q) @ Tc: 1.12 in/hr

PEAK DISCHARGE: 776 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	155
5-year	0.30	233
10-year	0.45	349
25-year	0.65	505
50-year	0.85	660

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: CP18 Job #: 06099-01

Watershed Area: 111.0 ac Watershed Type: Undeveloped-Foothills

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	60.0	8,590	0.0070	.035

Length of Watercourse (Lc): 8,590 feet Mean Slope: 0.0070

Length to Cen. of Gravity (Lca): 4,295 feet Weighted Basin Fac.: 0.035

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 100-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31
Areal Values (in)	0.91	1.39	1.72	2.32	2.87	3.22	3.36	3.69	4.04	4.31

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	100	83.	87.48	0.579
C	0	.	.	0.000
D	0	.	.	0.000
Imp.	1	99.	99.	0.959

Weighted Runoff Coef. (Cw): 0.583

Time of Concentration: 42.4 min

Rainfall Intensity (i) @ Tc: 3.61 in/hr

Runoff Supply Rate (q) @ Tc: 2.10 in/hr

PEAK DISCHARGE: 235 cfs

Lesser Return Periods

Return Period	Ratio	Qpeak
2-year	0.20	47
5-year	0.30	71
10-year	0.45	106
25-year	0.65	153
50-year	0.85	200

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: Pavement Job #: 06099-01

Watershed Area: 1.0 ac Watershed Type: Shallow Steetflow - Paved

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.9	396	0.0098	.040

Length of Watercourse (Lc): 396 feet Mean Slope: 0.0098

Length to Cen. of Gravity (Lca): 198 feet Weighted Basin Fac.: 0.040

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 10-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.60	0.91	1.13	1.52	1.88	2.10	2.16	2.40	2.67	2.83
Areal Values (in)	0.60	0.91	1.13	1.52	1.88	2.10	2.16	2.40	2.67	2.83

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	10	83.	84.57	0.366
C	0	.	.	0.000
D	90	91.	91.62	0.586
Imp.	100	99.	99.	0.938

Weighted Runoff Coef. (Cw): 0.938

Time of Concentration: 5.0 min

Rainfall Intensity (i) @ Tc: 7.20 in/hr

Runoff Supply Rate (q) @ Tc: 6.76 in/hr

PEAK DISCHARGE: 6.8 cfs

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HYDROLOGIC DATA SHEET FOR PIMA COUNTY FLOOD PEAK PROCEDURE

Pima County Regional Flood Control District

Client: _____ Prepared by: DB

Project Name: Houghton Road Date: 1/29/2007

Concentration Point: Water Harvesting Area Job #: 06099-01

Watershed Area: 1.0 ac Watershed Type: Shallow Steetflow - Natural

Watercourse Data By Reach

Reach No.	Height (Hi)	Length (Li)	Slope (Si)	Basin Factor (Nb)
1	3.9	396	0.0098	.040

Length of Watercourse (Lc): 396 feet Mean Slope: 0.0098

Length to Cen. of Gravity (Lca): 198 feet Weighted Basin Fac.: 0.040

Veg. Cover Type(s): Desert Brush Veg. Cover Density: 25 %

RETURN PERIOD: 10-years

Rainfall Depths: NOAA Atlas 14 (90% UCL) @ Latitude: 32.1450 Longitude: 110.7580

Duration:	5-min	10-min	15-min	30-min	60-min	2-hr	3-hr	6-hr	12-hr	24-hr
Point Values (in)	0.60	0.91	1.13	1.52	1.88	2.10	2.16	2.40	2.67	2.83
Areal Values (in)	0.60	0.91	1.13	1.52	1.88	2.10	2.16	2.40	2.67	2.83

Soils Data

Soil Type	Percent	Curve # (CN)	Adj. Curve # (CN*)	Runoff Coef. (C)
B	10	83.	84.57	0.366
C	0	.	.	0.000
D	90	91.	91.62	0.586
Imp.	1	99.	99.	0.938

Weighted Runoff Coef. (Cw): 0.568

Time of Concentration: 5.1 min

Rainfall Intensity (i) @ Tc: 7.11 in/hr

Runoff Supply Rate (q) @ Tc: 4.04 in/hr

PEAK DISCHARGE: 4.1 cfs

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APPENDIX 2
HYDRAULIC ANALYSIS
(EXISTING AND DEVELOPED CONDITIONS)

PAVEMENT DRAINAGE CALCULATIONS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 1a

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
283+65	288+00	435	varies	0.57	0.935	5	6.72	3.58	0.33	3.91	0.0050	0.020		0.27	13.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB1a	284+65	16' Catch Basin	0.27	3.72	0.19

Computed by: DB Checked by: _____ Date: 12/5/2007

MMLA PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 1b

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
279+16	283+65	449	varies	0.44	0.935	5	6.72	2.78	0.19	2.97	0.0050	0.020		0.25	12.4

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB1b	279+16.14	20' Catch Basin	0.25	2.97	0.00

Computed by: DB Checked by: _____ Date: 6/11/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 2 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
279+16	288+00	884	varies	0.33	0.724	5	6.72	1.61	0.00	1.61	0.0050	0.020		0.20	9.8

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 6/11/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 3a

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
283+65	288+00	435	varies	0.64	0.935	5	6.72	4.02	0.69	4.71	0.0050	0.020		0.29	14.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I3a	284+00	20' Catch Basin	0.29	4.7	0.04

Computed by: DB Checked by: _____ Date: 7/29/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 3b

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
279+16	283+65	449	varies	0.56	0.935	5	6.72	3.52	0.14	3.66	0.0050	0.020		0.27	13.4

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I3b	279+16.14	20' Scupper	0.27	3.66	0.00

Computed by: DB Checked by: _____ Date: 6/11/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 4
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
288+00	300+19	1219	varies	1.34	0.935	5	6.72	8.42	0.00	8.42	0.0150	0.020		0.30	14.9

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB4	289+30	32' Catch Basin	0.30	8.09	0.33

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 5 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
288+00	300+19	1219	varies	0.39	0.724	5	10.44	2.95	0.00	2.95	0.0150	0.020		0.24	11.9

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.24		2.95

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 6
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
288+00	300+19	1219	varies	1.57	0.935	5	6.72	9.86	0.00	9.86	0.0150	0.020		0.32	15.8

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I6	289+00	32' Scupper	0.32	9.17	0.69

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 7A
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
300+20	307+04	684	varies	1.06	0.935	5	6.72	6.66	0.00	6.66	0.0200	0.020		0.26	12.9

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB7A	306+60	28' Catch Basin	0.26	6.16	0.50

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 7B

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
307+04	312+43	539	varies	0.70	0.935	5	6.72	4.37	0.51	4.88	0.0200	0.020		0.50	20.8

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB7B	308+67 SAG	4' Catch Basin	0.50	4.88	0.00

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 8 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
300+19	314+45	1426	varies	0.66	0.724	5	10.44	4.99	0.00	4.99	0.0200	0.020		0.27	13.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.27		4.99

Computed by: DB Checked by: Date: 10/8/2007

MMLA PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 9A
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
300+19	307+04	685	varies	0.85	0.935	5	6.72	5.34	0.00	5.34	0.0200	0.020		0.24	11.9

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I9A	306+60	28' Catch Basin	0.24	5.17	0.17

Computed by: DB Checked by: _____ Date: 7/29/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 9B

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
307+04	312+43	539	varies	0.40	0.935	5	6.72	2.51	0.17	2.68	0.0200	0.020		0.37	14.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I9B	308+67 SAG	4' Scupper	0.37	2.68	0.00

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 10 a
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
312+43	319+40	697	varies	0.84	0.935	5	6.72	5.28	0.00	5.28	0.0200	0.020		0.24	11.8

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB10a	319+40	28' Catch Basin	0.24	5.12	0.16

Computed by: DB Checked by: _____ Date: 8/7/2008

MMLA PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 10 b
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
319+40	330+20	1080	varies	1.48	0.935	5	6.72	9.30	0.16	9.46	0.0200	0.020		0.50	20.6

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB10b	321+75 (SAG)	12' Catch Basin	0.50	9.46	0.00

Computed by: DB Checked by: _____ Date: 8/7/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 11 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
314+45	331+86	1741	varies	0.57	0.724	5	10.44	4.31	0.00	4.31	0.0200	0.020		0.26	12.9

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.26		4.31

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 12 a
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
312+43	319+18	675	varies	0.68	0.935	5	6.72	4.27	0.00	4.27	0.0200	0.020		0.22	10.9

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I12A	319+18	24' Catch Basins	0.22	4.07	0.20

Computed by: DB Checked by: _____ Date: 8/7/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 12 b
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
319+18	330+20	1102	varies	1.59	0.935	5	6.72	9.99	0.20	10.19	0.0200	0.020		0.51	21.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I12b	321+75 (SAG)	12' Scupper	0.51	10.19	0.00

Computed by: DB Checked by: _____ Date: 8/7/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 13
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
330+20	348+57	1837	varies	1.77	0.935	5	6.72	11.12	0.24	11.36	0.0230	0.020		0.55	23.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB13	341+10 (SAG)	12' Catch Basin	0.55	11.36	0.00

Computed by: DB Checked by: _____ Date: 12/5/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 14 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
332+20	348+57	1637	varies	0.56	0.724	5	6.72	2.72	0.00	2.72	0.0230	0.020		0.25	12.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: Date: 12/5/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 15
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
330+20	348+57	1837	varies	1.91	0.935	5	6.72	12.00	0.11	12.11	0.0230	0.020		0.57	24.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I15	341+10 (SAG)	12' Catch Basin	0.57	12.11	0.00

Computed by: DB Checked by: _____ Date: 7/29/2008

MMLA PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 16 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_o (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
347+50	348+57	107	varies	0.01	0.724	5	10.44	0.08	0.00	0.08	0.0210	0.020		0.06	2.9

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.06		0.08

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 18 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
348+57	349+50	93	varies	0.01	0.724	5	10.44	0.08	0.00	0.08	0.0160	0.020		0.06	3.0

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.06		0.08

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 19 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
348+57	352+15	358	varies	0.06	0.724	5	10.44	0.45	0.00	0.45	0.0160	0.020		0.12	5.8

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.12		0.45

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 21A

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
358+61	361+59	298	varies	0.26	0.935	5	6.72	1.63	0.00	1.63	0.0150	0.020		0.30	10.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB21A	359+00 SAG	4' Catch Basin	0.30	1.63	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 21B

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
348+64	358+61	997	varies	1.43	0.935	5	6.72	9.00	0.29	9.29	0.0150	0.020		0.49	20.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB21B	352+40 SAG	12' Catch Basin	0.49	9.29	0.00

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 21C
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
361+59	368+16	657	varies	0.77	0.935	5	6.72	4.84	0.00	4.84	0.0150	0.020		0.51	21.1

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB21C	363+71 SAG	4' Catch Basin	0.51	4.84	0.00

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 22 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
352+40	367+55	1515	varies	0.55	0.724	5	10.44	4.16	0.00	4.16	0.0150	0.020		0.27	13.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.27		4.16

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 23A
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
358+61	361+59	298	varies	0.26	0.935	5	6.72	1.63	2.60	4.23	0.0150	0.020		0.47	19.4

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I23A	359+00 SAG	4' Catch Basin	0.47	4.23	0.00

Computed by: DB Checked by: _____ Date: 7/29/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 23B

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
348+64	358+61	997	varies	1.26	0.935	5	6.72	7.92	2.60	10.52	0.0150	0.020		0.52	22.0

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I23B	352+40 SAG	12' Catch Basin	0.52	10.52	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 23C
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
361+59	368+16	657	varies	1.01	0.935	5	6.72	6.35	2.60	8.95	0.0150	0.020		0.57	24.1

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I23C	363+71SAG	8' Catch Basin	0.57	8.95	0.00

Computed by: DB Checked by: _____ Date: 7/29/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 24a
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
368+18	379+71	1153	varies	0.92	0.935	5	6.72	5.78	0.00	5.78	0.0300	0.020		0.23	11.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB24a	379+50	32' Catch Basin	0.23	5.6	0.18

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 24b
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
379+71	397+13	1742	varies	1.79	0.935	5	6.72	11.25	0.52	11.77	0.0100	0.020		0.56	23.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB24	396+80 SAG	12' Catch Basin	0.56	11.77	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 24C

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
368+18	371+00	282	varies	0.45	0.935	5	6.72	2.83	0.00	2.83	0.0300	0.020		0.17	8.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB24c	368+60	16' Catch Basin	0.17	2.83	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 25 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
368+18	382+09	1391	varies	0.23	0.724	5	10.44	1.74	0.00	1.74	0.0300	0.020		0.17	8.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.17		1.74

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 26 a

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
371+00	379+71	871	varies	0.88	0.935	5	6.72	5.53	0.00	5.53	0.0300	0.020		0.22	11.1

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I26a	379+50	24' Scupper	0.22	4.7	0.83

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 26 b

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
379+71	397+13	1742	varies	1.87	0.935	5	6.72	11.75	0.23	11.98	0.0100	0.020		0.48	19.8

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB26b	396+80 SAG	16' Catch Basin	0.48	11.98	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 26 C

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
368+18	371+00	282	varies	0.32	0.935	5	6.72	2.01	0.00	2.01	0.0300	0.020		0.15	7.6

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I26c	368+60	20' Scupper	0.15	2	0.01

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 27 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
377+13	382+09	496	varies	0.13	0.724	5	10.44	0.98	0.00	0.98	0.0180	0.020		0.15	7.6

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.15		0.98

Computed by: DB Checked by: _____ Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 28 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
381+55	397+13	1558	varies	0.41	0.724	5	10.44	3.10	0.00	3.10	0.0600	0.020		0.19	9.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.19		3.10

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 29 a

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
397+13	404+45	732	varies	0.85	0.935	5	6.72	5.34	0.00	5.34	0.0200	0.020		0.54	22.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB29A	398+20 SAG	4' Catch Basin	0.54	5.34	0.00

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 29 b
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
404+45	421+81	1736	varies	1.97	0.935	5	6.72	12.38	0.46	12.84	0.0200	0.020		0.60	25.1

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB29b	411+88 SAG	12' Catch Basin	0.60	12.84	0.00

Computed by: DB Checked by: _____ Date: 12/5/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 30 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
397+78	420+88	2310	varies	0.79	0.724	5	10.44	5.97	0.00	5.97	0.0200	0.020		0.29	14.6

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.29		5.97

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 31 a

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
397+13	404+45	732	varies	0.65	0.935	5	6.72	4.08	0.00	4.08	0.0200	0.020		0.46	19.0

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB31a	398+20 SAG	4' Catch Basin	0.46	4.08	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 31 b
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
~~403+18~~ 404+45	421+82	1864	varies	2.55	0.935	5	6.72	16.02	0.63	16.65	0.0200	0.020		0.58	24.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB31b	411+88 SAG	16' Catch Basin	0.58	16.65	0.00

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 32 a
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
443+00	447+00	400	varies	0.23	0.935	5	6.72	1.45	0.00	1.45	0.0150	0.020		0.15	7.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB32a	443+00	12' Catch Basin	0.15	1.34	0.11

Computed by: DB Checked by: _____ Date: 11/27/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 32 B
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
421+82	426+34	452	varies	0.65	0.935	5	6.72	4.08	0.00	4.08	0.0400	0.020		0.19	9.4

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB32B	422+40	24' Catch Basin	0.19	3.62	0.46

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 33 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
421+82	447+76	2594	varies	1.04	0.724	5	10.44	7.86	0.00	7.86	0.0150	0.020		0.34	17.1

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.34		7.86

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 34 a
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
443+00	447+00	400	varies	0.23	0.935	5	6.72	1.45	0.00	1.45	0.0150	0.020		0.15	7.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB34a	443+00	12' Catch Basin	0.15	1.34	0.11

Computed by: DB Checked by: _____ Date: 11/27/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 34 B

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
421+82	426+34	452	varies	0.45	0.935	5	6.72	2.83	0.00	2.83	0.0400	0.020		0.16	8.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB34b	422+90	16' Catch Basin	0.16	2.2	0.63

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 35 a
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
454+53	468+99	1446	varies	1.33	0.935	5	6.72	8.36	2.31	10.67	0.0150	0.020		N/A	N/A

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			N/A		

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 35 b

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
447+76	454+53	677	varies	0.93	0.935	5	6.72	5.84	0.00	5.84	0.0150	0.020		0.57	24.1

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I35b	449+66 SAG	4' Catch Basin	0.57	5.84	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 35 c
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
468+99	475+00	601	varies	1.24	0.935	5	6.72	7.79	0.00	7.79	0.0220	0.020		0.27	13.4

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I35C	469+30	20' Catch Basin	0.27	5.48	2.31

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 35 d
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
479+04	485+43	639	varies	0.64	0.935	5	6.72	4.02	0.00	4.02	0.0050	0.020		0.28	13.8

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB35d	479+04	20' Catch Basin	0.28	6.39	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 35 e

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
494+99	500+96	597	varies	0.74	0.935	5	6.72	4.65	0.00	4.65	0.0080	0.020		0.27	24.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I35E	494+99	20' Catch Basin	0.27	4.45	0.20

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 35 f

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
485+43	494+99	956	varies	0.96	0.935	5	6.72	6.03	0.20	6.23	0.0050	0.020		0.46	19.0

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 36 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
447+76	473+51	2575	varies	0.97	0.724	5	10.44	7.33	0.00	7.33	0.0150	0.020		0.33	16.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.33		7.33

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 37 a

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
454+53	468+99	1446	varies	1.33	0.935	5	6.72	8.36	0.00	8.36	0.0150	0.020		N/A	N/A

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 37 b

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
447+76	454+53	677	varies	0.71	0.935	5	6.72	4.46	0.00	4.46	0.0150	0.020		0.49	20.1

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I37b	449+66 SAG	4' Catch Basin	0.49	4.46	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 37 c
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
468+99	475+00	601	varies	1.38	0.935	5	6.72	8.67	0.00	8.67	0.0220	0.020		0.28	14.0

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I37C	469+30	28' Catch Basin	0.28	7.4	1.27

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 37 d
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
479+04	485+43	639	varies	0.75	0.935	5	6.72	4.71	0.00	4.71	0.0050	0.020		0.29	14.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB37D	479+04	16' Catch Basin	0.29	4.301	0.41

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 37 e
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
494+99	500+96	597	varies	0.91	0.935	5	6.72	5.72	0.00	5.72	0.0080	0.020		0.29	14.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
I37E	494+99	28' Catch Basin	0.29	5.72	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 37 f

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
485+43	494+99	956	varies	1.11	0.935	5	6.72	6.97	0.00	6.97	0.0050	0.020		0.49	20.4

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 38 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
473+21	475+39	218	varies	0.05	0.724	5	10.44	0.38	0.00	0.38	0.0220	0.020		0.10	5.1

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.10		0.38

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 39 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
455+07	499+97	4490	varies	0.69	0.724	5	10.44	5.22	0.00	5.22	0.0150	0.020		0.29	14.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.29		5.22

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 40 a
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
500+96	502+47	151	varies	2.20	0.935	5	6.72	13.82	0.00	13.82	0.0250	0.020		N/A	N/A

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_I (cfs)	$Q_c = Q_T - Q_I$ (cfs)

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 40 b
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
502+37	522+20	1983	varies	2.42	0.935	5	6.72	15.21	0.00	15.21	0.0070	0.020		0.55	23.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB40b	505+20 SAG	16' Catch Basin	0.55	15.21	0.00

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 40 c
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
531+59	553+76	2217	varies	0.30	0.935	5	6.72	1.88	0.00	1.88	0.0050	0.020		0.39	15.4

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 40 d

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
522+20	527+80	560	varies	0.60	0.935	5	6.72	3.77	0.43	4.20	0.0050	0.020		0.47	19.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB40d	525+97 SAG	4' Catch Basin	0.47	4.2	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 40 e

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
527+80	531+59	379	varies	0.41	0.935	5	6.72	2.58	0.00	2.58	0.0100	0.020		0.21	10.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB40e	527+80	12' Catch Basin	0.21	2.15	0.43

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 41 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
500+96	526+15	2519	varies	1.00	0.724	5	10.44	7.56	0.00	7.56	0.0100	0.020		0.36	18.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.36		7.56

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 42 a

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
500+96	502+70	174	varies	2.60	0.935	5	6.72	16.34	0.00	16.34	0.0100	0.020		N/A	N/A

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 12/5/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 42 b
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
502+70	522+20	1950	varies	2.16	0.935	5	6.72	13.57	0.00	13.57	0.0100	0.020		0.51	21.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB42b	505+20 SAG	16' Catch Basin	0.51	13.57	0.00

Computed by: DB Checked by: _____ Date: 12/5/2007

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PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 42 c
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
531+59	553+76	2217	varies	0.15	0.935	5	6.72	0.94	0.00	0.94	0.0050	0.020		0.28	9.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 42 d

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
522+20	527+80	560	varies	0.60	0.935	5	6.72	3.77	0.43	4.20	0.0050	0.020		0.32	19.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB42d	525+97 SAG	4' Catch Basin	0.32	4.2	0.00

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA
Highway: Houghton Road
Location: Watershed 42 e
Project No.: 06099-01

DESIGN DATA
Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
527+80	531+59	379	varies	0.41	0.935	5	6.72	2.58	0.00	2.58	0.0100	0.020		0.21	10.3

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
CB42e	527+80	12' Catch Basin	0.21	2.15	0.43

Computed by: DB Checked by: _____ Date: 11/20/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 43 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
525+94	528+05	211	varies	0.05	0.724	5	10.44	0.38	0.00	0.38	0.0130	0.020		0.11	5.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.11		0.38

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 44 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
527+75	553+02	2527	varies	0.66	0.724	5	10.44	4.99	0.00	4.99	0.0130	0.020		0.30	14.8

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.30	-	4.99

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 45
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
553+76	560+00	624	varies	0.69	0.935	5	6.72	4.34	0.00	4.34	0.0150	0.020		0.42	16.6

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road

Location: Watershed 46 Water Harvesting Area

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
553+76	560+00	624	varies	0.21	0.724	5	10.44	1.59	0.00	1.59	0.0150	0.020		0.19	9.4

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
			0.19		1.59

Computed by: DB Checked by: Date: 10/8/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road
Location: Watershed 47
Project No.: 06099-01

DESIGN DATA

Frequency: 10 years
P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in
n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
553+76	560+00	624	varies	0.62	0.935	5	6.72	3.90	0.00	3.90	0.0150	0.020		0.39	15.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 11/12/2007

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Old Spanish Trail**

Location: Side Street Watershed 1

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
20+70	27+41	671	varies	0.54	0.957	5	6.72	3.47	0.00	3.47	0.0220	0.020		0.29	10.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS1	20+80	12' Scupper	0.29	3.47	0.00

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Old Spanish Trail** Water Harvesting Median

Location: Side Street Watershed 2

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
20+70	27+41	671	varies	0.16	0.724	5	6.72	0.78	0.00	0.78	0.0220	0.020			

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Old Spanish Trail**

Location: Side Street Watershed 3

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
20+70	27+41	671	varies	0.44	0.957	5	6.72	2.83	0.00	2.83	0.0220	0.020		0.31	11.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS3	22+70	8' Scupper	0.31	2.83	0.00

Computed by: DB Checked by: _____ Date: 1/10/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Old Spanish Trail** Water Harvesting Median

Location: Side Street Watershed 4

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
20+70	21+80	110	varies	0.06	0.724	5	6.72	0.29	0.00	0.29	0.0220	0.020			

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Old Spanish Trail**

Location: Side Street Watershed 5

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
20+70	22+10	140	varies	0.08	0.957	5	6.72	0.51	3.12	3.63	0.0220	0.020		0.43	17.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS5	22+10	4' Scupper	0.43	3.63	0.00

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Old Spanish Trail**

Location: Side Street Watershed 6

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+00	19+10	410	varies	0.30	0.957	5	6.72	1.93	0.00	1.93	0.0300	0.020		0.15	7.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Old Spanish Trail** Water Harvesting Median

Location: Side Street Watershed 7

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+00	19+10	410	varies	0.14	0.724	5	6.72	0.68	0.00	0.68	0.0300	0.020			

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Old Spanish Trail**

Location: Side Street Watershed 8

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+00	19+10	410	varies	0.38	0.957	5	6.72	2.44	0.00	2.44	0.0300	0.020		0.16	8.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Golf Links Road**

Location: Side Street Watershed 12

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
20+69	26+48	579	varies	0.31	0.957	5	6.72	1.99	0.00	1.99	0.0070	0.020		0.32	11.7

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS12	20+69	4' Catch Basin	0.32	1.99	0.00

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Golf Links Road** Water Harvesting Median

Location: Side Street Watershed 13

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
23+96	26+48	252	varies	0.17	0.724	5	6.72	0.83	0.00	0.83	0.0070	0.020			

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Golf Links Road**

Location: Side Street Watershed 14

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
20+69	26+48	579	varies	0.17	0.957	5	6.72	1.09	0.00	1.09	0.0070	0.020		0.24	7.9

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS14	20+69	4' Catch Basin	0.24	1.09	0.00

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Golf Links Road**

Location: Side Street Watershed 15

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+00	19+07	407	varies	0.27	0.957	5	6.72	1.74	0.00	1.74	0.0300	0.020		0.14	7.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS15	15+00	16' Catch Basin	0.14	1.624	0.11

Computed by: DB Checked by: _____ Date: 1/10/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Golf Links Road** Water Harvesting Median

Location: Side Street Watershed 16

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
8+87	19+07	1020	varies	0.42	0.724	5	6.72	2.04	0.00	2.04	0.0300	0.020			

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Golf Links Road**

Location: Side Street Watershed 17

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+00	19+07	407	varies	0.56	0.957	5	6.72	3.60	0.00	3.60	0.0300	0.020		0.19	9.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS17	15+00	24' Catch Basin	0.19	3.41	0.19

Computed by: DB Checked by: _____ Date: 1/10/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Golf Links Road**

Location: Side Street Watershed 18

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
8+87	15+00	613	varies	0.44	0.957	5	6.72	2.83	0.11	2.94	0.0300	0.020		0.18	8.8

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/10/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Golf Links Road**

Location: Side Street Watershed 19

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
8+87	15+00	613	varies	0.48	0.957	5	6.72	3.09	0.19	3.28	0.0300	0.020		0.18	9.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/10/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Irvington Road**

Location: Side Street Watershed 22

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+96	19+15	319	varies	0.25	0.957	5	6.72	1.61	0.00	1.61	0.0100	0.020		0.29	10.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS22	18+00	4' Scupper	0.29	1.61	0.00

Computed by: DB Checked by: _____ Date: 1/10/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Irvington Road** Water Harvesting Median

Location: Side Street Watershed 23

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+96	19+15	319	varies	0.04	0.724	5	6.72	0.19	0.00	0.19	0.0100	0.020			

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Irvington Road**

Location: Side Street Watershed 24

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+96	19+15	319	varies	0.33	0.957	5	6.72	2.12	0.00	2.12	0.0100	0.020		0.33	12.2

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS24	18+00	4' Depressed Curb	0.33	2.12	0.00

Computed by: DB Checked by: _____ Date: 1/10/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Irvington Road** Water Harvesting Median

Location: Side Street Watershed 25

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.025

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+00	15+96	96	varies	0.08	0.724	5	6.72	0.39	0.00	0.39	0.0050	0.020			

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Irvington Road**

Location: Side Street Watershed 26

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
3+12	15+96	1284	varies	0.91	0.957	5	6.72	5.85	0.00	5.85	0.0080	0.020		0.29	14.5

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS26	36+88	24' Catch Basin	0.29	5.73	0.12

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

PAVEMENT DRAINAGE WORKSHEET

LOCATION DATA

Highway: Houghton Road **Irvington Road**

Location: Side Street Watershed 27

Project No.: 06099-01

DESIGN DATA

Frequency: 10 years

P_6 = 2.22 in P_{24} = 2.81 P_1 = 1.77 in

n = 0.016

From Station	To Station	L (ft)	W (ft)	D.A. (ac)	C	T_c (min)	I in/hr	Q (cfs)	Q_c (cfs)	Q_T (cfs)	So (ft/ft)	Sx (ft/ft)	z/n	D (ft)	T (ft)
15+00	15+96	96	varies	0.08	0.957	5	6.72	0.51	0.00	0.51	0.0080	0.020		0.12	5.9

INLET CALCULATIONS

Inlet ID	Station	Inlet Type	D (ft)	Q_i (cfs)	$Q_c = Q_T - Q_i$ (cfs)
ISS27	15+00	4' Scupper	0.12	0.4	0.11

Computed by: DB Checked by: _____ Date: 1/9/2008

M M L A
PSOMAS

CULVERT CALCULATIONS

Culvert Designer/Analyzer Report
CP02 (combined with CP03a)

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary				
Allowable HW Elevation	1,005.00 ft	Storm Event	Design	
Computed Headwater Elev	1,004.84 ft	Discharge	961.00 cfs	
Headwater Depth/Height	1.21	Tailwater Elevation	N/A ft	
Inlet Control HW Elev.	1,004.46 ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,004.84 ft			

Grades			
Upstream Invert	1,000.00 ft	Downstream Invert	997.61 ft
Length	199.00 ft	Constructed Slope	0.012000 ft/ft

Hydraulic Profile			
Profile	S2	Depth, Downstream	1.74 ft
Slope Type	Steep	Normal Depth	1.66 ft
Flow Regime	Supercritical	Critical Depth	2.62 ft
Velocity Downstream	13.83 ft/s	Critical Slope	0.003133 ft/ft

Section			
Section Shape	Box	Mannings Coefficient	0.013
Section Material	Concrete	Span	10.00 ft
Section Size	10 x 4 ft	Rise	4.00 ft
Number Sections	4		

Outlet Control Properties			
Outlet Control HW Elev.	1,004.84 ft	Upstream Velocity Head	1.31 ft
Ke	0.70	Entrance Loss	0.92 ft

Inlet Control Properties			
Inlet Control HW Elev.	1,004.46 ft	Flow Control	Unsubmerged
Inlet Type	0° wingwall flares	Area Full	160.0 ft²
K	0.06100	HDS 5 Chart	8
M	0.75000	HDS 5 Scale	3
C	0.04230	Equation Form	1
Y	0.82000		

Culvert Designer/Analyzer Report
CP03.5

Design:Trial-2

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,005.00	ft	Storm Event	Design	
Computed Headwater Elev:	1,004.19	ft	Discharge	213.00	cfs
Headwater Depth/Height	1.05		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,003.91	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,004.19	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	993.24	ft
Length	260.00	ft	Constructed Slope	0.026000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.52	ft
Slope Type	Steep		Normal Depth	1.52	ft
Flow Regime	Supercritical		Critical Depth	2.55	ft
Velocity Downstream	16.15	ft/s	Critical Slope	0.004527	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	4.00	ft
Section Size	48 inch		Rise	4.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	1,004.19	ft	Upstream Velocity Head	1.10	ft
Ke	0.50		Entrance Loss	0.55	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,003.91	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	37.7	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

PIPE CULVERT ANALYSIS
COMPUTATION OF CULVERT PERFORMANCE CURVE

CP04

August 20, 2008

PROGRAM INPUT DATA

DESCRIPTION	VALUE
Culvert Diameter (ft)	2.87
FHWA Chart Number	1
FHWA Scale Number (Type of Culvert Entrance)	2
Manning's Roughness Coefficient (n-value)	0.011
Entrance Loss Coefficient of Culvert Opening	0.1
Culvert Length (ft)	175.0
Invert Elevation at Downstream end of Culvert (ft)	0.0
Invert Elevation at Upstream end of Culvert (ft)	1.4
Culvert Slope (ft/ft)	0.008
Starting Flow Rate (cfs)	90.33
Incremental Flow Rate (cfs)	0.0
Ending Flow Rate (cfs)	90.33
Starting Tailwater Depth (ft)	2.77
Incremental Tailwater Depth (ft)	1.0
Ending Tailwater Depth (ft)	2.77

COMPUTATION RESULTS

Flow Rate (cfs)	Tailwater Depth (ft)	Headwater (ft) Inlet Control	Headwater (ft) Outlet Control	Normal Depth (ft)	Critical Depth (ft)	Depth at Outlet (ft)	Outlet Velocity (fps)
90.33	2.77	7.81	4.65	2.87	2.77	2.87	13.96

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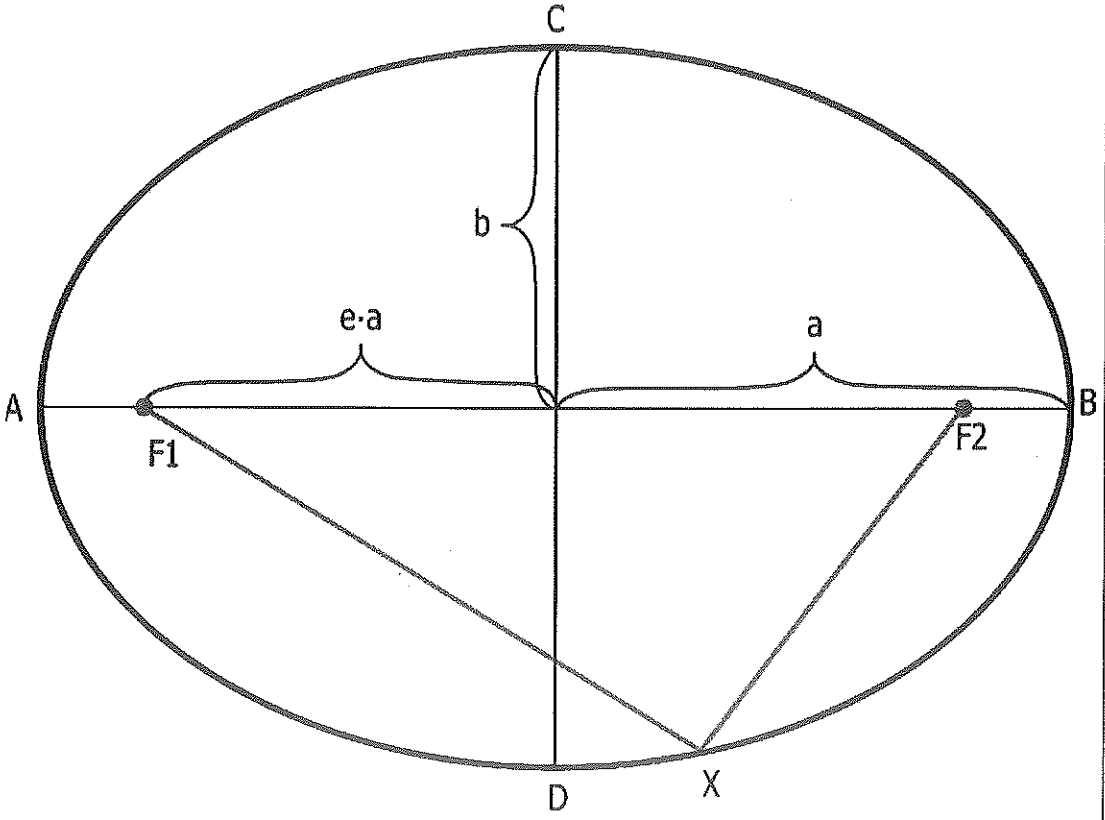
Ellipse Area Calculator

This **calculator** requires the use of **Javascript** enabled and capable browsers. This calculator is designed to give the approximate area of any ellipse. Enter the width of the longest long axis, AB, and the length of the longest short axis, CD. Then, click on Calculate. The area is in whatever designation of square units you have used for the entries. The formula is (PI * long axis * short axis) / 4. You may see all of our other area calculations by going to our **Area Calculator**.

Unit	Number	
Required Data Entry		
Long Axis Width	44	Units
Short Axis Length	27	Units
Calculate	Clear Values	
Calculated Results		
Ellipse Area	933.053018238	Square Units

Version 1.3.2



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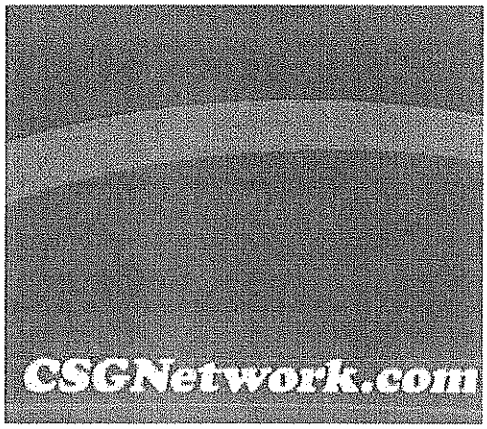

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Job No. 06099-01 Sheet ____ of ____ Prepared by ____ Date ____

Project Name HOUGHTON Reviewed by ____ Date ____

Title CP04 CULVERT FWA No. ____

44" ^ 27" → 933 sq. in

$\pi r^2 = 933$

$2\sqrt{\frac{933}{\pi}} = d = 34.5''$

Culvert Designer/Analyzer Report
CP05---RH

Design:Trial-4

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,006.00	ft	Storm Event	Design	
Computed Headwater Elev	1,004.74	ft	Discharge	279.00	cfs
Headwater Depth/Height	1.18		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,004.32	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,004.74	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	993.61	ft
Length	213.00	ft	Constructed Slope	0.030000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.31	ft
Slope Type	Steep		Normal Depth	1.27	ft
Flow Regime	Supercritical		Critical Depth	2.56	ft
Velocity Downstream	17.75	ft/s	Critical Slope	0.004099	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	6.00	ft
Section Size	6 x 4 ft		Rise	4.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	1,004.74	ft	Upstream Velocity Head	1.28	ft
Ke	0.70		Entrance Loss	0.90	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,004.32	ft	Flow Control	Unsubmerged	
Inlet Type	0° wingwall flares		Area Full	48.0	ft²
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

Culvert Designer/Analyzer Report
CP07---RH

Design:Trial-4

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,007.00	ft	Storm Event	Design	
Computed Headwater Elev	1,008.76	ft	Discharge	2,287.00	cfs
Headwater Depth/Height	1.10		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,008.05	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,008.76	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	998.25	ft
Length	175.00	ft	Constructed Slope	0.010000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	3.73	ft
Slope Type	Steep		Normal Depth	3.34	ft
Flow Regime	Supercritical		Critical Depth	5.01	ft
Velocity Downstream	17.01	ft/s	Critical Slope	0.003232	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	12.00	ft
Section Size	12 x 8 ft		Rise	8.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	1,008.76	ft	Upstream Velocity Head	2.50	ft
Ke	0.50		Entrance Loss	1.25	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,008.05	ft	Flow Control	Unsubmerged	
Inlet Type	30 to 75° wingwall flares		Area Full	288.0	ft²
K	0.02600		HDS 5 Chart	8	
M	1.00000		HDS 5 Scale	1	
C	0.03470		Equation Form	1	
Y	0.86000				

Culvert Designer/Analyzer Report
CP07.2

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,005.00	ft	Storm Event	Design	
Computed Headwater Elev	1,003.65	ft	Discharge	113.00	cfs
Headwater Depth/Height	0.91		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,003.36	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,003.65	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	997.32	ft
Length	223.00	ft	Constructed Slope	0.012000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.66	ft
Slope Type	Steep		Normal Depth	1.66	ft
Flow Regime	Supercritical		Critical Depth	2.26	ft
Velocity Downstream	11.45	ft/s	Critical Slope	0.004126	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	4.00	ft
Section Size	48 inch		Rise	4.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	1,003.65	ft	Upstream Velocity Head	0.92	ft
Ke	0.50		Entrance Loss	0.46	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,003.36	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	25.1	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP07.4

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,006.00	ft	Storm Event	Design	
Computed Headwater Elev	1,004.75	ft	Discharge	1,216.00	cfs
Headwater Depth/Height	1.19		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,004.45	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,004.75	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	993.56	ft
Length	184.00	ft	Constructed Slope	0.035000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.26	ft
Slope Type	Steep		Normal Depth	1.18	ft
Flow Regime	Supercritical		Critical Depth	2.64	ft
Velocity Downstream	19.28	ft/s	Critical Slope	0.003136	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 4 ft		Rise	4.00	ft
Number Sections	5				

Outlet Control Properties					
Outlet Control HW Elev.	1,004.75	ft	Upstream Velocity Head	1.32	ft
Ke	0.60		Entrance Loss	0.79	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,004.45	ft	Flow Control	Unsubmerged	
Inlet Type	0° wingwall flares		Area Full	200.0	ft²
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

Culvert Designer/Analyzer Report
CP07.6 north

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,004.00	ft	Storm Event	Design	
Computed Headwater Elev	1,002.21	ft	Discharge	19.00	cfs
Headwater Depth/Height	0.74		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,001.92	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,002.21	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	986.34	ft
Length	224.00	ft	Constructed Slope	0.061000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	0.69	ft
Slope Type	Steep		Normal Depth	0.69	ft
Flow Regime	Supercritical		Critical Depth	1.40	ft
Velocity Downstream	15.53	ft/s	Critical Slope	0.004144	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,002.21	ft	Upstream Velocity Head	0.54	ft
Ke	0.50		Entrance Loss	0.27	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,001.92	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	7.1	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP07.6 south

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,004.00	ft	Storm Event	Design	
Computed Headwater Elev	1,003.96	ft	Discharge	147.00	cfs
Headwater Depth/Height	1.32		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,003.86	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,003.96	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	988.26	ft
Length	261.00	ft	Constructed Slope	0.045000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.22	ft
Slope Type	Steep		Normal Depth	1.22	ft
Flow Regime	Supercritical		Critical Depth	2.28	ft
Velocity Downstream	18.19	ft/s	Critical Slope	0.006301	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	1,003.96	ft	Upstream Velocity Head	1.12	ft
Ke	0.50		Entrance Loss	0.56	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,003.86	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	21.2	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP07.8

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,005.00	ft	Storm Event	Design	
Computed Headwater Elev	1,003.76	ft	Discharge	119.00	cfs
Headwater Depth/Height	0.94		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,003.41	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,003.76	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	986.58	ft
Length	305.00	ft	Constructed Slope	0.044000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.21	ft
Slope Type	Steep		Normal Depth	1.21	ft
Flow Regime	Supercritical		Critical Depth	2.32	ft
Velocity Downstream	18.65	ft/s	Critical Slope	0.004201	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	4.00	ft
Section Size	48 inch		Rise	4.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	1,003.76	ft	Upstream Velocity Head	0.96	ft
Ke	0.50		Entrance Loss	0.48	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,003.41	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	25.1	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP08a

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,005.00	ft	Storm Event	Design	
Computed Headwater Elev	1,004.05	ft	Discharge	201.00	cfs
Headwater Depth/Height	1.01		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,003.74	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,004.05	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	993.67	ft
Length	211.00	ft	Constructed Slope	0.030000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.44	ft
Slope Type	Steep		Normal Depth	1.42	ft
Flow Regime	Supercritical		Critical Depth	2.47	ft
Velocity Downstream	16.46	ft/s	Critical Slope	0.004406	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	4.00	ft
Section Size	48 inch		Rise	4.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	1,004.05	ft	Upstream Velocity Head	1.05	ft
Ke	0.50		Entrance Loss	0.52	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,003.74	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	37.7	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP12---RH

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,007.00	ft	Storm Event	Design	
Computed Headwater Elev:	1,006.38	ft	Discharge	726.00	cfs
Headwater Depth/Height	1.06		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,005.88	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,006.38	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	999.03	ft
Length	195.00	ft	Constructed Slope	0.005000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	3.00	ft
Slope Type	Steep		Normal Depth	2.97	ft
Flow Regime	Supercritical		Critical Depth	3.45	ft
Velocity Downstream	12.10	ft/s	Critical Slope	0.003280	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 6 ft		Rise	6.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	1,006.38	ft	Upstream Velocity Head	1.72	ft
Ke	0.70		Entrance Loss	1.21	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,005.88	ft	Flow Control	Unsubmerged	
Inlet Type	0° wingwall flares		Area Full	120.0	ft²
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

Culvert Designer/Analyzer Report
CP13

Design:Trial-3

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,005.00	ft	Storm Event	Design	
Computed Headwater Elev	1,003.18	ft	Discharge	107.00	cfs
Headwater Depth/Height	1.06		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,003.03	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	1,003.18	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	999.51	ft
Length	164.00	ft	Constructed Slope	0.003000	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	1.94	ft
Slope Type	Mild		Normal Depth	2.40	ft
Flow Regime	Subcritical		Critical Depth	1.94	ft
Velocity Downstream	7.37	ft/s	Critical Slope	0.005061	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	1,003.18	ft	Upstream Velocity Head	0.58	ft
Ke	0.50		Entrance Loss	0.29	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,003.03	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	21.2	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP14

Design:Trial-3

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,005.00	ft	Storm Event	Design	
Computed Headwater Elev	1,003.71	ft	Discharge	89.00	cfs
Headwater Depth/Height	1.24		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,003.57	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,003.71	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	995.60	ft
Length	200.00	ft	Constructed Slope	0.022000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.42	ft
Slope Type	Steep		Normal Depth	1.41	ft
Flow Regime	Supercritical		Critical Depth	2.17	ft
Velocity Downstream	13.55	ft/s	Critical Slope	0.005818	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	3.00	ft
Section Size	36 inch		Rise	3.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	1,003.71	ft	Upstream Velocity Head	1.02	ft
Ke	0.50		Entrance Loss	0.51	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,003.57	ft	Flow Control	Transition	
Inlet Type	Square edge w/headwall		Area Full	14.1	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP15

Design:Trial-3

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,003.50	ft	Storm Event	Design	
Computed Headwater Elev	1,003.05	ft	Discharge	83.00	cfs
Headwater Depth/Height	1.22		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,002.93	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,003.05	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	998.13	ft
Length	125.00	ft	Constructed Slope	0.015000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.34	ft
Slope Type	Steep		Normal Depth	1.32	ft
Flow Regime	Supercritical		Critical Depth	1.79	ft
Velocity Downstream	10.34	ft/s	Critical Slope	0.006094	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.50	ft
Section Size	30 inch		Rise	2.50	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	1,003.05	ft	Upstream Velocity Head	0.84	ft
Ke	0.50		Entrance Loss	0.42	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,002.93	ft	Flow Control	Transition	
Inlet Type	Square edge w/headwall		Area Full	14.7	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP15 south exisiting

Design:Trial-3

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,003.00	ft	Storm Event	Design	
Computed Headwater Elev	1,002.25	ft	Discharge	42.00	cfs
Headwater Depth/Height	1.12		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,002.13	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,002.25	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	998.38	ft
Length	108.00	ft	Constructed Slope	0.015000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.01	ft
Slope Type	Steep		Normal Depth	1.01	ft
Flow Regime	Supercritical		Critical Depth	1.35	ft
Velocity Downstream	8.83	ft/s	Critical Slope	0.006050	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	3				

Outlet Control Properties					
Outlet Control HW Elev.	1,002.25	ft	Upstream Velocity Head	0.60	ft
Ke	0.50		Entrance Loss	0.30	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,002.13	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	9.4	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP16

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,005.00	ft	Storm Event	Design	
Computed Headwater Elev	1,003.62	ft	Discharge	112.00	cfs
Headwater Depth/Height	0.90		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,003.36	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	1,003.62	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	999.16	ft
Length	210.00	ft	Constructed Slope	0.004000	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	2.25	ft
Slope Type	Mild		Normal Depth	2.27	ft
Flow Regime	Subcritical		Critical Depth	2.25	ft
Velocity Downstream	7.69	ft/s	Critical Slope	0.004114	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	4.00	ft
Section Size	48 inch		Rise	4.00	ft
Number Sections	2				

Outlet Control Properties					
Outlet Control HW Elev.	1,003.62	ft	Upstream Velocity Head	0.90	ft
Ke	0.50		Entrance Loss	0.45	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,003.36	ft	Flow Control	Unsubmerged	
Inlet Type	Square edge w/headwall		Area Full	25.1	ft²
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP17---North Crossing at Poorman

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,003.00	ft	Storm Event	Design	
Computed Headwater Elev	1,002.75	ft	Discharge	75.00	cfs
Headwater Depth/Height	1.38		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,002.75	ft	Control Type	Inlet Control	
Outlet Control HW Elev.	1,002.75	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	999.58	ft
Length	85.00	ft	Constructed Slope	0.005000	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	1.56	ft
Slope Type	Mild		Normal Depth	N/A	ft
Flow Regime	Subcritical		Critical Depth	1.56	ft
Velocity Downstream	7.14	ft/s	Critical Slope	0.007588	ft/ft

Section					
Section Shape	Circular		Mannings Coefficient	0.013	
Section Material	Concrete		Span	2.00	ft
Section Size	24 inch		Rise	2.00	ft
Number Sections	4				

Outlet Control Properties					
Outlet Control HW Elev.	1,002.75	ft	Upstream Velocity Head	0.59	ft
Ke	0.50		Entrance Loss	0.29	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,002.75	ft	Flow Control	Submerged	
Inlet Type	Square edge w/headwall		Area Full	12.6	ft^2
K	0.00980		HDS 5 Chart	1	
M	2.00000		HDS 5 Scale	1	
C	0.03980		Equation Form	1	
Y	0.67000				

Culvert Designer/Analyzer Report
CP17---RH

Design:Trial-3

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,006.00	ft	Storm Event	Design	
Computed Headwater Elev	1,004.20	ft	Discharge	776.00	cfs
Headwater Depth/Height	1.05		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,003.87	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,004.20	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	999.19	ft
Length	162.00	ft	Constructed Slope	0.005000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	1.94	ft
Slope Type	Steep		Normal Depth	1.93	ft
Flow Regime	Supercritical		Critical Depth	2.27	ft
Velocity Downstream	10.00	ft/s	Critical Slope	0.003087	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 4 ft		Rise	4.00	ft
Number Sections	4				

Outlet Control Properties					
Outlet Control HW Elev.	1,004.20	ft	Upstream Velocity Head	1.14	ft
Ke	0.70		Entrance Loss	0.79	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,003.87	ft	Flow Control	Unsubmerged	
Inlet Type	0° wingwall flares		Area Full	160.0	ft^2
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

Culvert Designer/Analyzer Report
CP18---RH

Design:Trial-2

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,005.00	ft	Storm Event	Design	
Computed Headwater Elev	1,004.77	ft	Discharge	235.00	cfs
Headwater Depth/Height	1.19		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,004.40	ft	Control Type	Entrance Control	
Outlet Control HW Elev.	1,004.77	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	998.87	ft
Length	188.00	ft	Constructed Slope	0.006000	ft/ft

Hydraulic Profile					
Profile	S2		Depth, Downstream	2.10	ft
Slope Type	Steep		Normal Depth	2.06	ft
Flow Regime	Supercritical		Critical Depth	2.58	ft
Velocity Downstream	11.22	ft/s	Critical Slope	0.003127	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 4 ft		Rise	4.00	ft
Number Sections	1				

Outlet Control Properties					
Outlet Control HW Elev.	1,004.77	ft	Upstream Velocity Head	1.29	ft
Ke	0.70		Entrance Loss	0.90	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,004.40	ft	Flow Control	Unsubmerged	
Inlet Type	0° wingwall flares		Area Full	40.0	ft²
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

Culvert Designer/Analyzer Report
CP19---RH

Design:Trial-1

Solve For: Headwater Elevation

Culvert Summary					
Allowable HW Elevation	1,009.00	ft	Storm Event	Design	
Computed Headwater Elev:	1,005.34	ft	Discharge	1,689.00	cfs
Headwater Depth/Height	1.07		Tailwater Elevation	N/A	ft
Inlet Control HW Elev.	1,004.97	ft	Control Type	Outlet Control	
Outlet Control HW Elev.	1,005.34	ft			

Grades					
Upstream Invert	1,000.00	ft	Downstream Invert	999.44	ft
Length	187.00	ft	Constructed Slope	0.003000	ft/ft

Hydraulic Profile					
Profile	M2		Depth, Downstream	2.91	ft
Slope Type	Mild		Normal Depth	2.97	ft
Flow Regime	Subcritical		Critical Depth	2.91	ft
Velocity Downstream	9.68	ft/s	Critical Slope	0.003180	ft/ft

Section					
Section Shape	Box		Mannings Coefficient	0.013	
Section Material	Concrete		Span	10.00	ft
Section Size	10 x 5 ft		Rise	5.00	ft
Number Sections	6				

Outlet Control Properties					
Outlet Control HW Elev.	1,005.34	ft	Upstream Velocity Head	1.40	ft
Ke	0.70		Entrance Loss	0.98	ft

Inlet Control Properties					
Inlet Control HW Elev.	1,004.97	ft	Flow Control	Unsubmerged	
Inlet Type	0° wingwall flares		Area Full	300.0	ft²
K	0.06100		HDS 5 Chart	8	
M	0.75000		HDS 5 Scale	3	
C	0.04230		Equation Form	1	
Y	0.82000				

CHANNEL CALCULATIONS

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP2N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	26.70	cfs

Results		
Depth	1.19	ft
Flow Area	9.0	ft²
Wetted Perim	11.51	ft
Top Width	11.13	ft
Critical Depth	0.89	ft
Critical Slope	0.015898	ft/ft
Velocity	2.97	ft/s
Velocity Head	0.14	ft
Specific Energ	1.33	ft
Froude Numb	0.58	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP2S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	3.24	cfs

Results		
Depth	0.39	ft
Flow Area	2.0	ft²
Wetted Perim	6.46	ft
Top Width	6.34	ft
Critical Depth	0.26	ft
Critical Slope	0.022180	ft/ft
Velocity	1.61	ft/s
Velocity Head	0.04	ft
Specific Energ	0.43	ft
Froude Numb	0.50	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP3A S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	015000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	3.32	cfs

Results		
Depth	0.29	ft
Flow Area	1.4	ft²
Wetted Perim	5.83	ft
Top Width	5.74	ft
Critical Depth	0.26	ft
Critical Slope	0.022008	ft/ft
Velocity	2.35	ft/s
Velocity Head	0.09	ft
Specific Energ	0.38	ft
Froude Numb	0.84	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP3B N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	015000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	47.16	cfs

Results		
Depth	1.20	ft
Flow Area	9.1	ft²
Wetted Perim	11.59	ft
Top Width	11.20	ft
Critical Depth	1.21	ft
Critical Slope	0.014684	ft/ft
Velocity	5.17	ft/s
Velocity Head	0.42	ft
Specific Energ	1.62	ft
Froude Numb	1.01	
Flow Type	Supercritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP3B S
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	015000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	17.45	cfs

Results		
Depth	0.72	ft
Flow Area	4.4	ft²
Wetted Perim	8.56	ft
Top Width	8.33	ft
Critical Depth	0.70	ft
Critical Slope	0.016899	ft/ft
Velocity	3.92	ft/s
Velocity Head	0.24	ft
Specific Energ	0.96	ft
Froude Numb	0.95	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP3.5 N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	025000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	21.66	cfs

Results		
Depth	0.71	ft
Flow Area	4.3	ft²
Wetted Perim	8.47	ft
Top Width	8.24	ft
Critical Depth	0.79	ft
Critical Slope	0.016384	ft/ft
Velocity	5.01	ft/s
Velocity Head	0.39	ft
Specific Energ	1.10	ft
Froude Numb	1.22	
Flow Type	Supercritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP3.5 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	010000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	8.16	cfs

Results		
Depth	0.54	ft
Flow Area	3.0	ft²
Wetted Perim	7.39	ft
Top Width	7.21	ft
Critical Depth	0.45	ft
Critical Slope	0.018995	ft/ft
Velocity	2.72	ft/s
Velocity Head	0.11	ft
Specific Energ	0.65	ft
Froude Numb	0.74	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP4N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	6.75	cfs

Results		
Depth	0.58	ft
Flow Area	3.4	ft²
Wetted Perim	7.69	ft
Top Width	7.50	ft
Critical Depth	0.40	ft
Critical Slope	0.019582	ft/ft
Velocity	2.01	ft/s
Velocity Head	0.06	ft
Specific Energ	0.65	ft
Froude Numb	0.53	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP4S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	010000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	5.48	cfs

Results		
Depth	0.43	ft
Flow Area	2.3	ft²
Wetted Perim	6.72	ft
Top Width	6.58	ft
Critical Depth	0.35	ft
Critical Slope	0.020260	ft/ft
Velocity	2.41	ft/s
Velocity Head	0.09	ft
Specific Energ	0.52	ft
Froude Numb	0.72	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP5N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	010000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	3.10	cfs

Results		
Depth	0.31	ft
Flow Area	1.5	ft²
Wetted Perim	5.98	ft
Top Width	5.88	ft
Critical Depth	0.25	ft
Critical Slope	0.022376	ft/ft
Velocity	2.01	ft/s
Velocity Head	0.06	ft
Specific Energ	0.38	ft
Froude Numb	0.69	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP5S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	030000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	12.68	cfs

Results		
Depth	0.50	ft
Flow Area	2.8	ft²
Wetted Perim	7.19	ft
Top Width	7.03	ft
Critical Depth	0.58	ft
Critical Slope	0.017753	ft/ft
Velocity	4.56	ft/s
Velocity Head	0.32	ft
Specific Energ	0.83	ft
Froude Numb	1.28	
Flow Type	Supercritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP6N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	021000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	36.86	cfs

Results		
Depth	0.97	ft
Flow Area	6.7	ft²
Wetted Perim	10.16	ft
Top Width	9.85	ft
Critical Depth	1.06	ft
Critical Slope	0.015190	ft/ft
Velocity	5.46	ft/s
Velocity Head	0.46	ft
Specific Energ	1.44	ft
Froude Numb	1.16	
Flow Type	Supercritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7N
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	7.59	cfs

Results		
Depth	0.62	ft
Flow Area	3.6	ft²
Wetted Perimı	7.93	ft
Top Width	7.73	ft
Critical Depth	0.43	ft
Critical Slope	0.019216	ft/ft
Velocity	2.08	ft/s
Velocity Head	0.07	ft
Specific Energ	0.69	ft
Froude Numbı	0.54	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	021000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	16.61	cfs

Results		
Depth	0.64	ft
Flow Area	3.8	ft²
Wetted Perim	8.07	ft
Top Width	7.86	ft
Critical Depth	0.68	ft
Critical Slope	0.017032	ft/ft
Velocity	4.36	ft/s
Velocity Head	0.29	ft
Specific Energ	0.94	ft
Froude Numb	1.10	
Flow Type	Supercritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7.2 N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	016000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	1.62	cfs

Results		
Depth	0.19	ft
Flow Area	0.9	ft²
Wetted Perim	5.19	ft
Top Width	5.13	ft
Critical Depth	0.17	ft
Critical Slope	0.024991	ft/ft
Velocity	1.89	ft/s
Velocity Head	0.06	ft
Specific Energ	0.24	ft
Froude Numb	0.81	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7.2 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	016000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	4.34	cfs

Results		
Depth	0.33	ft
Flow Area	1.7	ft²
Wetted Perim	6.09	ft
Top Width	5.99	ft
Critical Depth	0.31	ft
Critical Slope	0.021088	ft/ft
Velocity	2.63	ft/s
Velocity Head	0.11	ft
Specific Energ	0.44	ft
Froude Numb	0.88	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7.4 N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	1.71	cfs

Results		
Depth	0.27	ft
Flow Area	1.3	ft²
Wetted Perim	5.72	ft
Top Width	5.63	ft
Critical Depth	0.17	ft
Critical Slope	0.024932	ft/ft
Velocity	1.31	ft/s
Velocity Head	0.03	ft
Specific Energ	0.30	ft
Froude Numb	0.48	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7.4 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	1.61	cfs

Results		
Depth	0.26	ft
Flow Area	1.3	ft²
Wetted Perim	5.66	ft
Top Width	5.57	ft
Critical Depth	0.16	ft
Critical Slope	0.025252	ft/ft
Velocity	1.28	ft/s
Velocity Head	0.03	ft
Specific Energ	0.29	ft
Froude Numb	0.48	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7.6 N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	4.78	cfs

Results		
Depth	0.48	ft
Flow Area	2.6	ft²
Wetted Perim	7.05	ft
Top Width	6.90	ft
Critical Depth	0.32	ft
Critical Slope	0.020734	ft/ft
Velocity	1.82	ft/s
Velocity Head	0.05	ft
Specific Energ	0.53	ft
Froude Numb	0.52	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7.6 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	010000	ft/ft
Left Side Slope	1.00	H : V
Right Side Slope	1.00	H : V
Bottom Width	4.00	ft
Discharge	147.14	cfs

Results		
Depth	3.00	ft
Flow Area	21.0	ft²
Wetted Perim	12.49	ft
Top Width	10.00	ft
Critical Depth	2.75	ft
Critical Slope	0.013970	ft/ft
Velocity	7.00	ft/s
Velocity Head	0.76	ft
Specific Energ	3.76	ft
Froude Numb	0.85	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7.8 N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	018000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	74.75	cfs

Results		
Depth	1.56	ft
Flow Area	11.1	ft²
Wetted Perim	10.99	ft
Top Width	10.26	ft
Critical Depth	1.67	ft
Critical Slope	0.013770	ft/ft
Velocity	6.71	ft/s
Velocity Head	0.70	ft
Specific Energ	2.26	ft
Froude Numb	1.13	
Flow Type	Supercritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP7.8 S
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	018000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	10.95	cfs

Results		
Depth	0.54	ft
Flow Area	3.0	ft²
Wetted Perim	7.39	ft
Top Width	7.21	ft
Critical Depth	0.53	ft
Critical Slope	0.018142	ft/ft
Velocity	3.65	ft/s
Velocity Head	0.21	ft
Specific Energ	0.74	ft
Froude Numb	1.00	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP8a N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	018000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	5.78	cfs

Results		
Depth	0.38	ft
Flow Area	1.9	ft²
Wetted Perim	6.38	ft
Top Width	6.26	ft
Critical Depth	0.36	ft
Critical Slope	0.020072	ft/ft
Velocity	2.99	ft/s
Velocity Head	0.14	ft
Specific Energ	0.52	ft
Froude Numb	0.95	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP8a S
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	018000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	1.00	cfs

Results		
Depth	0.14	ft
Flow Area	0.6	ft²
Wetted Perim	4.87	ft
Top Width	4.82	ft
Critical Depth	0.12	ft
Critical Slope	0.027406	ft/ft
Velocity	1.66	ft/s
Velocity Head	0.04	ft
Specific Energ	0.18	ft
Froude Numb	0.82	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP8b S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	007000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	189.00	cfs

Results		
Depth	3.08	ft
Flow Area	31.3	ft²
Wetted Perim	17.77	ft
Top Width	16.32	ft
Critical Depth	2.70	ft
Critical Slope	0.012229	ft/ft
Velocity	6.04	ft/s
Velocity Head	0.57	ft
Specific Energ	3.65	ft
Froude Numb	0.77	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	10 S above storm (
Flow Element	Trapezoidal Chann
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.035	
Channel Slope	005000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	30.00	cfs

Results		
Depth	1.47	ft
Flow Area	10.2	ft²
Wetted Perim(	10.58	ft
Top Width	9.89	ft
Critical Depth	1.01	ft
Critical Slope	0.021143	ft/ft
Velocity	2.93	ft/s
Velocity Head	0.13	ft
Specific Energ	1.61	ft
Froude Numb(	0.51	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	11 S above storm (
Flow Element	Trapezoidal Chann
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.035	
Channel Slope	005000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	54.00	cfs

Results		
Depth	1.98	ft
Flow Area	15.7	ft²
Wetted Perim(	12.84	ft
Top Width	11.91	ft
Critical Depth	1.40	ft
Critical Slope	0.019552	ft/ft
Velocity	3.44	ft/s
Velocity Head	0.18	ft
Specific Energ	2.16	ft
Froude Numb(	0.53	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP12 N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	010000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	14.69	cfs

Results		
Depth	0.73	ft
Flow Area	4.5	ft²
Wetted Perim	8.64	ft
Top Width	8.40	ft
Critical Depth	0.63	ft
Critical Slope	0.017347	ft/ft
Velocity	3.23	ft/s
Velocity Head	0.16	ft
Specific Energ	0.90	ft
Froude Numb	0.77	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP12 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	022000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	14.69	cfs

Results		
Depth	0.59	ft
Flow Area	3.4	ft²
Wetted Perim	7.76	ft
Top Width	7.57	ft
Critical Depth	0.63	ft
Critical Slope	0.017339	ft/ft
Velocity	4.27	ft/s
Velocity Head	0.28	ft
Specific Energ	0.88	ft
Froude Numb	1.12	
Flow Type	Supercritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP13 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	006000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	17.93	cfs

Results		
Depth	0.93	ft
Flow Area	6.3	ft²
Wetted Perim	9.87	ft
Top Width	9.57	ft
Critical Depth	0.71	ft
Critical Slope	0.016842	ft/ft
Velocity	2.85	ft/s
Velocity Head	0.13	ft
Specific Energ	1.05	ft
Froude Numb	0.62	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP14 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	008000	ft/ft
Left Side Slope	1.00	H : V
Right Side Slope	1.00	H : V
Bottom Width	4.00	ft
Discharge	90.90	cfs

Results		
Depth	2.47	ft
Flow Area	16.0	ft²
Wetted Perim	10.99	ft
Top Width	8.94	ft
Critical Depth	2.10	ft
Critical Slope	0.014607	ft/ft
Velocity	5.69	ft/s
Velocity Head	0.50	ft
Specific Energ	2.97	ft
Froude Numb	0.75	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP15 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	7.35	cfs

Results		
Depth	0.61	ft
Flow Area	3.6	ft²
Wetted Perim	7.86	ft
Top Width	7.66	ft
Critical Depth	0.42	ft
Critical Slope	0.019315	ft/ft
Velocity	2.07	ft/s
Velocity Head	0.07	ft
Specific Energ	0.68	ft
Froude Numb	0.53	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP16 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	1.00	H : V
Right Side Slope	1.00	H : V
Bottom Width	4.00	ft
Discharge	134.40	cfs

Results		
Depth	3.42	ft
Flow Area	25.4	ft²
Wetted Perim	13.68	ft
Top Width	10.84	ft
Critical Depth	2.62	ft
Critical Slope	0.014089	ft/ft
Velocity	5.29	ft/s
Velocity Head	0.44	ft
Specific Energ	3.86	ft
Froude Numb	0.61	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP17 N
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	1.00	H : V
Right Side Slope	1.00	H : V
Bottom Width	4.00	ft
Discharge	75.00	cfs

Results		
Depth	2.53	ft
Flow Area	16.5	ft²
Wetted Perim	11.15	ft
Top Width	9.05	ft
Critical Depth	1.88	ft
Critical Slope	0.014872	ft/ft
Velocity	4.55	ft/s
Velocity Head	0.32	ft
Specific Energ	2.85	ft
Froude Numb	0.59	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP17 S
Flow Element	Trapezoidal Cha
Method	Manning's Form
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	007500	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	46.73	cfs

Results		
Depth	1.54	ft
Flow Area	10.9	ft²
Wetted Perim	10.88	ft
Top Width	10.15	ft
Critical Depth	1.30	ft
Critical Slope	0.014642	ft/ft
Velocity	4.29	ft/s
Velocity Head	0.29	ft
Specific Energ	1.82	ft
Froude Numb	0.73	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP18 S
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	005000	ft/ft
Left Side Slope	1.00	H : V
Right Side Slope	1.00	H : V
Bottom Width	4.00	ft
Discharge	171.41	cfs

Results		
Depth	3.87	ft
Flow Area	30.5	ft²
Wetted Perim	14.94	ft
Top Width	11.74	ft
Critical Depth	2.99	ft
Critical Slope	0.013774	ft/ft
Velocity	5.63	ft/s
Velocity Head	0.49	ft
Specific Energ	4.36	ft
Froude Numb	0.62	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	CP19 S
Flow Element	Trapezoidal Cha
Method	Manning's Formı
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.030	
Channel Slope	007500	ft/ft
Left Side Slope	3.00	H : V
Right Side Slope	3.00	H : V
Bottom Width	4.00	ft
Discharge	33.62	cfs

Results		
Depth	1.21	ft
Flow Area	9.2	ft²
Wetted Perimı	11.62	ft
Top Width	11.23	ft
Critical Depth	1.01	ft
Critical Slope	0.015388	ft/ft
Velocity	3.66	ft/s
Velocity Head	0.21	ft
Specific Energ	1.41	ft
Froude Numb	0.71	
Flow Type	Subcritical	

FREEBOARD CALCULATIONS

P S O M A S

Project Name: Houghton Road
Project Number # : 06099-01 Made by DB Sheet1 Date 08/18/08
Reference: SMDDFPM Checked v Date

Calculation of Channel Parameters

General Equations:

1) Minimum Channel Freeboard

$$FB = 1/6\left[Y + \frac{V^2}{2g}\right] \qquad \text{Eq 8.4}$$

Where

FB = Freeboard (ft)
Y = Depth of Flow (ft)
V = average velocity of flow, (fps)
g = Acceleration due to gravity = 32.2 ft/sec2

2) Minimum Channel Radius

$$R_c = 3T \qquad \text{Froude Number <0.86}$$

Where

R_c = Minimum Radius of Curvature Centerline (ft)
T = Channel Topwidth at Watersurface (ft)

$$R_c = \frac{4V^2T}{gY} \qquad \text{Froude Number >0.86} \qquad \text{Eq 8.12}$$

Where

R_c = Minimum Radius of Curvature Centerline (ft)
T = Channel Topwidth at Watersurface (ft)
V = average velocity of flow, (fps)
Y = Hydraulic Depth of Flow (ft)

Channel	Y (ft)	V (fps)	FB (ft)	Froude Number	T (ft)	Rc (ft)	Total Depth (ft)
2N	1.19	2.97	0.22	0.58	11.13	33.39	**1.41**
2S	0.39	1.61	0.07	0.50	6.34	19.02	**0.46**
3a S	0.29	2.35	0.06	0.84	5.74	17.22	**0.35**
3b N	1.2	5.17	0.27	1.01	11.2	30.99	**1.47**
3b S	0.72	3.92	0.16	0.95	8.33	22.08	**0.88**
3.5 N	0.71	5.01	0.18	1.22	8.24	36.19	**0.89**
3.5 S	0.54	2.72	0.11	0.74	7.21	21.63	**0.65**
4N	0.58	2.01	0.11	0.53	7.5	22.50	**0.69**
4S	0.43	2.41	0.09	0.72	6.58	19.74	**0.52**
5N	0.31	2.01	0.06	0.69	5.88	17.64	**0.37**
5S	0.5	4.56	0.14	1.28	7.03	36.32	**0.64**
6N	0.97	5.46	0.24	1.16	9.85	37.61	**1.21**
7N	0.62	2.08	0.11	0.54	7.73	23.19	**0.73**
7S	0.64	4.36	0.16	1.10	7.86	29.00	**0.80**
7.2 N	0.19	1.89	0.04	0.81	5.13	15.39	**0.23**
7.2 S	0.33	2.63	0.07	0.88	5.99	15.60	**0.40**
7.4 N	0.27	1.31	0.05	0.48	5.63	16.89	**0.32**
7.4 S	0.26	1.28	0.05	0.48	5.57	16.71	**0.31**
7.6 N	0.48	1.82	0.09	0.52	6.9	20.70	**0.57**
7.6 S	3	7	0.63	0.85	10	30.00	**3.63**
7.8 N	1.56	6.71	0.38	1.13	10.26	36.79	**1.94**
7.8 S	0.54	3.65	0.12	1.00	7.21	22.10	**0.66**
8a N	0.38	2.99	0.09	0.95	6.26	18.30	**0.47**
8a S	0.14	1.66	0.03	0.82	4.82	14.46	**0.17**
8b S	3.08	6.04	0.61	0.77	16.32	48.96	**3.69**
10S*	1.47	2.93	0.27	0.51	9.89	29.67	**1.74**
11S*	1.98	3.44	0.36	0.53	11.91	35.73	**2.34**
12N	0.73	3.23	0.15	0.77	8.4	25.20	**0.88**
12S	0.59	4.27	0.15	1.12	7.57	29.06	**0.74**
13S	0.93	2.85	0.18	0.62	9.57	28.71	**1.11**
14S	2.47	5.69	0.50	0.75	8.94	26.82	**2.97**
15S	0.61	2.07	0.11	0.53	7.66	22.98	**0.72**
16S	3.42	5.29	0.64	0.61	10.84	32.52	**4.06**
17N	2.53	4.55	0.48	0.59	9.05	27.15	**3.01**
17S	1.54	4.29	0.30	0.73	10.15	30.45	**1.84**
18S	3.87	5.63	0.73	0.62	11.74	35.22	**4.60**
19S	1.21	3.66	0.24	0.71	11.23	33.69	**1.45**

INLET CALCULATIONS

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/12/2007

Project No. :
Project Name.:
Computed by :

WATERSHED 1A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0050
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	3.910
T	Width of Spread (ft)	13.69

Gutter Flow

Eo	Gutter Flow Ratio	0.344
d	Depth of Flow (ft)	0.27
V	Average Velocity (ft/sec)	2.09

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	19.62
L	Curb-Opening Length (ft)	16.00
e	Inlet Efficiency	0.952
Qi	Intercepted Flow (cfs)	3.723
Qb	By-pass Flow (cfs)	0.187

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/11/2008

Project No. :
Project Name.:
Computed by :

WATERSHED 1B
CB1b

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0050
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	2.970
T	Width of Spread (ft)	12.35

Gutter Flow

Eo	Gutter Flow Ratio	0.376
d	Depth of Flow (ft)	0.25
V	Average Velocity (ft/sec)	1.95

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	17.09
L	Curb-Opening Length (ft)	20.00
e	Inlet Efficiency	1.000
Qi	Intercepted Flow (cfs)	2.970
Qb	By-pass Flow (cfs)	0.000

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/11/2008

Project No. :
Project Name.:
Computed by :

watershed 2

Inlets on Grade: Gutter Flow Parameters

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0050
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	1.610
T	Width of Spread (ft)	9.82

Gutter Flow

Eo	Gutter Flow Ratio	0.455
d	Depth of Flow (ft)	0.20
V	Average Velocity (ft/sec)	1.67

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 3A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0050
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	4.710
T	Width of Spread (ft)	14.68

Gutter Flow

Eo	Gutter Flow Ratio	0.323
d	Depth of Flow (ft)	0.29
V	Average Velocity (ft/sec)	2.19

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	21.54
L	Curb-Opening Length (ft)	20.00
e	Inlet Efficiency	0.991
Qi	Intercepted Flow (cfs)	4.669
Qb	By-pass Flow (cfs)	0.041

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 06/11/2008

Project No. :
Project Name.:
Computed by :

CB3b

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0050
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	3.660
T	Width of Spread (ft)	13.35

Gutter Flow

Eo	Gutter Flow Ratio	0.351
d	Depth of Flow (ft)	0.27
V	Average Velocity (ft/sec)	2.05

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	18.98
L	Curb-Opening Length (ft)	20.00
e	Inlet Efficiency	1.000
Qi	Intercepted Flow (cfs)	3.660
Qb	By-pass Flow (cfs)	0.000

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 4

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0150
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	8.420
T	Width of Spread (ft)	14.85

Gutter Flow

Eo	Gutter Flow Ratio	0.320
d	Depth of Flow (ft)	0.30
V	Average Velocity (ft/sec)	3.82

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	38.32
L	Curb-Opening Length (ft)	32.00
e	Inlet Efficiency	0.961
Qi	Intercepted Flow (cfs)	8.092
Qb	By-pass Flow (cfs)	0.328

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 6

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0150
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	9.860
T	Width of Spread (ft)	15.76

Gutter Flow

Eo	Gutter Flow Ratio	0.304
d	Depth of Flow (ft)	0.32
V	Average Velocity (ft/sec)	3.97

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	41.46
L	Curb-Opening Length (ft)	32.00
e	Inlet Efficiency	0.930
Qi	Intercepted Flow (cfs)	9.171
Qb	By-pass Flow (cfs)	0.689

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 7A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0200
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	6.660
T	Width of Spread (ft)	12.89

Gutter Flow

Eo	Gutter Flow Ratio	0.362
d	Depth of Flow (ft)	0.26
V	Average Velocity (ft/sec)	4.01

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	36.71
L	Curb-Opening Length (ft)	28.00
e	Inlet Efficiency	0.925
Qi	Intercepted Flow (cfs)	6.160
Qb	By-pass Flow (cfs)	0.500

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 7B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	20.76
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.499
Qi	Intercepted Flow (cfs)	4.680

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 9A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0200
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	5.340
T	Width of Spread (ft)	11.87

Gutter Flow

Eo	Gutter Flow Ratio	0.389
d	Depth of Flow (ft)	0.24
V	Average Velocity (ft/sec)	3.79

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	32.84
L	Curb-Opening Length (ft)	28.00
e	Inlet Efficiency	0.968
Qi	Intercepted Flow (cfs)	5.170
Qb	By-pass Flow (cfs)	0.170

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 9B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	14.31
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.370
Qi	Intercepted Flow (cfs)	2.680

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 10A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0200
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	5.280
T	Width of Spread (ft)	11.82

Gutter Flow

Eo	Gutter Flow Ratio	0.390
d	Depth of Flow (ft)	0.24
V	Average Velocity (ft/sec)	3.78

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	32.65
L	Curb-Opening Length (ft)	28.00
e	Inlet Efficiency	0.970
Qi	Intercepted Flow (cfs)	5.122
Qb	By-pass Flow (cfs)	0.158

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 10B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	20.58
L	Curb-Opening Length (ft)	12.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.495
Qi	Intercepted Flow (cfs)	9.510

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 12A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0200
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	4.270
T	Width of Spread (ft)	10.91

Gutter Flow

Eo	Gutter Flow Ratio	0.417
d	Depth of Flow (ft)	0.22
V	Average Velocity (ft/sec)	3.59

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	29.32
L	Curb-Opening Length (ft)	24.00
e	Inlet Efficiency	0.954
Qi	Intercepted Flow (cfs)	4.072
Qb	By-pass Flow (cfs)	0.198

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 12b

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	21.26
L	Curb-Opening Length (ft)	12.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.509
Qi	Intercepted Flow (cfs)	9.990

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 13

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	23.17
L	Curb-Opening Length (ft)	12.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.547
Qi	Intercepted Flow (cfs)	11.360

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 15

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	24.18
L	Curb-Opening Length (ft)	12.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.567
Qi	Intercepted Flow (cfs)	12.110

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

Watershed 20

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0160
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	6.540
T	Width of Spread (ft)	13.35

Gutter Flow

Eo	Gutter Flow Ratio	0.351
d	Depth of Flow (ft)	0.27
V	Average Velocity (ft/sec)	3.67

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	34.33
L	Curb-Opening Length (ft)	28.00
e	Inlet Efficiency	0.952
Qi	Intercepted Flow (cfs)	6.228
Qb	By-pass Flow (cfs)	0.312

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/12/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 21A

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	10.27
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.289
Qi	Intercepted Flow (cfs)	1.630

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 21B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	20.26
L	Curb-Opening Length (ft)	12.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.489
Qi	Intercepted Flow (cfs)	9.29

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 21C

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	21.11
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.506
Qi	Intercepted Flow (cfs)	4.840

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 23A

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	19.41
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.471
Qi	Intercepted Flow (cfs)	4.230

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 23B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	22.01
L	Curb-Opening Length (ft)	12.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.524
Qi	Intercepted Flow (cfs)	10.520

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 23C

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	24.13
L	Curb-Opening Length (ft)	8.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.566
Qi	Intercepted Flow (cfs)	8.950

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 24A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0300
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	5.780
T	Width of Spread (ft)	11.33

Gutter Flow

Eo	Gutter Flow Ratio	0.404
d	Depth of Flow (ft)	0.23
V	Average Velocity (ft/sec)	4.50

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	37.93
L	Curb-Opening Length (ft)	32.00
e	Inlet Efficiency	0.965
Qi	Intercepted Flow (cfs)	5.575
Qb	By-pass Flow (cfs)	0.205

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 24B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	23.72
L	Curb-Opening Length (ft)	12.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.558
Qi	Intercepted Flow (cfs)	11.770

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 24C

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0300
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	2.830
T	Width of Spread (ft)	8.67

Gutter Flow

Eo	Gutter Flow Ratio	0.503
d	Depth of Flow (ft)	0.17
V	Average Velocity (ft/sec)	3.76

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	26.37
L	Curb-Opening Length (ft)	28.00
e	Inlet Efficiency	1.000
Qi	Intercepted Flow (cfs)	2.830
Qb	By-pass Flow (cfs)	0.000

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 26A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0300
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	5.530
T	Width of Spread (ft)	11.14

Gutter Flow

Eo	Gutter Flow Ratio	0.410
d	Depth of Flow (ft)	0.22
V	Average Velocity (ft/sec)	4.45

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	37.09
L	Curb-Opening Length (ft)	24.00
e	Inlet Efficiency	0.847
Qi	Intercepted Flow (cfs)	4.682
Qb	By-pass Flow (cfs)	0.848

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 26B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	19.81
L	Curb-Opening Length (ft)	16.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.480
Qi	Intercepted Flow (cfs)	11.980

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 26C

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0300
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	2.010
T	Width of Spread (ft)	7.63

Gutter Flow

Eo	Gutter Flow Ratio	0.555
d	Depth of Flow (ft)	0.15
V	Average Velocity (ft/sec)	3.45

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	22.14
L	Curb-Opening Length (ft)	20.00
e	Inlet Efficiency	0.985
Qi	Intercepted Flow (cfs)	1.980
Qb	By-pass Flow (cfs)	0.030

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 29A

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	22.67
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.537
Qi	Intercepted Flow (cfs)	5.340

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 29B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	25.13
L	Curb-Opening Length (ft)	12.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.586
Qi	Intercepted Flow (cfs)	12.840

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/20/2007

Project No. : 06099-01
Project Name.:
Computed by :

CP31A

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	18.95
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.462
Qi	Intercepted Flow (cfs)	4.080

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 31B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	24.68
L	Curb-Opening Length (ft)	16.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.577
Qi	Intercepted Flow (cfs)	16.650

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/27/2007

Project No. : 06099-01
Project Name.:
Computed by :

32A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0150
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	1.450
T	Width of Spread (ft)	7.69

Gutter Flow

Eo	Gutter Flow Ratio	0.552
d	Depth of Flow (ft)	0.15
V	Average Velocity (ft/sec)	2.45

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	15.71
L	Curb-Opening Length (ft)	12.00
e	Inlet Efficiency	0.926
Qi	Intercepted Flow (cfs)	1.342
Qb	By-pass Flow (cfs)	0.108

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 32B

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0400
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	4.080
T	Width of Spread (ft)	9.42

Gutter Flow

Eo	Gutter Flow Ratio	0.471
d	Depth of Flow (ft)	0.19
V	Average Velocity (ft/sec)	4.60

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	34.20
L	Curb-Opening Length (ft)	24.00
e	Inlet Efficiency	0.887
Qi	Intercepted Flow (cfs)	3.618
Qb	By-pass Flow (cfs)	0.462

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/27/2007

Project No. : 06099-01
Project Name.:
Computed by :

34A

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0150
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	1.450
T	Width of Spread (ft)	7.69

Gutter Flow

Eo	Gutter Flow Ratio	0.552
d	Depth of Flow (ft)	0.15
V	Average Velocity (ft/sec)	2.45

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	15.71
L	Curb-Opening Length (ft)	12.00
e	Inlet Efficiency	0.926
Qi	Intercepted Flow (cfs)	1.342
Qb	By-pass Flow (cfs)	0.108

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 34B

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0400
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	2.830
T	Width of Spread (ft)	8.22

Gutter Flow

Eo	Gutter Flow Ratio	0.525
d	Depth of Flow (ft)	0.16
V	Average Velocity (ft/sec)	4.19

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	28.38
L	Curb-Opening Length (ft)	16.00
e	Inlet Efficiency	0.775
Qi	Intercepted Flow (cfs)	2.195
Qb	By-pass Flow (cfs)	0.635

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 35B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	24.07
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.565
Qi	Intercepted Flow (cfs)	5.840

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 35C

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0220
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	7.790
T	Width of Spread (ft)	13.43

Gutter Flow

Eo	Gutter Flow Ratio	0.350
d	Depth of Flow (ft)	0.27
V	Average Velocity (ft/sec)	4.32

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	40.71
L	Curb-Opening Length (ft)	20.00
e	Inlet Efficiency	0.704
Qi	Intercepted Flow (cfs)	5.482
Qb	By-pass Flow (cfs)	2.308

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 35D

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0050
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	4.020
T	Width of Spread (ft)	13.83

Gutter Flow

Eo	Gutter Flow Ratio	0.341
d	Depth of Flow (ft)	0.28
V	Average Velocity (ft/sec)	2.10

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	19.90
L	Curb-Opening Length (ft)	20.00
e	Inlet Efficiency	1.000
Qi	Intercepted Flow (cfs)	4.020
Qb	By-pass Flow (cfs)	0.000

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 35E

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0080
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	4.650
T	Width of Spread (ft)	13.38

Gutter Flow

Eo	Gutter Flow Ratio	0.351
d	Depth of Flow (ft)	0.27
V	Average Velocity (ft/sec)	2.60

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	24.18
L	Curb-Opening Length (ft)	20.00
e	Inlet Efficiency	0.958
Qi	Intercepted Flow (cfs)	4.453
Qb	By-pass Flow (cfs)	0.197

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 35F

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	18.95
L	Curb-Opening Length (ft)	8.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.462
Qi	Intercepted Flow (cfs)	6.230

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 37B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	20.10
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.485
Qi	Intercepted Flow (cfs)	4.460

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 37C

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0220
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	8.670
T	Width of Spread (ft)	13.98

Gutter Flow

Eo	Gutter Flow Ratio	0.338
d	Depth of Flow (ft)	0.28
V	Average Velocity (ft/sec)	4.44

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	42.95
L	Curb-Opening Length (ft)	28.00
e	Inlet Efficiency	0.850
Qi	Intercepted Flow (cfs)	7.372
Qb	By-pass Flow (cfs)	1.298

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 37D

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0050
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	4.710
T	Width of Spread (ft)	14.68

Gutter Flow

Eo	Gutter Flow Ratio	0.323
d	Depth of Flow (ft)	0.29
V	Average Velocity (ft/sec)	2.19

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	21.54
L	Curb-Opening Length (ft)	16.00
e	Inlet Efficiency	0.913
Qi	Intercepted Flow (cfs)	4.301
Qb	By-pass Flow (cfs)	0.409

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 37E

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0080
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	5.720
T	Width of Spread (ft)	14.46

Gutter Flow

Eo	Gutter Flow Ratio	0.328
d	Depth of Flow (ft)	0.29
V	Average Velocity (ft/sec)	2.74

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	26.82
L	Curb-Opening Length (ft)	28.00
e	Inlet Efficiency	1.000
Qi	Intercepted Flow (cfs)	5.720
Qb	By-pass Flow (cfs)	0.000

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 37F

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	20.42
L	Curb-Opening Length (ft)	8.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.492
Qi	Intercepted Flow (cfs)	6.970

□

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 40B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	23.23
L	Curb-Opening Length (ft)	16.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.548
Qi	Intercepted Flow (cfs)	15.210

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/20/2007

Project No. : 06099-01
Project Name.:
Computed by :

CP 40d + 42d

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	19.32
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.470
Qi	Intercepted Flow (cfs)	4.200

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/20/2007

Project No. : 06099-01
Project Name.:
Computed by :

CB 40e + 42e Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0100
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	2.580
T	Width of Spread (ft)	10.29

Gutter Flow

Eo	Gutter Flow Ratio	0.438
d	Depth of Flow (ft)	0.21
V	Average Velocity (ft/sec)	2.44

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	19.01
L	Curb-Opening Length (ft)	12.00
e	Inlet Efficiency	0.834
Qi	Intercepted Flow (cfs)	2.152
Qb	By-pass Flow (cfs)	0.428

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/08/2007

Project No. : 06099-01
Project Name.:
Computed by :

WATERSHED 42B

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	21.53
L	Curb-Opening Length (ft)	16.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.514
Qi	Intercepted Flow (cfs)	13.570

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/26/2007

Project No. : 06099-01
Project Name.:
Computed by :

SS01

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	10.50
L	Curb-Opening Length (ft)	12.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.293
Qi	Intercepted Flow (cfs)	3.470

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/26/2007

Project No. : 06099-01
Project Name.:
Computed by :

SS03

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	11.20
L	Curb-Opening Length (ft)	8.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.307
Qi	Intercepted Flow (cfs)	2.830

0

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 12/03/2007

Project No. : 06099-01
Project Name.:
Computed by :

SS5

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	17.52
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.434
Qi	Intercepted Flow (cfs)	3.630

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/26/2007

Project No. : 06099-01
Project Name.:
Computed by :

SS06

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0300
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	1.930
T	Width of Spread (ft)	7.51

Gutter Flow

Eo	Gutter Flow Ratio	0.562
d	Depth of Flow (ft)	0.15
V	Average Velocity (ft/sec)	3.42

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	21.69
L	Curb-Opening Length (ft)	16.00
e	Inlet Efficiency	0.910
Qi	Intercepted Flow (cfs)	1.757
Qb	By-pass Flow (cfs)	0.173

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/26/2007

Project No. : 06099-01
Project Name.:
Computed by :

SS08

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0300
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	2.440
T	Width of Spread (ft)	8.20

Gutter Flow

Eo	Gutter Flow Ratio	0.525
d	Depth of Flow (ft)	0.16
V	Average Velocity (ft/sec)	3.63

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	24.45
L	Curb-Opening Length (ft)	16.00
e	Inlet Efficiency	0.852
Qi	Intercepted Flow (cfs)	2.080
Qb	By-pass Flow (cfs)	0.360

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 12/03/2007

Project No. : 06099-01
Project Name.:
Computed by :

ss12

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	11.74
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.318
Qi	Intercepted Flow (cfs)	1.990

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 12/03/2007

Project No. : 06099-01
Project Name.:
Computed by :

ss14

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope		L. Depression
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0200
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.00
a	Gutter Depression (inch)		1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	7.86
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.240
Qi	Intercepted Flow (cfs)	1.090

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/10/2008

Project No. : 06099-01
Project Name.:
Computed by :

SS15

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0300
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	1.740
T	Width of Spread (ft)	7.23

Gutter Flow

Eo	Gutter Flow Ratio	0.578
d	Depth of Flow (ft)	0.14
V	Average Velocity (ft/sec)	3.33

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	20.57
L	Curb-Opening Length (ft)	16.00
e	Inlet Efficiency	0.933
Qi	Intercepted Flow (cfs)	1.624
Qb	By-pass Flow (cfs)	0.116

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 01/10/2008

Project No. : 06099-01
Project Name.:
Computed by :

SS17

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope		Uniform
S	Longitudinal Slope	(ft/ft)	0.0300
Sx	Pavement Cross Slope	(ft/ft)	0.0200
Sw	Gutter Cross Slope	(ft/ft)	0.0200
n	Manning's Coefficient		0.016
W	Gutter Width (ft)		2.00
a	Gutter Depression (inch)		1.00
Q	Discharge (cfs)		3.600
T	Width of Spread (ft)		9.49

Gutter Flow

Eo	Gutter Flow Ratio	0.468
d	Depth of Flow (ft)	0.19
V	Average Velocity (ft/sec)	4.00

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	29.82
L	Curb-Opening Length (ft)	24.00
e	Inlet Efficiency	0.947
Qi	Intercepted Flow (cfs)	3.410
Qb	By-pass Flow (cfs)	0.190

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/26/2007

Project No. : 06099-01
Project Name.:
Computed by :

ss22

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	10.19
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.287
Qi	Intercepted Flow (cfs)	1.610

0

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Sag
Date: 11/26/2007

Project No. : 06099-01
Project Name.:
Computed by :

ss24

Inlets on Sag: Curb-Opening Inlet

Roadway and Discharge Data

	Cross Slope	L. Depression
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00

Inlet Interception

	Inlet Type *Sag*	Curb-Opening
T	Width of Spread (ft)	12.24
L	Curb-Opening Length (ft)	4.00
H	Curb-Opening Height (in)	6.00
d_curb	Depth at Curb (ft)	0.328
Qi	Intercepted Flow (cfs)	2.120

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/26/2007

Project No. : 06099-01
Project Name.:
Computed by :

SS26

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0080
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	5.850
T	Width of Spread (ft)	14.58

Gutter Flow

Eo	Gutter Flow Ratio	0.325
d	Depth of Flow (ft)	0.29
V	Average Velocity (ft/sec)	2.75

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	27.12
L	Curb-Opening Length (ft)	24.00
e	Inlet Efficiency	0.980
Qi	Intercepted Flow (cfs)	5.730
Qb	By-pass Flow (cfs)	0.120

FHWA Urban Drainage Design Program, HY-22
Drainage of Highway Pavements

Inlets on Grade
Date: 11/26/2007

Project No. : 06099-01
Project Name.:
Computed by :

SS27

Inlets on Grade: Curb Opening Inlet

Roadway and Discharge Data

	Cross Slope	Uniform
S	Longitudinal Slope (ft/ft)	0.0080
Sx	Pavement Cross Slope (ft/ft)	0.0200
Sw	Gutter Cross Slope (ft/ft)	0.0200
n	Manning's Coefficient	0.016
W	Gutter Width (ft)	2.00
a	Gutter Depression (inch)	1.00
Q	Discharge (cfs)	0.510
T	Width of Spread (ft)	5.85

Gutter Flow

Eo	Gutter Flow Ratio	0.672
d	Depth of Flow (ft)	0.12
V	Average Velocity (ft/sec)	1.49

Inlet Interception

	Inlet Type	Curb-Opening
LT	Length for 100% Inteception (ft)	7.85
L	Curb-Opening Length (ft)	4.00
e	Inlet Efficiency	0.722
Qi	Intercepted Flow (cfs)	0.368
Qb	By-pass Flow (cfs)	0.142

SPLASH PAD CALCULATIONS

CP02 (combined with CP03a)

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
241.00CFS	10.00FT	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
43.9FT	5.3FT	20.1FT	658.5FT3

MAX DEPTH OCCURS 17.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	5.26
4.4	1.68	1.0	5.10
8.8	3.94	2.0	4.78
13.2	4.94	3.0	4.10
17.6	5.26	4.0	2.68
21.9	5.05	5.0	1.21
26.3	4.52	6.0	0.47
30.7	3.68	7.0	0.21
35.1	2.63	8.0	0.11
39.5	1.37	9.1	0.05
43.9	0.00	10.1	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 8.32 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 36.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP03.5

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
71.00CFS	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
35.3FT	4.7FT	15.2FT	357.2FT3

MAX DEPTH OCCURS 14.1 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	4.69
3.5	1.50	0.8	4.55
7.1	3.52	1.5	4.27
10.6	4.41	2.3	3.66
14.1	4.69	3.0	2.39
17.7	4.50	3.8	1.08
21.2	4.03	4.6	0.42
24.7	3.28	5.3	0.19
28.3	2.34	6.1	0.09
31.8	1.22	6.8	0.05
35.3	0.00	7.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 5.54 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 26.6FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP4

319+50 3 existing ellipses

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
90.30CFS	3.00FT	1.50FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
52.4FT	5.0FT	27.4FT	1027.2FT3

MAX DEPTH OCCURS 20.9 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	5.04
5.2	1.61	1.4	4.89
10.5	3.78	2.7	4.59
15.7	4.74	4.1	3.93
20.9	5.04	5.5	2.57
26.2	4.84	6.9	1.16
31.4	4.33	8.2	0.45
36.6	3.53	9.6	0.20
41.9	2.52	11.0	0.10
47.1	1.31	12.3	0.05
52.4	0.00	13.7	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 14.89 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 52.1FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP05

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
139.50CFS	6.00FT	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
42.8FT	5.2FT	19.5FT	612.8FT3

MAX DEPTH OCCURS 17.1 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	5.19
4.3	1.66	1.0	5.03
8.6	3.89	1.9	4.72
12.8	4.88	2.9	4.05
17.1	5.19	3.9	2.65
21.4	4.98	4.9	1.19
25.7	4.46	5.8	0.47
29.9	3.63	6.8	0.21
34.2	2.59	7.8	0.10
38.5	1.35	8.8	0.05
42.8	0.00	9.7	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 7.93 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 34.9FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP07

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
763.00CFS	12.00FT	8.00FT	4.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
83.5FT	10.2FT	37.7FT	4583.4FT3

MAX DEPTH OCCURS 33.4 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	10.24
8.4	3.28	1.9	9.94
16.7	7.68	3.8	9.32
25.1	9.63	5.7	7.99
33.4	10.24	7.5	5.22
41.8	9.83	9.4	2.36
50.1	8.81	11.3	0.92
58.5	7.17	13.2	0.41
66.8	5.12	15.1	0.20
75.2	2.66	17.0	0.10
83.5	0.00	18.9	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 15.17 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 67.4FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP07.2

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
56.50CFS	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
30.0FT	4.3FT	12.3FT	226.2FT3

MAX DEPTH OCCURS 12.0 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	4.30
3.0	1.38	0.6	4.17
6.0	3.23	1.2	3.92
9.0	4.04	1.9	3.36
12.0	4.30	2.5	2.19
15.0	4.13	3.1	0.99
18.0	3.70	3.7	0.39
21.0	3.01	4.3	0.17
24.0	2.15	4.9	0.09
27.0	1.12	5.6	0.04
30.0	0.00	6.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 4.09 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 21.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP07.4

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
244.00CFS	10.00FT	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
44.3FT	5.3FT	20.3FT	675.0FT3

MAX DEPTH OCCURS 17.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	5.28
4.4	1.69	1.0	5.12
8.9	3.96	2.0	4.81
13.3	4.97	3.1	4.12
17.7	5.28	4.1	2.69
22.1	5.07	5.1	1.21
26.6	4.54	6.1	0.48
31.0	3.70	7.1	0.21
35.4	2.64	8.1	0.11
39.8	1.37	9.2	0.05
44.3	0.00	10.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 8.46 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 36.6FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP07.6 NORTH

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
19.00CFS	3.00FT	1.50FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
17.3FT	2.8FT	6.6FT	45.5FT3

MAX DEPTH OCCURS 6.9 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.81
1.7	0.90	0.3	2.72
3.5	2.11	0.7	2.56
5.2	2.64	1.0	2.19
6.9	2.81	1.3	1.43
8.7	2.70	1.6	0.65
10.4	2.42	2.0	0.25
12.1	1.97	2.3	0.11
13.8	1.40	2.6	0.06
15.6	0.73	3.0	0.03
17.3	0.00	3.3	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 1.87 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 11.0FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP07.6 SOUTH

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
49.00CFS	3.00FT	1.50FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
33.9FT	4.0FT	15.7FT	302.5FT3

MAX DEPTH OCCURS 13.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	4.01
3.4	1.28	0.8	3.89
6.8	3.00	1.6	3.65
10.2	3.77	2.4	3.13
13.6	4.01	3.1	2.04
17.0	3.85	3.9	0.92
20.4	3.45	4.7	0.36
23.7	2.80	5.5	0.16
27.1	2.00	6.3	0.08
30.5	1.04	7.1	0.04
33.9	0.00	7.8	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 6.61 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 28.3FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP07.8

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
59.50CFS	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
31.2FT	4.4FT	12.9FT	250.9FT3

MAX DEPTH OCCURS 12.5 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	4.39
3.1	1.40	0.6	4.26
6.2	3.29	1.3	3.99
9.3	4.12	1.9	3.42
12.5	4.39	2.6	2.24
15.6	4.21	3.2	1.01
18.7	3.77	3.9	0.39
21.8	3.07	4.5	0.18
24.9	2.19	5.2	0.09
28.0	1.14	5.8	0.04
31.2	0.00	6.5	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 4.38 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 22.3FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP08A

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
67.00CFS	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
33.9FT	4.6FT	14.4FT	318.1FT3

MAX DEPTH OCCURS 13.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	4.59
3.4	1.47	0.7	4.45
6.8	3.44	1.4	4.17
10.2	4.31	2.2	3.58
13.6	4.59	2.9	2.34
16.9	4.40	3.6	1.06
20.3	3.94	4.3	0.41
23.7	3.21	5.0	0.18
27.1	2.29	5.8	0.09
30.5	1.19	6.5	0.05
33.9	0.00	7.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 5.13 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 25.1FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP12

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
363.00CFS	10.00FT	6.00FT	3.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
57.2FT	7.3FT	25.2FT	1493.9FT3

MAX DEPTH OCCURS 22.9 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	7.32
5.7	2.34	1.3	7.10
11.4	5.49	2.5	6.66
17.1	6.88	3.8	5.71
22.9	7.32	5.0	3.73
28.6	7.03	6.3	1.68
34.3	6.30	7.5	0.66
40.0	5.12	8.8	0.29
45.7	3.66	10.1	0.15
51.4	1.90	11.3	0.07
57.2	0.00	12.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 9.59 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 44.5FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP 13

477+60 Cross-Drainage

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
57.00CFS	3.00FT	1.50FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
37.8FT	4.2FT	18.0FT	409.3FT3

MAX DEPTH OCCURS 15.1 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	4.24
3.8	1.36	0.9	4.11
7.6	3.18	1.8	3.86
11.3	3.99	2.7	3.31
15.1	4.24	3.6	2.16
18.9	4.07	4.5	0.98
22.7	3.65	5.4	0.38
26.4	2.97	6.3	0.17
30.2	2.12	7.2	0.08
34.0	1.10	8.1	0.04
37.8	0.00	9.0	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 8.08 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 32.9FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP14

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
44.50CFS	3.00FT	1.50FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
31.7FT	3.9FT	14.4FT	249.4FT3

MAX DEPTH OCCURS 12.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	3.86
3.2	1.24	0.7	3.75
6.3	2.90	1.4	3.52
9.5	3.63	2.2	3.01
12.7	3.86	2.9	1.97
15.8	3.71	3.6	0.89
19.0	3.32	4.3	0.35
22.2	2.71	5.0	0.15
25.3	1.93	5.7	0.08
28.5	1.00	6.5	0.04
31.7	0.00	7.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 5.81 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 25.7FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP15 EXISTING FOR NORTH CROSSING

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
28.00CFS	2.50FT	1.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
26.3FT	3.2FT	11.9FT	142.2FT3

MAX DEPTH OCCURS 10.5 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	3.21
2.6	1.03	0.6	3.11
5.3	2.41	1.2	2.92
7.9	3.02	1.8	2.50
10.5	3.21	2.4	1.64
13.1	3.08	3.0	0.74
15.8	2.76	3.6	0.29
18.4	2.25	4.2	0.13
21.0	1.61	4.8	0.06
23.6	0.83	5.3	0.03
26.3	0.00	5.9	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 4.79 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 21.3FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP15 EXISITING FOR SOUTH CROSSING

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
14.00CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
19.1FT	2.4FT	8.4FT	55.6FT3

MAX DEPTH OCCURS 7.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.44
1.9	0.78	0.4	2.37
3.8	1.83	0.8	2.22
5.7	2.30	1.3	1.90
7.6	2.44	1.7	1.25
9.5	2.34	2.1	0.56
11.4	2.10	2.5	0.22
13.4	1.71	2.9	0.10
15.3	1.22	3.4	0.05
17.2	0.63	3.8	0.02
19.1	0.00	4.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 3.20 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 14.8FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP16

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
56.00CFS	4.00FT	2.00FT	1.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
24.4FT	3.7FT	9.6FT	121.5FT3

MAX DEPTH OCCURS 9.8 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	3.65
2.4	1.17	0.5	3.54
4.9	2.74	1.0	3.32
7.3	3.43	1.4	2.85
9.8	3.65	1.9	1.86
12.2	3.51	2.4	0.84
14.6	3.14	2.9	0.33
17.1	2.56	3.4	0.15
19.5	1.83	3.8	0.07
22.0	0.95	4.3	0.04
24.4	0.00	4.8	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 4.04 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 21.0FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP17 Proposed North Crossing @ Poorman

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
19.00CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
23.7FT	2.7FT	11.1FT	102.3FT3

MAX DEPTH OCCURS 9.5 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.74
2.4	0.88	0.6	2.66
4.7	2.05	1.1	2.49
7.1	2.57	1.7	2.14
9.5	2.74	2.2	1.40
11.9	2.63	2.8	0.63
14.2	2.35	3.3	0.25
16.6	1.92	3.9	0.11
19.0	1.37	4.4	0.05
21.3	0.71	5.0	0.03
23.7	0.00	5.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 4.81 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 20.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP17

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
194.00CFS	10.00FT	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
37.6FT	4.8FT	16.5FT	426.7FT3

MAX DEPTH OCCURS 15.0 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	4.85
3.8	1.55	0.8	4.70
7.5	3.64	1.6	4.41
11.3	4.56	2.5	3.78
15.0	4.85	3.3	2.47
18.8	4.65	4.1	1.11
22.6	4.17	4.9	0.44
26.3	3.39	5.8	0.19
30.1	2.42	6.6	0.10
33.9	1.26	7.4	0.05
37.6	0.00	8.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 6.24 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 29.1FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP18

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
235.00CFS	10.00FT	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
43.1FT	5.2FT	19.7FT	626.1FT3

MAX DEPTH OCCURS 17.2 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	5.21
4.3	1.67	1.0	5.05
8.6	3.91	2.0	4.74
12.9	4.90	2.9	4.06
17.2	5.21	3.9	2.66
21.6	5.00	4.9	1.20
25.9	4.48	5.9	0.47
30.2	3.65	6.9	0.21
34.5	2.60	7.9	0.10
38.8	1.35	8.8	0.05
43.1	0.00	9.8	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 8.05 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 35.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CP19

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
281.50CFS	10.00FT	5.00FT	2.50FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
48.3FT	6.1FT	21.3FT	898.4FT3

MAX DEPTH OCCURS 19.3 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	6.14
4.8	1.97	1.1	5.96
9.7	4.61	2.1	5.59
14.5	5.78	3.2	4.79
19.3	6.14	4.3	3.13
24.1	5.90	5.3	1.41
29.0	5.28	6.4	0.55
33.8	4.30	7.5	0.25
38.6	3.07	8.5	0.12
43.5	1.60	9.6	0.06
48.3	0.00	10.7	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 8.20 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 37.8FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I3a

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
5.00CFS	20.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
2.0FT	0.4FT	0.7FT	0.1FT3

MAX DEPTH OCCURS 0.8 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.38
0.2	0.12	0.0	0.37
0.4	0.29	0.1	0.35
0.6	0.36	0.1	0.30
0.8	0.38	0.1	0.19
1.0	0.37	0.2	0.09
1.2	0.33	0.2	0.03
1.4	0.27	0.2	0.02
1.6	0.19	0.3	0.01
1.8	0.10	0.3	0.00
2.0	0.00	0.3	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.15 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 1.1FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I3b

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
4.00CFS	20.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
1.7FT	0.4FT	0.5FT	0.0FT3

MAX DEPTH OCCURS 0.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.35
0.2	0.11	0.0	0.34
0.3	0.26	0.1	0.32
0.5	0.33	0.1	0.27
0.7	0.35	0.1	0.18
0.8	0.34	0.1	0.08
1.0	0.30	0.2	0.03
1.2	0.25	0.2	0.01
1.3	0.18	0.2	0.01
1.5	0.09	0.2	0.00
1.7	0.00	0.3	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.11 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 0.8FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
9.00CFS	32.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
2.1FT	0.4FT	0.7FT	0.1FT3

MAX DEPTH OCCURS 0.9 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.40
0.2	0.13	0.0	0.39
0.4	0.30	0.1	0.36
0.6	0.37	0.1	0.31
0.9	0.40	0.1	0.20
1.1	0.38	0.2	0.09
1.3	0.34	0.2	0.04
1.5	0.28	0.3	0.02
1.7	0.20	0.3	0.01
1.9	0.10	0.3	0.00
2.1	0.00	0.4	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.18 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 1.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I9a

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
5.00CFS	28.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
1.5FT	0.3FT	0.5FT	0.0FT3

MAX DEPTH OCCURS 0.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.34
0.2	0.11	0.0	0.33
0.3	0.25	0.0	0.31
0.5	0.32	0.1	0.26
0.6	0.34	0.1	0.17
0.8	0.32	0.1	0.08
0.9	0.29	0.1	0.03
1.1	0.24	0.2	0.01
1.2	0.17	0.2	0.01
1.4	0.09	0.2	0.00
1.5	0.00	0.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.10 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 0.8FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I9b

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
3.00CFS	4.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
4.3FT	0.6FT	1.8FT	0.6FT3

MAX DEPTH OCCURS 1.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.58
0.4	0.18	0.1	0.56
0.9	0.43	0.2	0.52
1.3	0.54	0.3	0.45
1.7	0.58	0.4	0.29
2.1	0.55	0.5	0.13
2.6	0.50	0.5	0.05
3.0	0.40	0.6	0.02
3.4	0.29	0.7	0.01
3.8	0.15	0.8	0.01
4.3	0.00	0.9	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.65 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 3.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I12a

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
4.00CFS	24.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
1.5FT	0.3FT	0.5FT	0.0FT3

MAX DEPTH OCCURS 0.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.33
0.1	0.10	0.0	0.32
0.3	0.25	0.0	0.30
0.4	0.31	0.1	0.26
0.6	0.33	0.1	0.17
0.7	0.31	0.1	0.08
0.9	0.28	0.1	0.03
1.0	0.23	0.2	0.01
1.2	0.16	0.2	0.01
1.3	0.09	0.2	0.00
1.5	0.00	0.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.09 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 0.7FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I12b

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
10.00CFS	12.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
4.6FT	0.6FT	2.0FT	0.8FT3

MAX DEPTH OCCURS 1.8 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.60
0.5	0.19	0.1	0.58
0.9	0.45	0.2	0.55
1.4	0.56	0.3	0.47
1.8	0.60	0.4	0.31
2.3	0.58	0.5	0.14
2.8	0.52	0.6	0.05
3.2	0.42	0.7	0.02
3.7	0.30	0.8	0.01
4.1	0.16	0.9	0.01
4.6	0.00	1.0	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.75 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 3.5FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
12.00CFS	12.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
5.2FT	0.6FT	2.4FT	1.1FT3

MAX DEPTH OCCURS 2.1 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.64
0.5	0.21	0.1	0.62
1.0	0.48	0.2	0.58
1.6	0.60	0.4	0.50
2.1	0.64	0.5	0.33
2.6	0.62	0.6	0.15
3.1	0.55	0.7	0.06
3.7	0.45	0.8	0.03
4.2	0.32	0.9	0.01
4.7	0.17	1.1	0.01
5.2	0.00	1.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.96 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 4.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I23a

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
4.00CFS	4.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
5.2FT	0.6FT	2.4FT	1.1FT3

MAX DEPTH OCCURS 2.1 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.64
0.5	0.21	0.1	0.62
1.0	0.48	0.2	0.58
1.6	0.60	0.4	0.50
2.1	0.64	0.5	0.33
2.6	0.62	0.6	0.15
3.1	0.55	0.7	0.06
3.7	0.45	0.8	0.03
4.2	0.32	0.9	0.01
4.7	0.17	1.1	0.01
5.2	0.00	1.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.96 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 4.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I26c

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
2.00CFS	12.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
1.5FT	0.3FT	0.5FT	0.0FT3

MAX DEPTH OCCURS 0.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.33
0.1	0.10	0.0	0.32
0.3	0.25	0.0	0.30
0.4	0.31	0.1	0.26
0.6	0.33	0.1	0.17
0.7	0.31	0.1	0.08
0.9	0.28	0.1	0.03
1.0	0.23	0.2	0.01
1.2	0.16	0.2	0.01
1.3	0.09	0.2	0.00
1.5	0.00	0.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.09 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 0.7FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I23c

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
9.00CFS	8.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
5.7FT	0.7FT	2.6FT	1.4FT3

MAX DEPTH OCCURS 2.3 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.67
0.6	0.21	0.1	0.65
1.1	0.50	0.3	0.61
1.7	0.63	0.4	0.52
2.3	0.67	0.5	0.34
2.9	0.64	0.7	0.15
3.4	0.58	0.8	0.06
4.0	0.47	0.9	0.03
4.6	0.34	1.1	0.01
5.1	0.17	1.2	0.01
5.7	0.00	1.3	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 1.12 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 4.8FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

I26a

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
5.00CFS	24.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
1.7FT	0.4FT	0.6FT	0.0FT3

MAX DEPTH OCCURS 0.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.36
0.2	0.11	0.0	0.35
0.3	0.27	0.1	0.32
0.5	0.34	0.1	0.28
0.7	0.36	0.1	0.18
0.9	0.34	0.1	0.08
1.0	0.31	0.2	0.03
1.2	0.25	0.2	0.01
1.4	0.18	0.2	0.01
1.5	0.09	0.3	0.00
1.7	0.00	0.3	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.12 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 0.9FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

ISS1

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
4.00CFS	12.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
2.4FT	0.4FT	0.9FT	0.1FT3

MAX DEPTH OCCURS 1.0 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.43
0.2	0.14	0.0	0.41
0.5	0.32	0.1	0.39
0.7	0.40	0.1	0.33
1.0	0.43	0.2	0.22
1.2	0.41	0.2	0.10
1.4	0.37	0.3	0.04
1.7	0.30	0.3	0.02
1.9	0.21	0.3	0.01
2.2	0.11	0.4	0.00
2.4	0.00	0.4	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.22 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 1.4FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

ISS3

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
3.00CFS	8.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
2.6FT	0.4FT	1.0FT	0.2FT3

MAX DEPTH OCCURS 1.0 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.44
0.3	0.14	0.0	0.43
0.5	0.33	0.1	0.40
0.8	0.42	0.1	0.35
1.0	0.44	0.2	0.23
1.3	0.43	0.2	0.10
1.6	0.38	0.3	0.04
1.8	0.31	0.3	0.02
2.1	0.22	0.4	0.01
2.4	0.12	0.4	0.00
2.6	0.00	0.5	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.26 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 1.6FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

ISS22

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
2.00CFS	4.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
3.2FT	0.5FT	1.3FT	0.3FT3

MAX DEPTH OCCURS 1.3 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.49
0.3	0.16	0.1	0.48
0.6	0.37	0.1	0.45
1.0	0.47	0.2	0.39
1.3	0.49	0.3	0.25
1.6	0.48	0.3	0.11
1.9	0.43	0.4	0.04
2.2	0.35	0.4	0.02
2.6	0.25	0.5	0.01
2.9	0.13	0.6	0.00
3.2	0.00	0.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.38 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 2.1FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

ISS24

DISCHARGE	CULVERT WIDTH	HEIGHT	TAILWATER DEPTH	DURATION
2.00CFS	4.00FT	0.50FT	0.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
3.2FT	0.5FT	1.3FT	0.3FT3

MAX DEPTH OCCURS 1.3 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	0.49
0.3	0.16	0.1	0.48
0.6	0.37	0.1	0.45
1.0	0.47	0.2	0.39
1.3	0.49	0.3	0.25
1.6	0.48	0.3	0.11
1.9	0.43	0.4	0.04
2.2	0.35	0.4	0.02
2.6	0.25	0.5	0.01
2.9	0.13	0.6	0.00
3.2	0.00	0.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.38 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 2.1FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

Storm Drain System 2 (CP 3b)

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
96.00CFS	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
43.7FT	5.2FT	20.0FT	653.0FT3

MAX DEPTH OCCURS 17.5 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	5.25
4.4	1.68	1.0	5.09
8.7	3.94	2.0	4.78
13.1	4.93	3.0	4.09
17.5	5.25	4.0	2.68
21.9	5.04	5.0	1.21
26.2	4.51	6.0	0.47
30.6	3.67	7.0	0.21
35.0	2.62	8.0	0.10
39.4	1.36	9.0	0.05
43.7	0.00	10.0	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 8.28 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 36.0FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

289+00 Stormdrain System

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
100.00CFS	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
45.0FT	5.3FT	20.8FT	708.6FT3

MAX DEPTH OCCURS 18.0 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	5.33
4.5	1.71	1.0	5.17
9.0	4.00	2.1	4.85
13.5	5.01	3.1	4.16
18.0	5.33	4.2	2.72
22.5	5.12	5.2	1.23
27.0	4.58	6.2	0.48
31.5	3.73	7.3	0.21
36.0	2.67	8.3	0.11
40.5	1.39	9.4	0.05
45.0	0.00	10.4	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 8.74 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 37.5FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB1a system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
3.72CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
7.4FT	1.5FT	2.5FT	3.9FT3

MAX DEPTH OCCURS 3.0 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.49
0.7	0.48	0.1	1.44
1.5	1.11	0.2	1.35
2.2	1.40	0.4	1.16
3.0	1.49	0.5	0.76
3.7	1.43	0.6	0.34
4.5	1.28	0.7	0.13
5.2	1.04	0.9	0.06
6.0	0.74	1.0	0.03
6.7	0.39	1.1	0.01
7.4	0.00	1.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.55 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 3.9FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB1b System

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
3.00CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
6.4FT	1.4FT	2.1FT	2.6FT3

MAX DEPTH OCCURS 2.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.37
0.6	0.44	0.1	1.33
1.3	1.03	0.2	1.25
1.9	1.29	0.3	1.07
2.6	1.37	0.4	0.70
3.2	1.32	0.5	0.32
3.8	1.18	0.6	0.12
4.5	0.96	0.7	0.05
5.1	0.69	0.8	0.03
5.8	0.36	0.9	0.01
6.4	0.00	1.0	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.41 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 3.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB4 system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
8.09CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
12.9FT	2.0FT	5.1FT	18.5FT3

MAX DEPTH OCCURS 5.2 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.99
1.3	0.64	0.3	1.93
2.6	1.49	0.5	1.81
3.9	1.87	0.8	1.55
5.2	1.99	1.0	1.01
6.5	1.91	1.3	0.46
7.8	1.71	1.5	0.18
9.0	1.39	1.8	0.08
10.3	0.99	2.0	0.04
11.6	0.52	2.3	0.02
12.9	0.00	2.5	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 1.54 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 8.6FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB7a system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
6.16CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
10.7FT	1.8FT	4.0FT	10.8FT3

MAX DEPTH OCCURS 4.3 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.79
1.1	0.57	0.2	1.74
2.1	1.35	0.4	1.63
3.2	1.69	0.6	1.40
4.3	1.79	0.8	0.92
5.3	1.72	1.0	0.41
6.4	1.54	1.2	0.16
7.5	1.26	1.4	0.07
8.5	0.90	1.6	0.04
9.6	0.47	1.8	0.02
10.7	0.00	2.0	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 1.08 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 6.5FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB7b system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
4.88CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
9.0FT	1.6FT	3.2FT	6.7FT3

MAX DEPTH OCCURS 3.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.64
0.9	0.53	0.2	1.60
1.8	1.23	0.3	1.50
2.7	1.55	0.5	1.28
3.6	1.64	0.6	0.84
4.5	1.58	0.8	0.38
5.4	1.41	1.0	0.15
6.3	1.15	1.1	0.07
7.2	0.82	1.3	0.03
8.1	0.43	1.4	0.02
9.0	0.00	1.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.79 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 5.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB10A SYSTEM

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
5.12CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
9.3FT	1.7FT	3.3FT	7.4FT3

MAX DEPTH OCCURS 3.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.67
0.9	0.54	0.2	1.62
1.9	1.26	0.3	1.52
2.8	1.57	0.5	1.31
3.7	1.67	0.7	0.85
4.7	1.61	0.8	0.39
5.6	1.44	1.0	0.15
6.5	1.17	1.2	0.07
7.5	0.84	1.3	0.03
8.4	0.44	1.5	0.02
9.3	0.00	1.7	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.84 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 5.4FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB10B SYSTEM

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
9.46CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
14.4FT	2.1FT	5.9FT	25.4FT3

MAX DEPTH OCCURS 5.8 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.11
1.4	0.67	0.3	2.04
2.9	1.58	0.6	1.92
4.3	1.98	0.9	1.64
5.8	2.11	1.2	1.08
7.2	2.02	1.5	0.48
8.7	1.81	1.8	0.19
10.1	1.48	2.1	0.08
11.6	1.05	2.3	0.04
13.0	0.55	2.6	0.02
14.4	0.00	2.9	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 1.90 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 10.0FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB13 system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
11.36CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
16.5FT	2.3FT	6.9FT	36.6FT3

MAX DEPTH OCCURS 6.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.26
1.6	0.72	0.3	2.19
3.3	1.69	0.7	2.05
4.9	2.12	1.0	1.76
6.6	2.26	1.4	1.15
8.2	2.17	1.7	0.52
9.9	1.94	2.1	0.20
11.5	1.58	2.4	0.09
13.2	1.13	2.8	0.05
14.8	0.59	3.1	0.02
16.5	0.00	3.5	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 2.43 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 12.0FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50..

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB21a system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
1.63CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
4.1FT	1.1FT	1.2FT	0.8FT3

MAX DEPTH OCCURS 1.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.09
0.4	0.35	0.1	1.06
0.8	0.82	0.1	0.99
1.2	1.02	0.2	0.85
1.7	1.09	0.2	0.56
2.1	1.05	0.3	0.25
2.5	0.94	0.4	0.10
2.9	0.76	0.4	0.04
3.3	0.55	0.5	0.02
3.7	0.28	0.5	0.01
4.1	0.00	0.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.18 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 1.7FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB21b system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
9.29CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
14.3FT	2.1FT	5.8FT	24.5FT3

MAX DEPTH OCCURS 5.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.09
1.4	0.67	0.3	2.03
2.9	1.57	0.6	1.91
4.3	1.97	0.9	1.63
5.7	2.09	1.2	1.07
7.1	2.01	1.4	0.48
8.6	1.80	1.7	0.19
10.0	1.47	2.0	0.08
11.4	1.05	2.3	0.04
12.8	0.54	2.6	0.02
14.3	0.00	2.9	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 1.86 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 9.9FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB21c system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
4.84CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
9.0FT	1.6FT	3.2FT	6.6FT3

MAX DEPTH OCCURS 3.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.64
0.9	0.52	0.2	1.59
1.8	1.23	0.3	1.49
2.7	1.54	0.5	1.28
3.6	1.64	0.6	0.84
4.5	1.57	0.8	0.38
5.4	1.41	1.0	0.15
6.3	1.15	1.1	0.07
7.2	0.82	1.3	0.03
8.1	0.43	1.4	0.02
9.0	0.00	1.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.78 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 5.1FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB23b system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
10.52CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
15.6FT	2.2FT	6.5FT	31.4FT3

MAX DEPTH OCCURS 6.2 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.19
1.6	0.70	0.3	2.13
3.1	1.65	0.6	2.00
4.7	2.06	1.0	1.71
6.2	2.19	1.3	1.12
7.8	2.11	1.6	0.50
9.3	1.89	1.9	0.20
10.9	1.54	2.3	0.09
12.5	1.10	2.6	0.04
14.0	0.57	2.9	0.02
15.6	0.00	3.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 2.19 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 11.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB24a system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
5.60CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
10.0FT	1.7FT	3.6FT	8.9FT3

MAX DEPTH OCCURS 4.0 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.73
1.0	0.55	0.2	1.68
2.0	1.30	0.4	1.58
3.0	1.63	0.5	1.35
4.0	1.73	0.7	0.88
5.0	1.66	0.9	0.40
6.0	1.49	1.1	0.16
7.0	1.21	1.3	0.07
8.0	0.87	1.5	0.03
9.0	0.45	1.6	0.02
10.0	0.00	1.8	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.95 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 5.9FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB24b system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
33.17CFS	4.00FT	2.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
20.6FT	3.5FT	7.6FT	78.0FT3

MAX DEPTH OCCURS 8.2 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	3.52
2.1	1.13	0.4	3.42
4.1	2.64	0.8	3.21
6.2	3.31	1.1	2.75
8.2	3.52	1.5	1.80
10.3	3.38	1.9	0.81
12.3	3.03	2.3	0.32
14.4	2.47	2.7	0.14
16.5	1.76	3.0	0.07
18.5	0.92	3.4	0.04
20.6	0.00	3.8	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 2.01 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 12.4FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB24c system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
2.83CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
6.1FT	1.3FT	1.9FT	2.3FT3

MAX DEPTH OCCURS 2.5 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.34
0.6	0.43	0.1	1.30
1.2	1.01	0.2	1.22
1.8	1.26	0.3	1.05
2.5	1.34	0.4	0.68
3.1	1.29	0.5	0.31
3.7	1.15	0.6	0.12
4.3	0.94	0.7	0.05
4.9	0.67	0.8	0.03
5.5	0.35	0.9	0.01
6.1	0.00	1.0	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.38 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 3.0FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB29b system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
29.49CFS	2.50FT	1.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
27.2FT	3.3FT	12.5FT	157.8FT3

MAX DEPTH OCCURS 10.9 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	3.27
2.7	1.05	0.6	3.18
5.4	2.46	1.2	2.98
8.2	3.08	1.9	2.55
10.9	3.27	2.5	1.67
13.6	3.14	3.1	0.75
16.3	2.82	3.7	0.29
19.1	2.29	4.4	0.13
21.8	1.64	5.0	0.07
24.5	0.85	5.6	0.03
27.2	0.00	6.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 5.14 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 22.4FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB32a system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
2.68CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
5.9FT	1.3FT	1.9FT	2.0FT3

MAX DEPTH OCCURS 2.4 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.31
0.6	0.42	0.1	1.27
1.2	0.99	0.2	1.20
1.8	1.23	0.3	1.02
2.4	1.31	0.4	0.67
2.9	1.26	0.5	0.30
3.5	1.13	0.6	0.12
4.1	0.92	0.6	0.05
4.7	0.66	0.7	0.03
5.3	0.34	0.8	0.01
5.9	0.00	0.9	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.36 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 2.8FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB32b system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
3.62CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
7.3FT	1.5FT	2.4FT	3.7FT3

MAX DEPTH OCCURS 2.9 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.47
0.7	0.47	0.1	1.43
1.5	1.10	0.2	1.34
2.2	1.38	0.4	1.15
2.9	1.47	0.5	0.75
3.7	1.41	0.6	0.34
4.4	1.26	0.7	0.13
5.1	1.03	0.9	0.06
5.8	0.74	1.0	0.03
6.6	0.38	1.1	0.01
7.3	0.00	1.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.53 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 3.8FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB34b system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
2.20CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
5.1FT	1.2FT	1.5FT	1.4FT3

MAX DEPTH OCCURS 2.1 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.22
0.5	0.39	0.1	1.18
1.0	0.91	0.2	1.11
1.5	1.15	0.2	0.95
2.1	1.22	0.3	0.62
2.6	1.17	0.4	0.28
3.1	1.05	0.5	0.11
3.6	0.85	0.5	0.05
4.1	0.61	0.6	0.02
4.6	0.32	0.7	0.01
5.1	0.00	0.8	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.27 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 2.3FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB35b system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
5.84CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
10.3FT	1.8FT	3.8FT	9.7FT3

MAX DEPTH OCCURS 4.1 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.76
1.0	0.56	0.2	1.71
2.1	1.32	0.4	1.60
3.1	1.65	0.6	1.37
4.1	1.76	0.8	0.90
5.1	1.69	0.9	0.40
6.2	1.51	1.1	0.16
7.2	1.23	1.3	0.07
8.2	0.88	1.5	0.04
9.2	0.46	1.7	0.02
10.3	0.00	1.9	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 1.00 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 6.2FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB35c systems

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
12.88CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
18.0FT	2.4FT	7.8FT	47.0FT3

MAX DEPTH OCCURS 7.2 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.37
1.8	0.76	0.4	2.30
3.6	1.78	0.8	2.15
5.4	2.22	1.2	1.85
7.2	2.37	1.6	1.21
9.0	2.27	1.9	0.54
10.8	2.04	2.3	0.21
12.6	1.66	2.7	0.09
14.4	1.18	3.1	0.05
16.2	0.62	3.5	0.02
18.0	0.00	3.9	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 2.87 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 13.7FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB35d system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
10.39CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
15.4FT	2.2FT	6.4FT	30.6FT3

MAX DEPTH OCCURS 6.2 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.18
1.5	0.70	0.3	2.12
3.1	1.64	0.6	1.99
4.6	2.05	1.0	1.70
6.2	2.18	1.3	1.11
7.7	2.10	1.6	0.50
9.3	1.88	1.9	0.20
10.8	1.53	2.2	0.09
12.4	1.09	2.6	0.04
13.9	0.57	2.9	0.02
15.4	0.00	3.2	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 2.15 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 11.0FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB35e system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
10.17CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
15.2FT	2.2FT	6.3FT	29.3FT3

MAX DEPTH OCCURS 6.1 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.17
1.5	0.69	0.3	2.10
3.0	1.62	0.6	1.97
4.6	2.04	0.9	1.69
6.1	2.17	1.3	1.10
7.6	2.08	1.6	0.50
9.1	1.86	1.9	0.19
10.6	1.52	2.2	0.09
12.2	1.08	2.5	0.04
13.7	0.56	2.8	0.02
15.2	0.00	3.1	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 2.09 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 10.8FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB40b system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
28.78CFS	2.50FT	1.25FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
26.8FT	3.2FT	12.2FT	150.2FT3

MAX DEPTH OCCURS 10.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	3.24
2.7	1.04	0.6	3.15
5.4	2.43	1.2	2.95
8.0	3.05	1.8	2.53
10.7	3.24	2.4	1.65
13.4	3.11	3.0	0.75
16.1	2.79	3.7	0.29
18.7	2.27	4.3	0.13
21.4	1.62	4.9	0.06
24.1	0.84	5.5	0.03
26.8	0.00	6.1	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 4.97 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 21.8FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB40d systems

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
8.40CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
13.3FT	2.0FT	5.3FT	20.0FT3

MAX DEPTH OCCURS 5.3 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	2.02
1.3	0.65	0.3	1.96
2.7	1.51	0.5	1.83
4.0	1.90	0.8	1.57
5.3	2.02	1.1	1.03
6.6	1.94	1.3	0.46
8.0	1.73	1.6	0.18
9.3	1.41	1.8	0.08
10.6	1.01	2.1	0.04
11.9	0.52	2.4	0.02
13.3	0.00	2.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 1.62 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 8.9FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

CB40e system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
4.30CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
8.3FT	1.6FT	2.9FT	5.2FT3

MAX DEPTH OCCURS 3.3 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.57
0.8	0.50	0.1	1.52
1.7	1.18	0.3	1.43
2.5	1.47	0.4	1.22
3.3	1.57	0.6	0.80
4.1	1.51	0.7	0.36
5.0	1.35	0.9	0.14
5.8	1.10	1.0	0.06
6.6	0.78	1.1	0.03
7.4	0.41	1.3	0.02
8.3	0.00	1.4	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.67 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 4.6FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

SS12 system

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
3.08CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
6.5FT	1.4FT	2.1FT	2.7FT3

MAX DEPTH OCCURS 2.6 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.38
0.7	0.44	0.1	1.34
1.3	1.04	0.2	1.26
2.0	1.30	0.3	1.08
2.6	1.38	0.4	0.71
3.3	1.33	0.5	0.32
3.9	1.19	0.6	0.12
4.6	0.97	0.7	0.06
5.2	0.69	0.8	0.03
5.9	0.36	0.9	0.01
6.5	0.00	1.1	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.43 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 3.3FT

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

Stormdrain SS15

DISCHARGE	CULVERT DIAM	TAILWATER DEPTH	DURATION
5.03CFS	2.00FT	1.00FT	5.00MIN

MAX SCOUR LGT	MAX SCOUR DEPTH	MAX SCOUR WIDTH	SCOUR VOLUME
9.2FT	1.7FT	3.3FT	7.2FT3

MAX DEPTH OCCURS 3.7 FT DOWNSTREAM OF THE CULVERT OUTLET

SCOUR PROFILE		SCOUR X-SECT AT LOC MAX DEPTH	
LENGTH	DEPTH	DIST FROM CL	DEPTH
0.0	0.00	0.0	1.66
0.9	0.53	0.2	1.61
1.8	1.25	0.3	1.51
2.8	1.56	0.5	1.30
3.7	1.66	0.7	0.85
4.6	1.60	0.8	0.38
5.5	1.43	1.0	0.15
6.5	1.16	1.2	0.07
7.4	0.83	1.3	0.03
8.3	0.43	1.5	0.02
9.2	0.00	1.6	0.00

STONE DIAM(D50) REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITION
==> 0.82 INCHES ON A HORIZONTAL BLANKET 2D50 THICK.

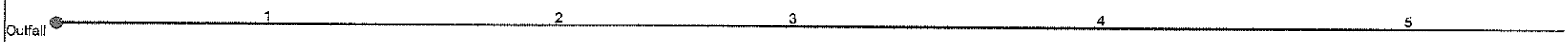
LENGTH OF HORIZONTAL STONE PROTECTION BLANKET REQUIRED TO PREVENT SCOUR UNDER ALL TAILWATER CONDITIONS = 5.3FT.

THE RIPRAP BLANKET SHOULD BE 3 CULVERT DIAMETERS WID E AT THE CULVERT AND SHOULD BE FLARED 1(NORMAL TO THE CULVE RT CL) ON 2(PARALLEL TO THE CULVERT CENTERLINE AND HAVE A THICKNESS EQUAL TO 2D50.

IF THE COMPUTED STONE SIZE (D50) IS NOT REALISTIC, IT CAN BE REDUCED BY 38 AND 59 PERCENT IF PREFORMED SCOUR HOLES 0.5 OR 1.0 CULVERT DIAMETER DEEP, RESPECTIVELY, ARE USED. THE BOTTOM OF THE SCOUR HOLE SHOULD BE 3 CULVERT DIAMETER LONG AND 2 CULVERT DIAMETERS WIDE AND SHOULD BEGIN 1.5 AND 3.0 CULVERT DIAMETERS DOWNSTREAM FROM THE CULVERT EXIT PORTAL FOR SCOUR HOLE DEPTH OF 0.5 AND 1.0 CULVERT DIAMETERS, RESPECTIVELY. IT SHOULD HAVE 1V TO 3H SIDE SLOPES IN ALL DIRECTIONS AND HAVE A RIP RAP THICKNESS EQUAL TO 2D50.

STORM DRAIN CALCULATIONS

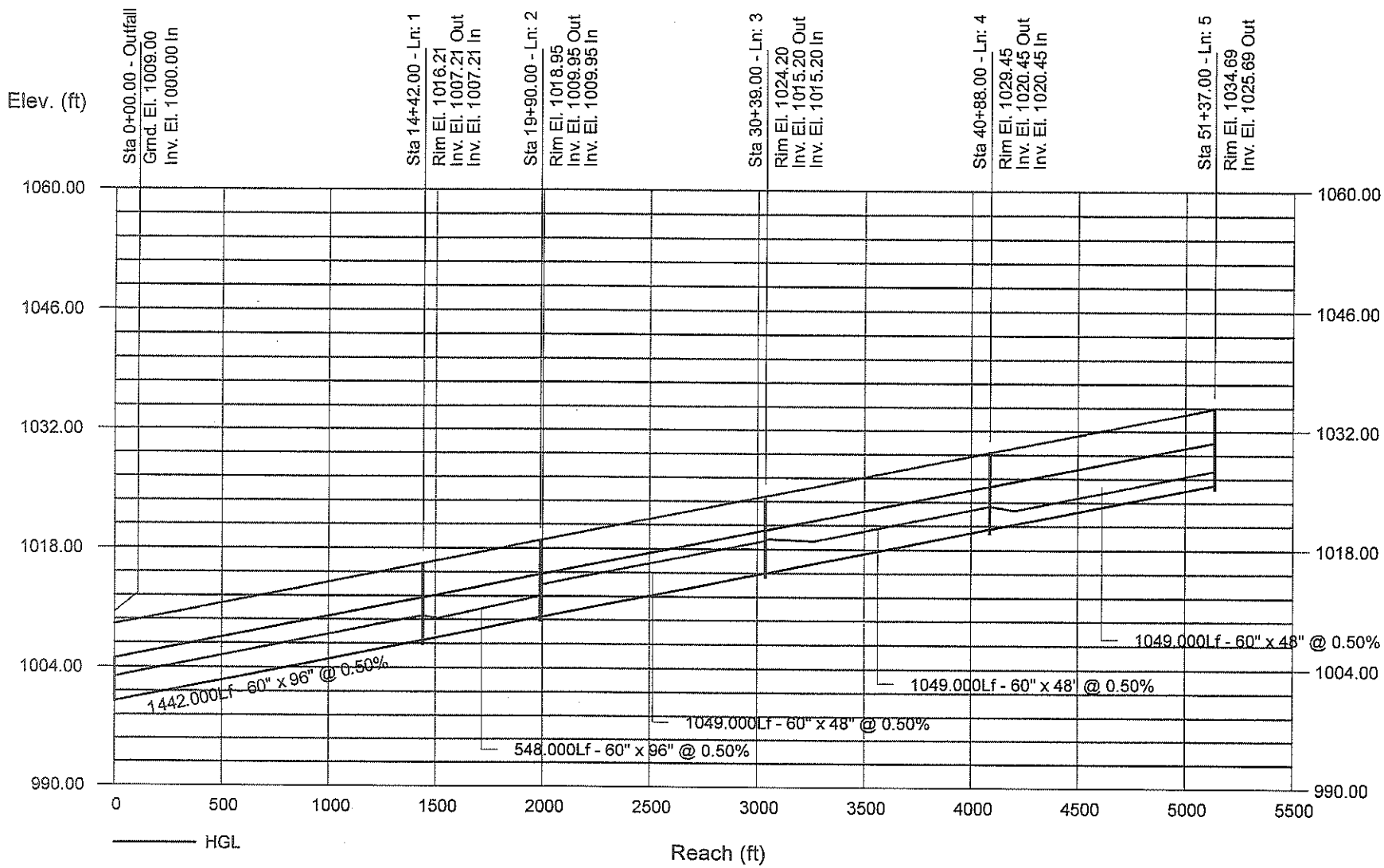
Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: Box Culvert to Pantano.stm	Number of lines: 5	Date: 05-13-2008

Storm Sewer Profile

Proj. file: Box Culvert to Pantano.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	1442.000	0.000	MH	46.00	0.00	0.00	0.0	1000.00	0.50	1007.21	60x96	Box	0.013	0.15	0.00	
2	1	548.000	0.000	MH	30.00	0.00	0.00	0.0	1007.21	0.50	1009.95	60x96	Box	0.013	0.15	0.00	
3	2	1049.000	0.000	MH	49.00	0.00	0.00	0.0	1009.95	0.50	1015.20	60x48	Box	0.013	0.15	0.00	
4	3	1049.000	0.000	MH	49.00	0.00	0.00	0.0	1015.20	0.50	1020.45	60x48	Box	0.013	0.15	0.00	
5	4	1049.000	0.000	MH	49.00	0.00	0.00	0.0	1020.45	0.50	1025.69	60x48	Box	0.013	1.00	0.00	

Project File: Box Culvert to Pantano.stm | Number of lines: 5 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		223.0	60x96	Box	1442.000	1000.00	1007.21	0.500	1002.89	1010.10	0.22	1010.10	End	Manhole
2		177.0	60x96	Box	548.000	1007.21	1009.95	0.500	1010.10	1012.43	n/a	1012.43 j	1	Manhole
3		147.0	60x48	Box	1049.000	1009.95	1015.20	0.500	1013.75	1018.99	0.22	1019.21	2	Manhole
4		98.00	60x48	Box	1049.000	1015.20	1020.45	0.500	1019.21	1023.10	n/a	1023.10 j	3	Manhole
5		49.00	60x48	Box	1049.000	1020.45	1025.69	0.500	1023.10	1027.36	n/a	1027.36 j	4	Manhole

Project File: Box Culvert to Pantano.stm

Number of lines: 5

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs. ; j - Line contains hyd. jump.

Hydra ic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	60 96 b	223.0	1000.00	1002.89	2.89	23.10	9.65	1.45	1004.34	0.358	1442.00	1007.21	1010.10	2.89**	23.10	9.65	1.45	1011.55	0.358	0.358	n/a	0.15	0.22
2	60 96 b	177.0	1007.21	1010.10	2.89	23.10	7.66	0.91	1011.01	0.225	548.00	1009.95	1012.43 j	2.48**	19.81	8.94	1.24	1013.67	0.347	0.286	n/a	0.15	n/a
3	60 48 b	147.0	1009.95	1013.75	3.80*	15.20	9.67	1.45	1015.20	0.499	1049.00	1015.20	1018.99	3.79	15.17	9.69	1.46	1020.45	0.502	0.500	5.248	0.15	0.22
4	60 48 b	98.00	1015.20	1019.21	4.01	16.05	6.11	0.58	1019.79	0.194	1049.00	1020.45	1023.10 j	2.65**	10.60	9.25	1.33	1024.43	0.549	0.372	n/a	0.15	0.20
5	60 48 b	49.00	1020.45	1023.10	2.65	10.60	4.62	0.33	1023.43	0.137	1049.00	1025.69	1027.36 j	1.67**	6.68	7.33	0.84	1028.20	0.467	0.302	n/a	1.00	n/a

Project File: Box Culvert to Pantano.stm | Number of lines: 5 | Run Date: 05-13-2008

Notes: * Normal depth assumed.; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

M M L A Project Name: Houghton Road
P S O M A S Project Number # : 06099-01 Made by DB Date 12/10/07
Reference: COT SMDDFM Checked By _____ Date _____

GRATED INLET DESIGN

General Equations

Wier

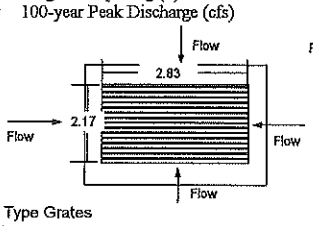
$$Q = C_D L H^{3/2} C_F^{-1}$$

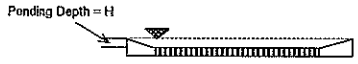
where
- L = Length of Opening (ft)
- C_D = Weir Coefficient
- C_F = Clogging Factor
- H = Height of Opening (ft)
- Q = 100-year Peak Discharge (cfs)

Orifice

$$Q = C_S A H^{1/2} C_F^{-1}$$

where
- A = Effective Area
- Cs = Orifice Coefficient
- C_F = Clogging Factor
- H = Depth of ponding
- Q = 100-year Peak Discharge (cfs)





For ADOT TB1.2 Type Grates
Bar Spacing = 2 in
No. Bars = 16
Total Openings = 17
Effective Area = 4.66 ft²/Grate
Effective Horizontal Opening = 2.83 ft

One Row

Edge Length	
1 grate =	10.0
2 grates =	15.7
3 grates =	21.3
4 grates =	27.0
5 grates =	32.6
6 grates =	38.3
7 grates =	44.0
8 grates =	49.6
9 grates =	55.3
10 grates =	60.9
11 grates =	66.6
12 grates =	72.3
13 grates =	77.9
14 grates =	83.6
15 grates =	89.2
16 grates =	94.9
17 grates =	100.6
18 grates =	106.2
19 grates =	111.9
20 grates =	117.5

Solution

For CP 10

Weir
- Q_{100} = 30 cfs
- C_D = 3.0
- C_F = 1.5
- H = 2 ft
- **L = 5 ft**

One grate provides 10-feet of opening
To account for clogging use **1 -grates**

Orifice
- Q_{100} = 30
- C_S = 5.35
- C_F = 1.5
- H = 2
- A = 5.9476

One grate provides 4.7 ft² of opening
To account for clogging use **2 -grates**

2 -grates governs

Solution

For CP 11

Weir
- Q_{100} = 49 cfs
- C_D = 3.0
- C_F = 1.5
- H = 2 ft
- **L = 9 ft**

One grate provides 10-feet of opening
To account for clogging use **1 -grates**

Orifice
- Q_{100} = 49
- C_S = 5.35
- C_F = 1.5
- H = 2
- A = 9.7145

One grate provides 4.7 ft² of opening
To account for clogging use **3 -grates**

3 -grates governs

Solution

For CP 29B and 31B

Weir
- Q_{100} = 30 cfs
- C_D = 3.0
- C_F = 1.5
- H = 2 ft
- **L = 5 ft**

One grate provides 10-feet of opening
To account for clogging use **1 -grates**

Orifice
- Q_{100} = 30
- C_S = 5.35
- C_F = 1.5
- H = 2
- A = 5.9476

One grate provides 4.7 ft² of opening
To account for clogging use **2 -grates**

2 -grates governs

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	10 S above storm (
Flow Element	Trapezoidal Chann
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.035	
Channel Slope	005000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	30.00	cfs

Results		
Depth	1.47	ft
Flow Area	10.2	ft²
Wetted Perim(	10.58	ft
Top Width	9.89	ft
Critical Depth	1.01	ft
Critical Slope	0.021143	ft/ft
Velocity	2.93	ft/s
Velocity Head	0.13	ft
Specific Energ	1.61	ft
Froude Numb(	0.51	
Flow Type	Subcritical	

Worksheet
Worksheet for Trapezoidal Channel

Project Description	
Worksheet	11 S above storm (
Flow Element	Trapezoidal Chann
Method	Manning's Formula
Solve For	Channel Depth

Input Data		
Mannings Coeffic	0.035	
Channel Slope	005000	ft/ft
Left Side Slope	2.00	H : V
Right Side Slope	2.00	H : V
Bottom Width	4.00	ft
Discharge	49.00	cfs

Results		
Depth	1.88	ft
Flow Area	14.6	ft²
Wetted Perim(	12.43	ft
Top Width	11.54	ft
Critical Depth	1.33	ft
Critical Slope	0.019804	ft/ft
Velocity	3.35	ft/s
Velocity Head	0.17	ft
Specific Energ	2.06	ft
Froude Numb(	0.52	
Flow Type	Subcritical	

PSOMAS

Costa Mesa 714/751-7373 | Denver 720/493-2920 | Phoenix 602/222-8260 | Riverside 951/787-8421 | Roseville 916/788-8122 | Sacramento 916/929-7100

Salt Lake City 801/270-5777 | San Diego 858/576-9200 | Santa Clarita 661/219-6000 | Tucson 520/292-2300 | West Los Angeles 310/954-3700

Job No. _____ Sheet ____ of ____ Prepared by _____ Date _____

Project Name _____ Reviewed by _____ Date _____

Title _____ FWA No. _____

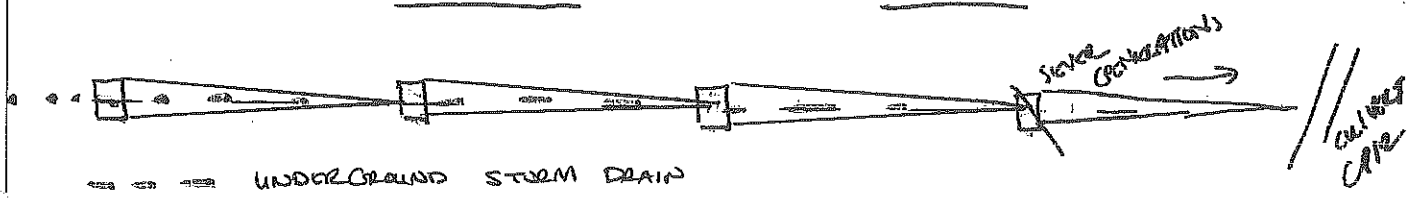
11

$\frac{147}{4} + \frac{46}{4} = 48.25 \approx$ 49 CFS

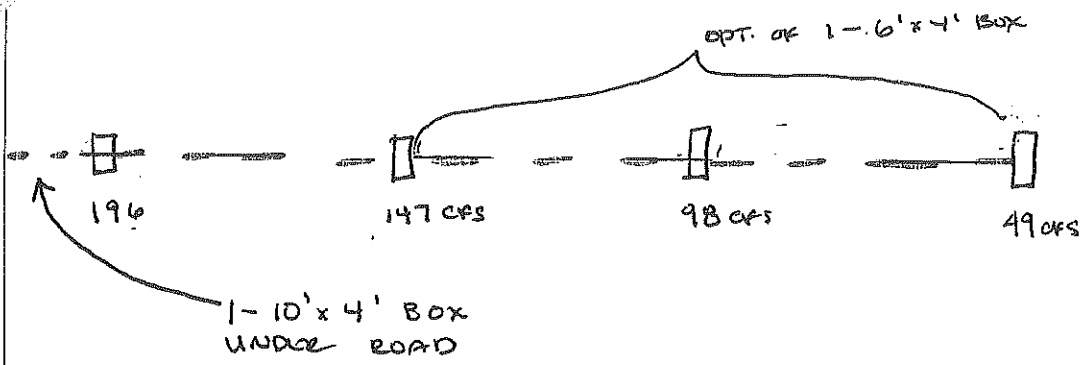
CHANNEL 0.5%
4' BOTTOM
2:1 SIDES

TOP WIDTH 11.54 ≈ 12 FT.

INLETS 3 GRATES @ EACH OF ~~4~~ 3 INLETS



UNDERGROUND STORM DRAIN INLETS (EACH 3 GRATES)

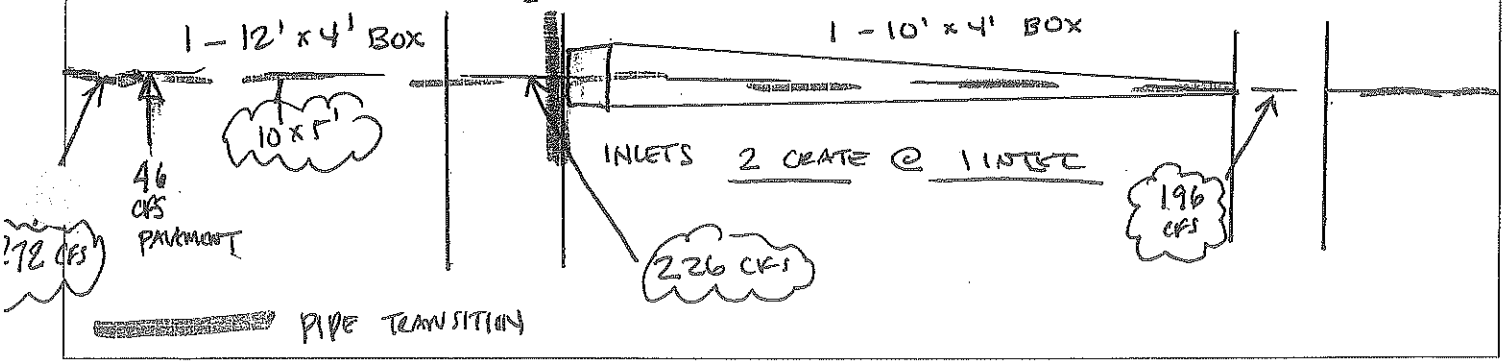


10

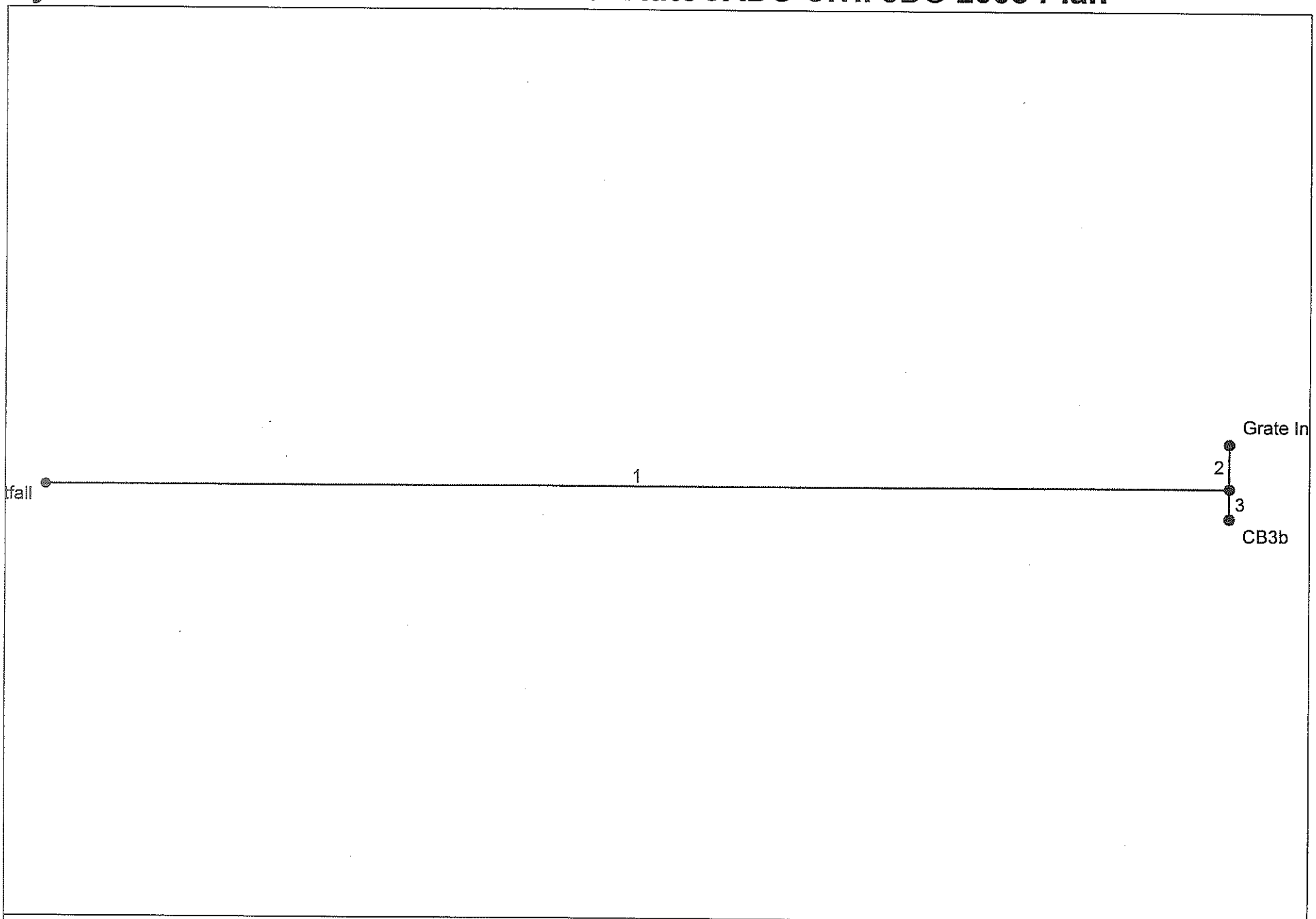
30 CFS
CHANNEL

0.5%
4' BOTTOM
2:1 SIDES

TOP WIDTH 9.89 ≈ 10 FT



Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

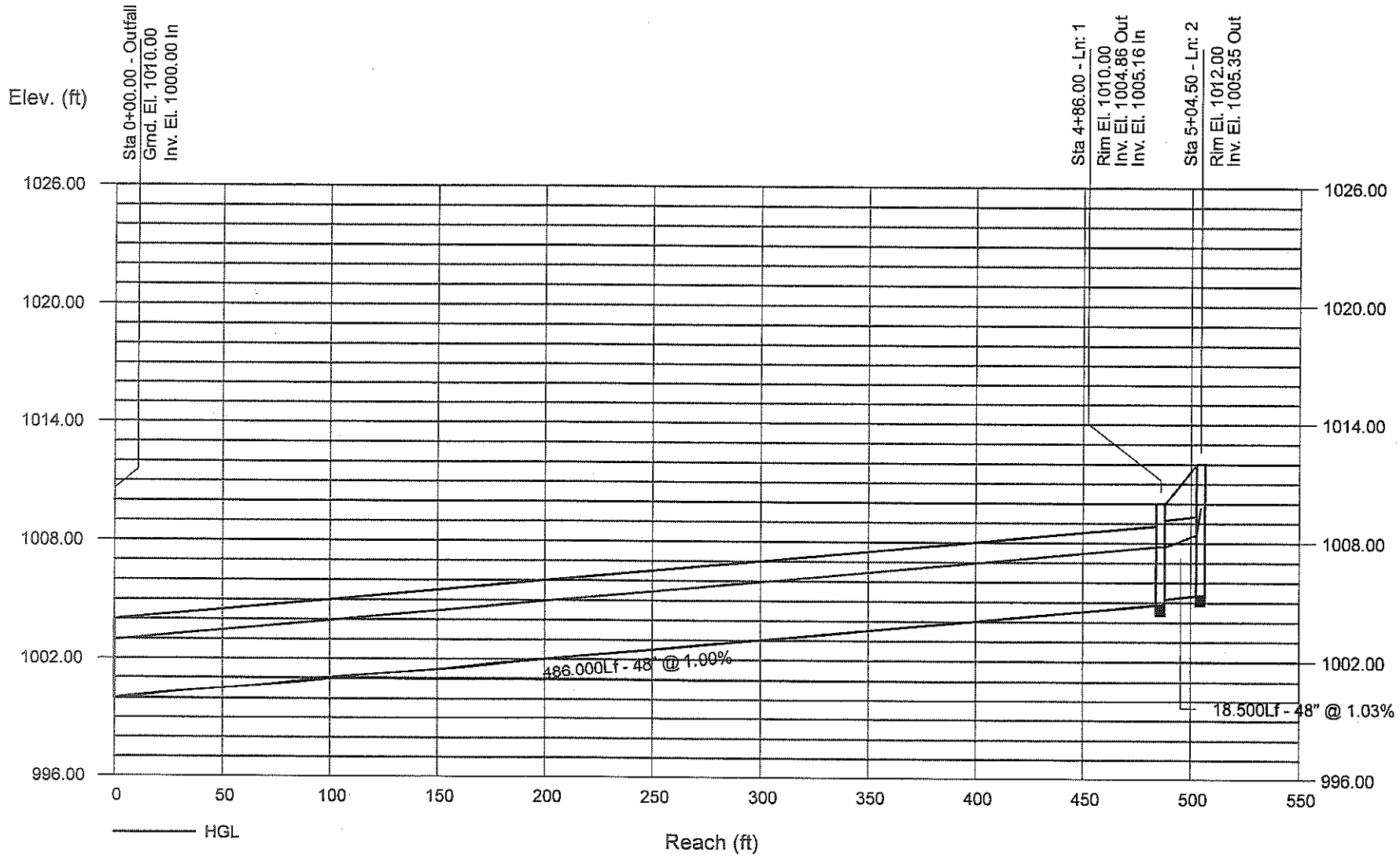


Project File: Station 289+00 system.stm	Number of lines: 3	Date: 06-12-2008

Hydraflow Storm Sewers Extension v6.052

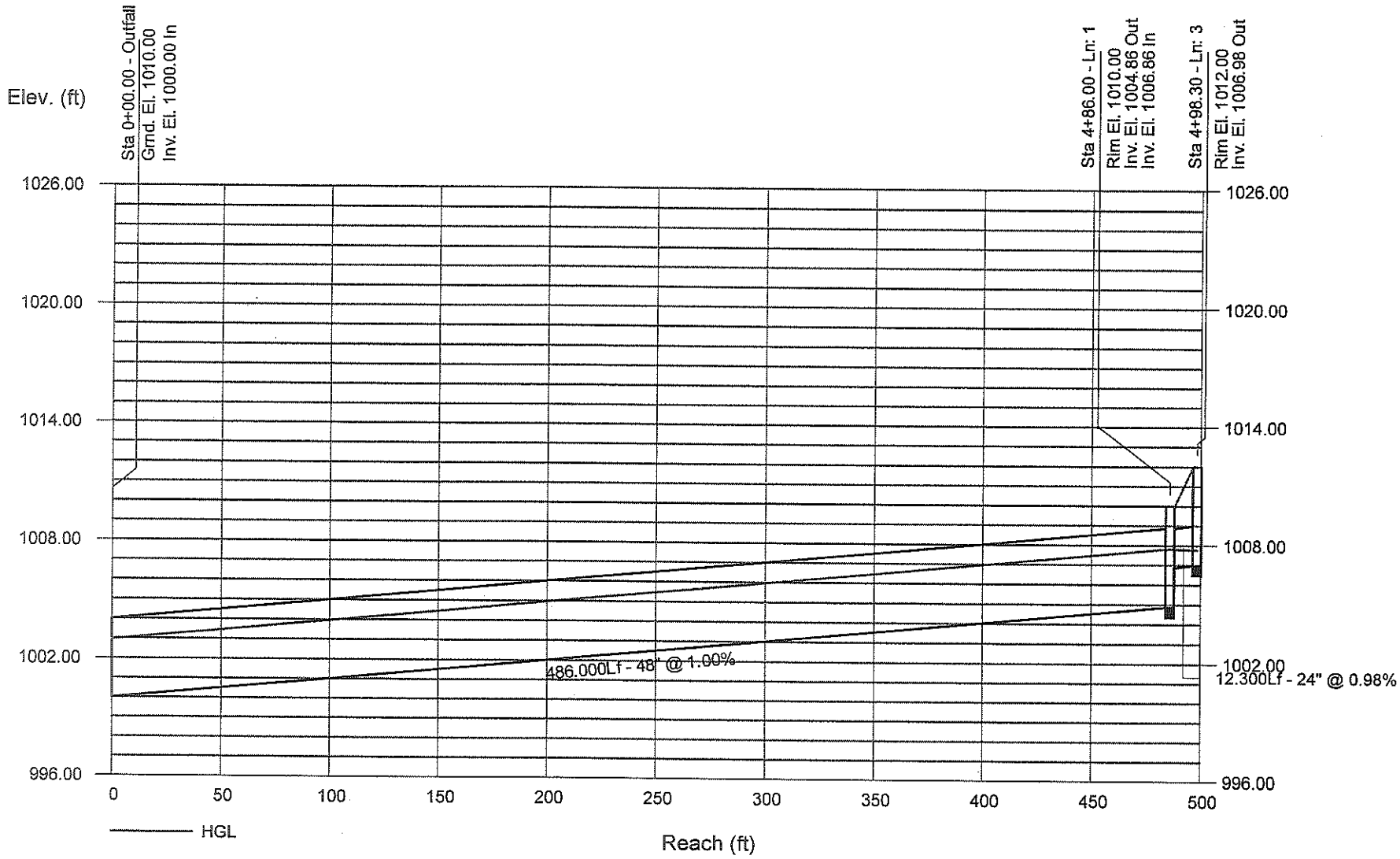
Storm Sewer Profile

Proj. file: Station 289+(stem.stm



Storm Sewer Profile

Proj. file: Station 289+00 system.stm



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1		99.66	48	Cir	486.000	1000.00	1004.86	1.000	1002.95	1007.81	1.56	1007.81	End	Manhole
2		96.00	48	Cir	18.500	1005.16	1005.35	1.027	1007.81	1008.42	1.34	1009.76	1	Grate
3		3.66	24	Cir	12.300	1006.86	1006.98	0.976	1007.81	1007.78	0.00	1007.78	1	Grate

Project File: Station 289+00 system.stm

Number of lines: 3

Run Date: 06-12-2008

NOTES: Return period = 2 Yrs.

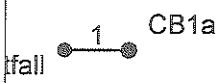
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	48	99.66	1000.00	1002.95	2.95	9.94	10.02	1.56	1004.51	0.601	486.00	1004.86	1007.81	2.95**	9.94	10.02	1.56	1009.37	0.601	0.601	n/a	1.00	1.56
2	48	96.00	1005.16	1007.81	2.65	8.85	10.85	1.83	1009.64	0.738	18.500	1005.35	1008.42	3.07	10.36	9.27	1.34	1009.76	0.509	0.623	0.115	1.00	1.34
3	24	3.66	1006.86	1007.81	0.95	1.48	2.48	0.10	1007.91	0.124	12.300	1006.98	1007.78	0.80	1.17	3.13	0.15	1007.93	0.233	0.178	0.022	0.00	0.00

Project File: Station 289+00 system.stm | Number of lines: 3 | Run Date: 06-12-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

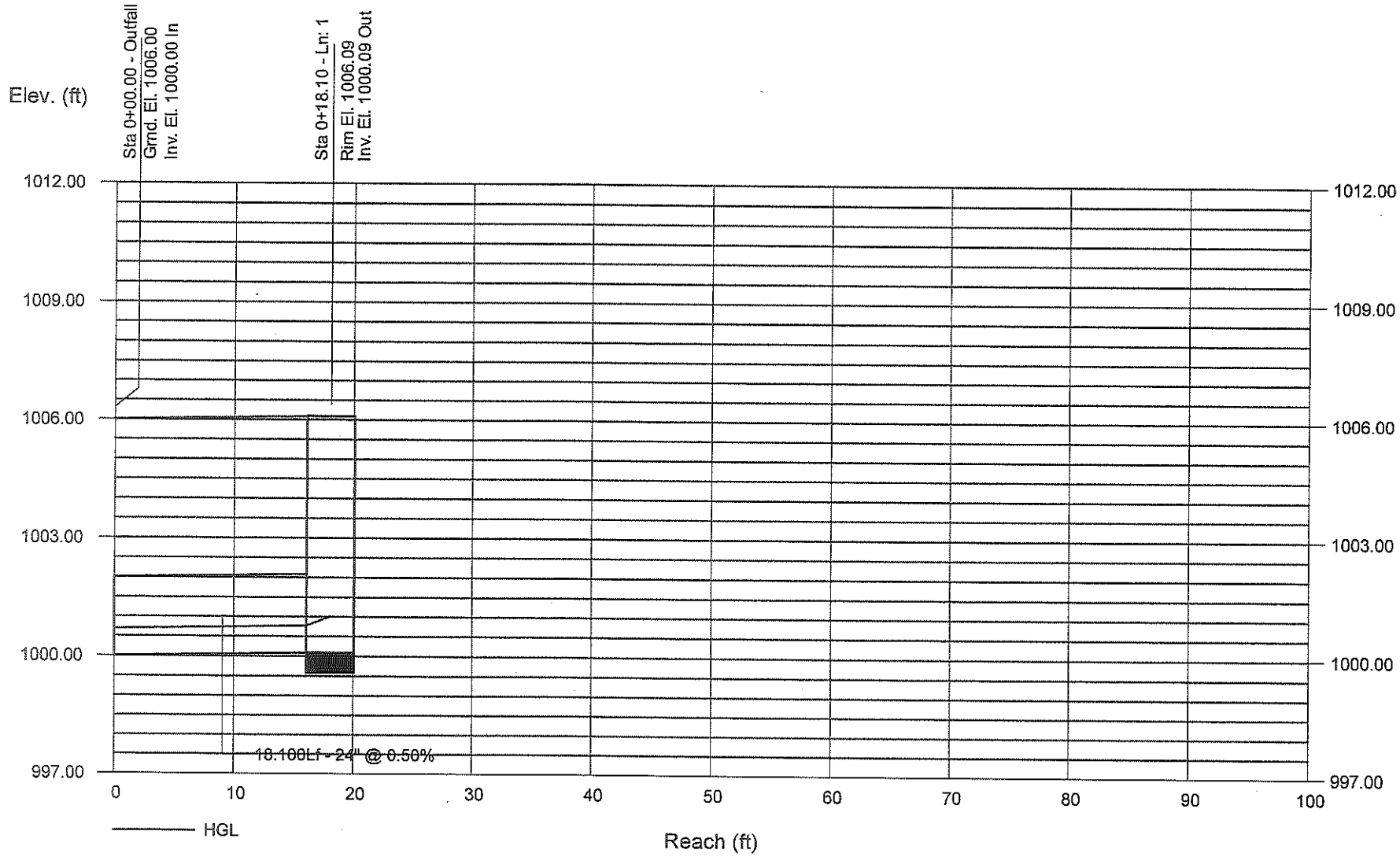
Hydr .ow Storm Sewers Extension for A .oCAD® Civil 3D® 2008 Plan



Project File: CB1a system.stm	Number of lines: 1	Date: 06-12-2008

Storm Sewer Profile

Proj. file: CB1a system.stm



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	1	3.72	24	Cir	18.100	1000.00	1000.09	0.497	1000.68	1000.78	0.24	1001.01	End	Curb-Horiz

Project File: CB1a system.stm

Number of lines: 1

Run Date: 06-12-2008

NOTES: Return period = 2 Yrs.

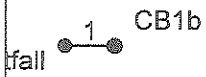
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	3.72	1000.00	1000.68	0.68	0.95	3.92	0.24	1000.92	0.429	18.100	1000.09	1000.78	0.69**	0.96	3.89	0.24	1001.01	0.418	0.424	0.077	1.00	0.24

Project File: CB1a system.stm | Number of lines: 1 | Run Date: 06-12-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydr. .ow Storm Sewers Extension for A..toCAD® Civil 3D® 2008 Plan

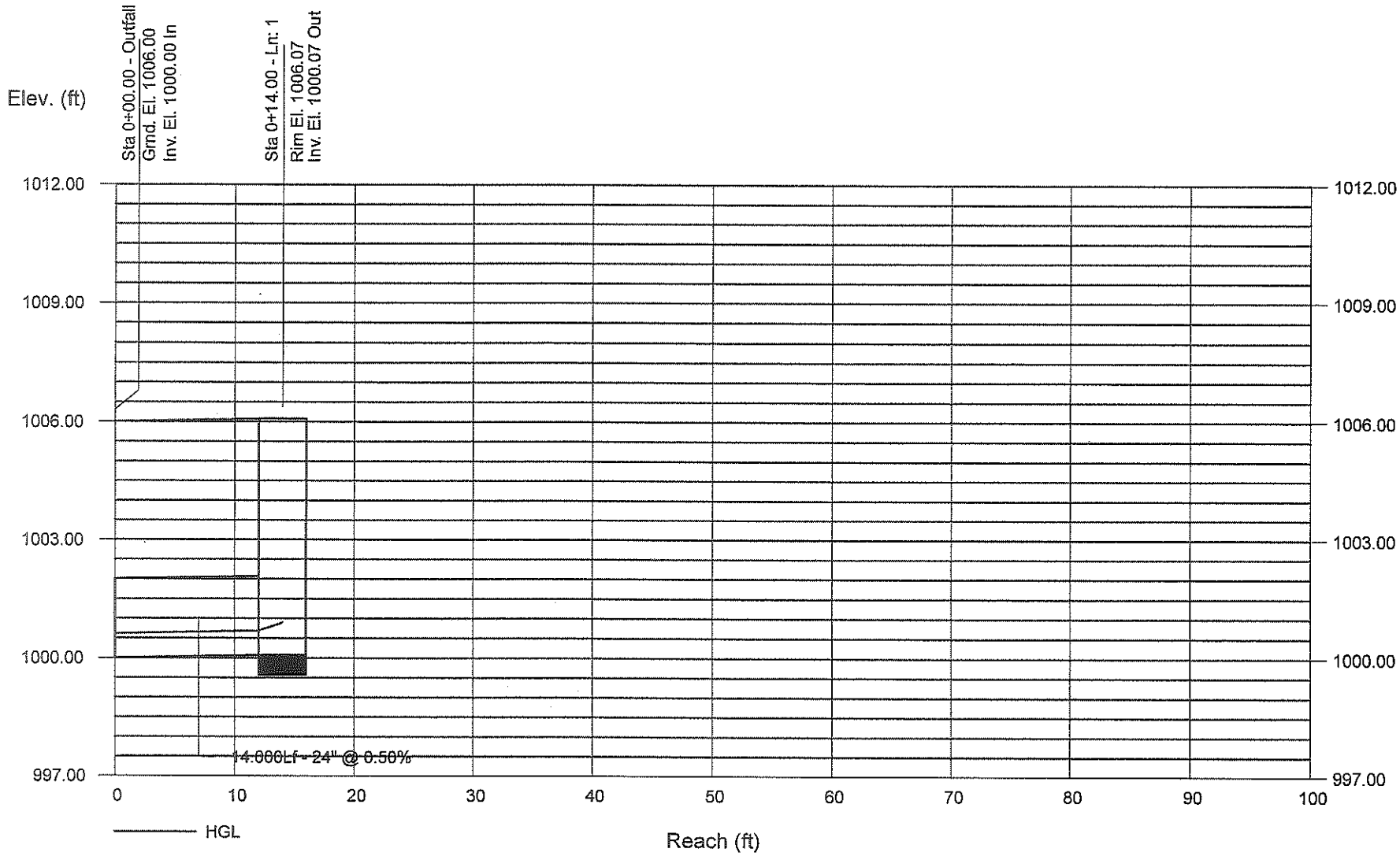


Project File: CB1b system.stm	Number of lines: 1	Date: 06-12-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB1b system.stm



Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	1	2.97	24	Cir	14.000	1000.00	1000.07	0.500	1000.61	1000.69	0.20	1000.89	End	Curb-Horiz

Project File: CB1b system.stm

Number of lines: 1

Run Date: 06-12-2008

NOTES: Return period = 2 Yrs.

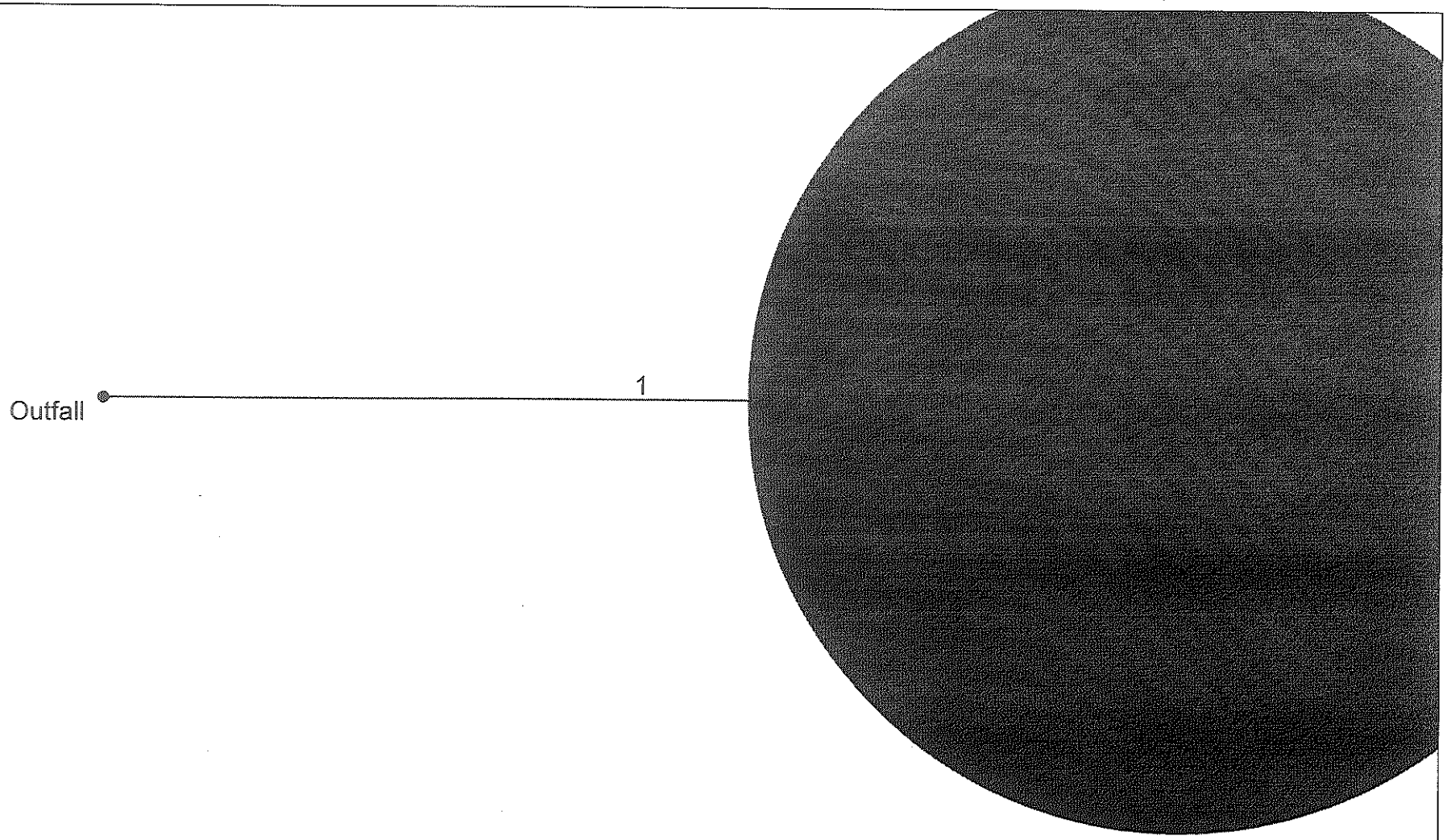
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	2.97	1000.00	1000.61	0.61	0.81	3.66	0.21	1000.82	0.421	14.000	1000.07	1000.69	0.61**	0.82	3.62	0.20	1000.89	0.409	0.415	0.058	1.00	0.20

Project File: CB1b system.stm | Number of lines: 1 | Run Date: 06-12-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

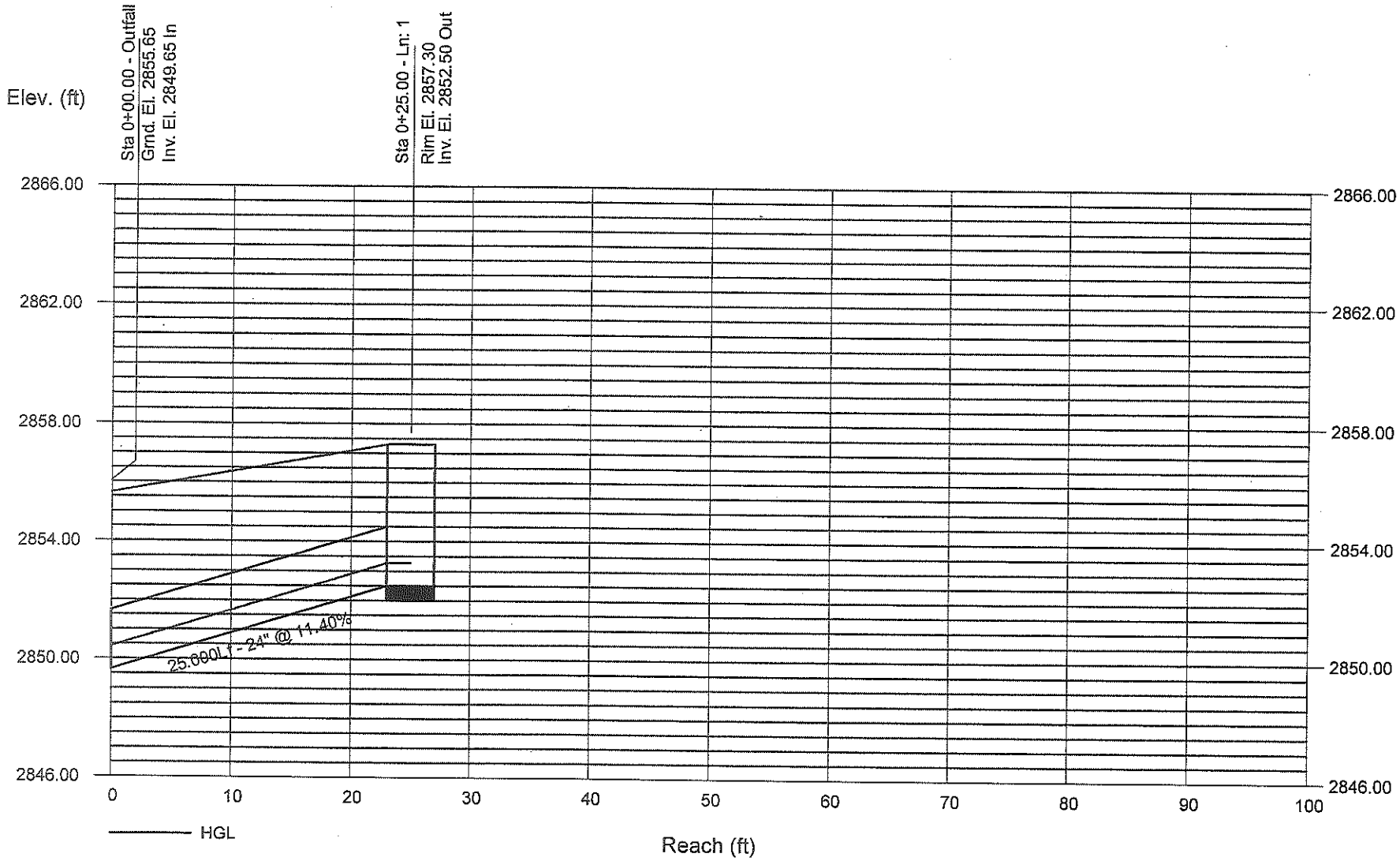
Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



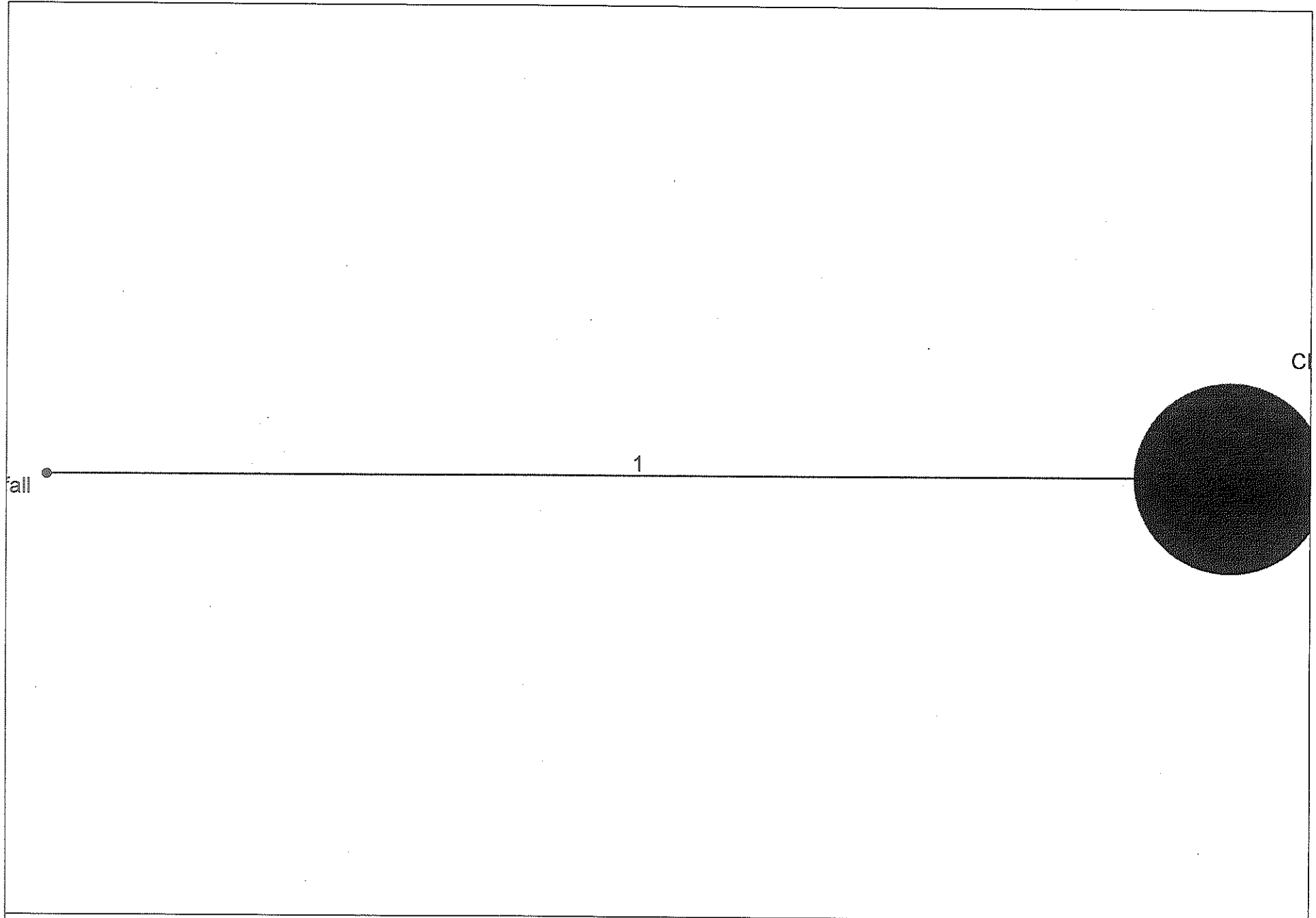
Project File: CB4 system.stm	Number of lines: 1	Date: 05-13-2008

Storm Sewer Profile

Proj. file: CB3a.stm



Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB3a.stm	Number of lines: 1	Date: 07-30-2008

Hydraflow Storm Sewers Extension v6.052

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev. (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB3a	Curb-Horiz	2857.30	Cir	4.00	4.00	24	Cir	2852.50			

Project File: CB3a.stm | Number of Structures: 1 | Run Date: 07-30-2008

Hydraulic Grade Line Computations

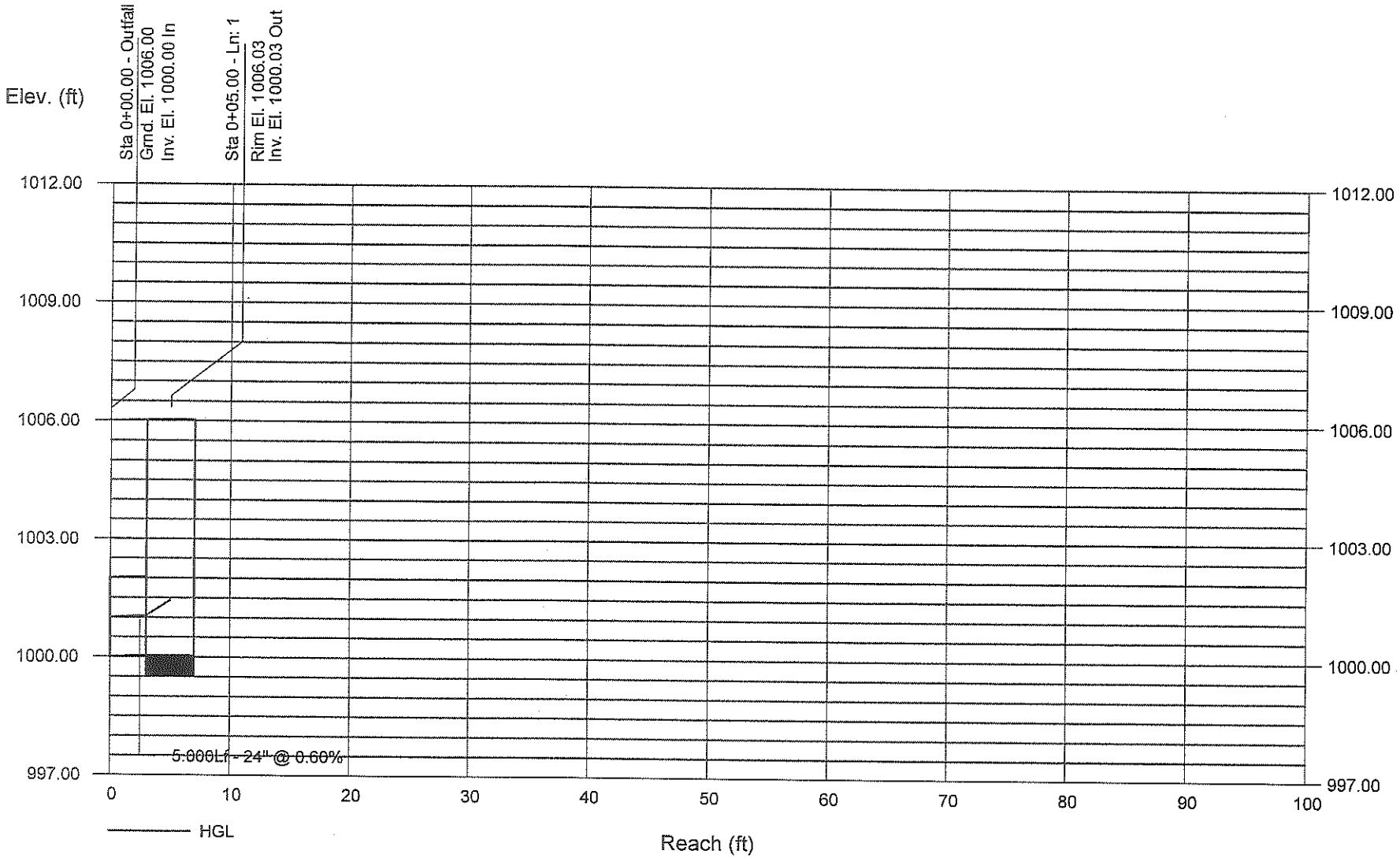
Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	4.70	2849.65	2850.42	0.77	1.11	4.23	0.28	2850.70	0.442	25.000	2852.50	2853.27	0.77**	1.11	4.23	0.28	2853.55	0.442	0.442	n/a	1.00	n/a

Project File: CB3a.stm | Number of lines: 1 | Run Date: 07-30-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: CB4 system.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	5.000	0.000	Curb	8.09	0.00	0.00	0.0	1000.00	0.60	1000.03	24	Cir	0.013	1.00	0.00	2

Project File: CB4 system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	2	8.09	24	Cir	5.000	1000.00	1000.03	0.601	1001.01	1001.04	0.40	1001.44	End	Curb-Horiz

Project File: CB4 system.stm

Number of lines: 1

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

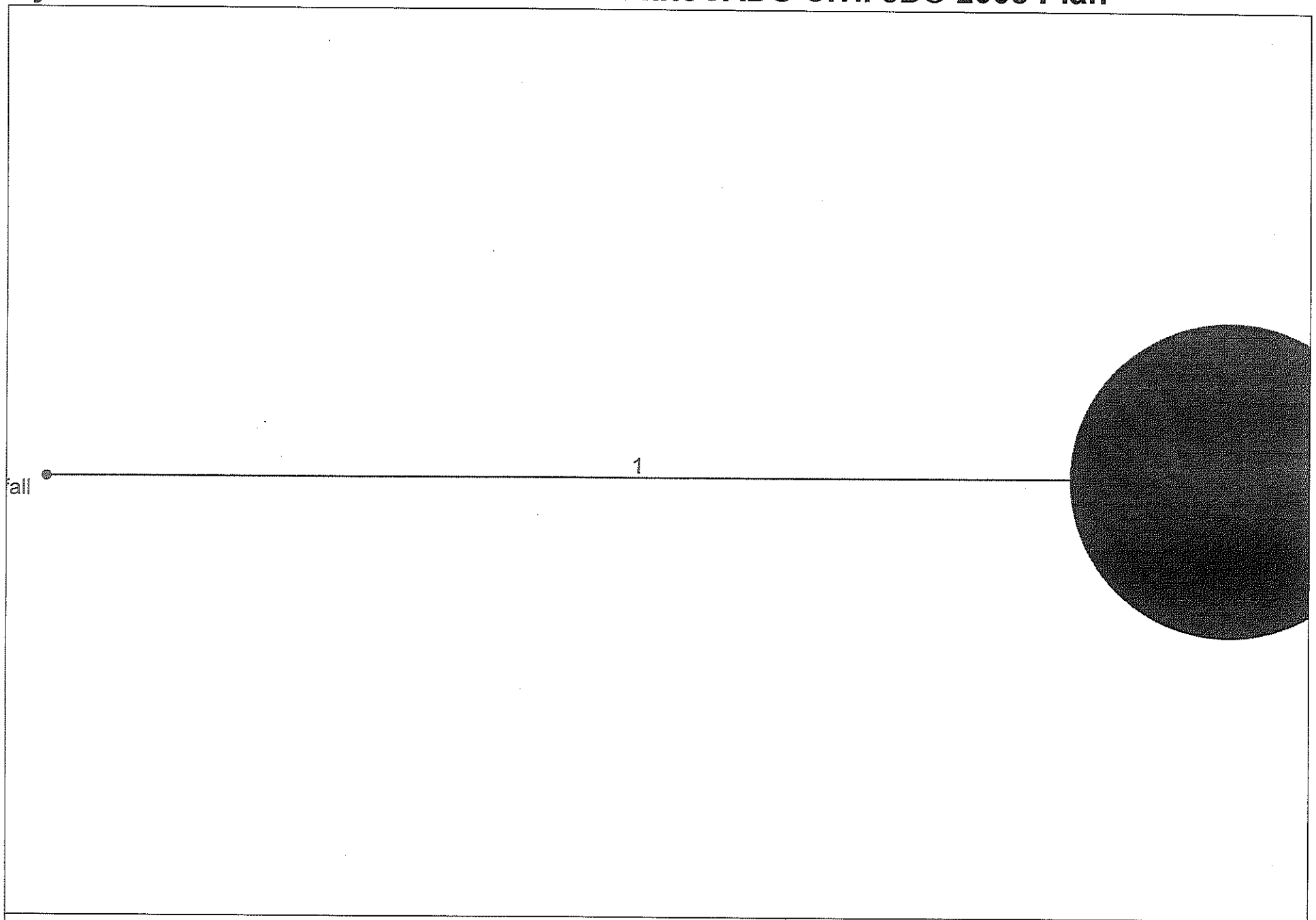
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	8.09	1000.00	1001.01	1.01	1.59	5.10	0.40	1001.41	0.499	5.000	1000.03	1001.04	1.01**	1.60	5.07	0.40	1001.44	0.491	0.495	0.025	1.00	0.40

Project File: CB4 system.stm | Number of lines: 1 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

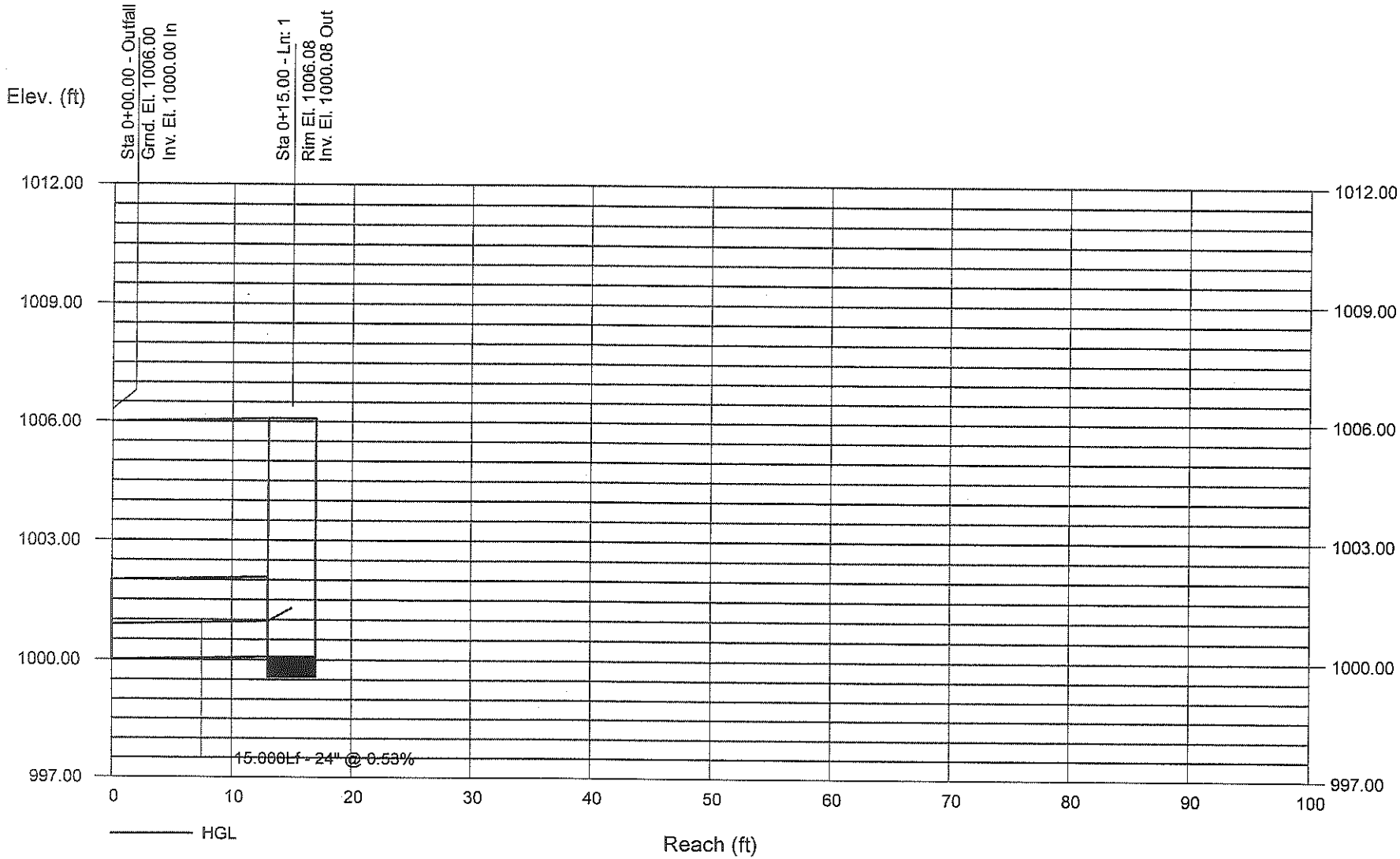


Project File: CB7a system.stm	Number of lines: 1	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB stem.stm



Hydraflow Storm Sewers Extension

Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	15.000	0.000	Curb	6.16	0.00	0.00	0.0	1000.00	0.53	1000.08	24	Cir	0.013	1.00	0.00	3

Project File: CB7a system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	3	6.16	24	Cir	15.000	1000.00	1000.08	0.533	1000.88	1000.96	0.33	1001.29	End	Curb-Horiz

Project File: CB7a system.stm | Number of lines: 1 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	6.16	1000.00	1000.88	0.88	1.33	4.63	0.33	1001.21	0.465	15.000	1000.08	1000.96	0.88**	1.34	4.60	0.33	1001.29	0.456	0.460	0.069	1.00	0.33

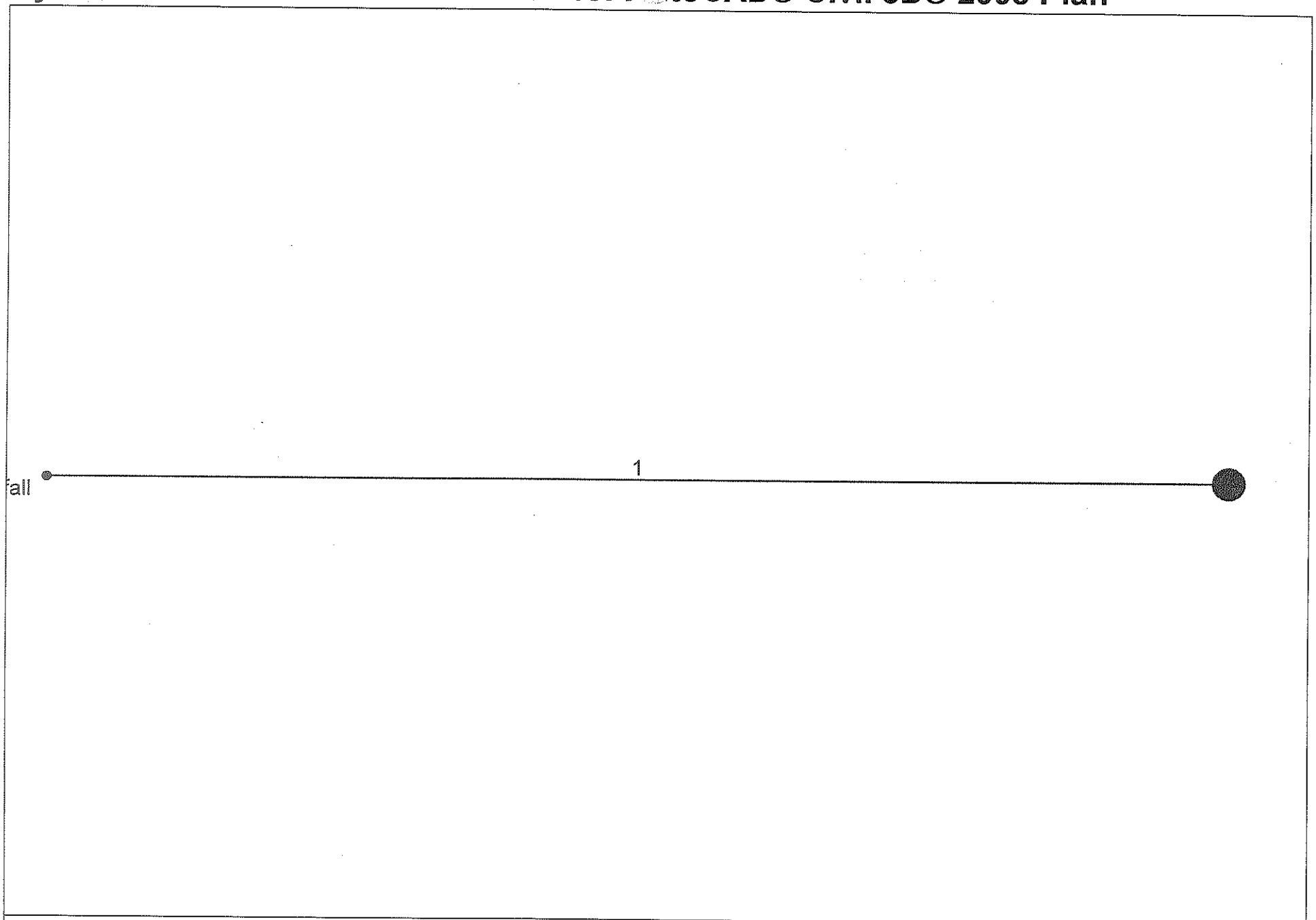
Project File: CB7a system.stm

Number of lines: 1

Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

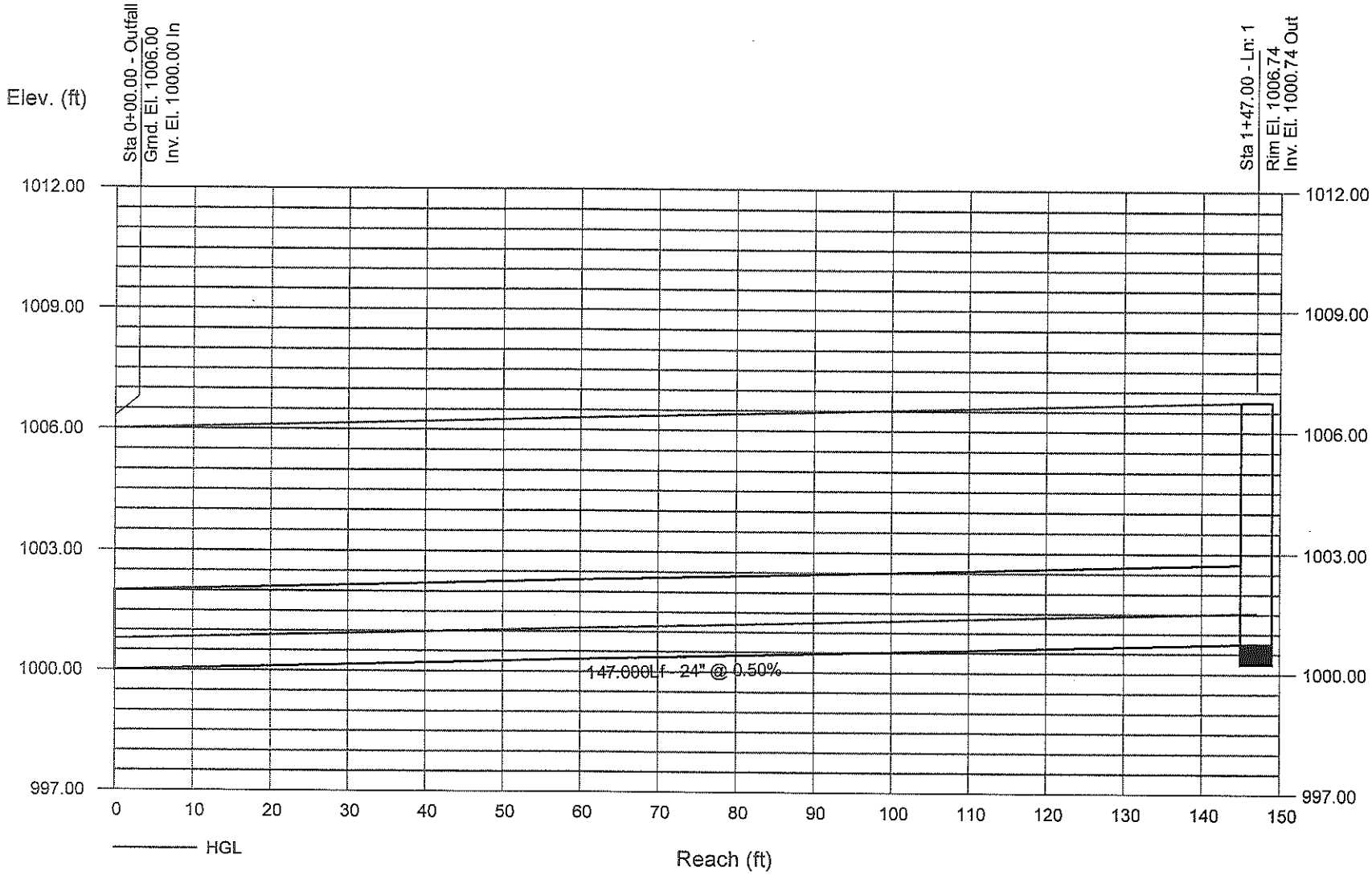


Project File: CB7b system.stm	Number of lines: 1	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB7b system.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	147.000	0.000	Curb	4.88	0.00	0.00	0.0	1000.00	0.50	1000.74	24	Cir	0.013	1.00	0.00	4

Project File: CB7b system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	4	4.88	24	Cir	147.000	1000.00	1000.74	0.503	1000.78	1001.52	n/a	1001.52	End	Curb-Horiz

Project File: CB7b system.stm

Number of lines: 1

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

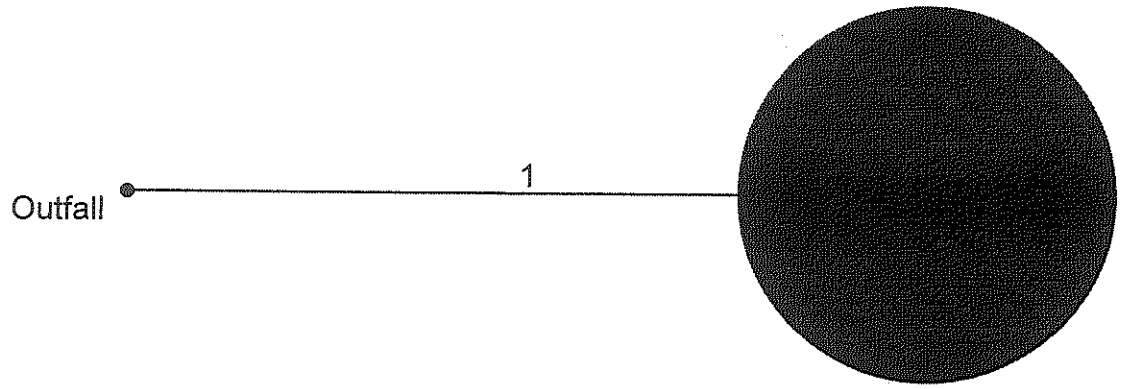
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	4.88	1000.00	1000.78	0.78	1.14	4.28	0.29	1001.07	0.445	147.00	1000.74	1001.52	0.78**	1.14	4.28	0.29	1001.81	0.445	0.445	n/a	1.00	n/a

Project File: CB7b system.stm | Number of lines: 1 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

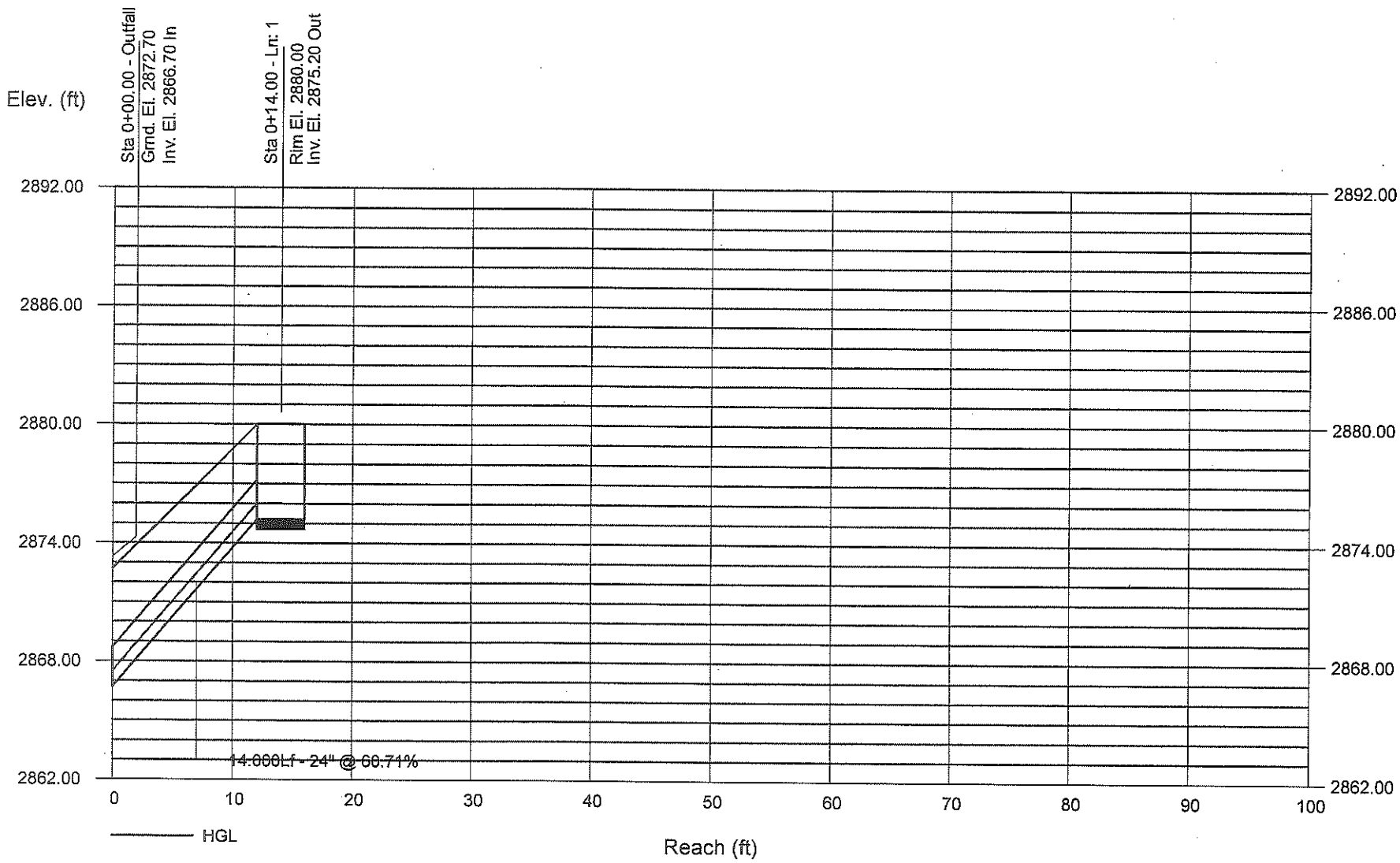
Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB10a system.stm	Number of lines: 1	Date: 05-13-2008

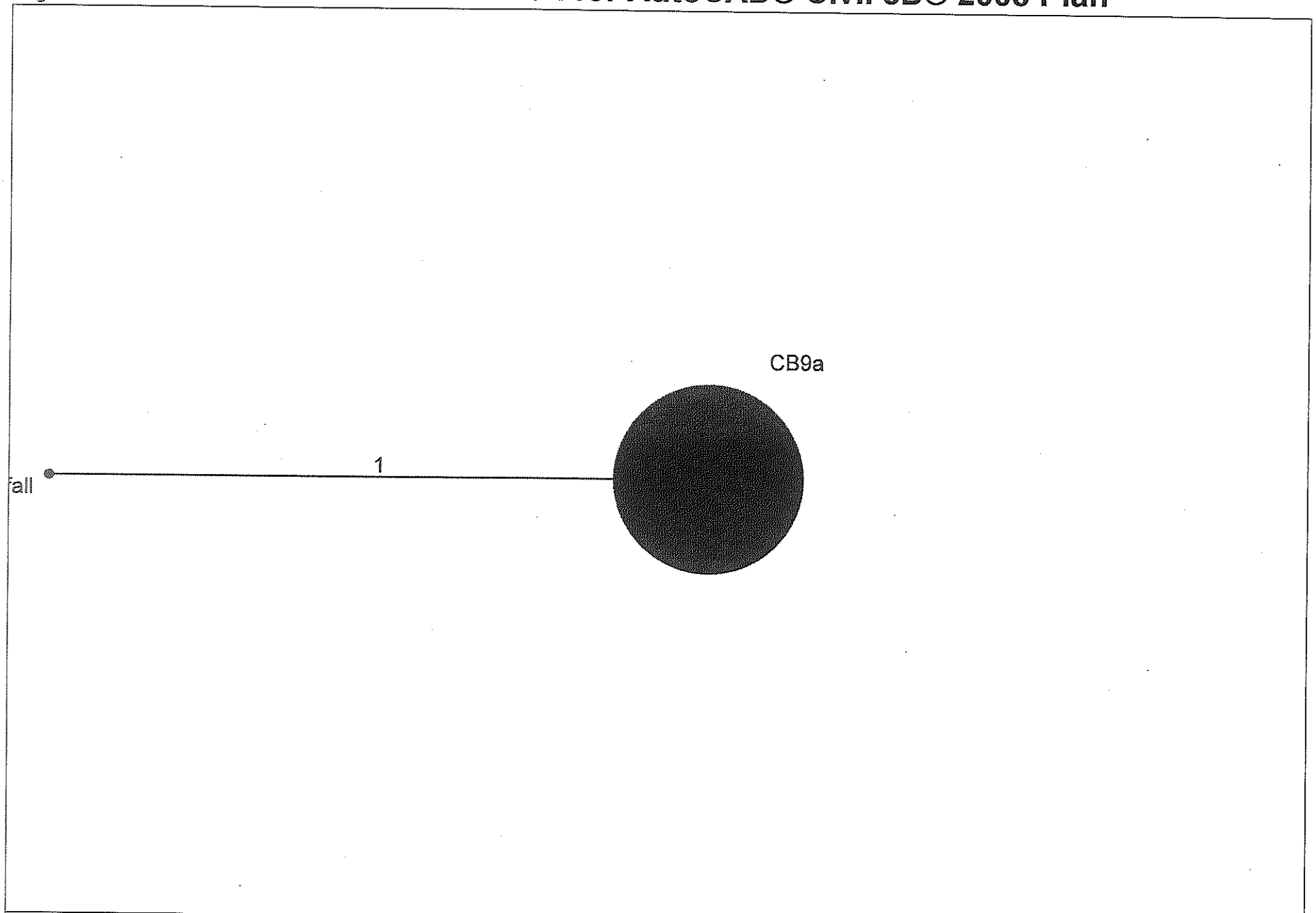
Storm Sewer Profile

Proj. CB9a.stm



Hydraflow Storm Sewers Extension

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB9a.stm	Number of lines: 1	Date: 07-30-2008

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev. (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB9a	Curb-Horiz	2880.00	Cir	4.00	4.00	24	Cir	2875.20			

Project File: CB9a.stm | Number of Structures: 1 | Run Date: 07-30-2008

Hydraulic Grade Line Computations

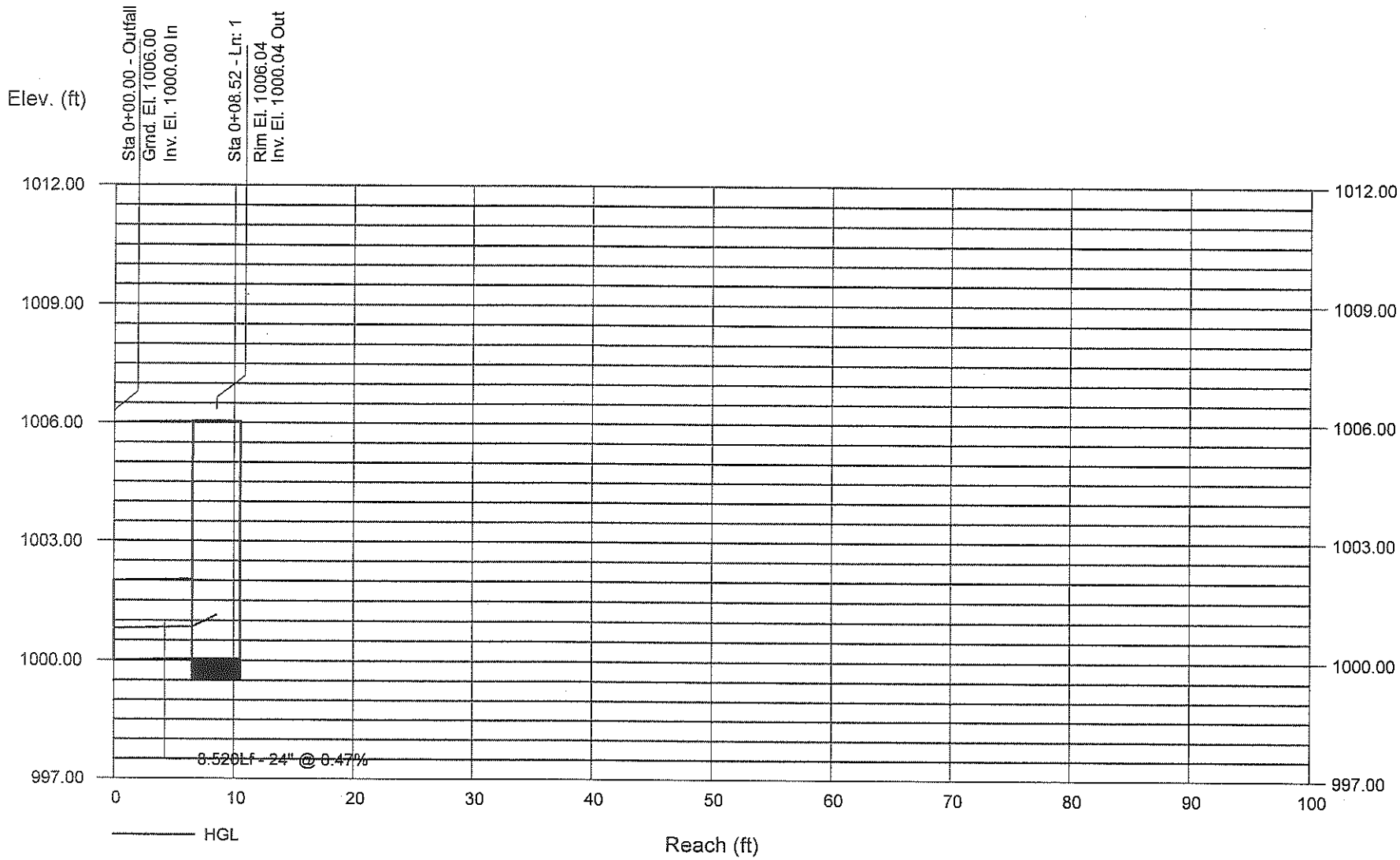
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	5.17	2866.70	2867.51	0.81	1.18	4.37	0.30	2867.80	0.449	14.000	2875.20	2876.01	0.81**	1.18	4.37	0.30	2876.30	0.449	0.449	n/a	1.00	0.30

Project File: CB9a.stm | Number of lines: 1 | Run Date: 07-30-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: CB1[illegible]stem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	8.520	0.000	Curb	5.12	0.00	0.00	0.0	1000.00	0.47	1000.04	24	Cir	0.013	1.00	0.00	5

Project File: CB10a system.stm

Number of lines: 1

Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	5	5.12	24	Cir	8.520	1000.00	1000.04	0.469	1000.80	1000.85	0.29	1001.14	End	Curb-Horiz

Project File: CB10a system.stm | Number of lines: 1 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

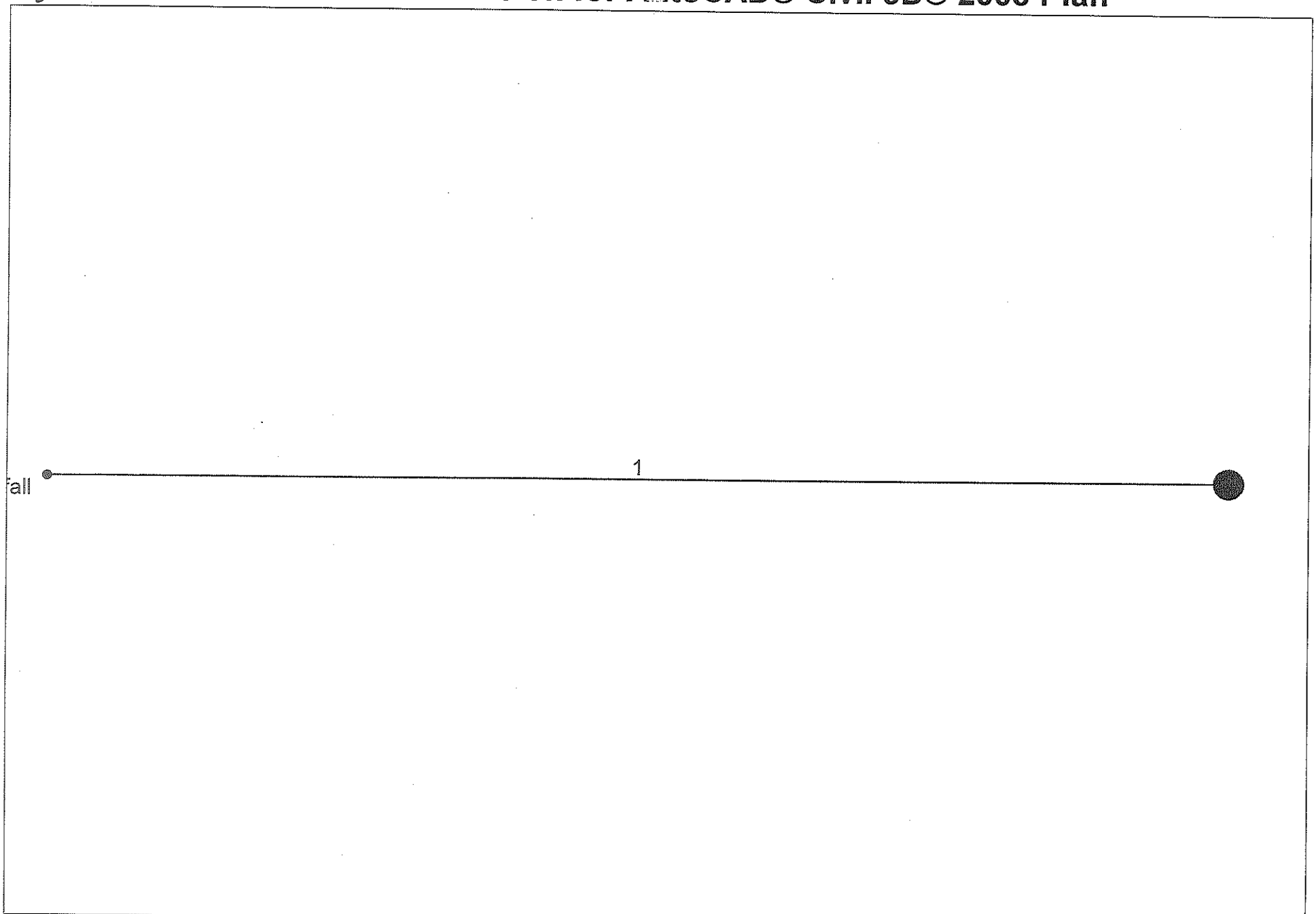
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	5.12	1000.00	1000.80	0.80	1.18	4.35	0.29	1001.10	0.448	8.520	1000.04	1000.85	0.81**	1.19	4.32	0.29	1001.14	0.439	0.443	0.038	1.00	0.29

Project File: CB10a system.stm | Number of lines: 1 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

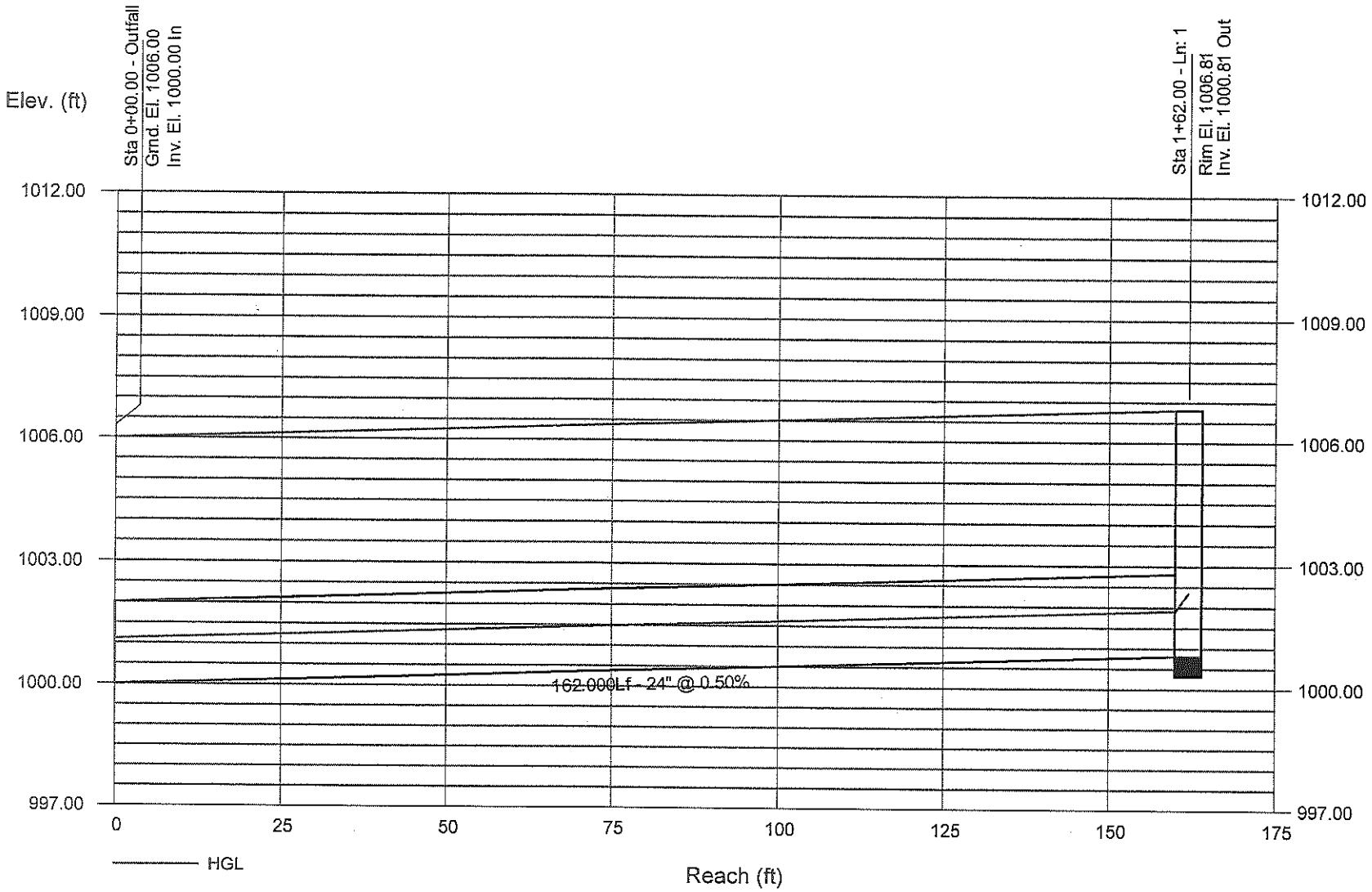


Project File: CB10b system.stm	Number of lines: 1	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB10b system.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	162.000	0.000	Curb	9.46	0.00	0.00	0.0	1000.00	0.50	1000.81	24	Cir	0.013	1.00	0.00	6

Project File: CB10b system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	6	9.46	24	Cir	162.000	1000.00	1000.81	0.500	1001.11	1001.91	0.44	1002.35	End	Curb-Horiz

Project File: CB10b system.stm

Number of lines: 1

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

Hydraulic Grade Line Computations

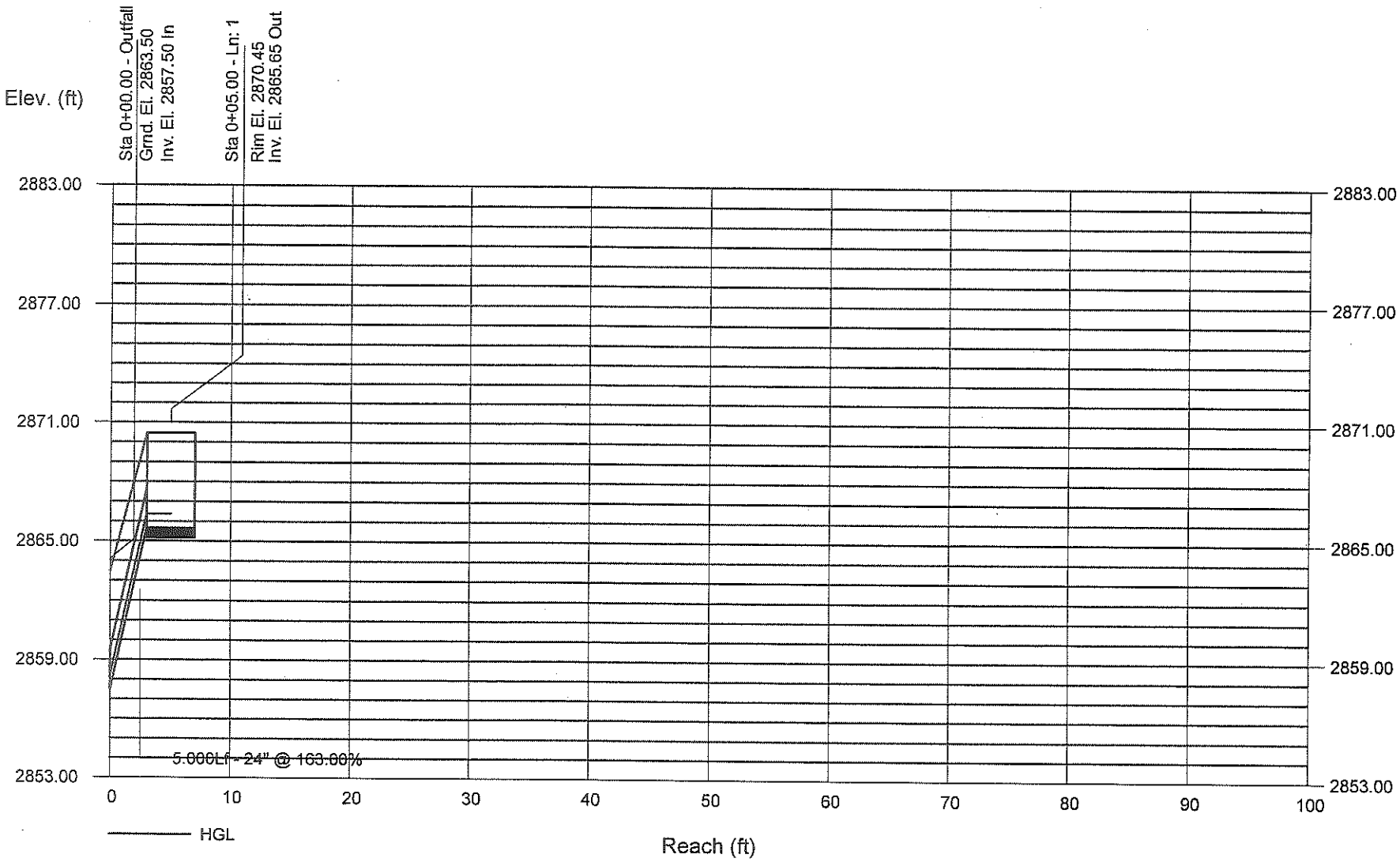
Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	9.46	1000.00	1001.11	1.11	1.78	5.30	0.44	1001.54	0.500	162.00	1000.81	1001.91	1.10	1.78	5.32	0.44	1002.35	0.504	0.502	0.813	1.00	0.44

Project File: CB10b system.stm | Number of lines: 1 | Run Date: 05-13-2008

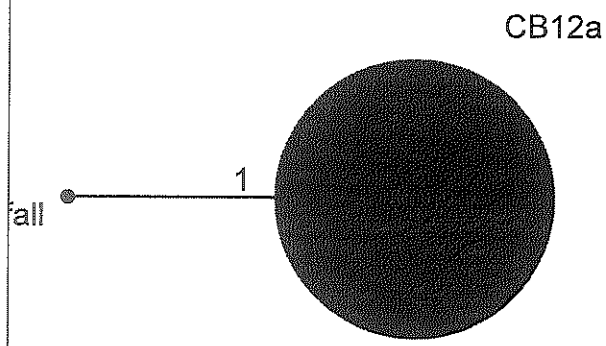
; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: CB12a.stm



Hydr .ow Storm Sewers Extension for A .toCAD® Civil 3D® 2008 Plan



Project File: CB12a.stm	Number of lines: 1	Date: 07-30-2008

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev. (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB12a	Curb-Horiz	2870.45	Cir	4.00	4.00	24	Cir	2865.65			

Project File: CB12a.stm | Number of Structures: 1 | Run Date: 07-30-2008

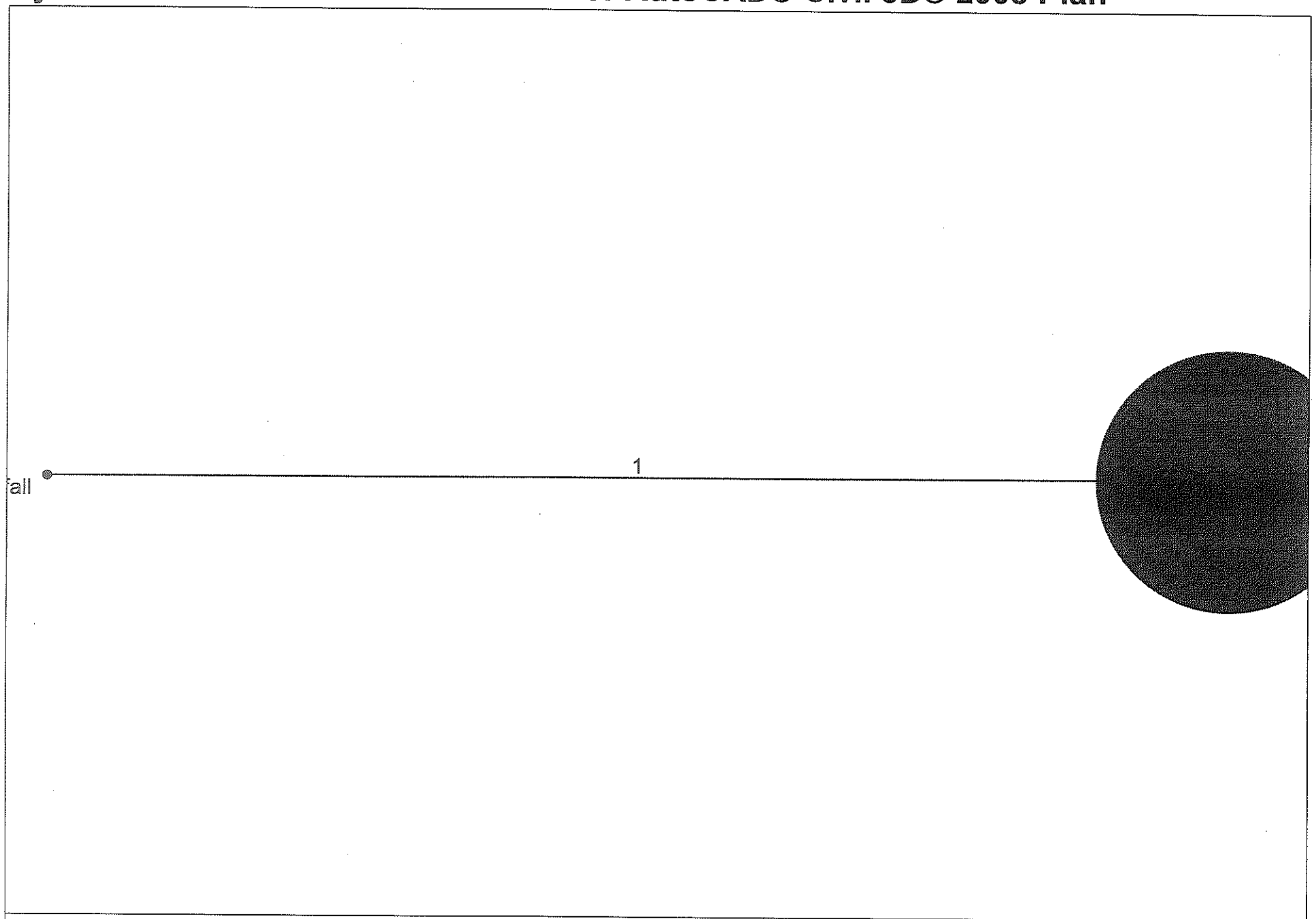
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	4.07	2857.50	2858.22	0.71	1.01	4.04	0.25	2858.47	0.433	5.000	2865.65	2866.37	0.71**	1.01	4.04	0.25	2866.62	0.434	0.434	n/a	1.00	0.25

Project File: CB12a.stm | Number of lines: 1 | Run Date: 07-30-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

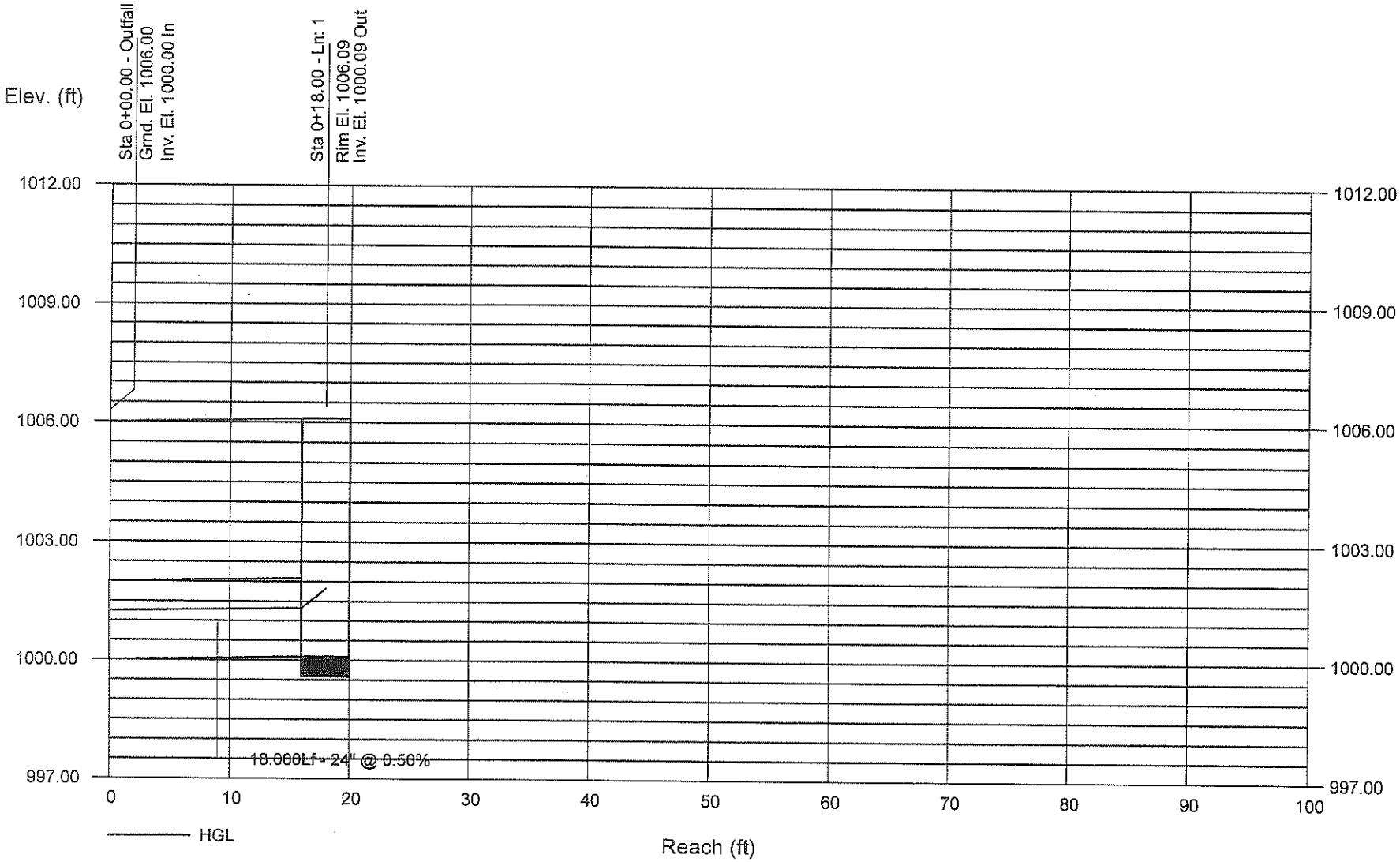
Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB13 system.stm	Number of lines: 1	Date: 05-13-2008

Stor Sewer Profile

Proj. file: CB stem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	18.000	0.000	Curb	11.36	0.00	0.00	0.0	1000.00	0.50	1000.09	24	Cir	0.013	1.00	0.00	7

Project File: CB13 system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	7	11.36	24	Cir	18.000	1000.00	1000.09	0.500	1001.25	1001.33	0.48	1001.81	End	Curb-Horiz

Project File: CB13 system.stm

Number of lines: 1

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

Hydraulic Grade Line Computations

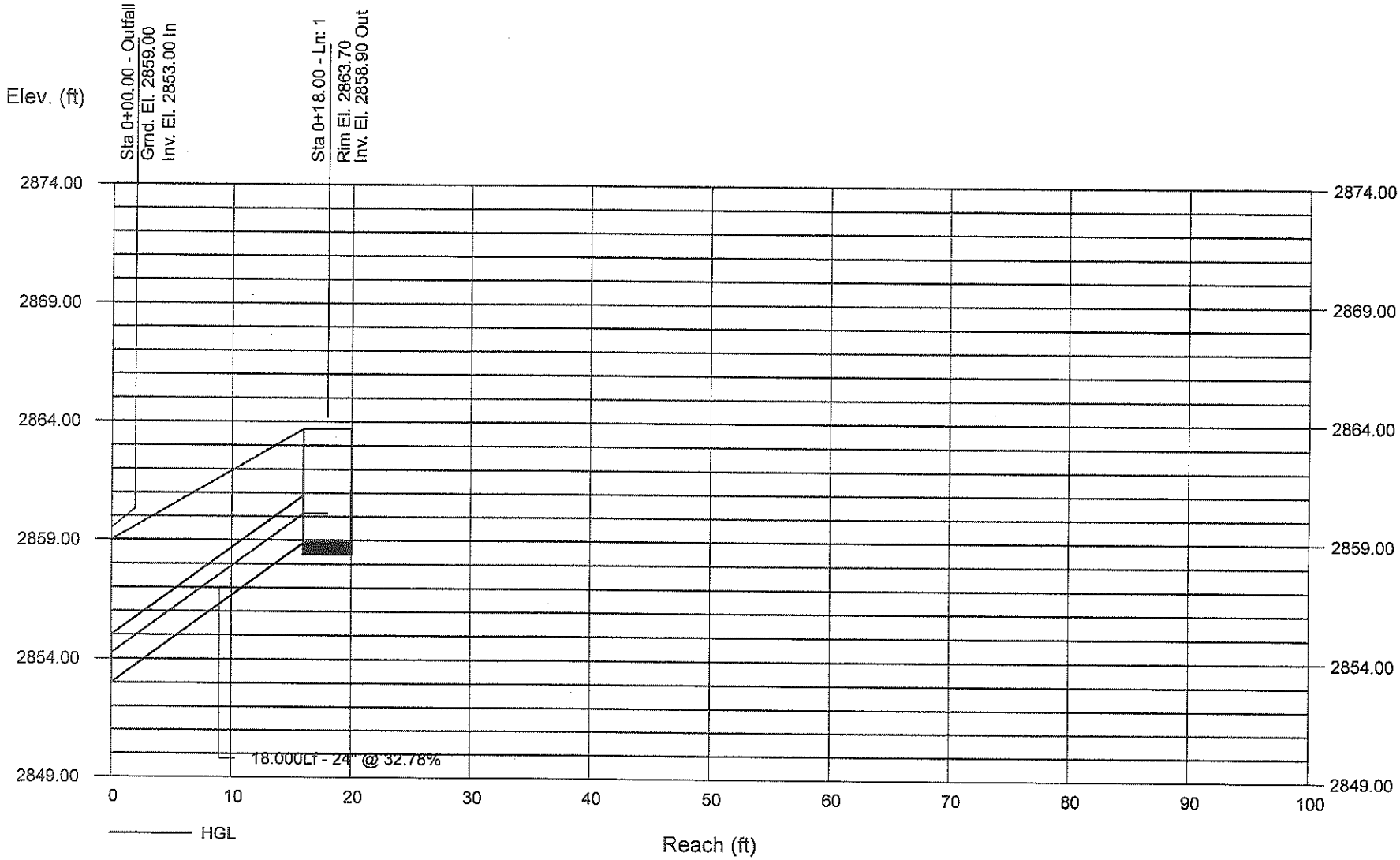
Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	11.36	1000.00	1001.25	1.25	2.06	5.53	0.47	1001.72	0.500	18.000	1000.09	1001.33	1.24	2.05	5.54	0.48	1001.81	0.503	0.502	0.090	1.00	0.48

Project File: CB13 system.stm | Number of lines: 1 | Run Date: 05-13-2008

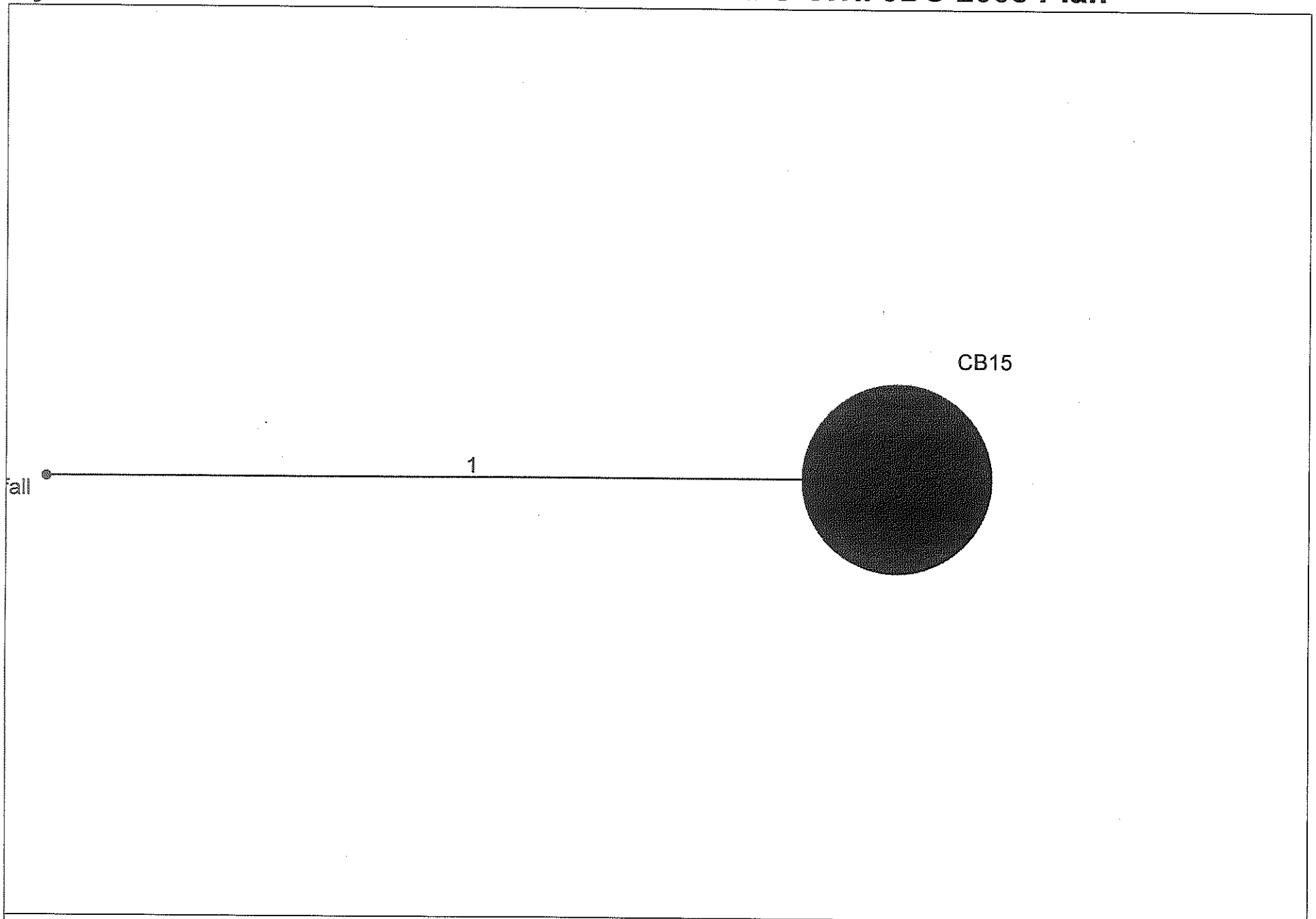
; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: CB1 stem.stm



Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB15 system.stm	Number of lines: 1	Date: 07-30-2008

Hydraflow Storm Sewers Extension v6.052

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev. (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB15	Curb-Horiz	2863.70	Cir	4.00	4.00	24	Cir	2858.90			

Project File: CB15 system.stm | Number of Structures: 1 | Run Date: 07-30-2008

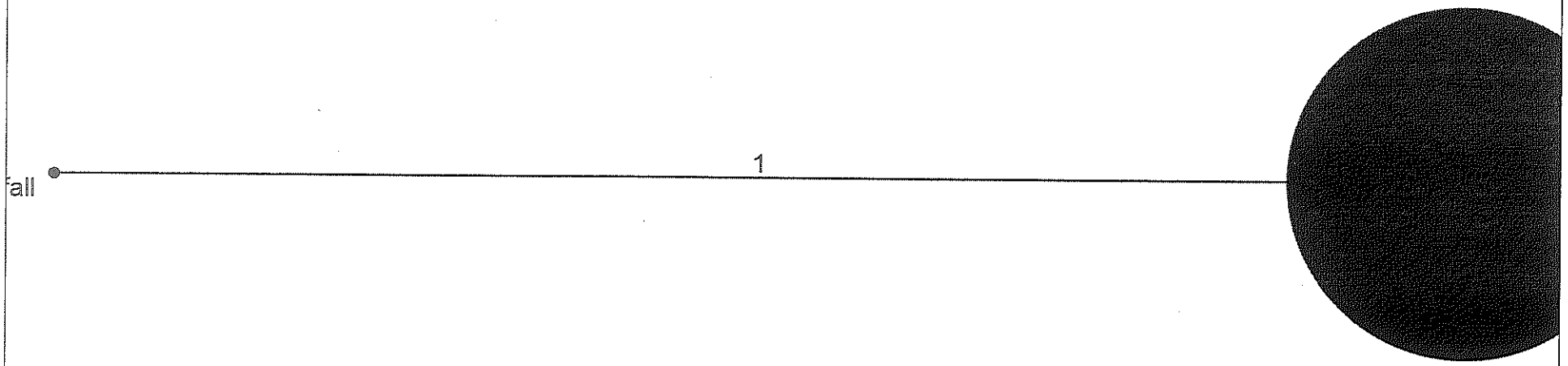
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	12.11	2853.00	2854.23	1.23	2.03	5.96	0.55	2854.79	0.586	18.000	2858.90	2860.13	1.23**	2.03	5.96	0.55	2860.69	0.586	0.586	n/a	1.00	n/a

Project File: CB15 system.stm | Number of lines: 1 | Run Date: 07-30-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

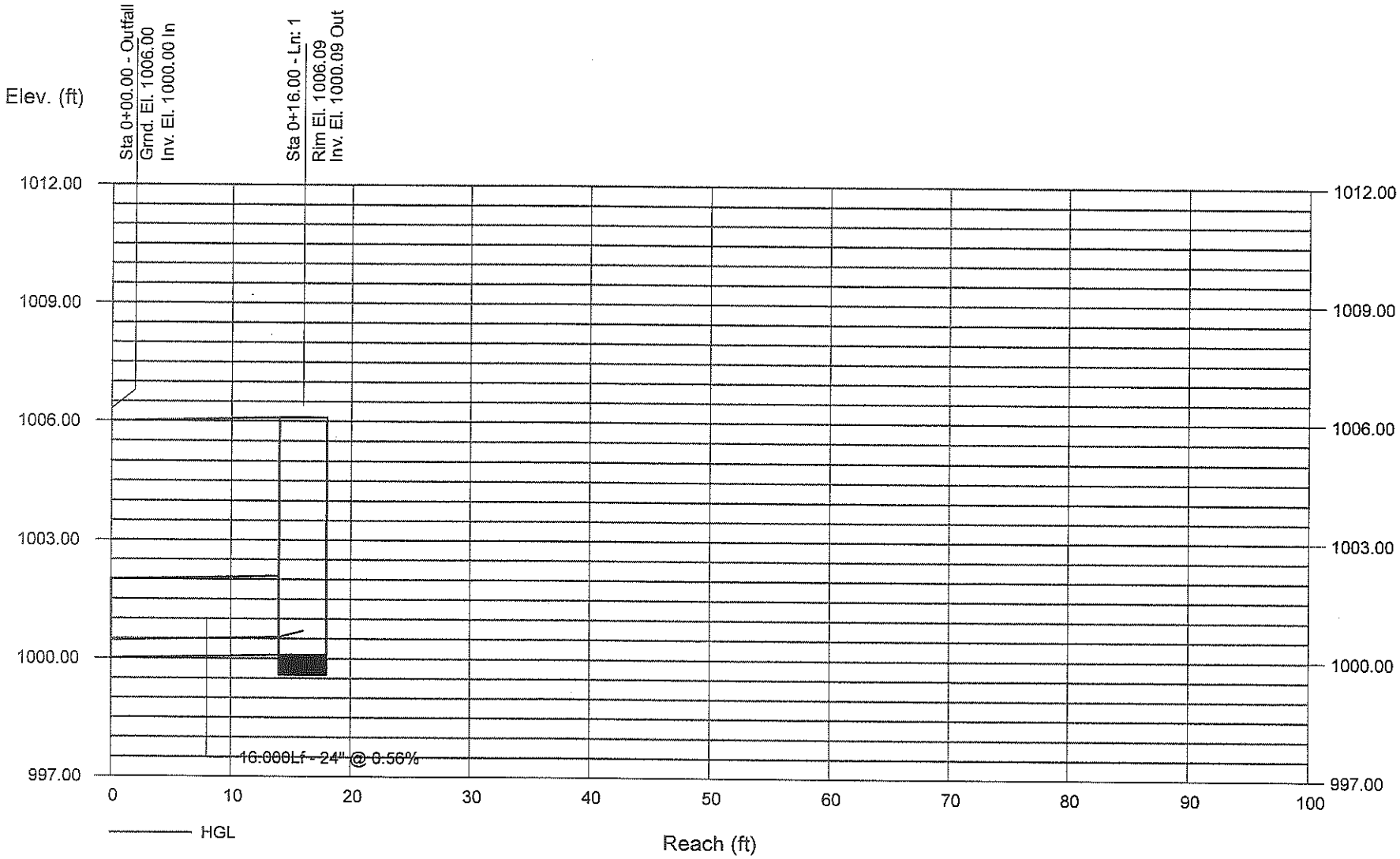
Hydr ow Storm Sewers Extension for A .oCAD® Civil 3D® 2008 Plan



Project File: CB21a system.stm	Number of lines: 1	Date: 05-13-2008

Storm Sewer Profile

Proj. file: CB21a system.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	16.000	0.000	Curb	1.63	0.00	0.00	0.0	1000.00	0.56	1000.09	24	Cir	0.013	1.00	0.00	8

Project File: CB21a system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	8	1.63	24	Cir	16.000	1000.00	1000.09	0.563	1000.45	1000.55	0.14	1000.69	End	Curb-Horiz

Project File: CB21a system.stm

Number of lines: 1

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

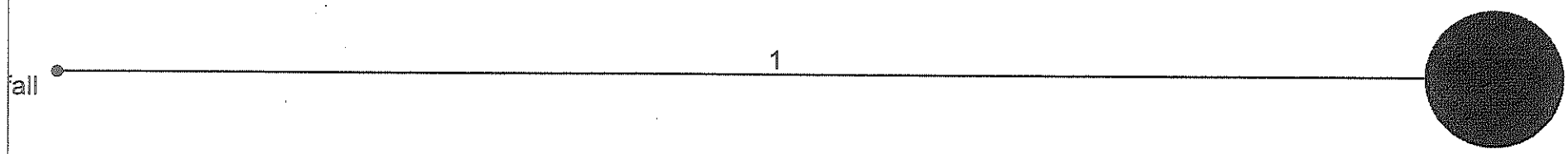
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	1.63	1000.00	1000.45	0.45	0.53	3.06	0.15	1000.60	0.413	16.000	1000.09	1000.55	0.46**	0.54	3.02	0.14	1000.69	0.398	0.406	0.065	1.00	0.14

Project File: CB21a system.stm | Number of lines: 1 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

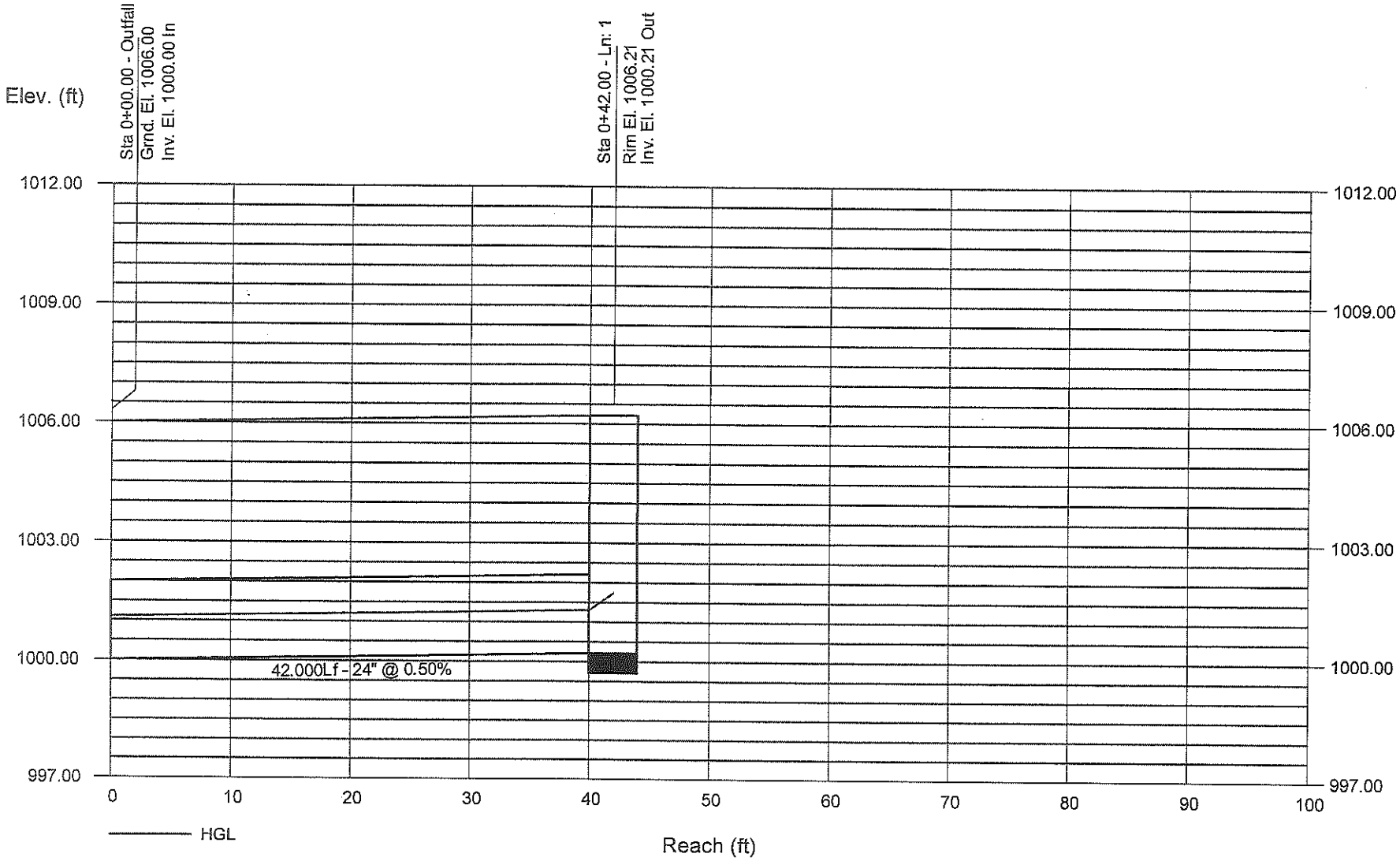
Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB21b system.stm	Number of lines: 1	Date: 05-13-2008

Storm Sewer Profile

Proj. file: CB2 stem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	42.000	0.000	Curb	9.29	0.00	0.00	0.0	1000.00	0.50	1000.21	24	Cir	0.013	1.00	0.00	9

Project File: CB21b system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	9	9.29	24	Cir	42.000	1000.00	1000.21	0.500	1001.10	1001.31	0.43	1001.74	End	Curb-Horiz

Project File: CB21b system.stm

Number of lines: 1

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

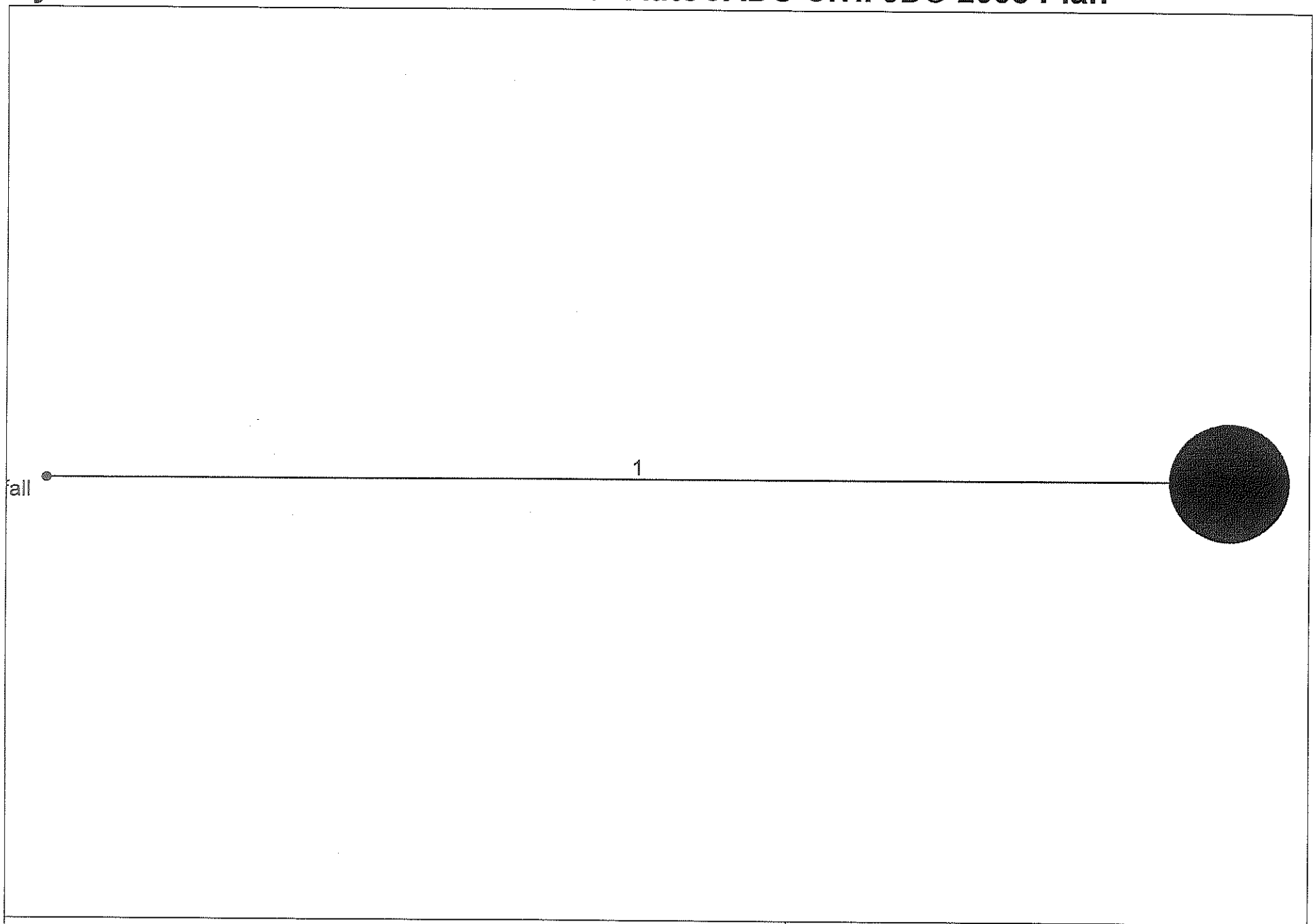
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	9.29	1000.00	1001.10	1.09	1.76	5.28	0.43	1001.53	0.500	42.000	1000.21	1001.31	1.09	1.76	5.28	0.43	1001.74	0.500	0.500	0.210	1.00	0.43

Project File: CB21b system.stm | Number of lines: 1 | Run Date: 05-13-2008

; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

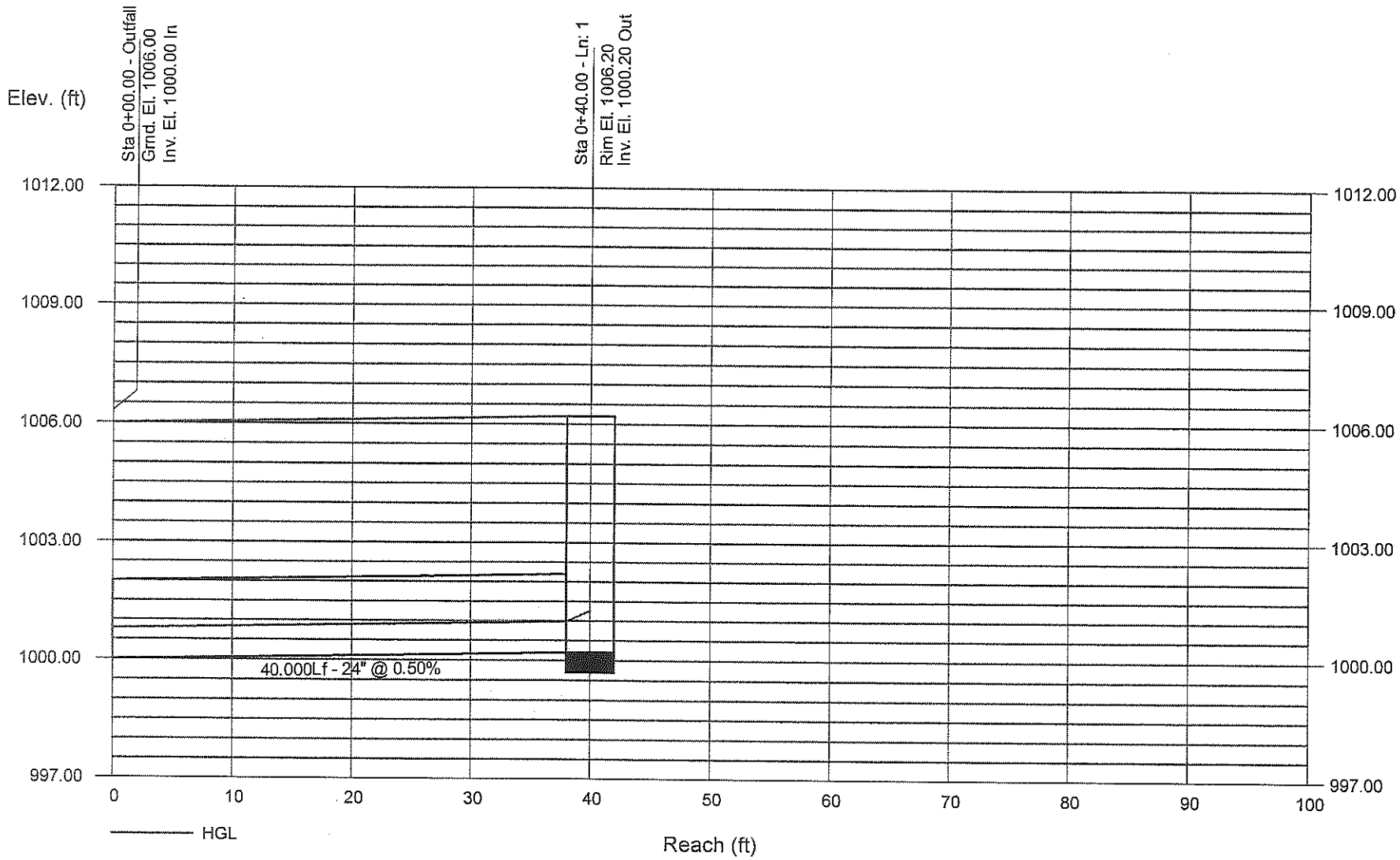


Project File: CB21c system.stm	Number of lines: 1	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB21c system.stm



Stor Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	40.000	0.000	Curb	4.84	0.00	0.00	0.0	1000.00	0.50	1000.20	24	Cir	0.013	1.00	0.00	10

Project File: CB21c system.stm

Number of lines: 1

Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	10	4.84	24	Cir	40.000	1000.00	1000.20	0.500	1000.78	1000.98	0.28	1001.26	End	Curb-Horiz

Project File: CB21c system.stm

Number of lines: 1

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

Hydraulic Grade Line Computations

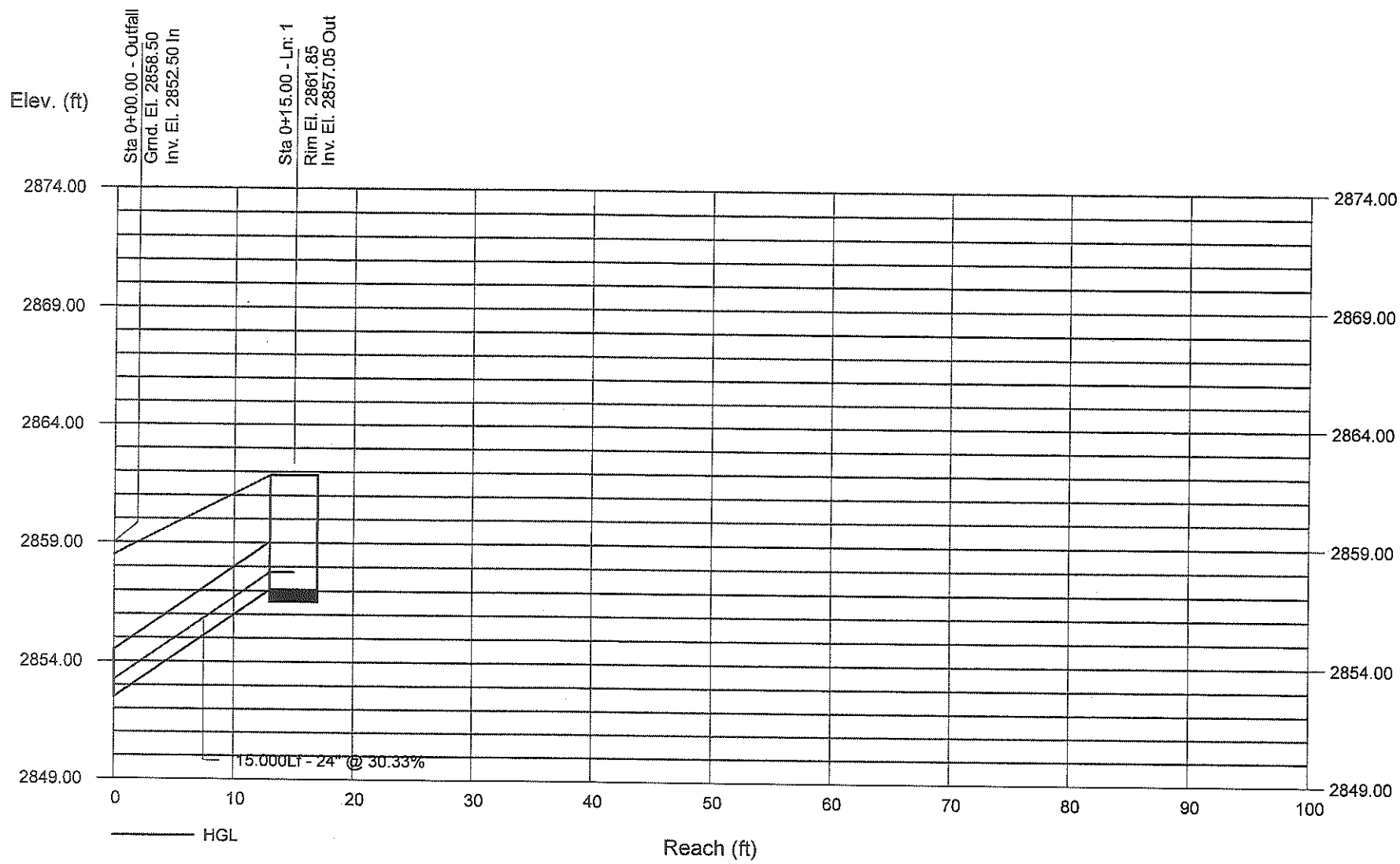
Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	4.84	1000.00	1000.78	0.78	1.13	4.27	0.28	1001.06	0.444	40.000	1000.20	1000.98	0.78**	1.14	4.24	0.28	1001.26	0.434	0.439	0.176	1.00	0.28

Project File: CB21c system.stm | Number of lines: 1 | Run Date: 05-13-2008

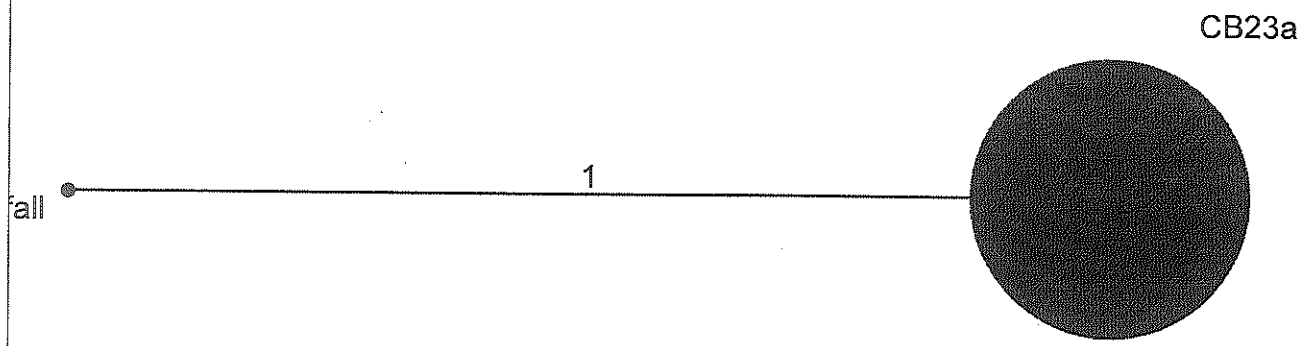
Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Storm Sewer Profile

Proj. file: CB23a system.stm



Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB23a system.stm	Number of lines: 1	Date: 07-30-2008

Hydraflow Storm Sewers Extension v6.052

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev. (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB23a	Curb-Horiz	2861.85	Cir	4.00	4.00	24	Cir	2857.05			

Project File: CB23a system.stm | Number of Structures: 1 | Run Date: 07-30-2008

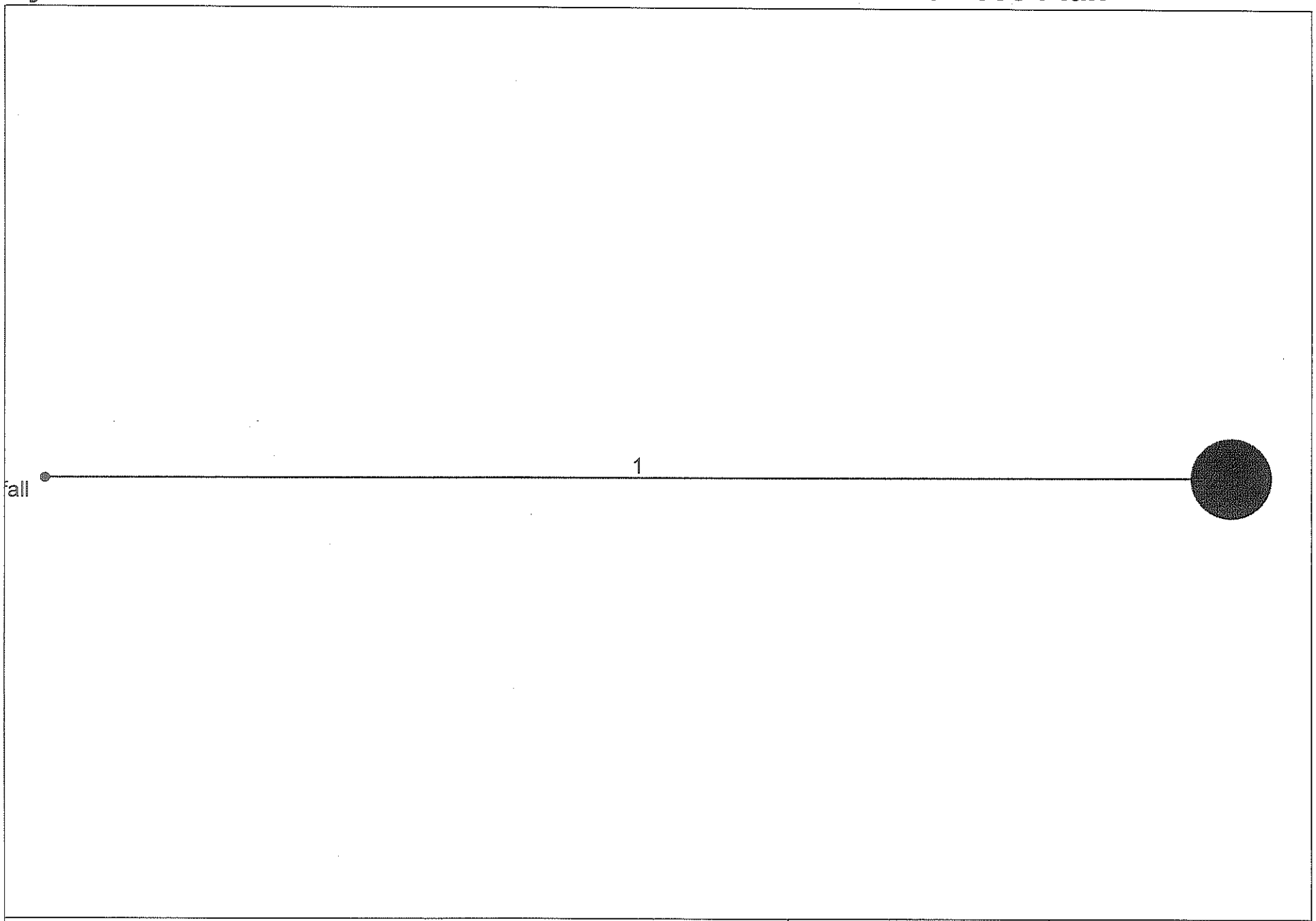
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	4.23	2852.50	2853.23	0.73	1.03	4.09	0.26	2853.49	0.436	15.000	2857.05	2857.78	0.73**	1.03	4.09	0.26	2858.04	0.436	0.436	n/a	1.00	0.26

Project File: CB23a system.stm | Number of lines: 1 | Run Date: 07-30-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

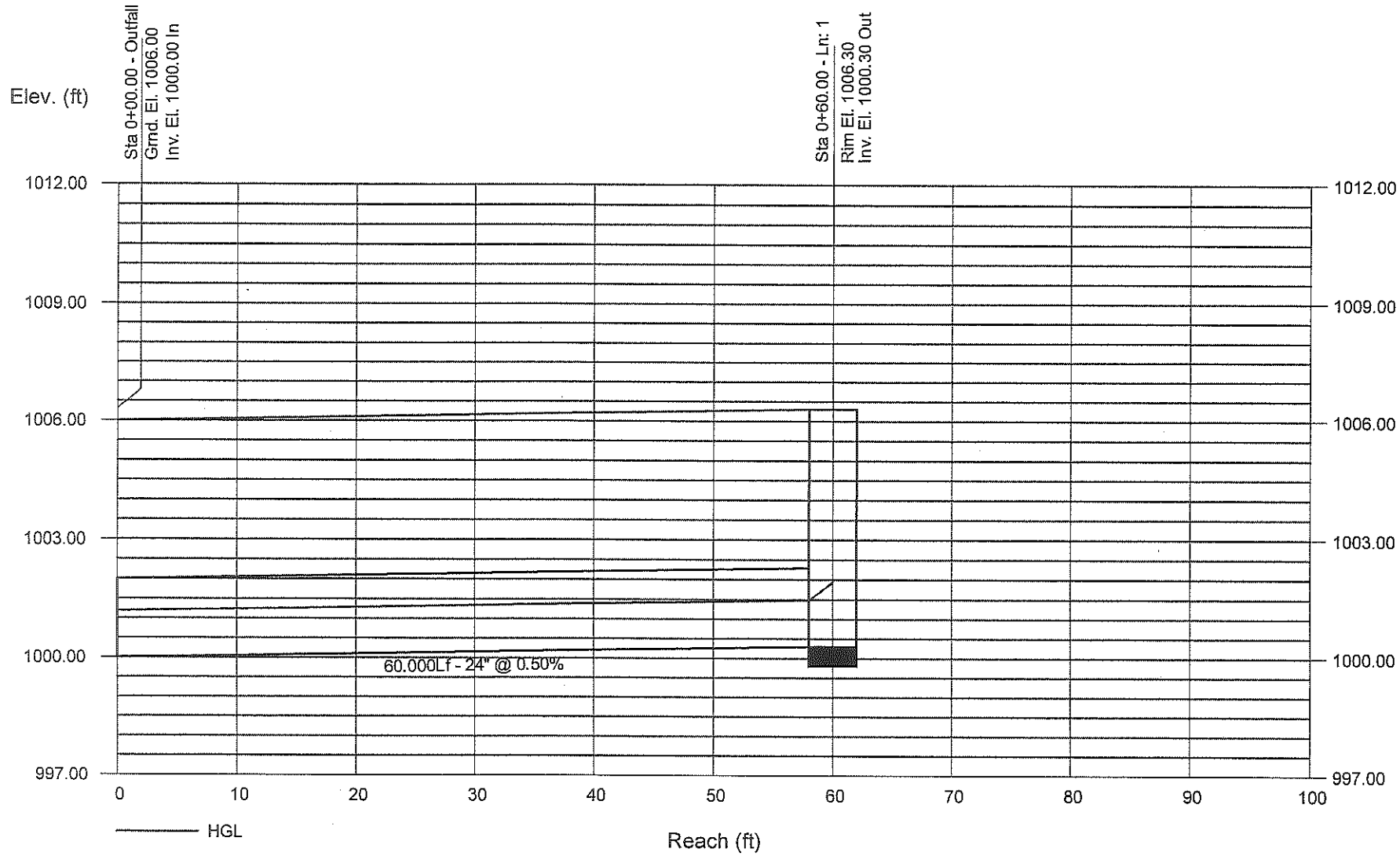
Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB23b system.stm	Number of lines: 1	Date: 05-13-2008

Stor Sewer Profile

Proj. file: CB2 ystem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	60.000	0.000	Curb	10.52	0.00	0.00	0.0	1000.00	0.50	1000.30	24	Cir	0.013	1.00	0.00	11

Project File: CB23b system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	11	10.52	24	Cir	60.000	1000.00	1000.30	0.500	1001.18	1001.48	0.46	1001.94	End	Curb-Horiz

Project File: CB23b system.stm | Number of lines: 1 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

Hydraulic Grade Line Computations

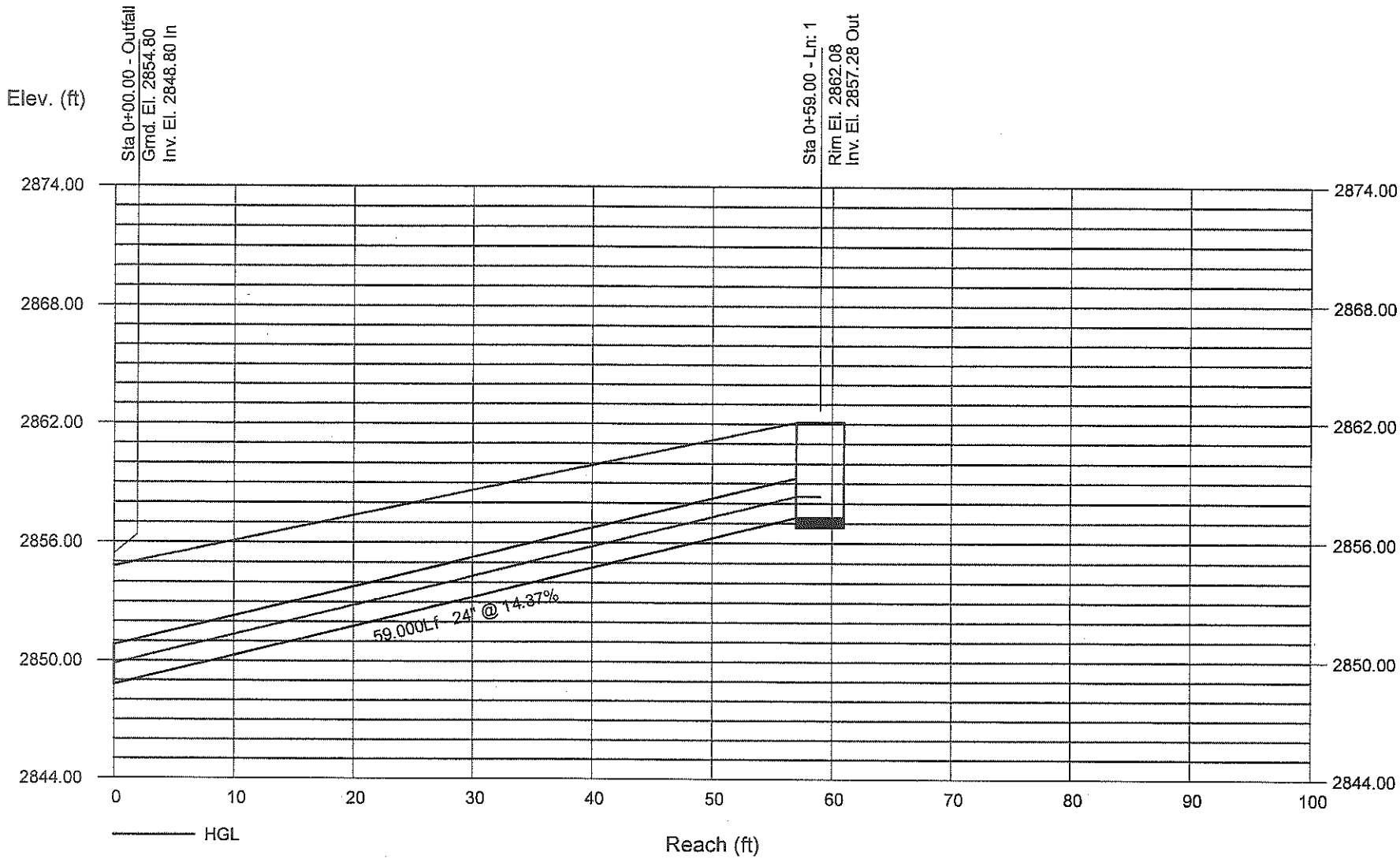
Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	10.52	1000.00	1001.18	1.18	1.94	5.43	0.46	1001.64	0.499	60.000	1000.30	1001.48	1.18	1.94	5.44	0.46	1001.94	0.500	0.500	0.300	1.00	0.46

Project File: CB23b system.stm | Number of lines: 1 | Run Date: 05-13-2008

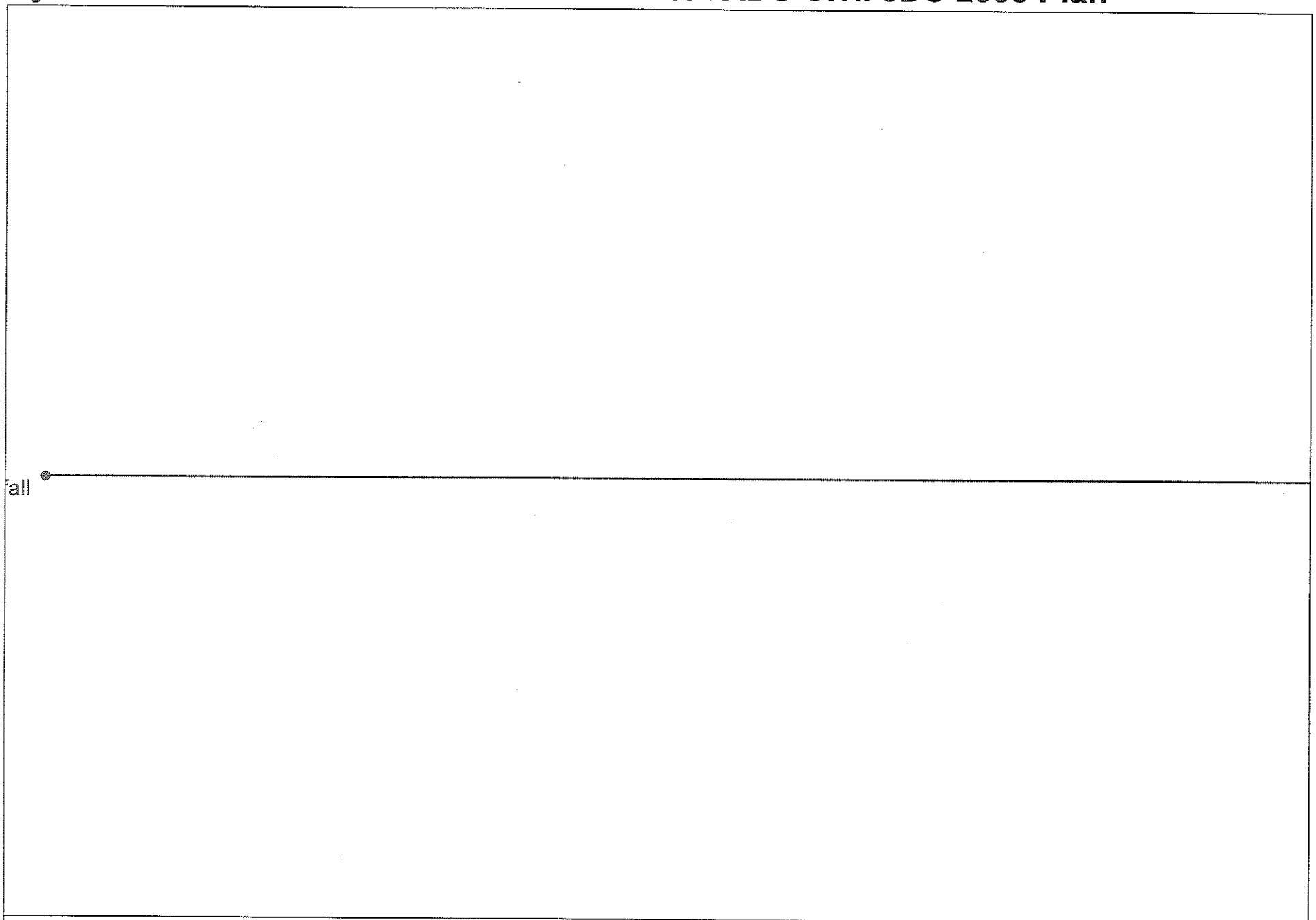
; c = cir e = ellip b = box

Stor Sewer Profile

Proj. file: CB2 ystem.stm



Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB23c system.stm	Number of lines: 1	Date: 07-30-2008

Stru ure Report

Struct No.	Structure ID	Junction Type	Rim Elev. (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	CB23c	Curb-Horiz	2862.08	Cir	4.00	4.00	24	Cir	2857.28			

Project File: CB23c system.stm | Number of Structures: 1 | Run Date: 07-30-2008

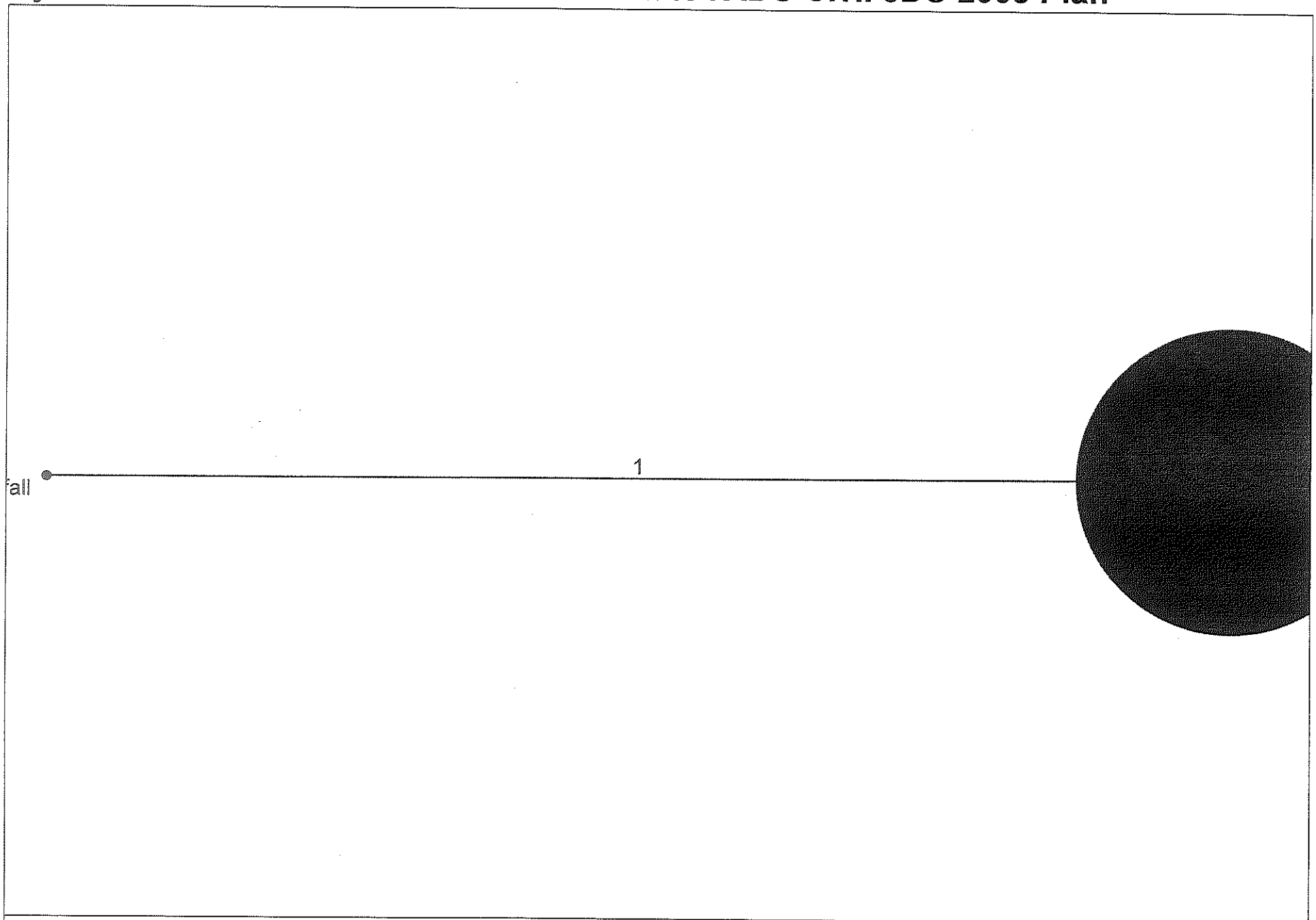
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	8.95	2848.80	2849.86	1.06	1.69	5.30	0.44	2850.30	0.516	59.000	2857.28	2858.34	1.06**	1.69	5.30	0.44	2858.78	0.516	0.516	n/a	1.00	n/a

Project File: CB23c system.stm | Number of lines: 1 | Run Date: 07-30-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

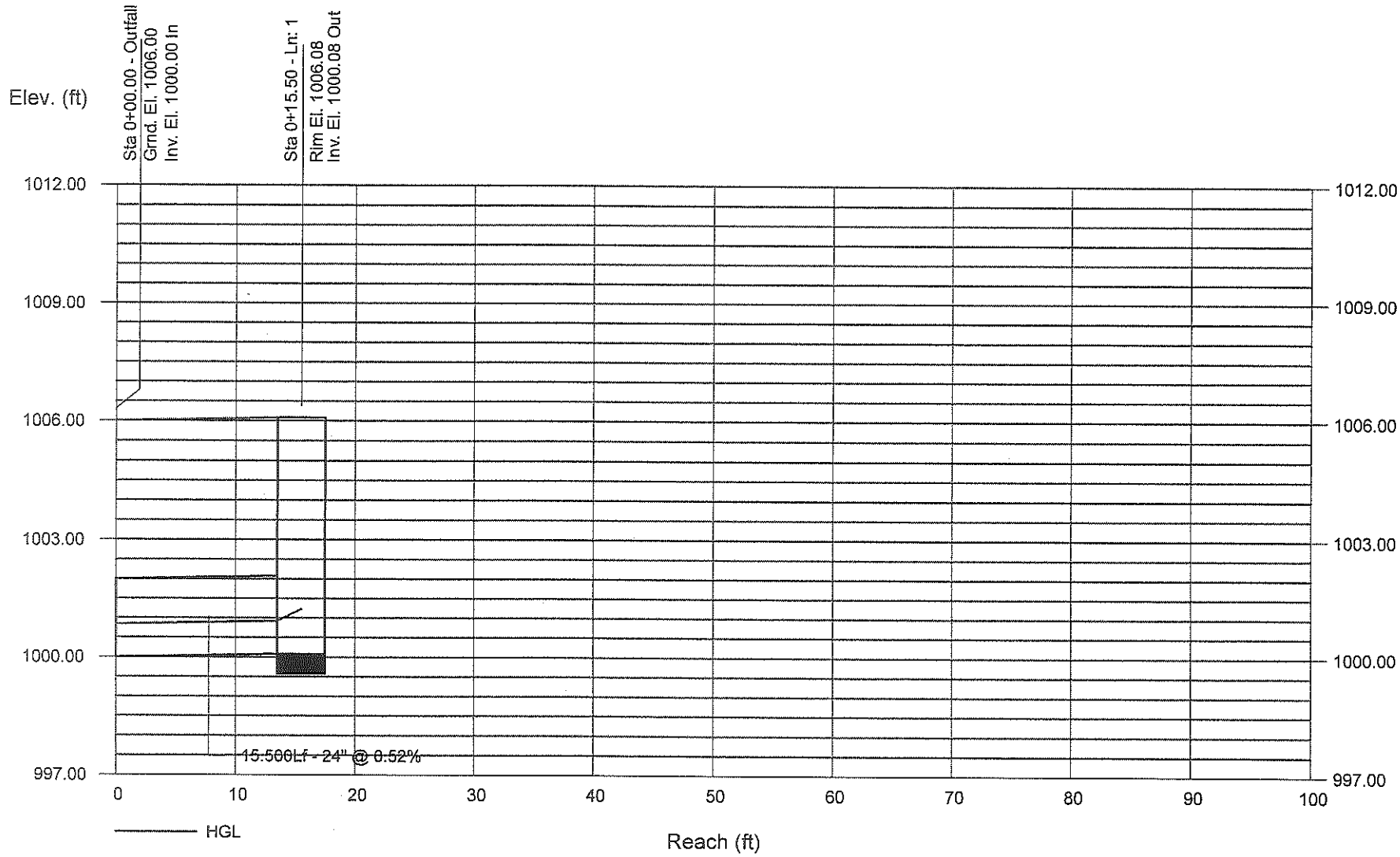


Project File: CB24a system.stm	Number of lines: 1	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB24a system.stm



Stor Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	15.500	0.000	Curb	5.60	0.00	0.00	0.0	1000.00	0.52	1000.08	24	Cir	0.013	1.00	0.00	12

Project File: CB24a system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	12	5.60	24	Cir	15.500	1000.00	1000.08	0.516	1000.84	1000.92	0.31	1001.23	End	Curb-Horiz

Project File: CB24a system.stm | Number of lines: 1 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

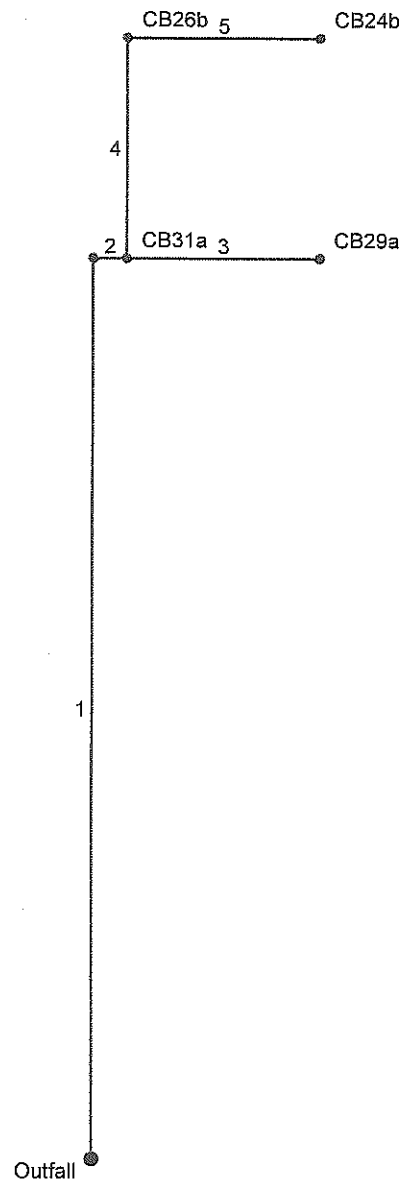
Hydr lic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	5.60	1000.00	1000.84	0.84	1.25	4.49	0.31	1001.15	0.456	15.500	1000.08	1000.92	0.84**	1.26	4.45	0.31	1001.23	0.446	0.451	0.070	1.00	0.31

Project File: CB24a system.stm | Number of lines: 1 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

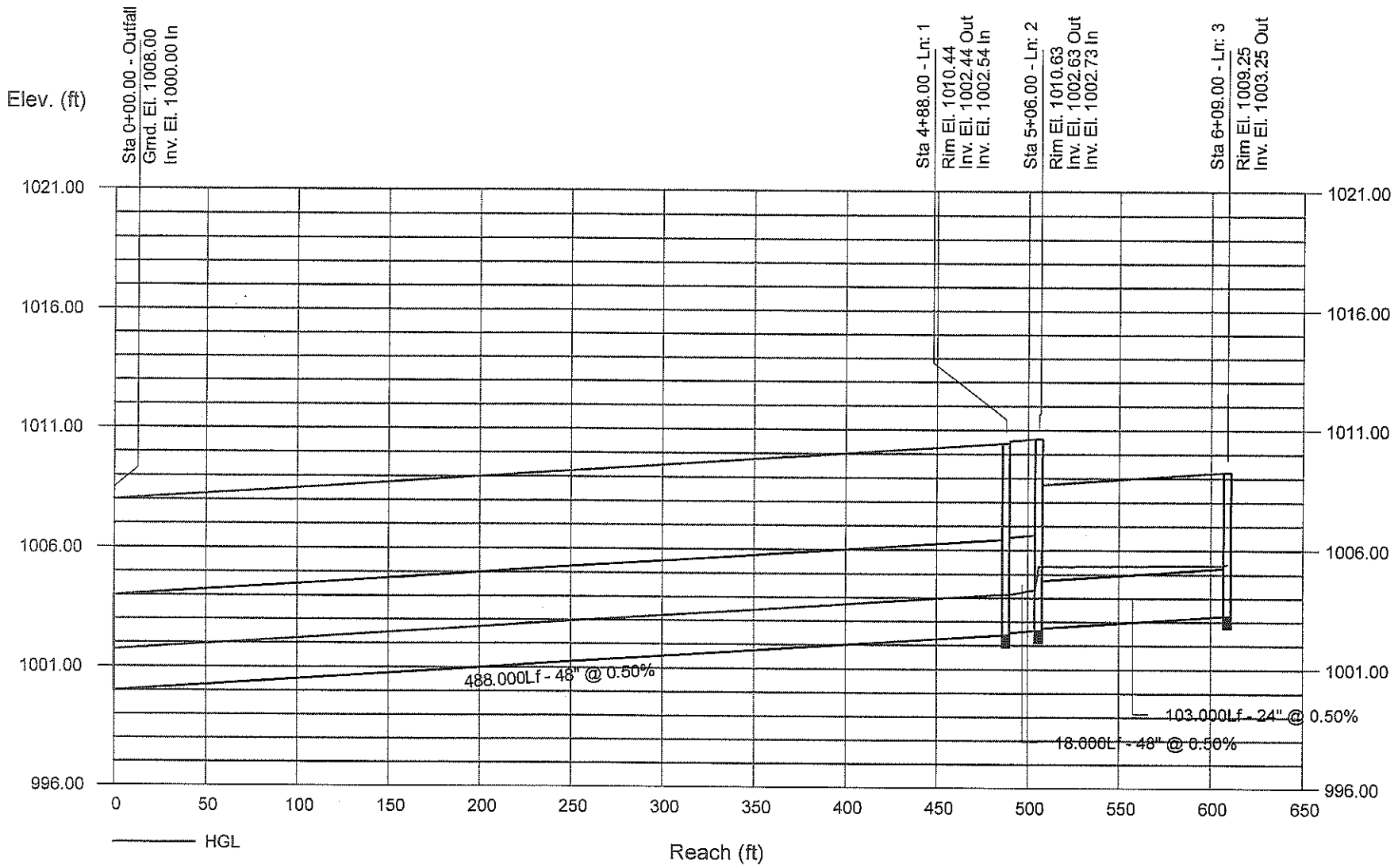
Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan



Project File: CB24b system.stm	Number of lines: 5	Date: 05-13-2008

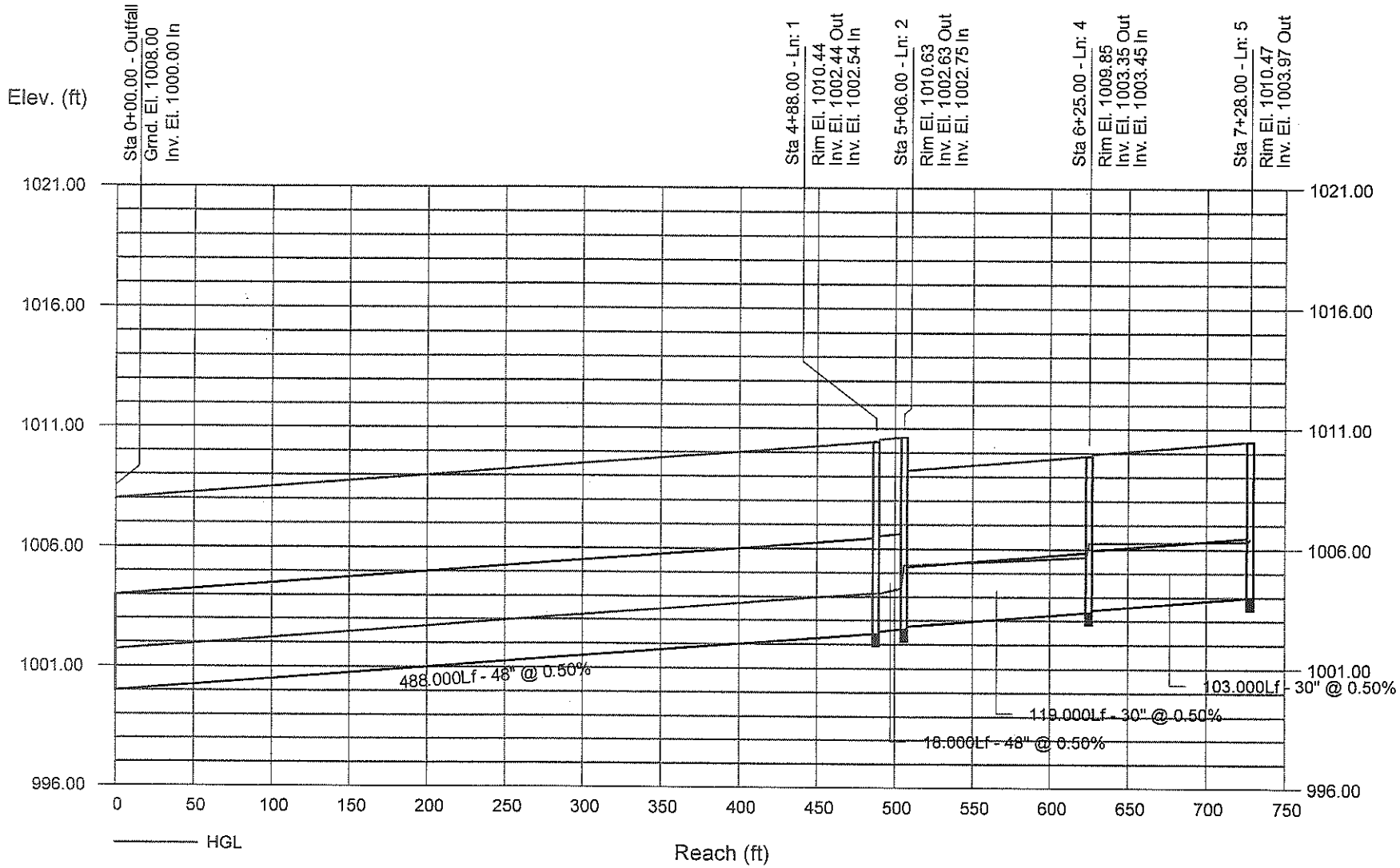
Stor Sewer Profile

Proj. file: CB2 ystem.stm



Storm Sewer Profile

Proj. file: CB24b system.stm



Stor. Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	488.000	-90.000	MH	0.00	0.00	0.00	0.0	1000.00	0.50	1002.44	48	Cir	0.013	1.00	0.00	17
2	1	18.000	90.000	Curb	4.08	0.00	0.00	0.0	1002.54	0.50	1002.63	48	Cir	0.013	1.50	0.00	16
3	2	103.000	0.000	Curb	5.34	0.00	0.00	0.0	1002.73	0.50	1003.25	24	Cir	0.013	1.00	0.00	15
4	2	119.000	-90.000	Curb	11.98	0.00	0.00	0.0	1002.75	0.50	1003.35	30	Cir	0.013	1.50	0.00	14
5	4	103.000	90.000	Curb	11.77	0.00	0.00	0.0	1003.45	0.50	1003.97	30	Cir	0.013	1.00	0.00	13

Project File: CB24b system.stm | Number of lines: 5 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	17	33.17	48	Cir	488.000	1000.00	1002.44	0.500	1001.70	1004.14	n/a	1004.14	End	Manhole
2	16	33.17	48	Cir	18.000	1002.54	1002.63	0.500	1004.14	1004.34	0.97	1005.31	1	Curb-Horiz
3	15	5.34	24	Cir	103.000	1002.73	1003.25	0.505	1005.31*	1005.37*	0.04	1005.42	2	Curb-Horiz
4	14	23.75	30	Cir	119.000	1002.75	1003.35	0.504	1005.31	1005.66	0.59	1006.25	2	Curb-Horiz
5	13	11.77	30	Cir	103.000	1003.45	1003.97	0.505	1006.25	1006.32	0.09	1006.42	4	Curb-Horiz

Project File: CB24b system.stm | Number of lines: 5 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs. ; *Surcharged (HGL above crown).

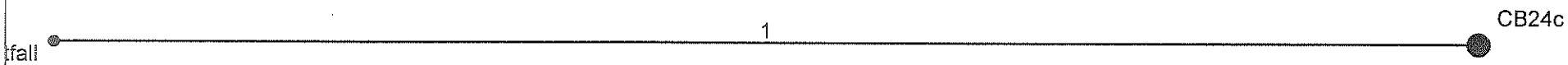
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	48	33.17	1000.00	1001.70	1.70	5.10	6.50	0.66	1002.36	0.374	488.00	1002.44	1004.14	1.70**	5.10	6.50	0.66	1004.80	0.374	0.374	n/a	1.00	n/a
2	48	33.17	1002.54	1004.14	1.60	4.71	7.05	0.77	1004.92	0.466	18.000	1002.63	1004.34	1.71**	5.14	6.45	0.65	1004.99	0.366	0.416	0.075	1.50	0.97
3	24	5.34	1002.73	1005.31	2.00	3.14	1.70	0.04	1005.36	0.056	103.00	1003.25	1005.37	2.00	3.14	1.70	0.04	1005.42	0.056	0.056	0.057	1.00	0.04
4	30	23.75	1002.75	1005.31	2.50	4.91	4.84	0.36	1005.68	0.336	119.00	1003.35	1005.66	2.31	4.74	5.01	0.39	1006.05	0.291	0.313	0.373	1.50	0.59
5	30	11.77	1003.45	1006.25	2.50	4.91	2.40	0.09	1006.34	0.082	103.00	1003.97	1006.32	2.35	4.79	2.46	0.09	1006.42	0.071	0.077	0.079	1.00	0.09

Project File: CB24b system.stm | Number of lines: 5 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

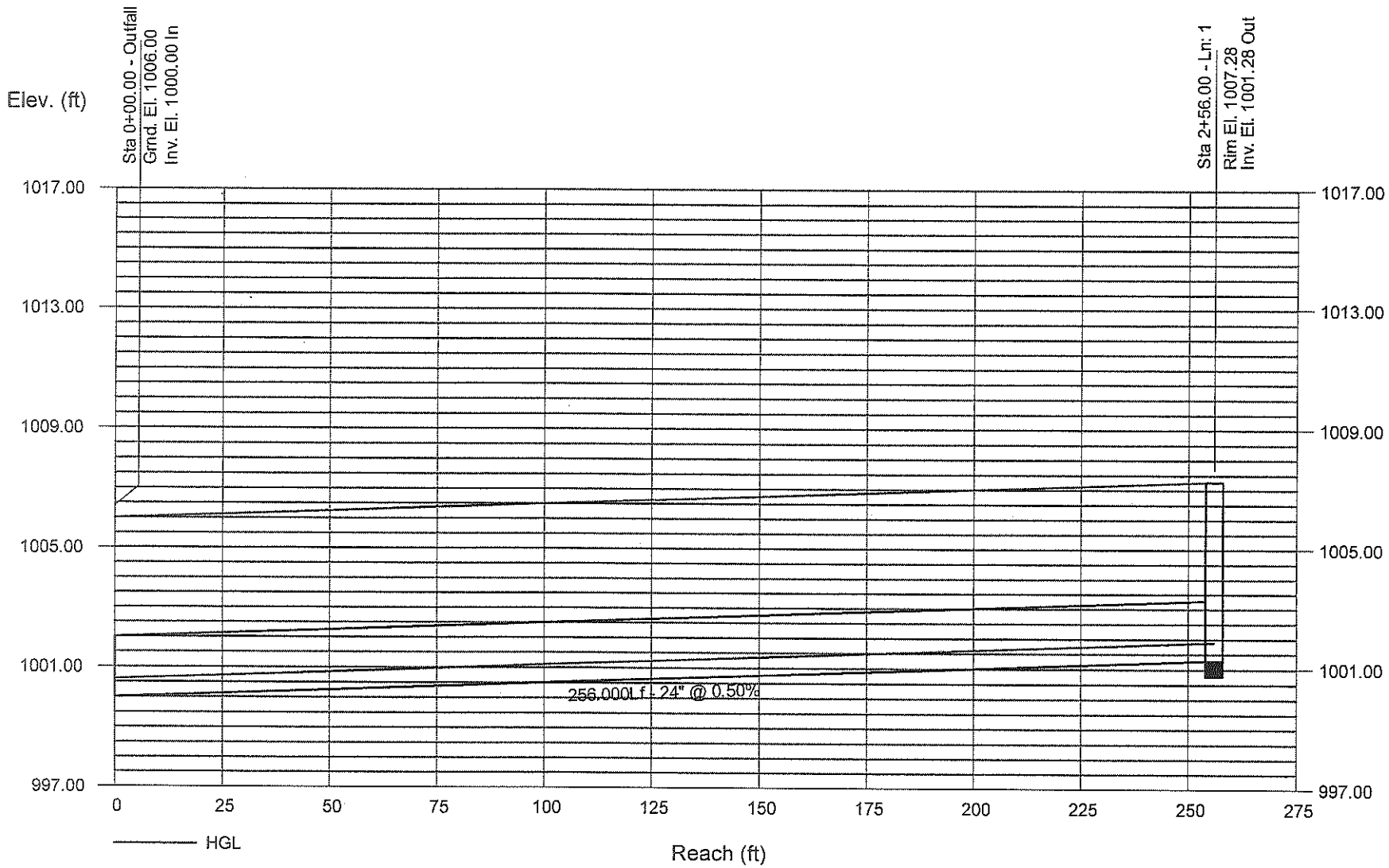


Project File: CB24c system.stm	Number of lines: 1	Date: 05-13-2008

Hydraflow Storm Se Extension v6.052

Stor Sewer Profile

Proj. file: CB2 /stem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	256.000	0.000	Curb	2.83	0.00	0.00	0.0	1000.00	0.50	1001.28	24	Cir	0.013	1.00	0.00	18

Project File: CB24c system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	18	2.83	24	Cir	256.000	1000.00	1001.28	0.500	1000.60	1001.88	0.20	1001.88	End	Curb-Horiz

Project File: CB24c system.stm

Number of lines: 1

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

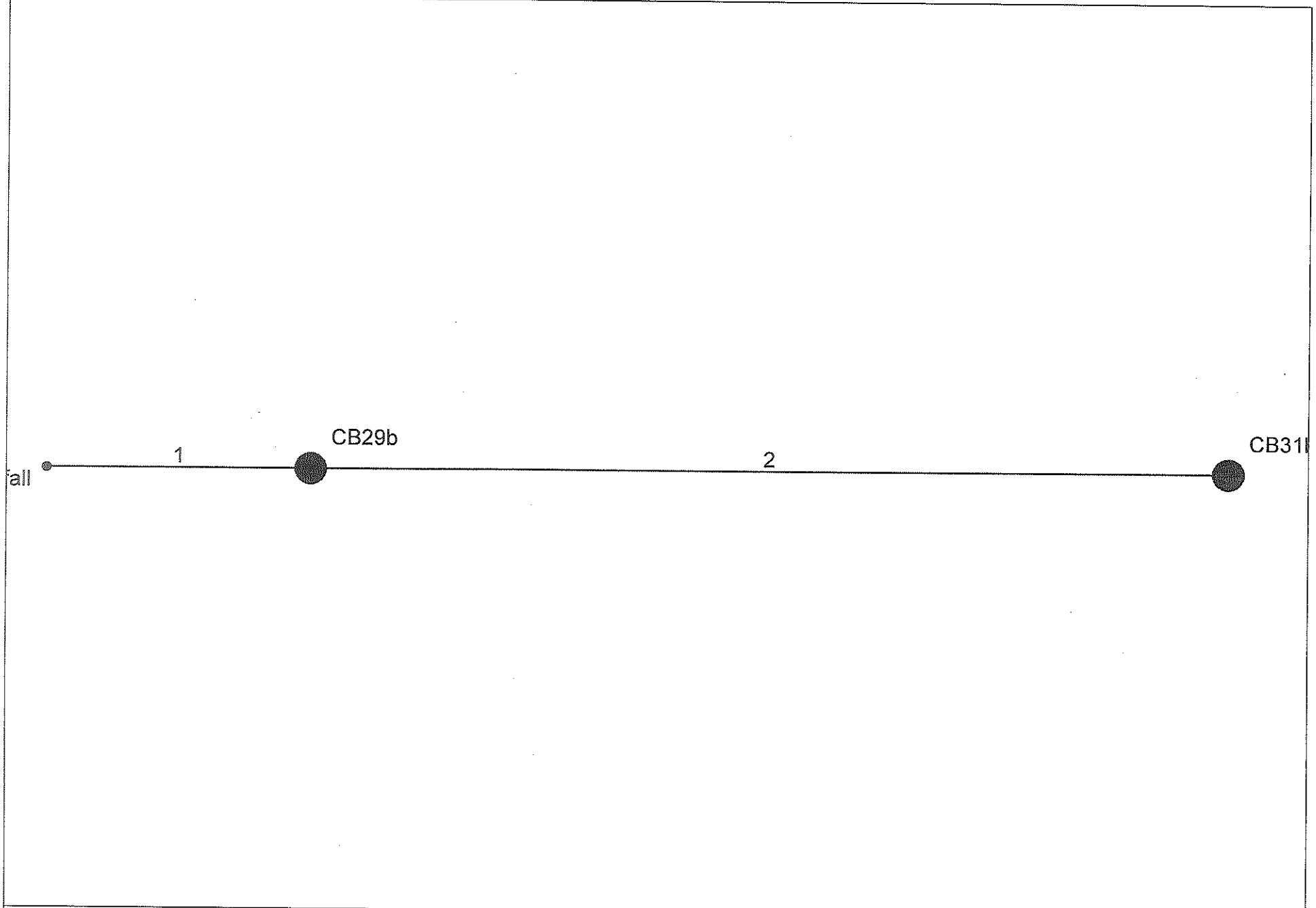
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	2.83	1000.00	1000.60	0.60	0.79	3.60	0.20	1000.80	0.420	256.00	1001.28	1001.88	0.60**	0.79	3.60	0.20	1002.08	0.420	0.420	n/a	1.00	0.20

Project File: CB24c system.stm | Number of lines: 1 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

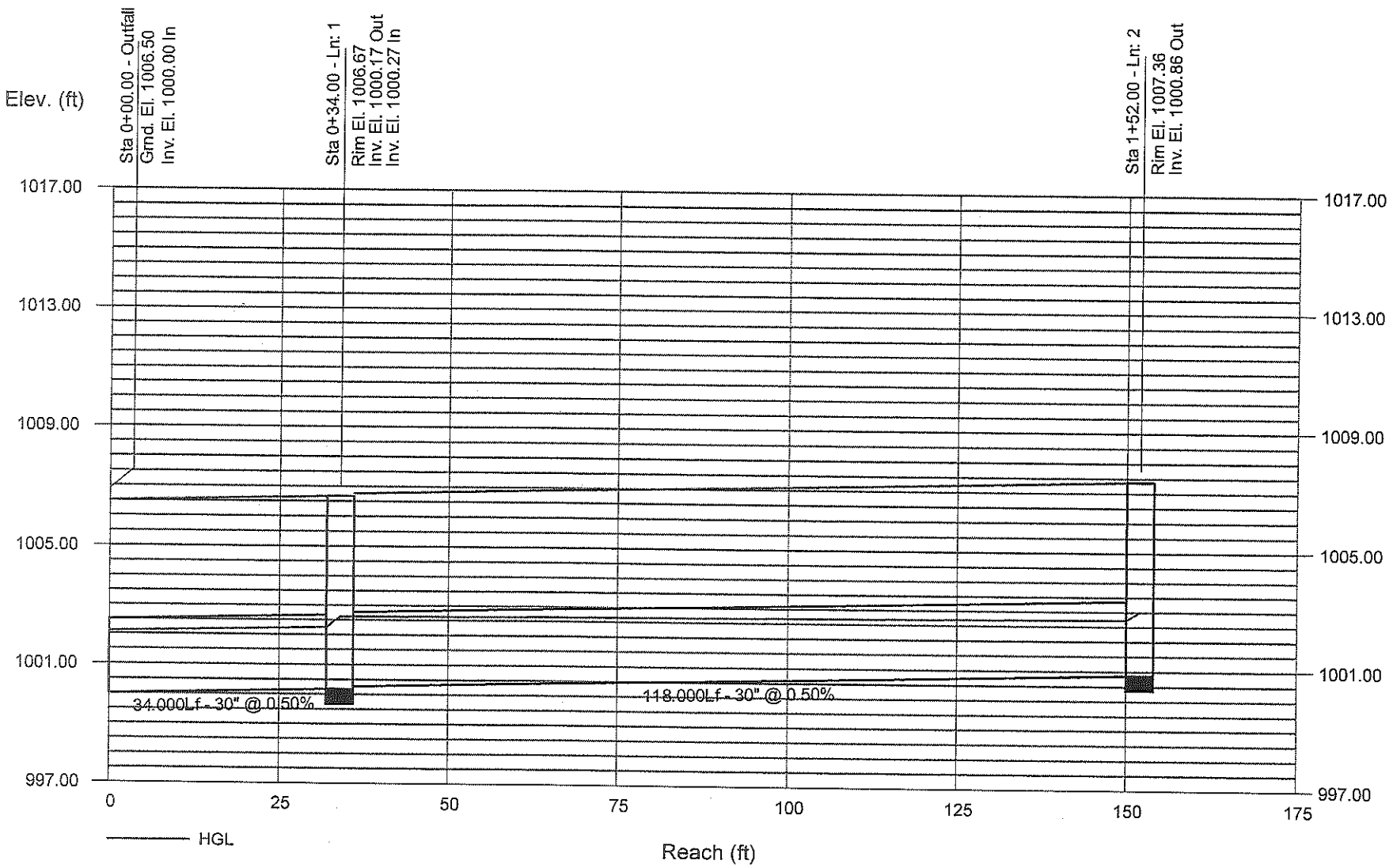


Project File: CB29b system.stm	Number of lines: 2	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB29b system.stm



Stor Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	34.000	0.000	Curb	12.84	0.00	0.00	0.0	1000.00	0.50	1000.17	30	Cir	0.013	0.50	0.00	19
2	1	118.000	0.000	Curb	16.65	0.00	0.00	0.0	1000.27	0.50	1000.86	30	Cir	0.013	1.00	0.00	20

Project File: CB29b system.stm | Number of lines: 2 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	19	29.49	30	Cir	34.000	1000.00	1000.17	0.500	1002.09	1002.26	0.35	1002.61	End	Curb-Horiz
2	20	16.65	30	Cir	118.000	1000.27	1000.86	0.500	1002.61	1002.72	0.28	1003.00	1	Curb-Horiz

Project File: CB29b system.stm

Number of lines: 2

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	30	29.49	1000.00	1002.09	2.09	4.38	6.73	0.70	1002.79	0.500	34.000	1000.17	1002.26	2.09	4.38	6.74	0.71	1002.96	0.501	0.500	0.170	0.50	0.35
2	30	16.65	1000.27	1002.61	2.34	4.78	3.49	0.19	1002.80	0.142	118.000	1000.86	1002.72	1.86	3.92	4.25	0.28	1003.00	0.202	0.172	0.203	1.00	0.28

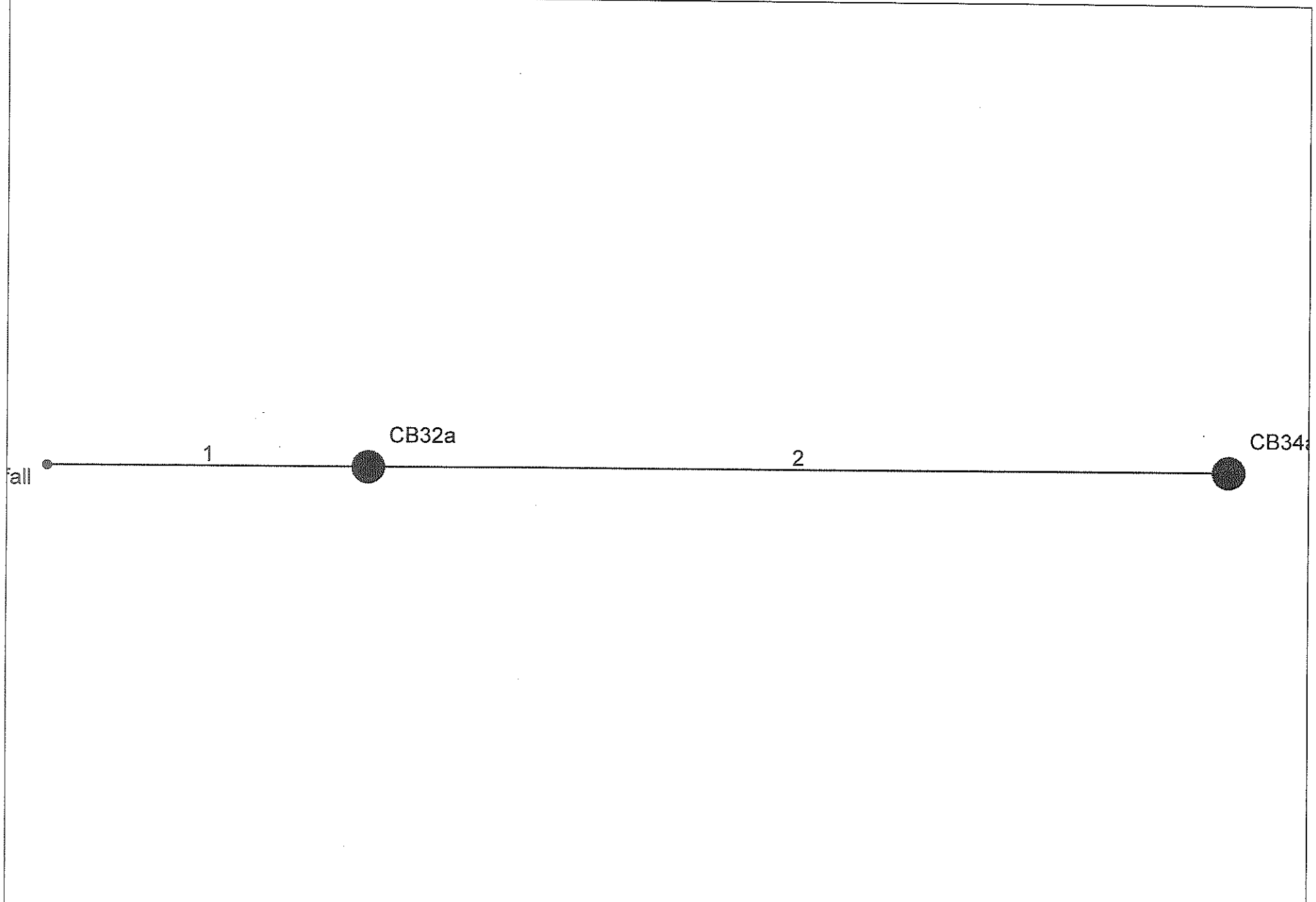
Project File: CB29b system.stm

Number of lines: 2

Run Date: 05-13-2008

; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

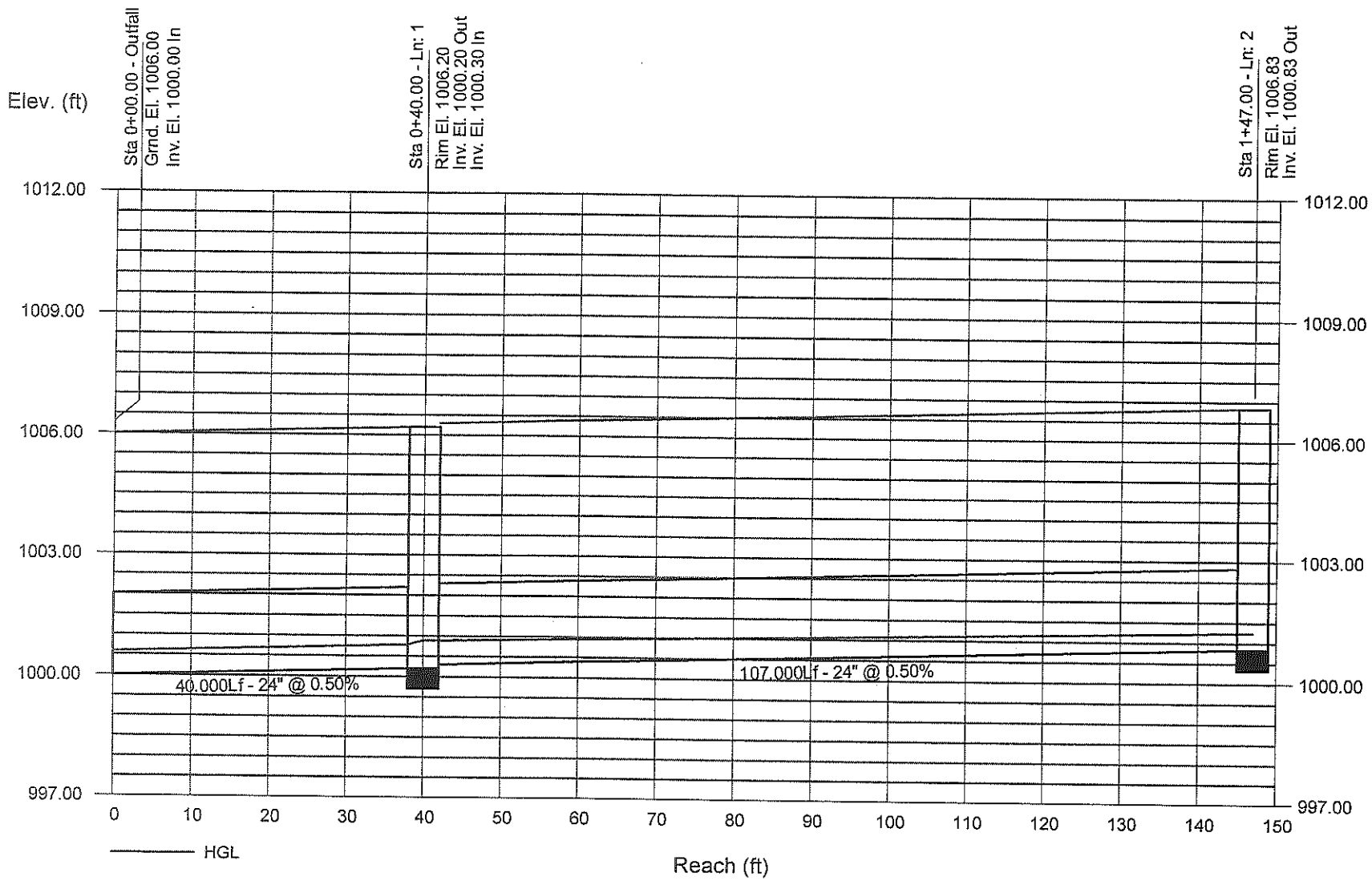


Project File: CB32a system.stm	Number of lines: 2	Date: 05-13-2008

Hydraflow Storm Se Extension v6.052

Storm Sewer Profile

Proj. file: CB3 ystem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	40.000	0.000	Curb	1.34	0.00	0.00	0.0	1000.00	0.50	1000.20	24	Cir	0.013	0.50	0.00	21
2	1	107.000	0.000	Curb	1.34	0.00	0.00	0.0	1000.30	0.50	1000.83	24	Cir	0.013	1.00	0.00	23

Project File: CB32a system.stm

Number of lines: 2

Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	21	2.68	24	Cir	40.000	1000.00	1000.20	0.500	1000.58	1000.78	0.10	1000.88	End	Curb-Horiz
2	23	1.34	24	Cir	107.000	1000.30	1000.83	0.495	1000.88	1001.24	n/a	1001.24	1	Curb-Horiz

Project File: CB32a system.stm | Number of lines: 2 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

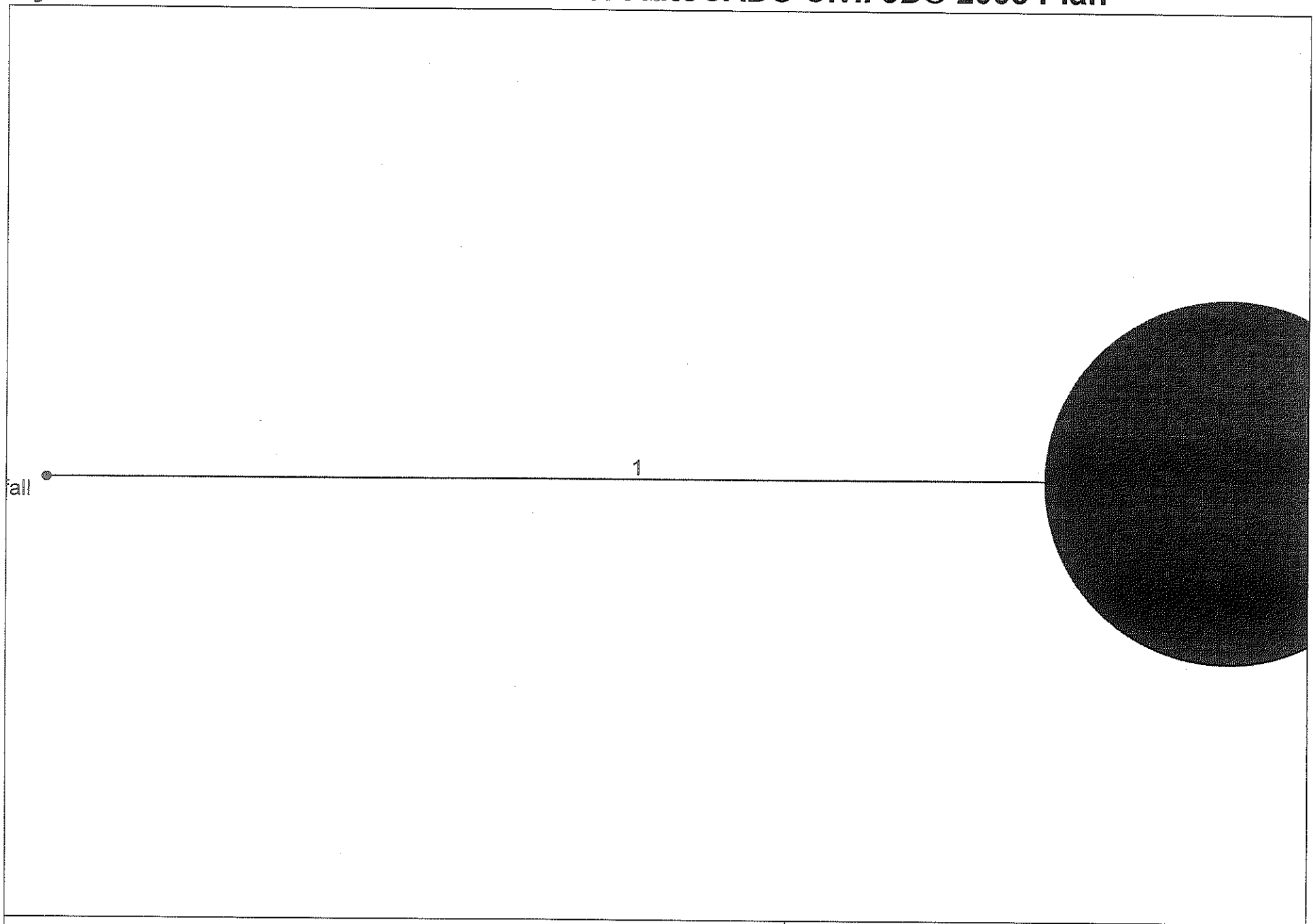
Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	2.68	1000.00	1000.58	0.58	0.76	3.55	0.20	1000.78	0.418	40.000	1000.20	1000.78	0.58**	0.76	3.51	0.19	1000.98	0.406	0.412	0.165	0.50	0.10
2	24	1.34	1000.30	1000.88	0.58	0.76	1.77	0.05	1000.93	0.104	107.000	1000.83	1001.24	0.41**	0.46	2.89	0.13	1001.37	0.414	0.259	n/a	1.00	n/a

Project File: CB32a system.stm | Number of lines: 2 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

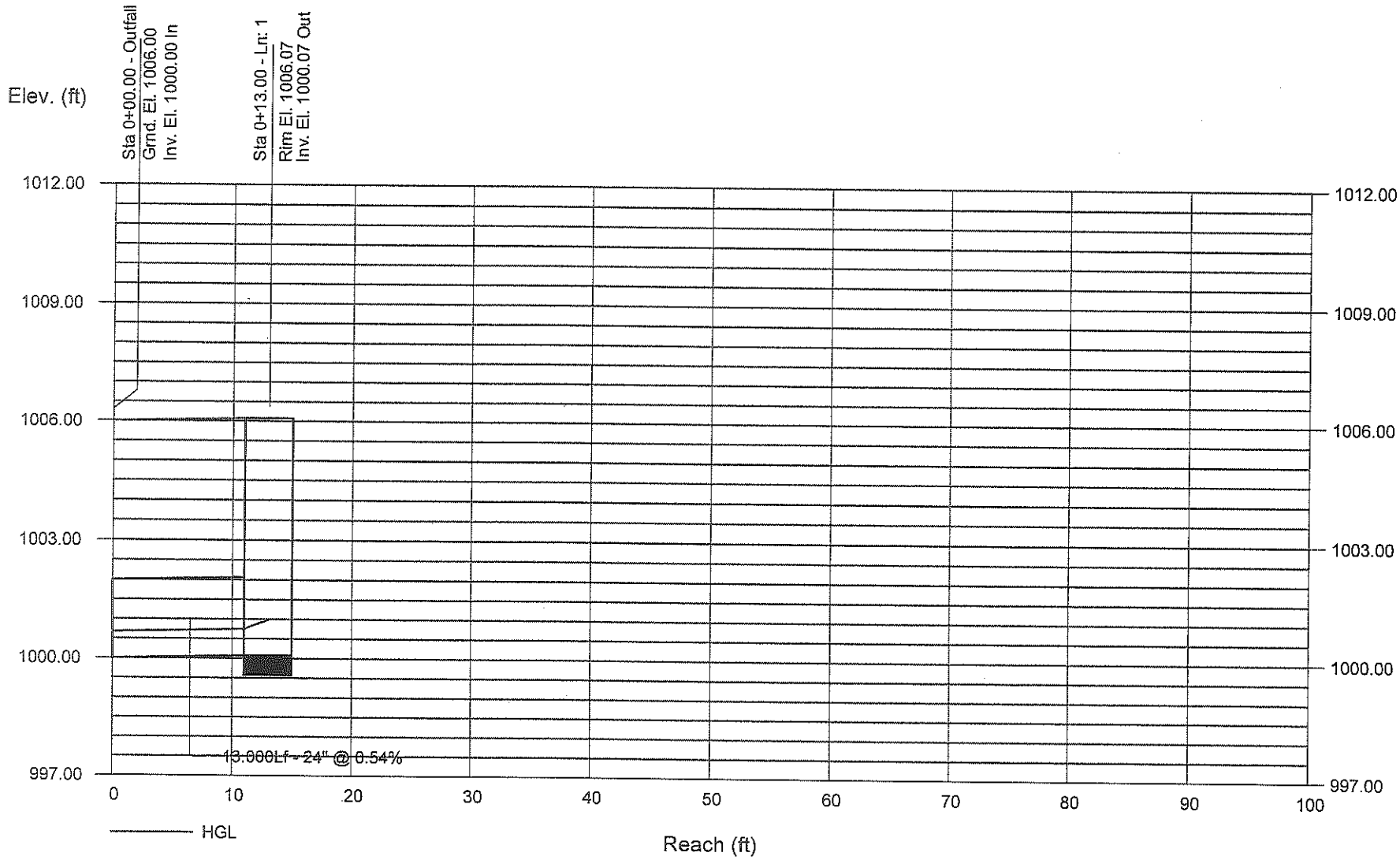


Project File: CB32b system.stm	Number of lines: 1	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB32b system.stm



Stor. Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	13.000	0.000	Curb	3.62	0.00	0.00	0.0	1000.00	0.54	1000.07	24	Cir	0.013	1.00	0.00	22

Project File: CB32b system.stm | Number of lines: 1 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	~~22~~ 23	3.62	24	Cir	13.000	1000.00	1000.07	0.539	1000.67	1000.75	0.23	1000.98	End	Curb-Horiz

Project File: CB32b system.stm | Number of lines: 1 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

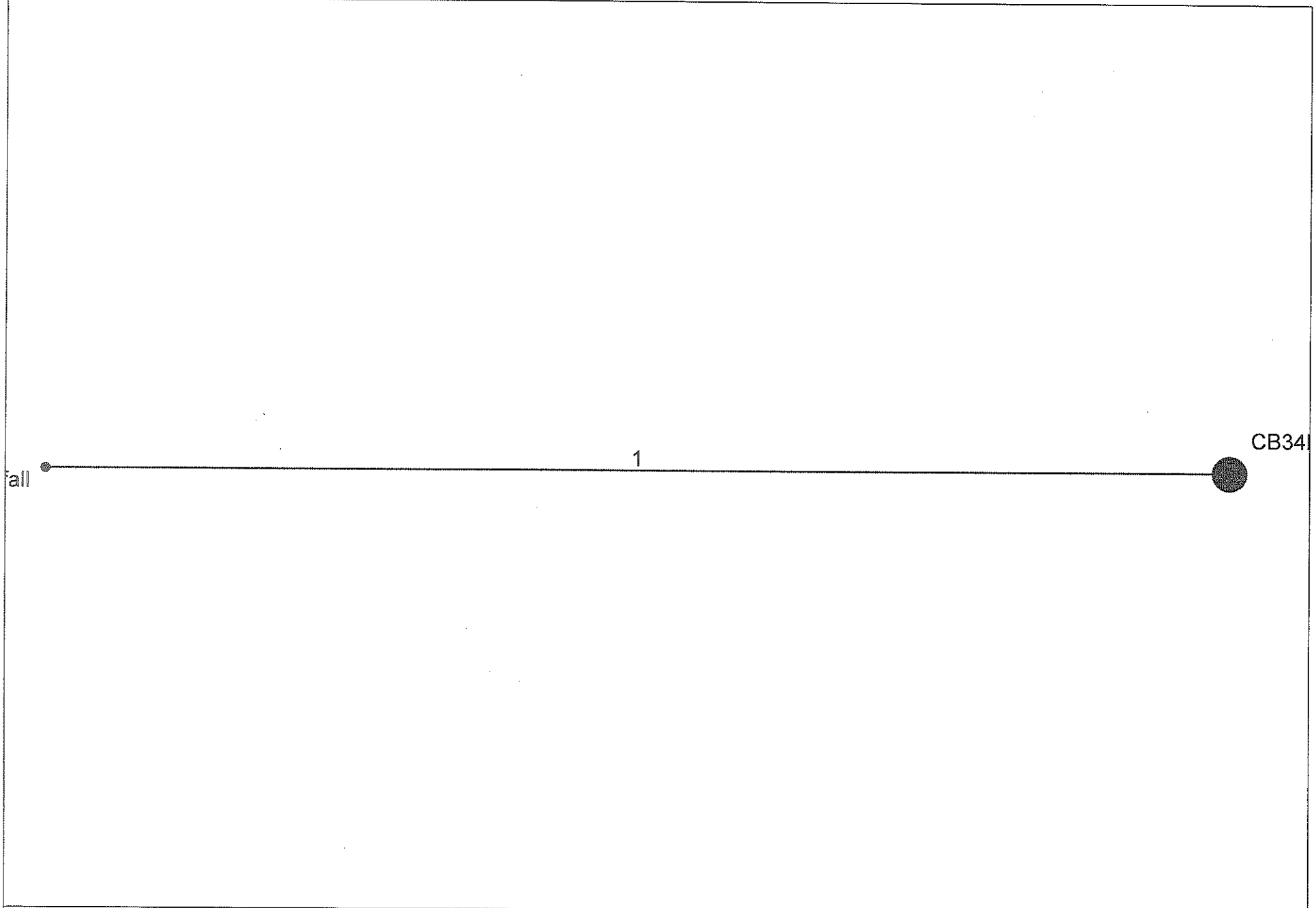
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	3.62	1000.00	1000.67	0.67	0.93	3.89	0.24	1000.91	0.428	13.000	1000.07	1000.75	0.68**	0.94	3.85	0.23	1000.98	0.417	0.422	0.055	1.00	0.23

Project File: CB32b system.stm | Number of lines: 1 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

Hydraflow Storm Sewers Extension for AutoCAD® Civil 3D® 2008 Plan

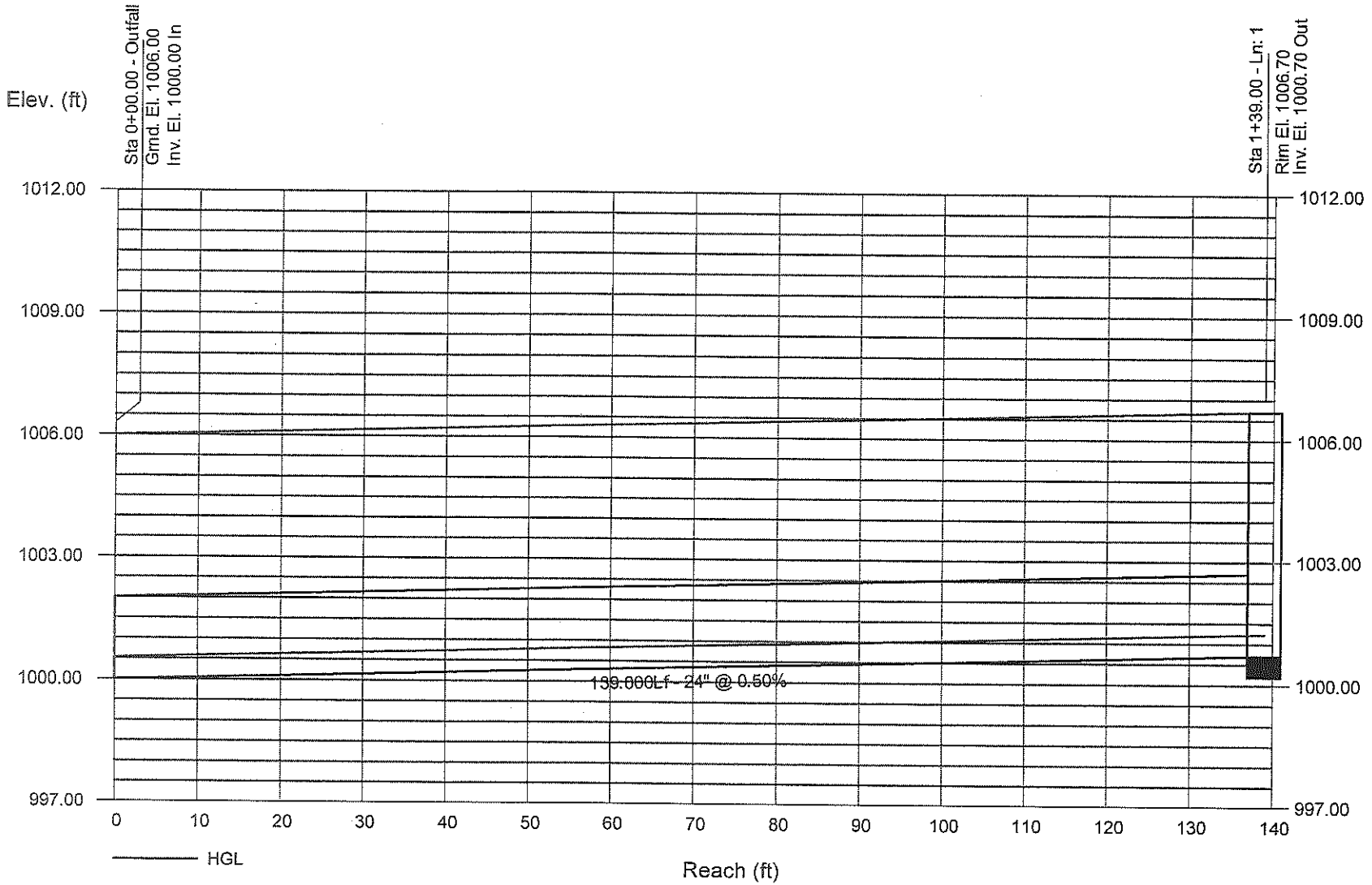


Project File: CB34b system.stm	Number of lines: 1	Date: 05-13-2008

Hydraflow Storm Se Extension v6.052

Storm Sewer Profile

Proj. file: CB3 ystem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	139.000	0.000	Curb	2.20	0.00	0.00	0.0	1000.00	0.50	1000.70	24	Cir	0.013	1.00	0.00	24

Project File: CB34b system.stm

Number of lines: 1

Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	24	2.20	24	Cir	139.000	1000.00	1000.70	0.504	1000.53	1001.23	n/a	1001.23	End	Curb-Horiz

Project File: CB34b system.stm

Number of lines: 1

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

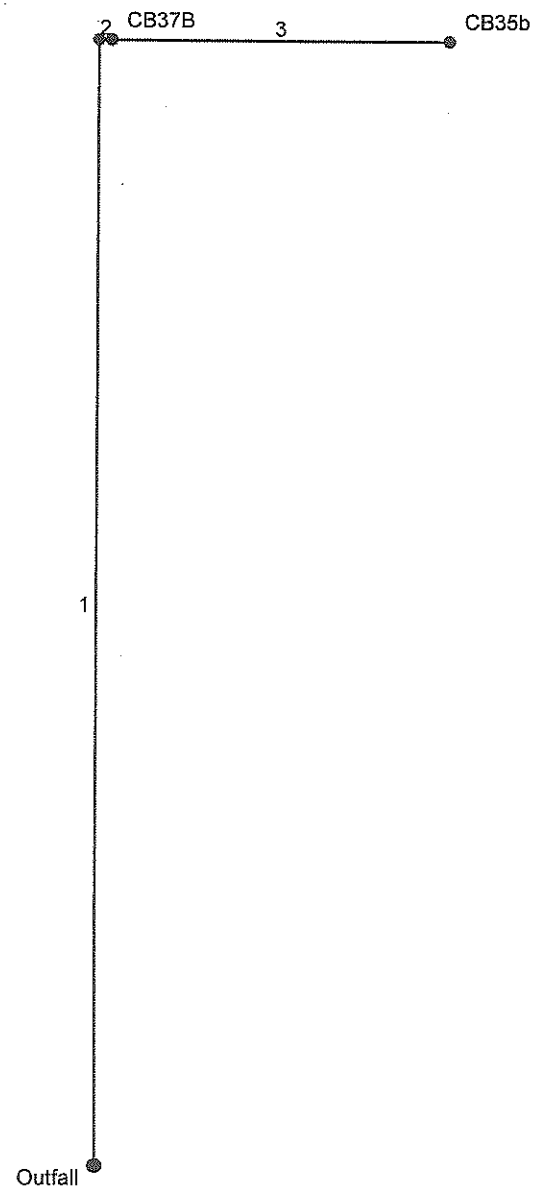
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	2.20	1000.00	1000.53	0.53	0.66	3.34	0.17	1000.70	0.415	139.00	1000.70	1001.23	0.53**	0.66	3.34	0.17	1001.40	0.415	0.415	n/a	1.00	n/a

Project File: CB34b system.stm | Number of lines: 1 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

CB3 system

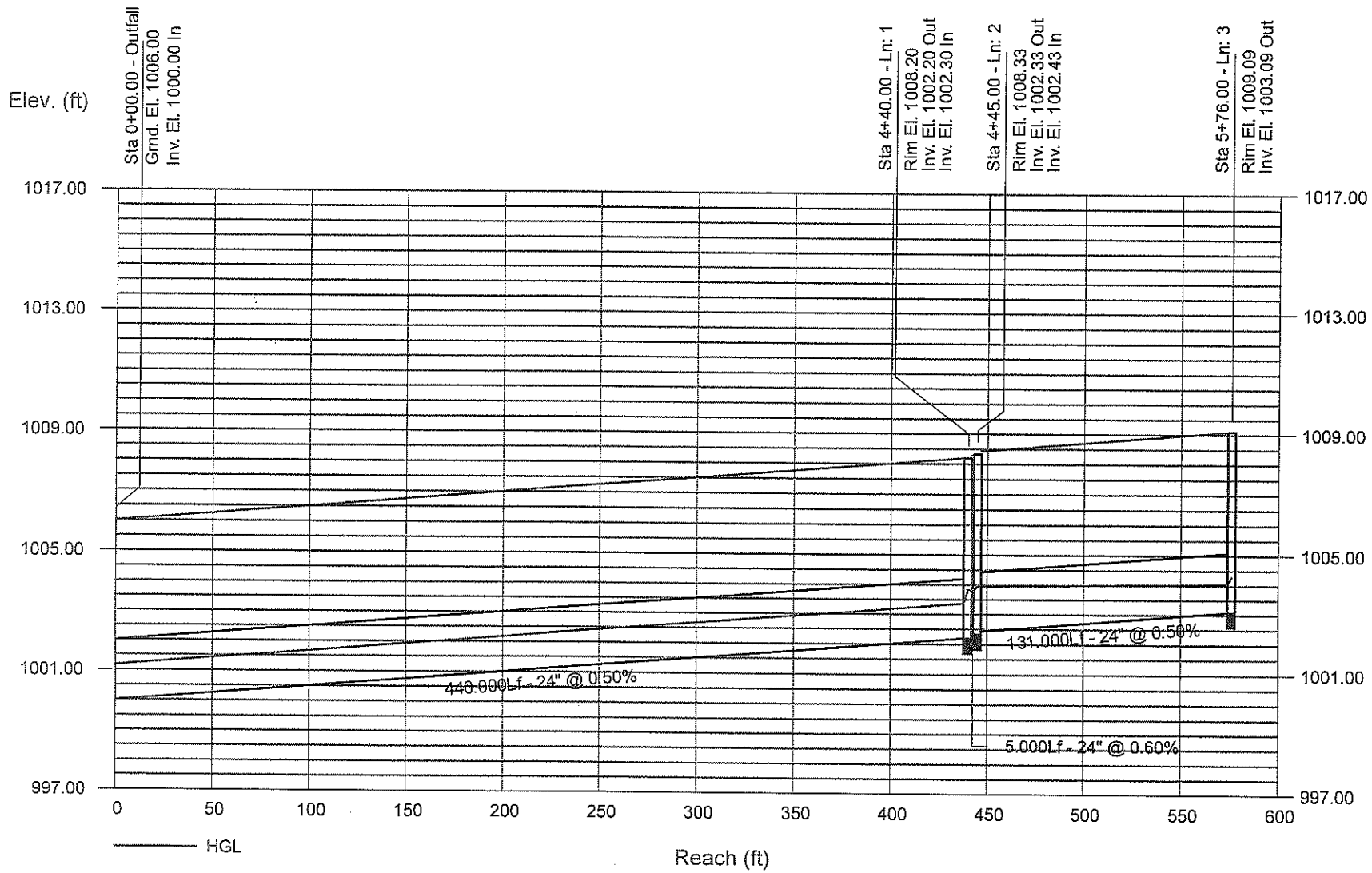


Project File: CB35b system.stm	Number of lines: 3	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB35b system.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	440.000	-90.000	MH	0.00	0.00	0.00	0.0	1000.00	0.50	1002.20	24	Cir	0.013	1.00	0.00	27
2	1	5.000	90.000	Curb	4.46	0.00	0.00	0.0	1002.30	0.60	1002.33	24	Cir	0.013	0.50	0.00	26
3	2	131.000	0.000	Curb	5.84	0.00	0.00	0.0	1002.43	0.50	1003.09	24	Cir	0.013	1.00	0.00	25

CB35b system | Number of lines: 3 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	27	10.30	24	Cir	440.000	1000.00	1002.20	0.500	1001.17	1003.37	0.46	1003.82	End	Manhole
2	26	10.30	24	Cir	5.000	1002.30	1002.33	0.601	1003.82	1003.82	0.13	1003.96	1	Curb-Horiz
3	25	5.84	24	Cir	131.000	1002.43	1003.09	0.504	1003.96	1004.05	0.24	1004.29	2	Curb-Horiz

CB35b system | Number of lines: 3 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

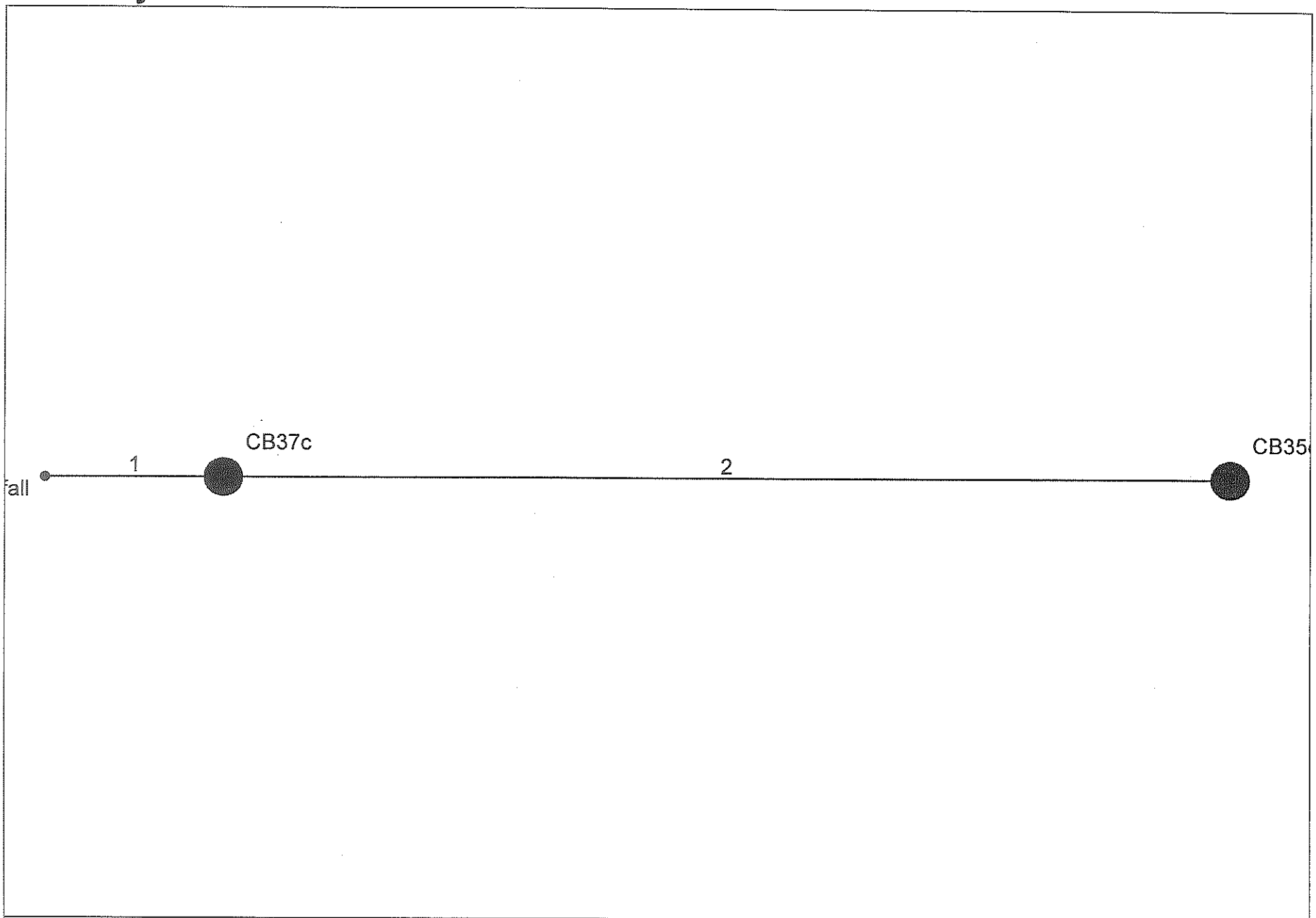
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	10.30	1000.00	1001.17	1.17	1.90	5.41	0.45	1001.62	0.500	440.00	1002.20	1003.37	1.17	1.90	5.42	0.46	1003.82	0.502	0.501	2.203	1.00	0.46
2	24	10.30	1002.30	1003.82	1.52	2.57	4.01	0.25	1004.07	0.241	5.000	1002.33	1003.82	1.49	2.52	4.09	0.26	1004.09	0.252	0.246	0.012	0.50	0.13
3	24	5.84	1002.43	1003.96	1.52	2.57	2.27	0.08	1004.04	0.077	131.00	1003.09	1004.05	0.96	1.48	3.94	0.24	1004.29	0.312	0.195	0.255	1.00	0.24

CB35b system | Number of lines: 3 | Run Date: 05-13-2008

; c = cir e = ellip b = box

CB35c system

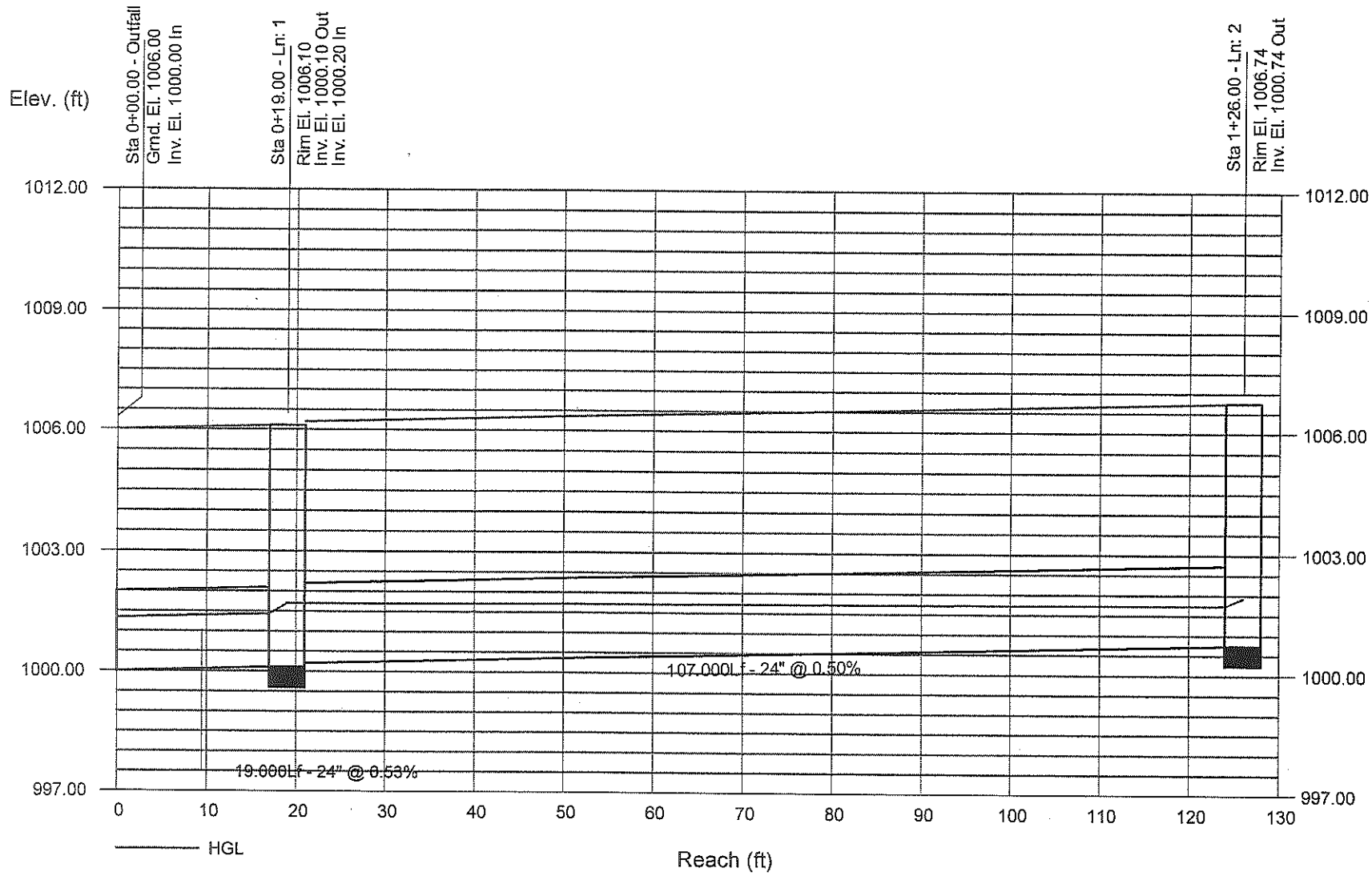


Project File: CB35c system.stm	Number of lines: 2	Date: 05-13-2008

Hydraflow Storm Se Extension v6.052

Stor Sewer Profile

Proj. file: CB3 ystem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	19.000	0.000	Curb	7.40	0.00	0.00	0.0	1000.00	0.53	1000.10	24	Cir	0.013	0.50	0.00	29
2	1	107.000	0.000	Curb	5.48	0.00	0.00	0.0	1000.20	0.50	1000.74	24	Cir	0.013	1.00	0.00	28

CB35c system

Number of lines: 2

Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	29	12.88	24	Cir	19.000	1000.00	1000.10	0.526	1001.34	1001.43	0.26	1001.69	End	Curb-Horiz
2	28	5.48	24	Cir	107.000	1000.20	1000.74	0.505	1001.69	1001.74	0.19	1001.93	1	Curb-Horiz

CB35c system | Number of lines: 2 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

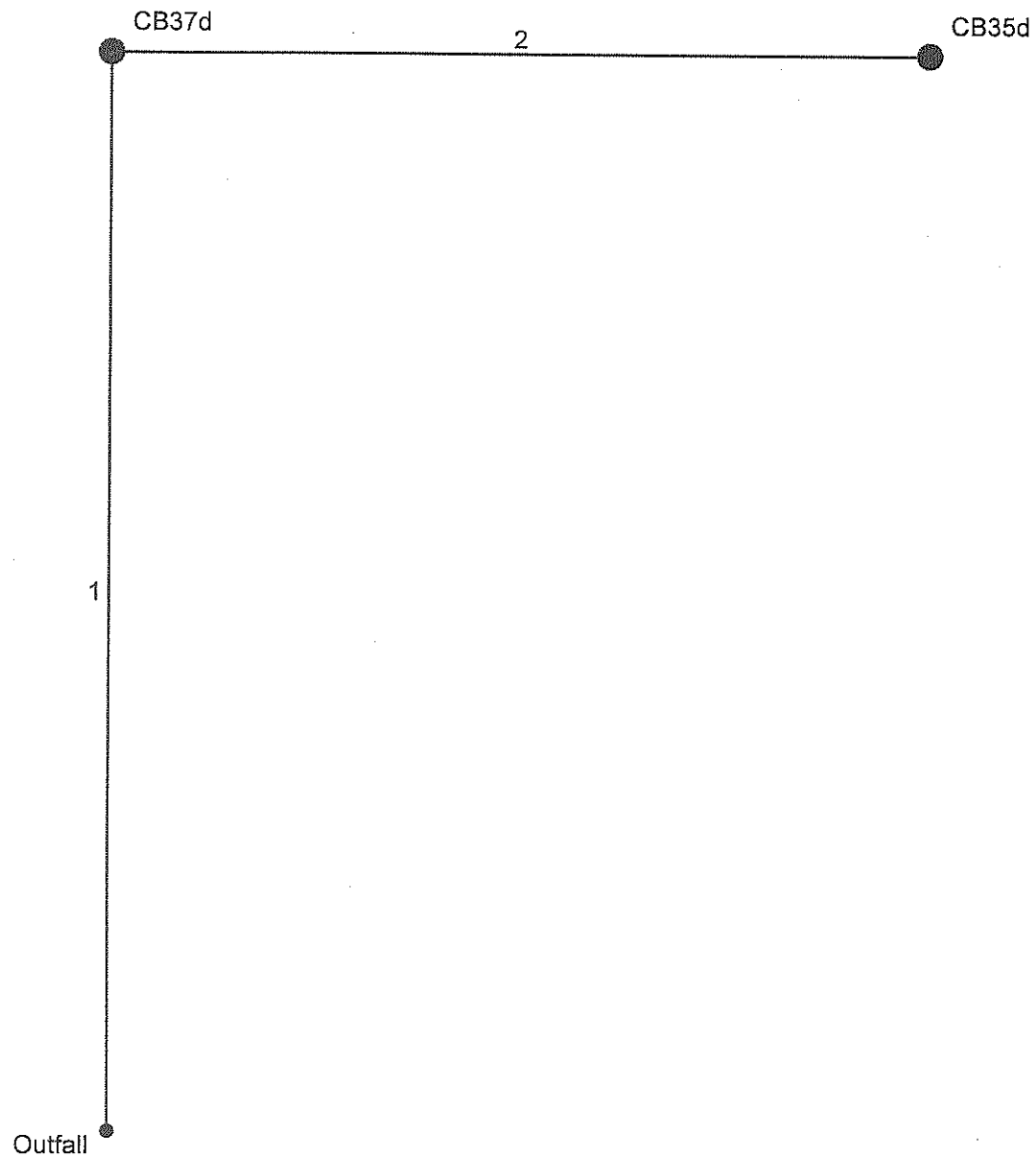
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	12.88	1000.00	1001.34	1.34	2.23	5.78	0.52	1001.86	0.526	19.000	1000.10	1001.43	1.33	2.22	5.79	0.52	1001.95	0.528	0.527	0.100	0.50	0.26
2	24	5.48	1000.20	1001.69	1.49	2.52	2.18	0.07	1001.77	0.071	107.00	1000.74	1001.74	1.00	1.58	3.47	0.19	1001.93	0.232	0.152	0.162	1.00	0.19

CB35c system | Number of lines: 2 | Run Date: 05-13-2008

; c = cir e = ellip b = box

CB3 system

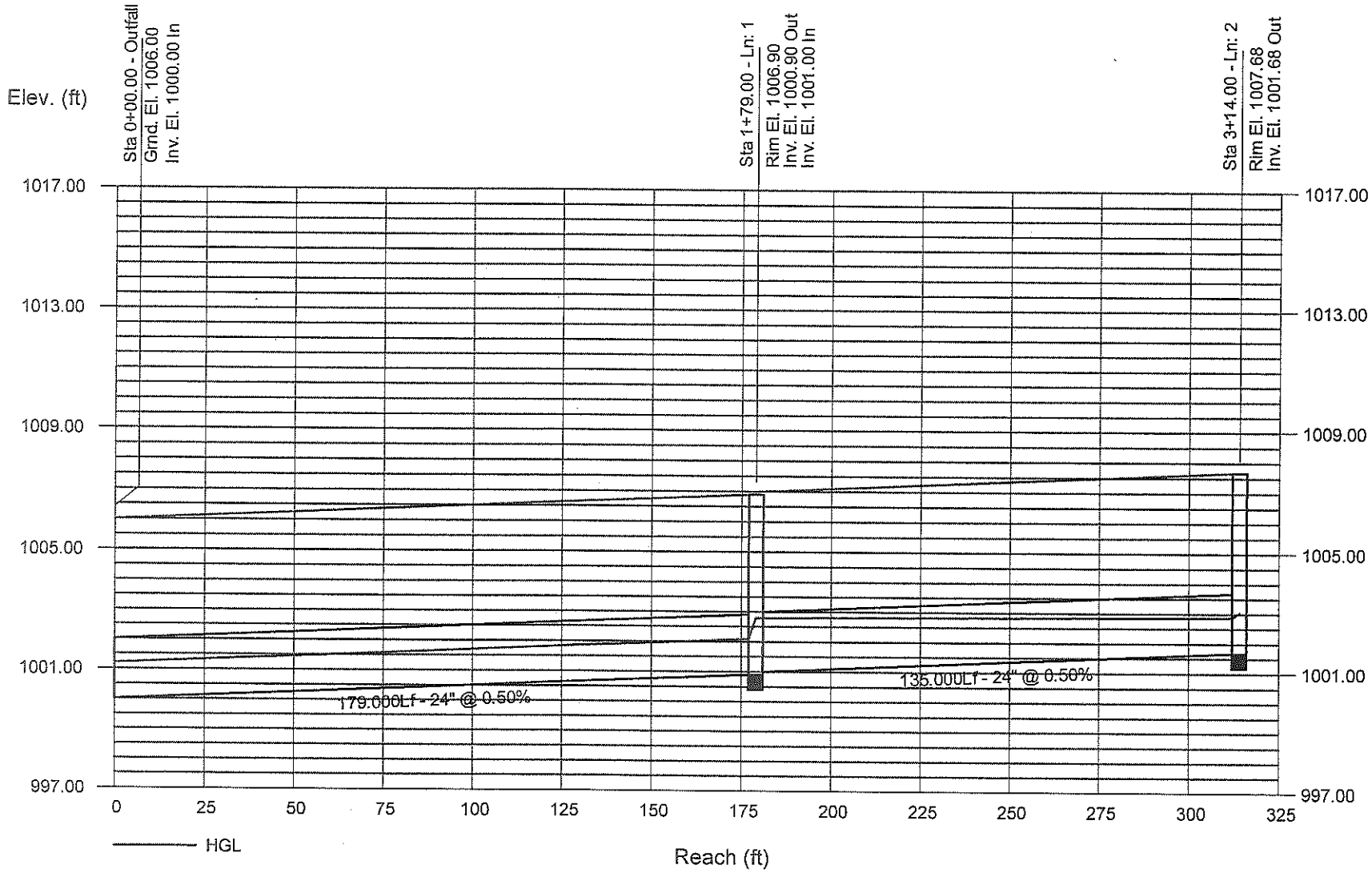


Project File: CB35d system.stm	Number of lines: 2	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB35d system.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	179.000	-90.000	Curb	4.30	0.00	0.00	0.0	1000.00	0.50	1000.90	24	Cir	0.013	1.50	0.00	31
2	1	135.000	90.000	Curb	6.39	0.00	0.00	0.0	1001.00	0.50	1001.68	24	Cir	0.013	1.00	0.00	30

CB35d system

Number of lines: 2

Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	31	10.69	24	Cir	179.000	1000.00	1000.90	0.503	1001.19	1002.09	0.70	1002.79	End	Curb-Horiz
2	30	6.39	24	Cir	135.000	1001.00	1001.68	0.504	1002.79	1002.86	0.17	1003.03	1	Curb-Horiz

CB35d system | Number of lines: 2 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	10.69	1000.00	1001.19	1.19	1.96	5.46	0.46	1001.66	0.503	179.00	1000.90	1002.09	1.19	1.95	5.47	0.47	1002.56	0.505	0.504	0.901	1.50	0.70
2	24	6.39	1001.00	1002.79	1.79	2.97	2.15	0.07	1002.86	0.071	135.00	1001.68	1002.86	1.18	1.94	3.30	0.17	1003.03	0.184	0.127	0.172	1.00	0.17

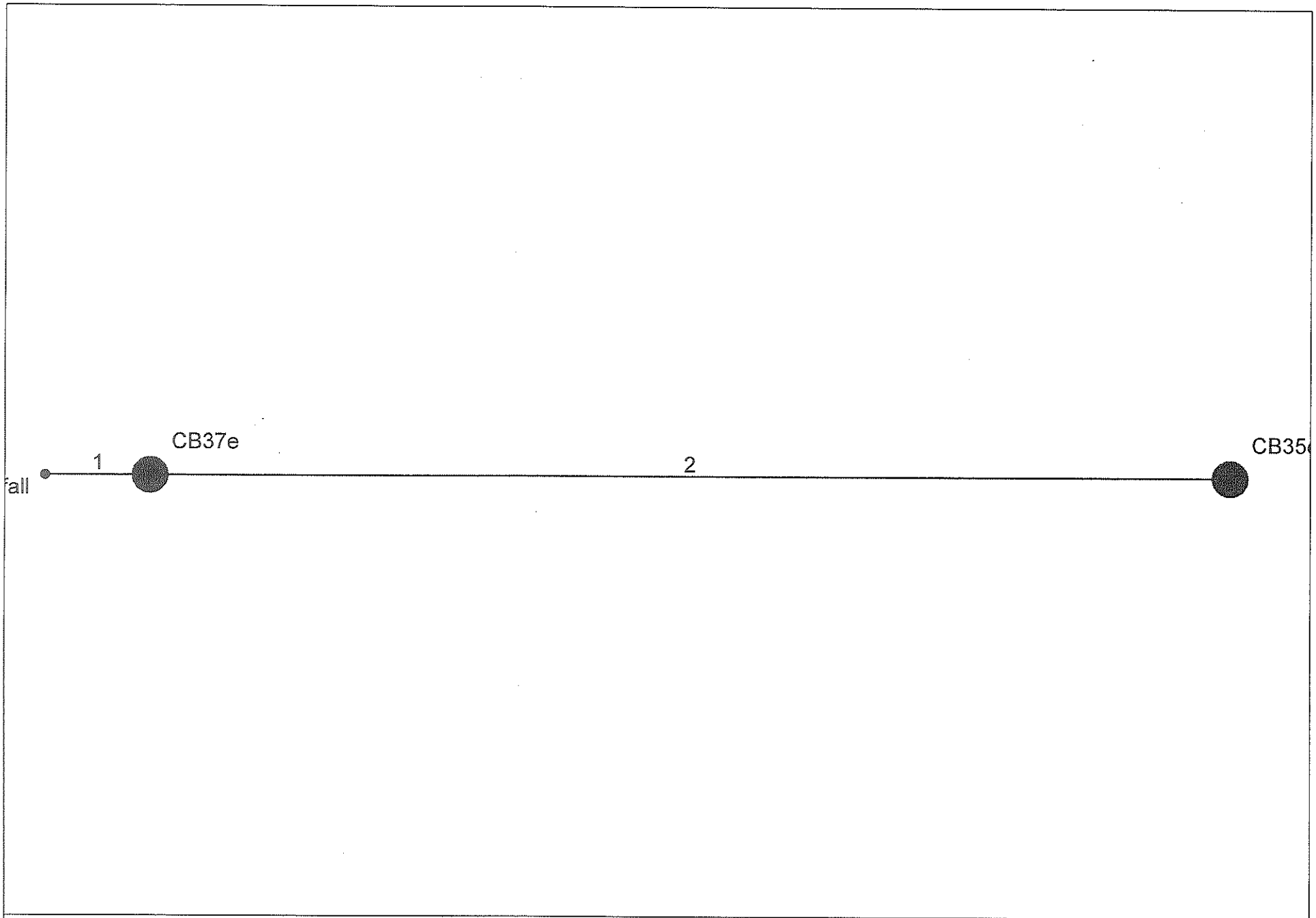
CB35d system

Number of lines: 2

Run Date: 05-13-2008

; c = cir e = ellip b = box

CB35e

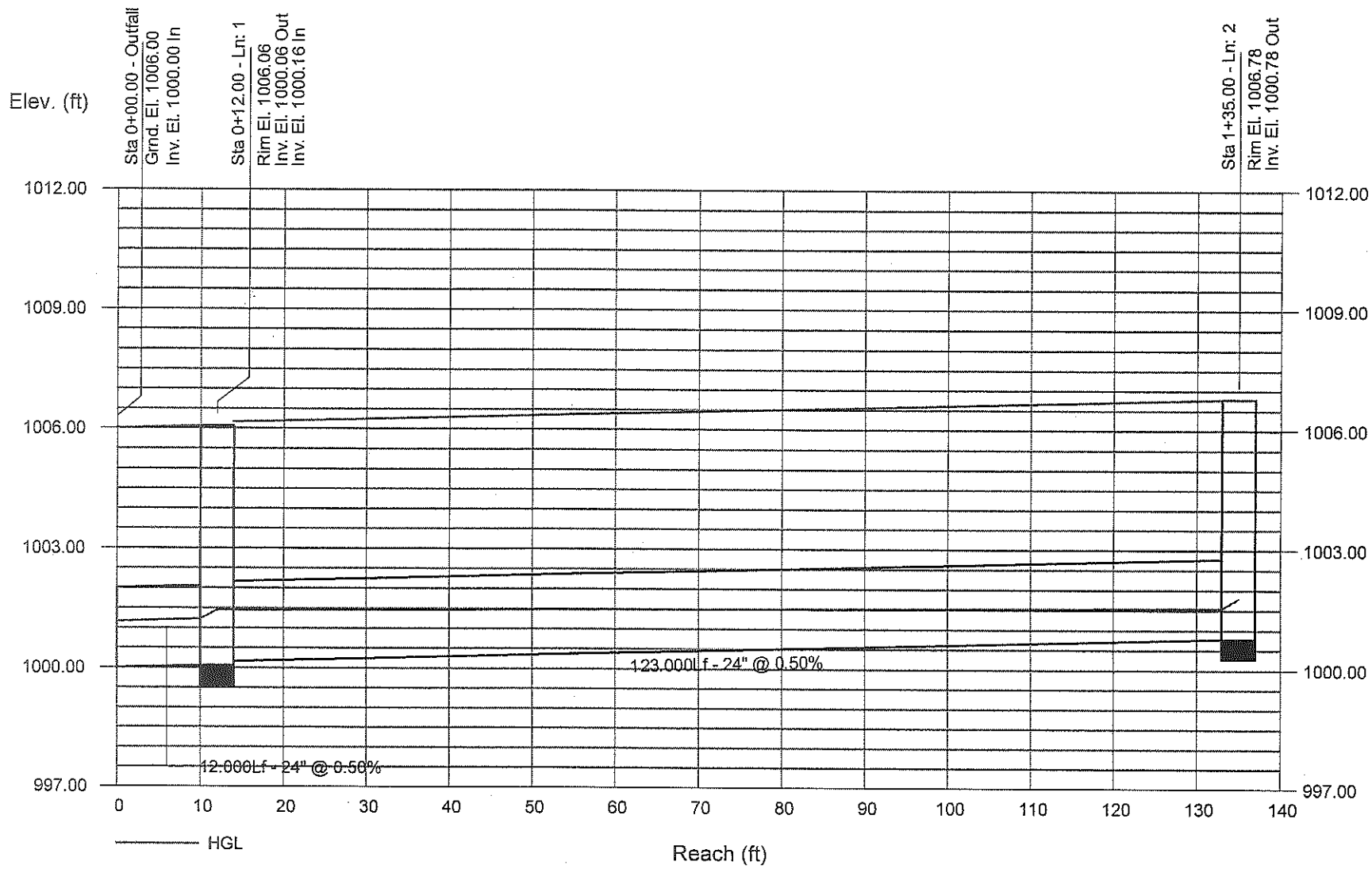


Project File: CB35e system.stm	Number of lines: 2	Date: 05-13-2008

Hydraflow Storm Se Extension v6.052

Stor Sewer Profile

Proj. file: CB3 stem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	12.000	0.000	Curb	5.72	0.00	0.00	0.0	1000.00	0.50	1000.06	24	Cir	0.013	0.50	0.00	33
2	1	123.000	0.000	Curb	4.45	0.00	0.00	0.0	1000.16	0.50	1000.78	24	Cir	0.013	1.00	0.00	32

CB35e | Number of lines: 2 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	33	10.17	24	Cir	12.000	1000.00	1000.06	0.500	1001.16	1001.22	0.23	1001.45	End	Curb-Horiz
2	32	4.45	24	Cir	123.000	1000.16	1000.78	0.504	1001.45	1001.55	0.25	1001.80	1	Curb-Horiz

CB35e

Number of lines: 2

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	10.17	1000.00	1001.16	1.16	1.89	5.39	0.45	1001.61	0.500	12.000	1000.06	1001.22	1.16	1.89	5.39	0.45	1001.67	0.499	0.499	0.060	0.50	0.23
2	24	4.45	1000.16	1001.45	1.28	2.13	2.09	0.07	1001.51	0.070	123.00	1000.78	1001.55	0.77	1.12	3.98	0.25	1001.80	0.390	0.230	0.283	1.00	0.25

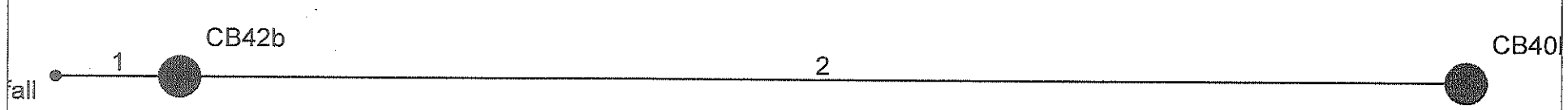
CB35e

Number of lines: 2

Run Date: 05-13-2008

; c = cir e = ellip b = box

CB4(system

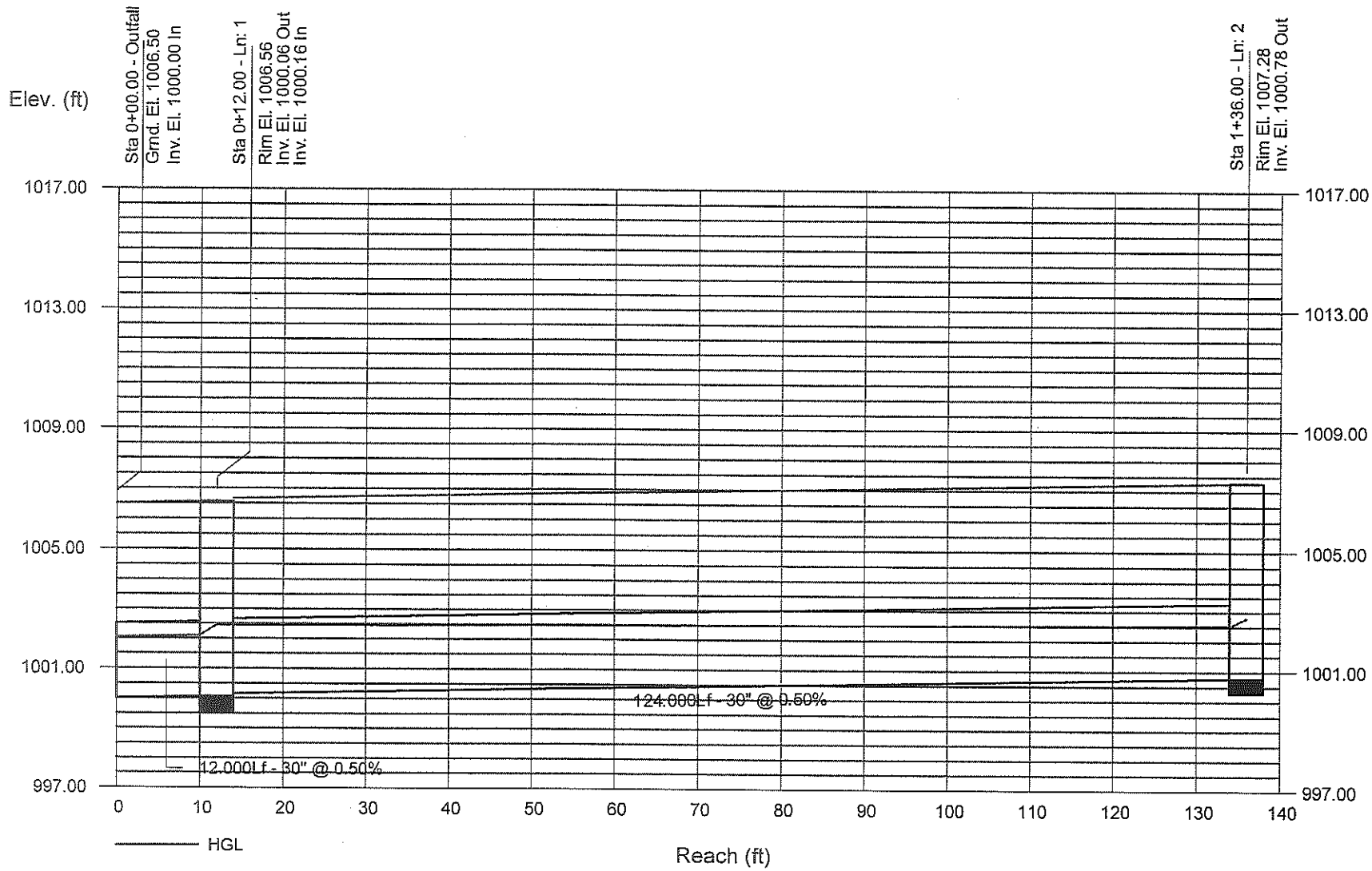


Project File: CB40b system.stm	Number of lines: 2	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB40b system.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	12.000	0.000	Curb	13.57	0.00	0.00	0.0	1000.00	0.50	1000.06	30	Cir	0.013	0.50	0.00	35
2	1	124.000	0.000	Curb	15.21	0.00	0.00	0.0	1000.16	0.50	1000.78	30	Cir	0.013	1.00	0.00	34

CB40b system | Number of lines: 2 | Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	35	28.78	30	Cir	12.000	1000.00	1000.06	0.500	1002.03	1002.09	0.35	1002.44	End	Curb-Horiz
2	34	15.21	30	Cir	124.000	1000.16	1000.78	0.500	1002.44	1002.54	0.26	1002.80	1	Curb-Horiz

CB40b system

Number of lines: 2

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

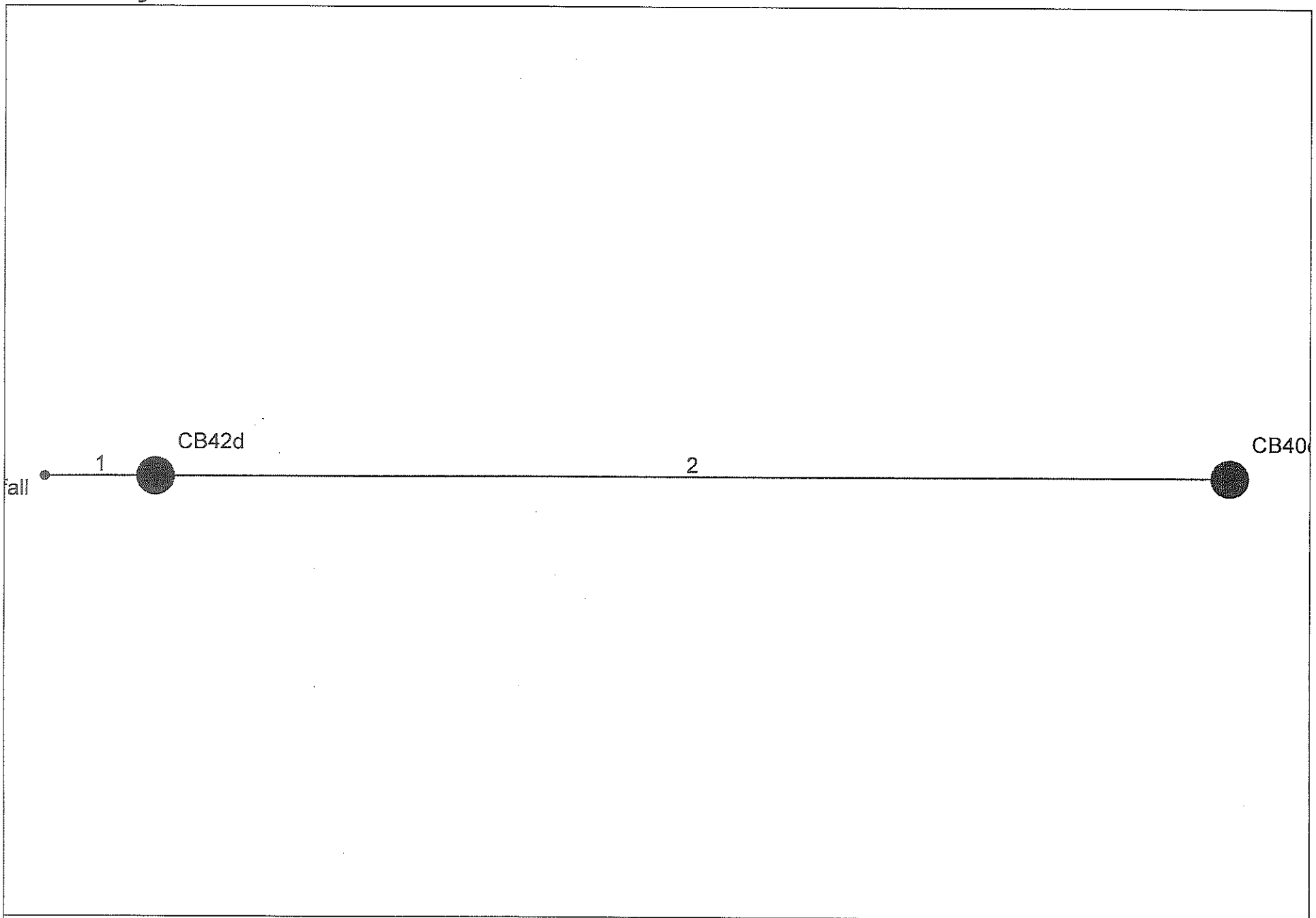
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	30	28.78	1000.00	1002.03	2.03	4.27	6.73	0.71	1002.74	0.500	12.000	1000.06	1002.09	2.03	4.27	6.74	0.71	1002.80	0.501	0.500	0.060	0.50	0.35
2	30	15.21	1000.16	1002.44	2.28	4.70	3.23	0.16	1002.61	0.120	124.000	1000.78	1002.54	1.76	3.69	4.13	0.26	1002.80	0.194	0.157	0.195	1.00	0.26

CB40b system | Number of lines: 2 | Run Date: 05-13-2008

; c = cir e = ellip b = box

CB40d system

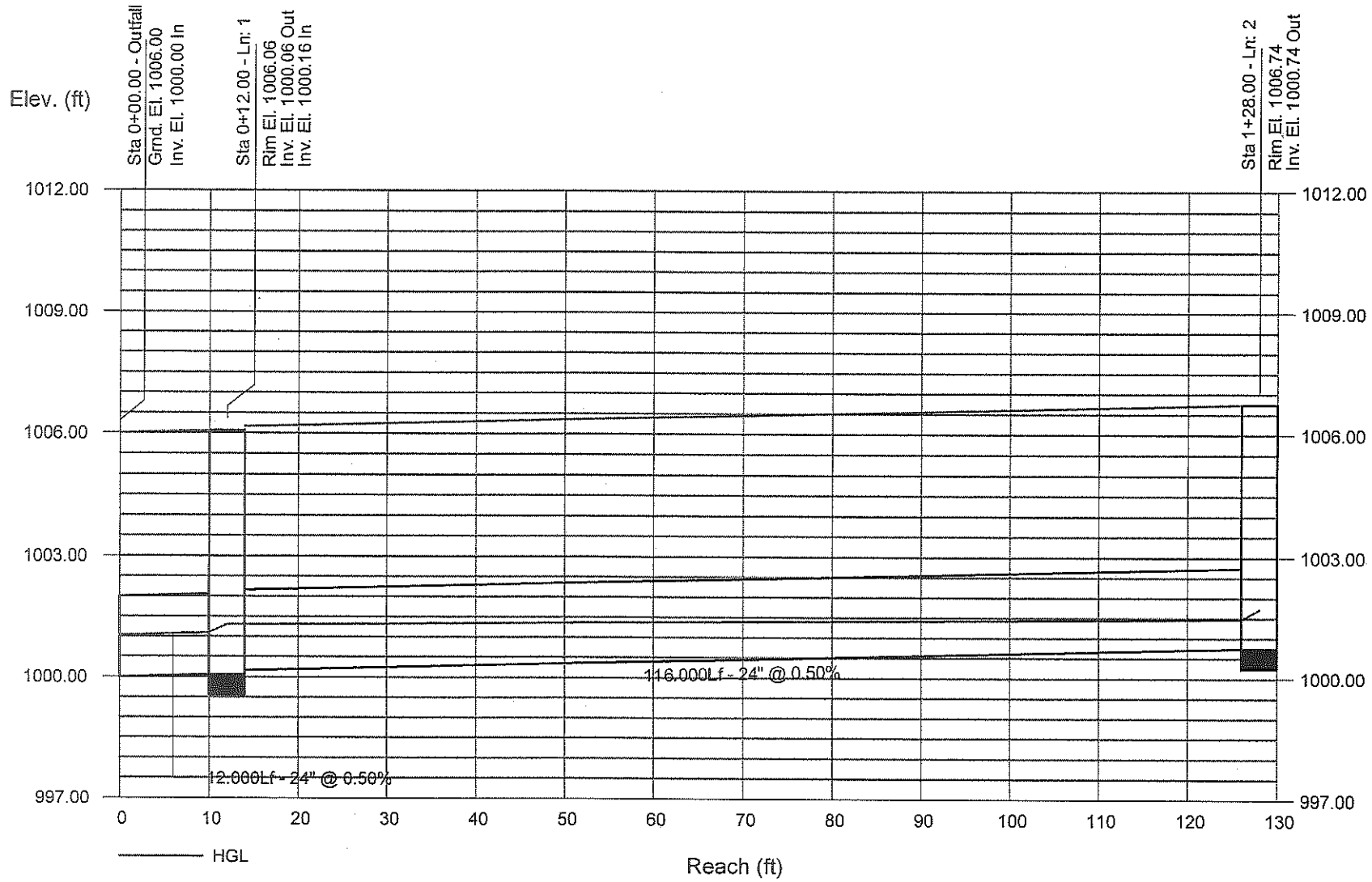


Project File: CB40d system.stm	Number of lines: 2	Date: 05-13-2008

Hydraflow Storm Se Extension v6.052

Stor Sewer Profile

Proj. file: CB4 stem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	12.000	0.000	Curb	4.20	0.00	0.00	0.0	1000.00	0.50	1000.06	24	Cir	0.013	0.50	0.00	37
2	1	116.000	0.000	Curb	4.20	0.00	0.00	0.0	1000.16	0.50	1000.74	24	Cir	0.013	1.00	0.00	36

CB40d system

Number of lines: 2

Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	37	8.40	24	Cir	12.000	1000.00	1000.06	0.500	1001.03	1001.09	0.21	1001.30	End	Curb-Horiz
2	36	4.20	24	Cir	116.000	1000.16	1000.74	0.500	1001.30	1001.47	0.25	1001.73	1	Curb-Horiz

CB40d system

Number of lines: 2

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs.

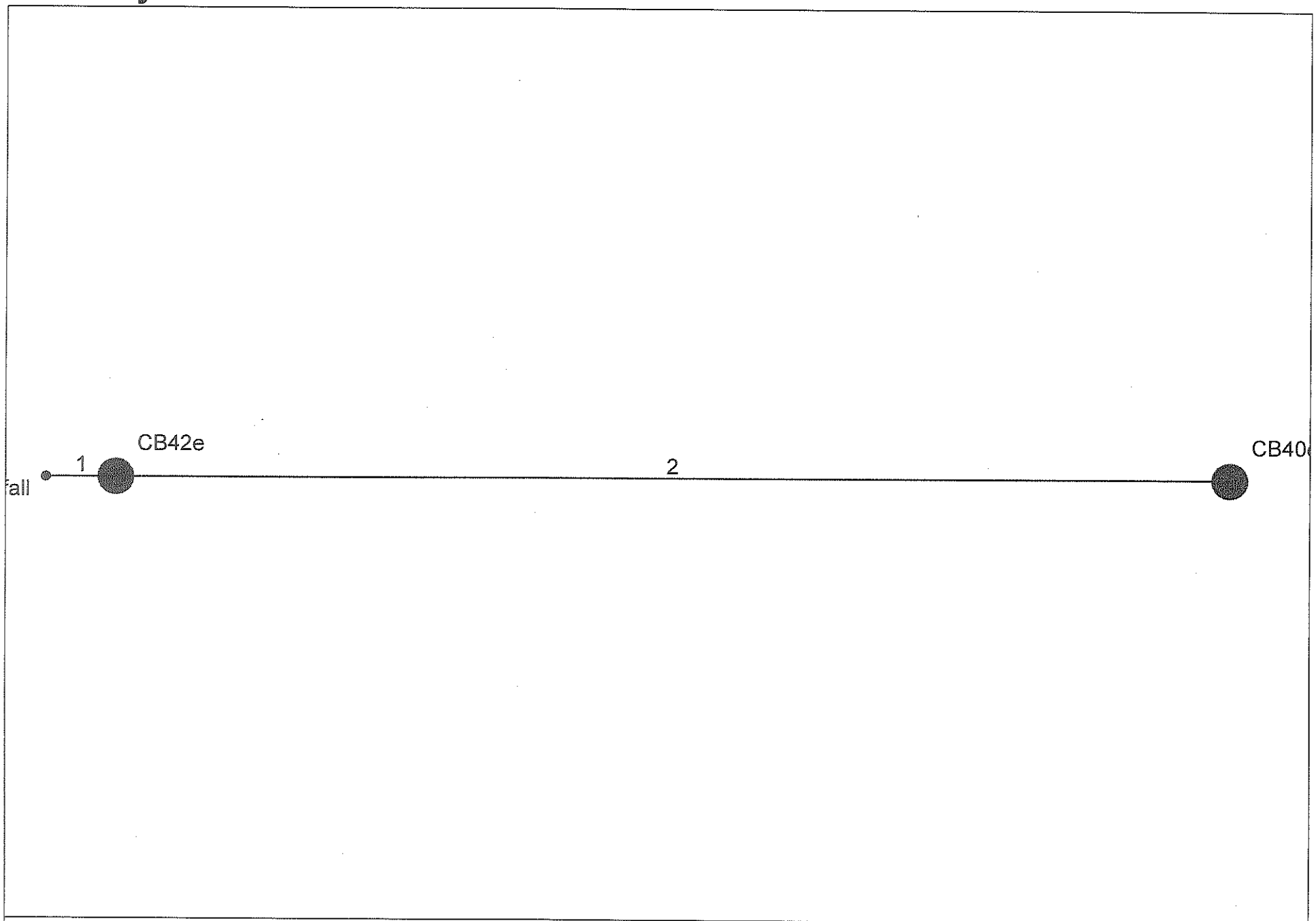
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	8.40	1000.00	1001.03	1.03	1.63	5.15	0.41	1001.44	0.500	12.000	1000.06	1001.09	1.03**	1.63	5.14	0.41	1001.50	0.497	0.498	0.060	0.50	0.21
2	24	4.20	1000.16	1001.30	1.14	1.84	2.28	0.08	1001.38	0.090	116.000	1000.74	1001.47	0.73**	1.04	4.04	0.25	1001.73	0.425	0.258	0.299	1.00	0.25

CB40d system | Number of lines: 2 | Run Date: 05-13-2008

Notes: ; ** Critical depth. ; c = cir e = ellip b = box

CB4 system

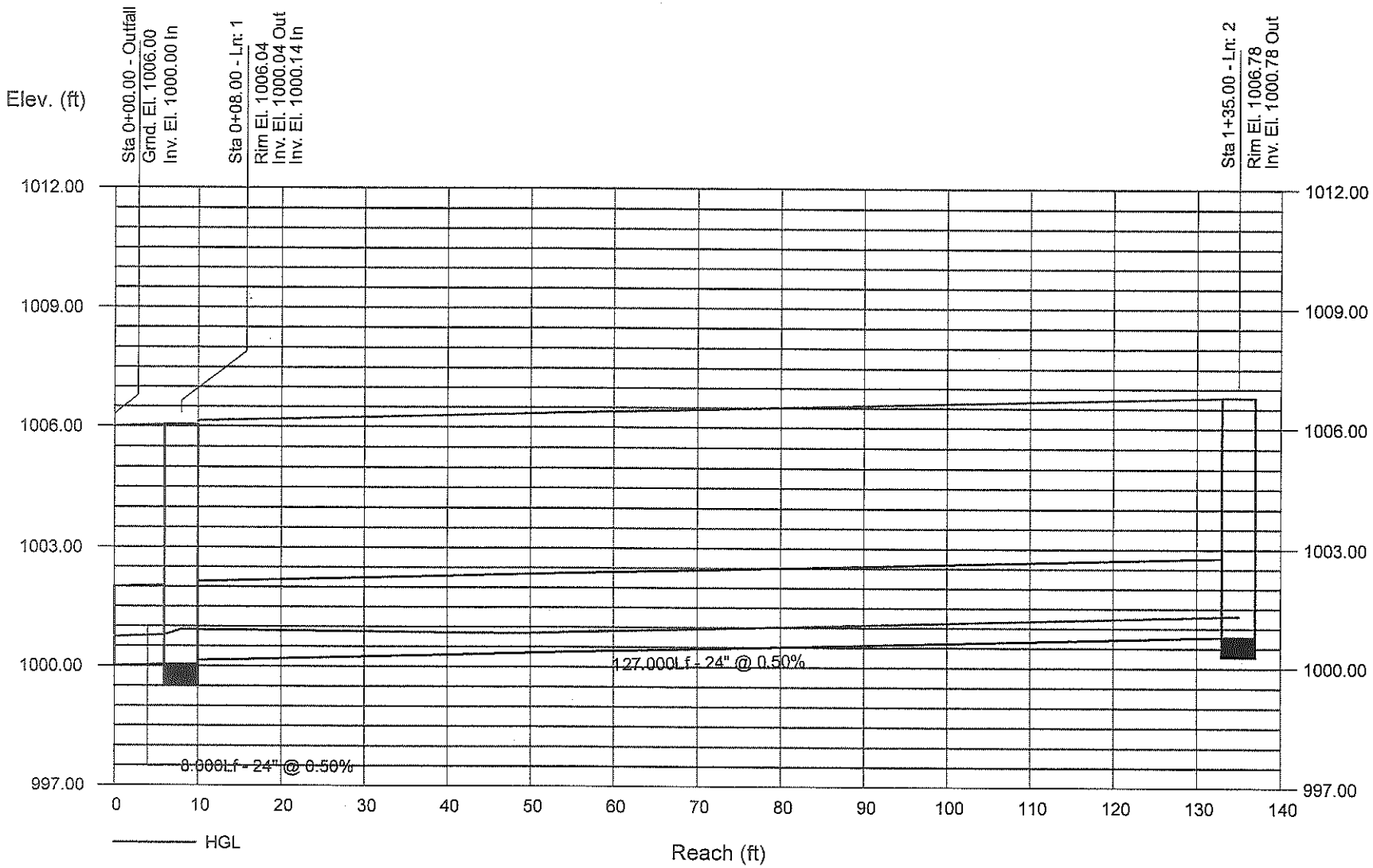


Project File: CB40e system.stm	Number of lines: 2	Date: 05-13-2008

Hydraflow Storm Sewers Extension v6.052

Storm Sewer Profile

Proj. file: CB40e system.stm



Stor Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	8.000	0.000	Curb	2.15	0.00	0.00	0.0	1000.00	0.50	1000.04	24	Cir	0.013	0.50	0.00	39
2	1	127.000	0.000	Curb	2.15	0.00	0.00	0.0	1000.14	0.50	1000.78	24	Cir	0.013	1.00	0.00	38

CB40e system

Number of lines: 2

Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	39	4.30	24	Cir	8.000	1000.00	1000.04	0.500	1000.73	1000.78	0.13	1000.91	End	Curb-Horiz
2	38	2.15	24	Cir	127.000	1000.14	1000.78	0.504	1000.91	1001.30	n/a	1001.30 j	1	Curb-Horiz

CB40e system

Number of lines: 2

Run Date: 05-13-2008

NOTES: Return period = 2 Yrs. ; j - Line contains hyd. jump.

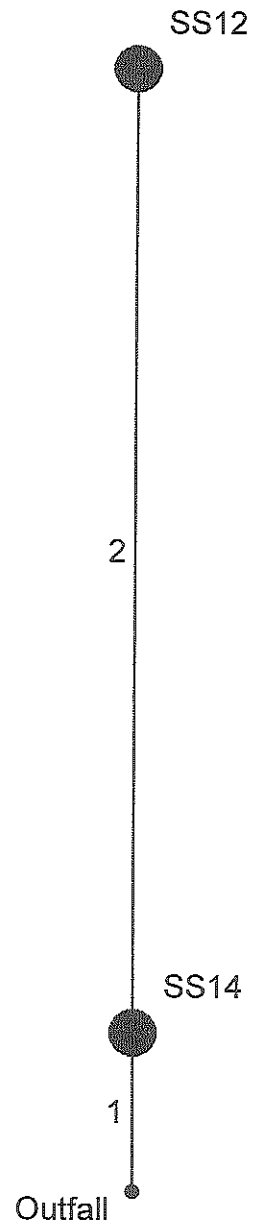
Hydraulic Grade Line Computations

Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	4.30	1000.00	1000.73	0.73	1.05	4.11	0.26	1001.00	0.437	8.000	1000.04	1000.78	0.74**	1.06	4.07	0.26	1001.04	0.426	0.431	0.035	0.50	0.13
2	24	2.15	1000.14	1000.91	0.77	1.11	1.93	0.06	1000.97	0.092	127.00	1000.78	1001.30 j	0.52**	0.65	3.32	0.17	1001.47	0.415	0.253	n/a	1.00	0.17

CB40e system | Number of lines: 2 | Run Date: 05-13-2008

Notes: ; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

SS12 system

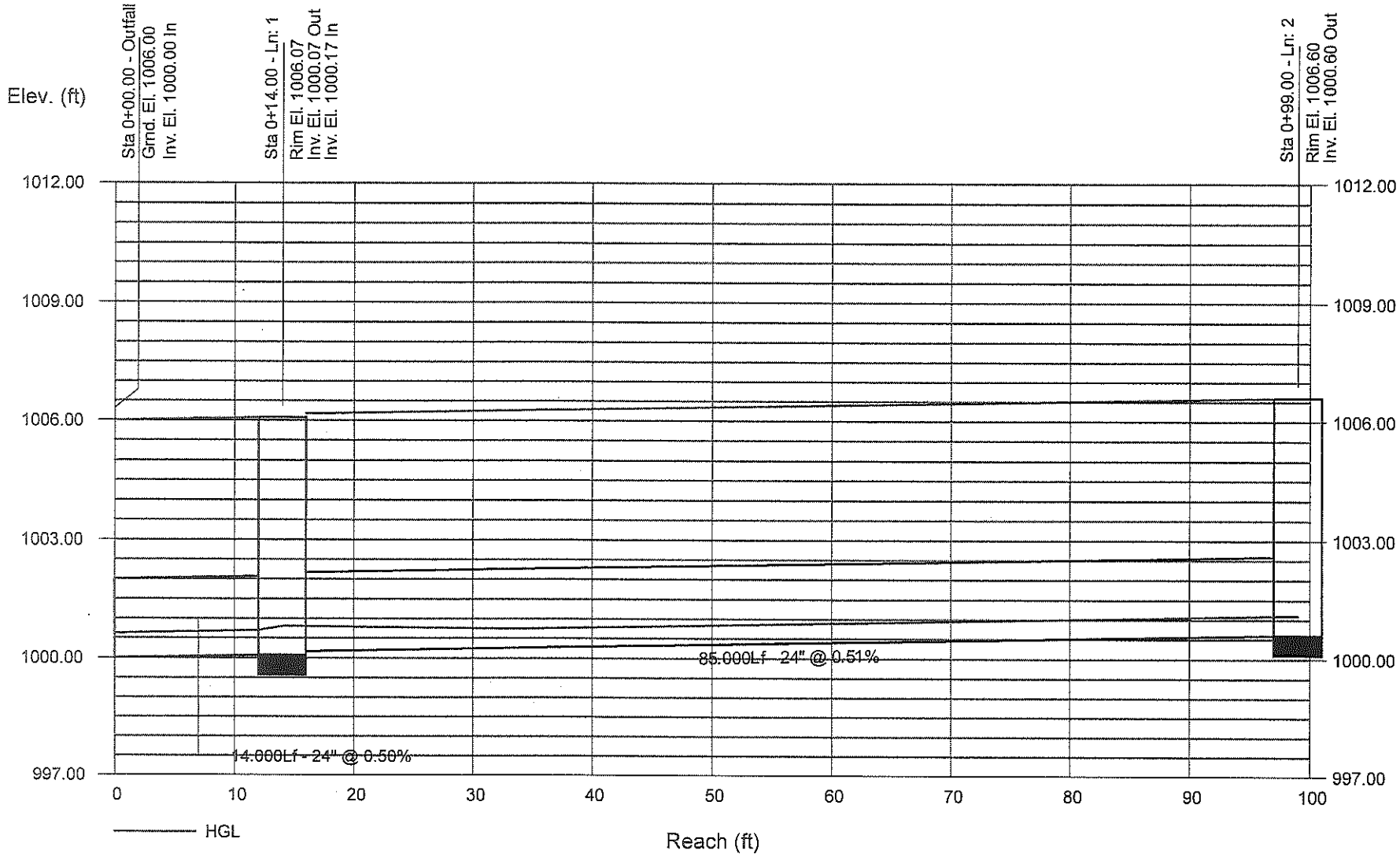


Project File: SS12 system.stm	Number of lines: 2	Date: 05-13-2008

Hydraflow Storm Se[illegible] Extension v6.052

Stor Sewer Profile

Proj. file: SS ystem.stm



Storm Sewer Inventory Report

Line No.	Alignment				Flow Data				Physical Data								Line ID
	Dnstr line No.	Line length (ft)	Defl angle (deg)	Junc type	Known Q (cfs)	Drng area (ac)	Runoff coeff (C)	Inlet time (min)	Invert El Dn (ft)	Line slope (%)	Invert El Up (ft)	Line size (in)	Line shape	N value (n)	J-loss coeff (K)	Inlet/ Rim El (ft)	
1	End	14.000	-90.000	Curb	1.09	0.00	0.00	0.0	1000.00	0.50	1000.07	24	Cir	0.013	0.50	0.00	41
2	1	85.000	0.000	Curb	1.99	0.00	0.00	0.0	1000.17	0.51	1000.60	24	Cir	0.013	1.00	0.00	40

SS12 system

Number of lines: 2

Date: 05-13-2008

Storm Sewer Summary Report

Line No.	Line ID	Flow rate (cfs)	Line size (in)	Line shape	Line length (ft)	Invert EL Dn (ft)	Invert EL Up (ft)	Line slope (%)	HGL down (ft)	HGL up (ft)	Minor loss (ft)	HGL Junct (ft)	Dns line No.	Junction Type
1	41	3.08	24	Cir	14.000	1000.00	1000.07	0.500	1000.62	1000.70	0.10	1000.80	End	Curb-Horiz
2	40	1.99	24	Cir	85.000	1000.17	1000.60	0.506	1000.80	1001.10	n/a	1001.10 j	1	Curb-Horiz

SS12 system | Number of lines: 2 | Run Date: 05-13-2008

NOTES: Return period = 2 Yrs. ; j - Line contains hyd. jump.

Hydraulic Grade Line Computations

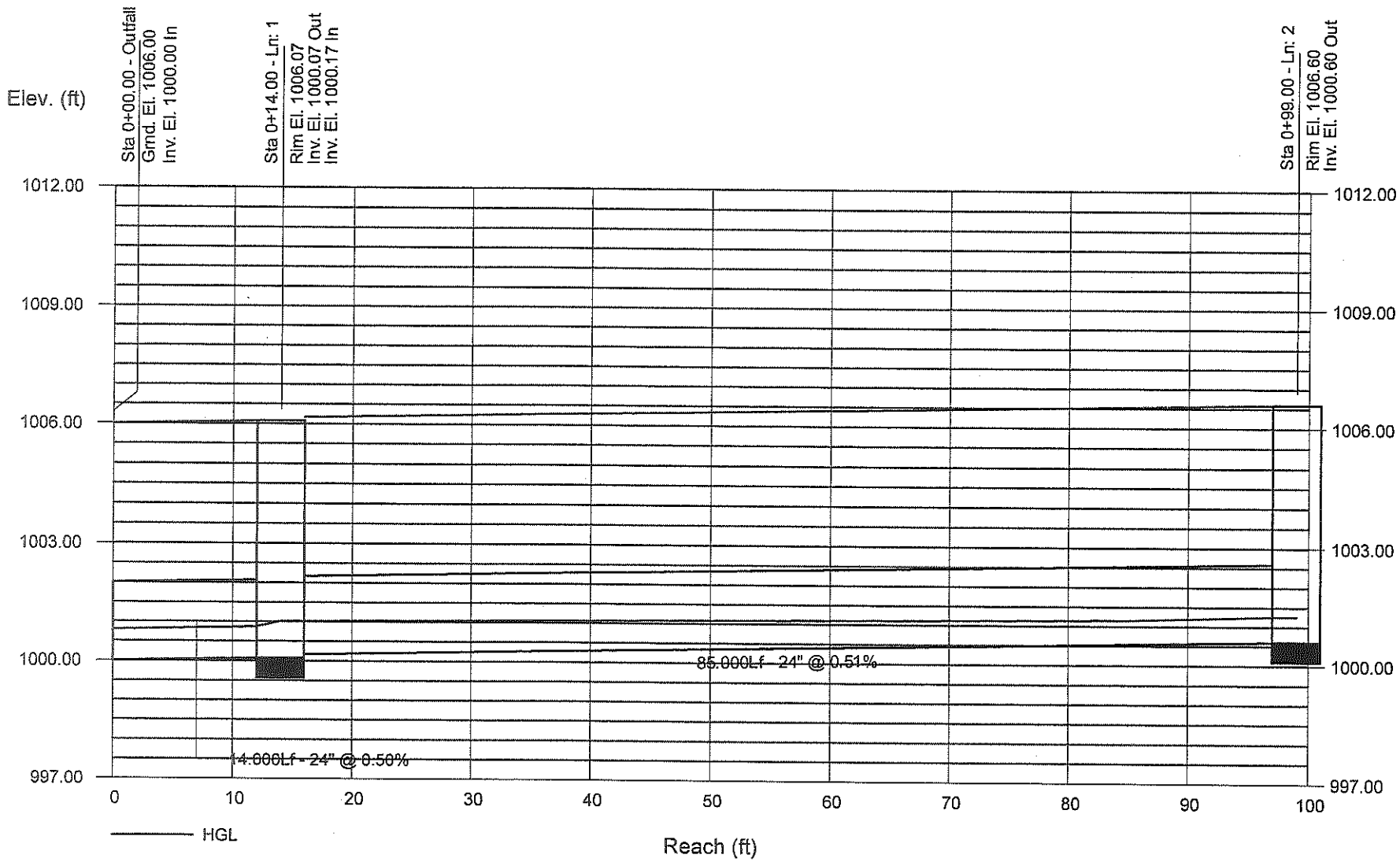
Line	Size (in)	Q (cfs)	Downstream Invert elev (ft)	Downstream HGL elev (ft)	Downstream Depth (ft)	Downstream Area (sqft)	Downstream Vel (ft/s)	Downstream Vel head (ft)	Downstream EGL elev (ft)	Downstream Sf (%)	Len (ft)	Upstream Invert elev (ft)	Upstream HGL elev (ft)	Upstream Depth (ft)	Upstream Area (sqft)	Upstream Vel (ft/s)	Upstream Vel head (ft)	Upstream EGL elev (ft)	Upstream Sf (%)	Check Ave Sf (%)	Check Enrgy loss (ft)	JL coeff (K)	Minor loss (ft)
1	24	3.08	1000.00	1000.62	0.62	0.83	3.70	0.21	1000.83	0.422	14.000	1000.07	1000.70	0.63**	0.84	3.66	0.21	1000.91	0.410	0.416	0.058	0.50	0.10
2	24	1.99	1000.17	1000.80	0.63	0.85	2.34	0.09	1000.89	0.167	85.000	1000.60	1001.10 j	0.50**	0.61	3.24	0.16	1001.26	0.414	0.290	n/a	1.00	0.16

SS12 system | Number of lines: 2 | Run Date: 05-13-2008

Notes: ; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

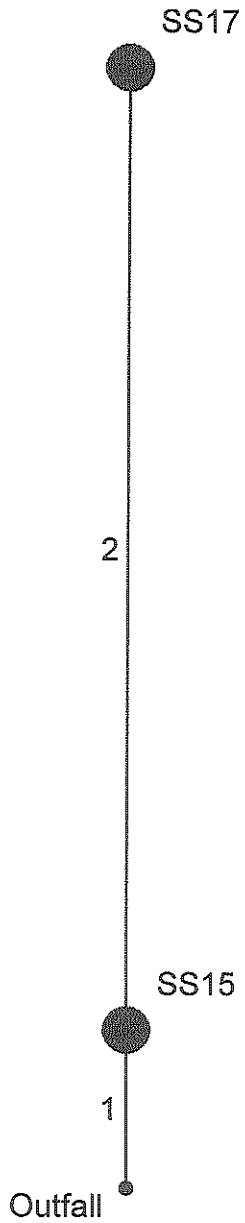
Storm Sewer Profile

Proj. file: SS /stem.stm



Hydraflow Storm Sewers Extension

SS12 system



Project File: SS15 system.stm	Number of lines: 2	Date: 07-11-2008

Hydraflow Storm Sewers Extension v6.052

Structure Report

Struct No.	Structure ID	Junction Type	Rim Elev. (ft)	Structure			Line Out			Line In		
				Shape	Length (ft)	Width (ft)	Size (in)	Shape	Invert (ft)	Size (in)	Shape	Invert (ft)
1	SS15	Curb-Horiz	0.00	Cir	4.00	4.00	24	Cir	1000.07	24	Cir	1000.17
2	SS17	Curb-Horiz	0.00	Cir	4.00	4.00	24	Cir	1000.60			

SS12 system | Number of Structures: 2 | Run Date: 07-11-2008

Hydraulic Grade Line Computations

Line	Size	Q	Downstream								Len	Upstream								Check		JL coeff	Minor loss
	(in)	(cfs)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	(ft)	Invert elev (ft)	HGL elev (ft)	Depth (ft)	Area (sqft)	Vel (ft/s)	Vel head (ft)	EGL elev (ft)	Sf (%)	Ave Sf (%)	Enrgy loss (ft)	(K)	(ft)
1	24	5.03	1000.00	1000.79	0.79	1.16	4.33	0.29	1001.09	0.447	14.000	1000.07	1000.87	0.80**	1.17	4.29	0.29	1001.16	0.437	0.442	0.062	0.50	0.14
2	24	3.41	1000.17	1001.01	0.84	1.26	2.71	0.11	1001.13	0.166	85.000	1000.60	1001.25 j	0.65**	0.89	3.82	0.23	1001.48	0.426	0.296	n/a	1.00	0.23

SS12 system | Number of lines: 2 | Run Date: 07-11-2008

Notes: ; ** Critical depth.; j-Line contains hyd. jump. ; c = cir e = ellip b = box

APPENDIX 3
PANTANO WASH BRIDGE HEC-RAS MODEL

ALTERNATIVE 1

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

*****************************************************************************

PROJECT DATA
Project Title: HEC-RAS v4 edit FINAL
Project File : v4_FINAL.prj
Run Date and Time: 7/28/2008 1:47:24 PM

Project in English units

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PLAN DATA

Plan Title: Plan 41
Plan File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.p41

          Geometry Title: Alternative 1
          Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g03

          Flow Title    : Flow Profiles
          Flow File     : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Plan Summary Information:
Number of:  Cross Sections =   18    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

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

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

*****************************************************************************

FLOW DATA

Flow Title: Flow Profiles
Flow File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Flow Data (cfs)
*********************************************************************************************
* River          Reach          RS      *          PF 1          PF 2          PF 3 *
* River #1       Reach #1       225     *          31000         24490         36000 *
*********************************************************************************************

Boundary Conditions
*****************************************************************************************************
* River          Reach          Profile         *          Upstream                Downstream    *
*****************************************************************************************************
* River #1       Reach #1       PF 1            *      Known WS = 2784.88      Known WS = 2761.65 *
* River #1       Reach #1       PF 2            *       Known WS = 2783.7      Known WS = 2761.06 *
* River #1       Reach #1       PF 3            *      Known WS = 2785.58      Known WS = 2762.17 *
*****************************************************************************************************

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GEOMETRY DATA

Geometry Title: Alternative 1
Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g03

CROSS SECTION


RIVER: River #1
REACH: Reach #1          RS: 225

INPUT
Description:
Station Elevation Data    num=      87
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
   ***************************************************************************
    -600    2787  -527.4    2786 -514.33    2786    -503    2787  -490.5    2787
  -483.14   2786 -430.62    2785 -415.31    2785 -385.29    2785  -379.5    2784
  -373.64   2783 -367.89    2782 -362.54    2781 -335.28    2780 -319.81    2779
  -309.13   2779  -289.6    2780 -286.98    2781 -284.35    2782 -281.73    2783
   -279.1   2784 -265.97    2784 -248.75    2784 -107.38    2784  -45.25    2784
   -31.61   2784   48.35    2784   54.16    2784   56.16    2783   58.16    2782
    60.16   2781   62.16    2780   64.15    2779   66.14    2778   68.14    2777
```

70.13	2776	72.11	2775	74.12	2774	76.14	2773	78.74	2772
82.21	2771	85.67	2770	89.14	2769	92.61	2768	122.93	2768
133.3	2769	169.83	2770	179.3	2771	182.56	2772	185.85	2773
191.57	2774	200.62	2775	210.54	2776	215.34	2776	220.78	2775
226.28	2774	226.63	2774	232.86	2775	239.08	2776	251.88	2777
259.19	2778	262.5	2779	265.81	2780	269.11	2781	272.46	2782
277.36	2783	282.24	2784	287.11	2785	294.48	2785	301.44	2784
367.61	2783	378.84	2782	390.07	2781	426.4	2780	455.43	2780
512.28	2781	521.82	2781	734.04	2780	745.89	2779	758.18	2779
772.24	2780	777.86	2781	783.57	2782	799.74	2782	826.6	2782
838.75	2783	841.94	2787						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	48.35	.03	287.11	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.35	287.11	299.75	282.05	262.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	48.35	2790	F
287.11	841.94	2790	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2786.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.66	Wt. n-Val.		0.030	
W.S. Elev (ft)	2783.79	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2781.42	Flow Area (sq ft)		2368.69	
E.G. Slope (ft/ft)	0.003148	Area (sq ft)	331.46	2368.69	1497.45
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	849.40	Top Width (ft)	98.63	226.64	524.13
Vel Total (ft/s)	13.09	Avg. Vel. (ft/s)		13.09	
Max Chl Dpth (ft)	15.79	Hydr. Depth (ft)		10.45	
Conv. Total (cfs)	552522.3	Conv. (cfs)		552522.3	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		231.77	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.01	
Alpha	1.00	Stream Power (lb/ft s)		26.29	
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	17.53	203.46	74.79
C & E Loss (ft)	0.15	Cum SA (acres)	13.30	27.81	37.24

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2784.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	2782.23	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2780.05	Flow Area (sq ft)		2023.49	
E.G. Slope (ft/ft)	0.003108	Area (sq ft)	187.89	2023.49	748.39
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	754.54	Top Width (ft)	85.48	215.90	453.17
Vel Total (ft/s)	12.10	Avg. Vel. (ft/s)		12.10	
Max Chl Dpth (ft)	14.23	Hydr. Depth (ft)		9.37	
Conv. Total (cfs)	439315.6	Conv. (cfs)		439315.6	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		220.49	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		1.78	
Alpha	1.00	Stream Power (lb/ft s)		21.55	
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)	9.76	176.19	45.74
C & E Loss (ft)	0.08	Cum SA (acres)	8.97	26.41	31.56

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2787.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.95	Wt. n-Val.		0.030	
W.S. Elev (ft)	2784.84	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2782.42	Flow Area (sq ft)		2613.48	
E.G. Slope (ft/ft)	0.003262	Area (sq ft)	712.12	2613.48	2061.12
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1215.25	Top Width (ft)	432.69	237.96	544.60
Vel Total (ft/s)	13.77	Avg. Vel. (ft/s)		13.77	
Max Chl Dpth (ft)	16.84	Hydr. Depth (ft)		10.98	
Conv. Total (cfs)	630296.7	Conv. (cfs)		630296.7	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		243.24	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.19	
Alpha	1.00	Stream Power (lb/ft s)		30.14	
Frctn Loss (ft)	1.26	Cum Volume (acre-ft)	24.84	221.46	99.35
C & E Loss (ft)	0.16	Cum SA (acres)	17.48	28.26	40.01

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

CROSS SECTION

.VER: River #1
REACH: Reach #1 RS: 220

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-581.45	2790	-578.15	2789	-569.74	2788	-557.64	2787	-527.23	2786
-505.43	2785	-463.74	2785	-455.79	2785	-443.54	2785	-433.72	2785
-425.53	2784	-417.97	2783	-380.36	2783	-349.98	2783	-307.83	2783
-282.84	2783	-261.98	2782	-239.35	2781	-190.7	2780	-183.94	2779
-175.54	2778	-157.15	2777	-133.21	2777	-112.75	2778	-89.46	2779
0	2780	93.96	2781	93.97	2781	123.68	2781	123.69	2781
125.31	2780	126.91	2779	128.5	2778	128.51	2778	130.1	2777
131.69	2776	131.7	2775.99	133.28	2775	134.86	2774	134.87	2774
136.44	2773	136.45	2772.99	138.01	2772	138.02	2772	139.58	2771
139.59	2770.99	141.14	2770	141.15	2769.99	142.52	2769	159.27	2768
159.28	2768	162.78	2767	187.06	2767	198.25	2768	198.26	2768
204.67	2769	210.08	2770	213.61	2771	215.17	2772	215.18	2772
221.37	2773	224.62	2773.16	241.47	2774	241.48	2774	279.56	2774
320.64	2774	324.91	2775	324.92	2775	329.19	2776	333.46	2777
333.47	2777	337.74	2778	342.02	2779	346.29	2780	346.3	2780
351.04	2781	354.75	2781.74	356.06	2782	468.74	2782	570.77	2781
570.78	2781	576.15	2780	582.31	2779	588.49	2778	588.5	2778
635.74	2778	648.28	2778	648.29	2778	650.75	2778	650.76	2778
657.91	2779	677.66	2780	677.67	2780	685.61	2780	704.82	2779
761.06	2779	800.38	2779	800.39	2779	821.89	2778	871.9	2778
871.91	2778	918.79	2779	922.82	2780	922.83	2780	927.55	2781
927.56	2781	954.11	2782	954.12	2782	1008.32	2783	1008.33	2783

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-581.45	.045	123.69	.03	354.75	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
123.69	354.75	277.65	269.4	261.19	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-581.45	123.69	2785	F
354.75	1008.33	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2785.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.92	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2780.92	Flow Area (sq ft)		1897.98	
E.G. Slope (ft/ft)	0.006598	Area (sq ft)	500.52	1897.98	790.65
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	904.77	Top Width (ft)	321.96	226.84	355.97
Vel Total (ft/s)	16.33	Avg. Vel. (ft/s)		16.33	
Max Chl Dpth (ft)	13.92	Hydr. Depth (ft)		8.37	
Conv. Total (cfs)	381638.5	Conv. (cfs)		381638.5	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		232.04	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.37	
Alpha	1.00	Stream Power (lb/ft s)		55.03	
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)	14.67	189.65	67.91
C & E Loss (ft)	0.48	Cum SA (acres)	11.85	26.34	34.59

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: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2783.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.12	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.16	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2779.58	Flow Area (sq ft)		1728.23	
E.G. Slope (ft/ft)	0.005463	Area (sq ft)	297.80	1728.23	524.30
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	784.47	Top Width (ft)	214.10	222.03	348.34
Vel Total (ft/s)	14.17	Avg. Vel. (ft/s)		14.17	
Max Chl Dpth (ft)	13.16	Hydr. Depth (ft)		7.78	
Conv. Total (cfs)	331339.7	Conv. (cfs)		331339.7	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		226.94	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.60	
Alpha	1.00	Stream Power (lb/ft s)		36.81	
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	8.09	164.04	41.91
C & E Loss (ft)	0.29	Cum SA (acres)	7.94	24.99	29.15

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

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2786.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.54	Wt. n-Val.		0.030	
W.S. Elev (ft)	2781.82	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2781.82	Flow Area (sq ft)		2104.79	
E.G. Slope (ft/ft)	0.006460	Area (sq ft)	832.95	2104.79	1156.10
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1075.72	Top Width (ft)	381.66	231.06	463.00
Vel Total (ft/s)	17.10	Avg. Vel. (ft/s)		17.10	
Max Chl Dpth (ft)	14.82	Hydr. Depth (ft)		9.11	
Conv. Total (cfs)	447891.0	Conv. (cfs)		447891.0	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		236.36	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.59	
Alpha	1.00	Stream Power (lb/ft s)		61.43	
Frctn Loss (ft)	1.57	Cum Volume (acre-ft)	19.53	206.18	89.67
C & E Loss (ft)	0.44	Cum SA (acres)	14.68	26.74	36.97

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 215

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600	2791	-597.36	2790	-594.38	2789	-591.34	2788	-588.34	2787
-585.87	2786	-583.46	2785	-574.84	2784	-529.58	2783	-494.62	2782
-493.31	2782	-466.31	2782	-418.17	2781	-406.34	2781	-357.18	2781
292.94	2780	22.72	2779	71.36	2778	79.77	2777	83.57	2776
87.37	2775	91.17	2774	94.97	2773	97.27	2772	99.2	2771
101.13	2770	103.06	2769	111.41	2768	118.38	2767	160.1	2767
165.01	2768	169.93	2769	174.87	2770	240.22	2771	270.17	2772
274.15	2773	280.87	2774	287.59	2775	294.31	2776	301.03	2777
307.75	2778	350.35	2779	373.61	2780	494.04	2780	528.29	2779
542.52	2778	588.86	2777	611.04	2776	639.44	2776	644.41	2777
652.37	2778	665.66	2779	769.93	2779	798.66	2778	809.36	2777
839.56	2776	858.07	2776	928.58	2777	933.82	2778	939.05	2779
944.29	2780	950.35	2781						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	22.72	.03	350.35	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
22.72	350.35	294.95	268.22	230.48	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	22.72	2785	F
357.15	950.35	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2783.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2780.49	Reach Len. (ft)	294.95	268.22	230.48
Crit W.S. (ft)	2779.67	Flow Area (sq ft)		2416.70	9.10
E.G. Slope (ft/ft)	0.004711	Area (sq ft)	318.35	2416.70	1327.16
Q Total (cfs)	31000.00	Flow (cfs)		30974.96	25.04
Top Width (ft)	1271.30	Top Width (ft)	346.79	327.63	596.88
Vel Total (ft/s)	12.78	Avg. Vel. (ft/s)		12.82	2.75
Max Chl Dpth (ft)	13.48	Hydr. Depth (ft)		7.38	1.34
Conv. Total (cfs)	451664.8	Conv. (cfs)		451300.0	364.8
Length Wtd. (ft)	268.20	Wetted Per. (ft)		330.12	6.81
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.15	0.39
Alpha	1.01	Stream Power (lb/ft s)		27.59	1.08
Frctn Loss (ft)	1.56	Cum Volume (acre-ft)	12.06	176.31	61.56
C & E Loss (ft)	0.02	Cum SA (acres)	9.72	24.62	31.73

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2781.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.17	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2779.44	Reach Len. (ft)	294.95	268.22	230.48
Crit W.S. (ft)	2777.92	Flow Area (sq ft)		2073.47	1.98
E.G. Slope (ft/ft)	0.004906	Area (sq ft)	30.14	2073.47	781.98

* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24487.99	* 2.01	*
* Top Width (ft)	* 903.76	* Top Width (ft)	* 137.95	* 327.63	* 438.18	*
* Vel Total (ft/s)	* 11.80	* Avg. Vel. (ft/s)	*	* 11.81	* 1.01	*
* Max Chl Dpth (ft)	* 12.44	* Hydr. Depth (ft)	*	* 6.33	* 0.29	*
* Conv. Total (cfs)	*349644.7	* Conv. (cfs)	*	*349616.0	* 28.7	*
* Length Wtd. (ft)	* 268.22	* Wetted Per. (ft)	*	* 330.12	* 6.81	*
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*	* 1.92	* 0.09	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 22.72	* 0.09	*
* Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	* 7.04	* 152.28	* 37.99	*
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	* 6.81	* 23.30	* 26.79	*

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2784.13	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 4.72	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2779.41	* Reach Len. (ft)	* 294.95	* 268.22	* 230.48 *
* Crit W.S. (ft)	* 2780.35	* Flow Area (sq ft)	*	* 2063.55	* 1.77 *
* E.G. Slope (ft/ft)	*0.010772	* Area (sq ft)	* 26.11	* 2063.55	* 768.74 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*35997.52	* 2.48 *
* Top Width (ft)	* 892.30	* Top Width (ft)	* 128.39	* 327.63	* 436.28 *
* Vel Total (ft/s)	* 17.43	* Avg. Vel. (ft/s)	*	* 17.44	* 1.40 *
* Max Chl Dpth (ft)	* 12.41	* Hydr. Depth (ft)	*	* 6.30	* 0.26 *
* Conv. Total (cfs)	*346857.0	* Conv. (cfs)	*	*346833.1	* 23.9 *
* Length Wtd. (ft)	* 268.20	* Wetted Per. (ft)	*	* 330.12	* 6.81 *
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*	* 4.20	* 0.18 *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 73.33	* 0.24 *
* Frctn Loss (ft)	* 2.21	* Cum Volume (acre-ft)	* 16.79	* 193.29	* 83.90 *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 13.05	* 25.01	* 34.28 *

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 210

PUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-614.23	2787.75	-596.1	2786.75	-542.4	2785.75	-516.9	2784.75	-424.44	2783.75
-412.49	2782.75	-394.83	2781.75	-379.82	2780.75	-371.56	2781	-360.26	2780
-302.66	2779	-125.77	2778	-116.44	2778	0	2779	83.98	2779
120.42	2778	175.57	2777	179.48	2776	183.19	2775	186.89	2774
190.59	2773	194.29	2772	198	2771	201.7	2770	205.4	2769
209.11	2768	212.81	2767	216.2	2766	262.35	2766	287.31	2767
299.68	2767.58	308.47	2768	316.57	2769	356.57	2770	363.17	2771
371.31	2772	379.21	2773	387.12	2774	393.96	2775	400.77	2776
419.08	2777	420.22	2777.02	492.78	2778	516.88	2779	542.96	2779
542.97	2779	551.39	2778	559.71	2777	623.32	2776	653.95	2775
677.99	2775	689.88	2776	701.76	2777	713.64	2778	846.55	2778
880.52	2777	931.83	2776	949.52	2775	978.42	2775	1020.01	2776
1023.25	2777	1026.61	2778	1029.97	2779	1033.37	2780	1041.03	2781
1066.33	2782	1122.14	2782						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-614.23	.045	83.98	.03	516.88	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
83.98	516.88	283.6	269.08	254.74	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-614.23	83.98	2783	F
516.88	1122.14	2783	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2781.45	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.79	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2778.66	* Reach Len. (ft)	* 283.60	* 269.08	* 254.74 *
* Crit W.S. (ft)	* 2778.66	* Flow Area (sq ft)	*	* 2313.85	* *
* E.G. Slope (ft/ft)	*0.007383	* Area (sq ft)	* 69.68	* 2313.85	* 952.49 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*31000.00	* *
* Top Width (ft)	* 1097.58	* Top Width (ft)	* 202.40	* 412.21	* 482.97 *
* Vel Total (ft/s)	* 13.40	* Avg. Vel. (ft/s)	*	* 13.40	* *
* Max Chl Dpth (ft)	* 12.66	* Hydr. Depth (ft)	*	* 5.61	* *
* Conv. Total (cfs)	*360784.2	* Conv. (cfs)	*	*360784.2	* *
* Length Wtd. (ft)	* 268.92	* Wetted Per. (ft)	*	* 414.26	* *
* Min Ch El (ft)	* 2766.00	* Shear (lb/sq ft)	*	* 2.57	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 34.49	* *
* Frctn Loss (ft)	* 1.53	* Cum Volume (acre-ft)	* 10.74	* 161.75	* 55.53 *
* C & E Loss (ft)	* 0.31	* Cum SA (acres)	* 7.86	* 22.34	* 28.88 *

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

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2780.03	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.19	Wt. n-Val.		0.030		
W.S. Elev (ft)	2776.84	Reach Len. (ft)	283.60	269.08	254.74	
Crit W.S. (ft)	2776.53	Flow Area (sq ft)		1708.58		
E.G. Slope (ft/ft)	0.006179	Area (sq ft)		1708.58	279.01	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00		
Top Width (ft)	503.53	Top Width (ft)		239.90	263.64	
Vel Total (ft/s)	14.33	Avg. Vel. (ft/s)		14.33		
Max Chl Dpth (ft)	10.84	Hydr. Depth (ft)		7.12		
Conv. Total (cfs)	311544.8	Conv. (cfs)		311544.8		
Length Wtd. (ft)	269.02	Wetted Per. (ft)		241.89		
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72		
Alpha	1.00	Stream Power (lb/ft s)		39.06		
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	6.94	140.64	35.19	
C & E Loss (ft)	0.23	Cum SA (acres)	6.35	21.55	24.94	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2782.30	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.01	Wt. n-Val.		0.030		
W.S. Elev (ft)	2779.29	Reach Len. (ft)	283.60	269.08	254.74	
Crit W.S. (ft)	2779.29	Flow Area (sq ft)		2585.10		
E.G. Slope (ft/ft)	0.007343	Area (sq ft)	271.74	2585.10	1268.72	
Q Total (cfs)	36000.00	Flow (cfs)		36000.00		
Top Width (ft)	1350.50	Top Width (ft)	403.52	432.90	514.09	
Vel Total (ft/s)	13.93	Avg. Vel. (ft/s)		13.93		
Max Chl Dpth (ft)	13.29	Hydr. Depth (ft)		5.97		
Conv. Total (cfs)	420112.1	Conv. (cfs)		420112.1		
Length Wtd. (ft)	268.78	Wetted Per. (ft)		434.97		
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72		
Alpha	1.00	Stream Power (lb/ft s)		37.94		
Frctn Loss (ft)	1.51	Cum Volume (acre-ft)	15.78	178.98	78.51	
C & E Loss (ft)	0.36	Cum SA (acres)	11.25	22.67	31.76	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 205

INPUT
Description:
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2779.75	17.21	2778.75	28.7	2777.75	66.51	2776.75	94.56	2776.75
100.85	2776.75	468.23	2777	600.71	2777	670.1	2776	673.71	2775
677.6	2774	681.95	2773	686.31	2772	690.66	2771	695.01	2770
699.36	2769	703.71	2768	708.06	2767	712.41	2766	716.76	2765
780.93	2765	805.65	2766	827.39	2767	839.98	2768	855.27	2769
866.08	2770	876.89	2771	884.28	2772	887.51	2773	890.74	2774
893.96	2775	894.82	2775	897.09	2774	899.36	2773	907.15	2773
937.24	2774	983.75	2775	1019.24	2776	1175.04	2776	1314.05	2775
1444.32	2775	1447.57	2776	1450.85	2777	1454.14	2778	1457.58	2779
1460.79	2780	1572.29	2780	1594.22	2779	1655.34	2779	1675.82	2780
1723.5	2781	1758.89	2782	1762.13	2782	1876.53	2781	1913.81	2781
1931.12	2782	1958.13	2783	2003.69	2783	2099.98	2783	2221.07	2784
2374.26	2785	2425.16	2785	2552.13	2785				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	600.71	.03	1019.24	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
600.71	1019.24	280.12	286.64	293.88	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2779.34	Element	Left OB	Channel	Right OB	

* Vel Head (ft)	* 3.12	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.22	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.30	* Flow Area (sq ft)	*	* 2116.44	* 294.44	*
* E.G. Slope (ft/ft)	*0.008080	* Area (sq ft)	*	* 2116.44	* 294.44	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30320.23	* 679.77	*
* Top Width (ft)	* 793.24	* Top Width (ft)	*	* 364.20	* 429.04	*
Vel Total (ft/s)	* 12.86	* Avg. Vel. (ft/s)	*	* 14.33	* 2.31	*
Max Chl Dpth (ft)	* 11.22	* Hydr. Depth (ft)	*	* 5.81	* 0.69	*
* Conv. Total (cfs)	*344871.9	* Conv. (cfs)	*	*337309.5	* 7562.4	*
* Length Wtd. (ft)	* 287.14	* Wetted Per. (ft)	*	* 366.68	* 429.23	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.91	* 0.35	*
* Alpha	* 1.21	* Stream Power (lb/ft s)	*	* 41.71	* 0.80	*
* Frctn Loss (ft)	* 2.08	* Cum Volume (acre-ft)	* 10.52	* 148.06	* 51.88	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 7.20	* 19.95	* 26.21	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2778.12	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.43	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2775.69	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2775.69	* Flow Area (sq ft)	*	* 1931.75	* 123.12	*
* E.G. Slope (ft/ft)	*0.006333	* Area (sq ft)	*	* 1931.75	* 123.12	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24275.54	* 214.46	*
* Top Width (ft)	* 564.95	* Top Width (ft)	*	* 336.91	* 228.04	*
* Vel Total (ft/s)	* 11.92	* Avg. Vel. (ft/s)	*	* 12.57	* 1.74	*
* Max Chl Dpth (ft)	* 10.69	* Hydr. Depth (ft)	*	* 5.73	* 0.54	*
* Conv. Total (cfs)	*307743.6	* Conv. (cfs)	*	*305048.6	* 2695.0	*
* Length Wtd. (ft)	* 286.88	* Wetted Per. (ft)	*	* 339.34	* 228.14	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.25	* 0.21	*
* Alpha	* 1.10	* Stream Power (lb/ft s)	*	* 28.28	* 0.37	*
* Frctn Loss (ft)	* 1.49	* Cum Volume (acre-ft)	* 6.94	* 129.40	* 34.01	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 6.35	* 19.77	* 23.50	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: 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 #PF 3

* E.G. Elev (ft)	* 2780.06	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 3.45	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.61	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.75	* Flow Area (sq ft)	*	* 2263.62	* 461.87	*
* E.G. Slope (ft/ft)	*0.009177	* Area (sq ft)	*	* 2263.62	* 461.87	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*34469.06	* 1530.94	*
* Top Width (ft)	* 821.56	* Top Width (ft)	*	* 391.24	* 430.32	*
* Vel Total (ft/s)	* 13.21	* Avg. Vel. (ft/s)	*	* 15.23	* 3.31	*
* Max Chl Dpth (ft)	* 11.61	* Hydr. Depth (ft)	*	* 5.79	* 1.07	*
* Conv. Total (cfs)	*375805.2	* Conv. (cfs)	*	*359823.7	* 15981.5	*
* Length Wtd. (ft)	* 287.76	* Wetted Per. (ft)	*	* 393.72	* 430.56	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 3.29	* 0.61	*
* Alpha	* 1.28	* Stream Power (lb/ft s)	*	* 50.16	* 2.04	*
* Frctn Loss (ft)	* 2.20	* Cum Volume (acre-ft)	* 14.90	* 164.01	* 73.45	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 9.94	* 20.12	* 29.00	*

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

RIVER: River #1
REACH: Reach #1 RS: 200

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2780	57.36	2780	60.61	2779	63.64	2778	66.72	2777
82.64	2776	133.38	2775	157.32	2774	160.71	2773	164.05	2772
167.4	2771	170.76	2770	174.13	2769	177.5	2768	180.93	2767
196.35	2766	210.46	2765	223.84	2764	238.32	2763	259.65	2763
259.7	2763	274.72	2764	330.68	2765	338.84	2766	343.67	2767
348.5	2768	354.06	2769	359.85	2770	365.64	2771	371.43	2772
377.22	2773	380.61	2773	529.52	2773	534.88	2772	540.16	2771
545.4	2770	561.87	2770	628.9	2771	670.42	2772	691.36	2773
726.72	2773	751.79	2773	852.22	2774	1033.68	2775	1050.22	2775
1183.08	2776	1186.05	2777	1189.02	2778	1191.99	2779	1246.04	2779
1253.82	2778	1267.34	2778	1270.81	2779	1388.57	2780	1424.17	2780
1424.18	2780	1474.73	2780	1528.93	2781	1568.19	2781	1595.98	2781
1670.08	2782	1757.29	2783						

ning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	157.32	.03	380.61	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
157.32	380.61	179.8	195.07	210.23	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2777.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.87	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2774.60	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2774.99	Flow Area (sq ft)	4.36	1897.21	1052.36
E.G. Slope (ft/ft)	0.004947	Area (sq ft)	4.36	1897.21	1052.36
Q Total (cfs)	31000.00	Flow (cfs)	4.55	27365.53	3629.92
Top Width (ft)	818.81	Top Width (ft)	14.44	223.29	581.08
Vel Total (ft/s)	10.49	Avg. Vel. (ft/s)	1.04	14.42	3.45
Max Chl Dpth (ft)	11.60	Hydr. Depth (ft)	0.30	8.50	1.81
Conv. Total (cfs)	440756.3	Conv. (cfs)	64.7	389081.7	51610.0
Length Wtd. (ft)	197.50	Wetted Per. (ft)	14.45	225.19	581.41
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.09	2.60	0.56
Alpha	1.68	Stream Power (lb/ft s)	0.10	37.53	1.93
Frctn Loss (ft)	1.79	Cum Volume (acre-ft)	10.50	134.86	47.34
C & E Loss (ft)	0.07	Cum SA (acres)	7.16	18.01	22.80

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 #PF 2

E.G. Elev (ft)	2776.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2773.47	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2773.95	Flow Area (sq ft)		1643.45	496.72
E.G. Slope (ft/ft)	0.005630	Area (sq ft)		1643.45	496.72
Q Total (cfs)	24490.00	Flow (cfs)		23109.66	1380.34
Top Width (ft)	639.31	Top Width (ft)		221.48	417.84
Vel Total (ft/s)	11.44	Avg. Vel. (ft/s)		14.06	2.78
Max Chl Dpth (ft)	10.46	Hydr. Depth (ft)		7.42	1.19
Conv. Total (cfs)	326395.8	Conv. (cfs)		307999.0	18396.8
Length Wtd. (ft)	196.46	Wetted Per. (ft)		223.29	418.17
Min Ch El (ft)	2763.00	Shear (lb/sq ft)		2.59	0.42
Alpha	1.43	Stream Power (lb/ft s)		36.37	1.16
Frctn Loss (ft)	1.71	Cum Volume (acre-ft)	6.94	117.63	31.92
C & E Loss (ft)	0.05	Cum SA (acres)	6.35	17.93	21.32

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2778.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.64	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2776.55	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2775.91	Flow Area (sq ft)	105.05	2332.67	2477.81
E.G. Slope (ft/ft)	0.002457	Area (sq ft)	105.05	2332.67	2477.81
Q Total (cfs)	36000.00	Flow (cfs)	200.32	27214.85	8584.83
Top Width (ft)	1110.90	Top Width (ft)	83.49	223.29	804.11
Vel Total (ft/s)	7.32	Avg. Vel. (ft/s)	1.91	11.67	3.46
Max Chl Dpth (ft)	13.55	Hydr. Depth (ft)	1.26	10.45	3.08
Conv. Total (cfs)	726273.1	Conv. (cfs)	4041.3	549039.2	173192.6
Length Wtd. (ft)	198.51	Wetted Per. (ft)	83.54	225.19	804.54
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.19	1.59	0.47
Alpha	1.97	Stream Power (lb/ft s)	0.37	18.54	1.64
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	14.56	148.88	63.54
C & E Loss (ft)	0.23	Cum SA (acres)	9.67	18.10	24.84

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 195

INPUT
Description:
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
26.87	2778.75	80.18	2778.75	91.81	2777.75	102.18	2776.75	109.95	2775.75
196.7	2774	238.41	2773	243.26	2772	248.12	2771	252.97	2770
267.11	2769	278.26	2768	282.3	2767	286.64	2766	294.54	2765
315.54	2764	336.81	2763	362.46	2762	375.59	2762	395.84	2763
410.49	2764	456.09	2765	471.11	2766	476.14	2767	481.17	2768
488.94	2768	495.94	2767	498.12	2767	504.07	2768	509.82	2769
514.48	2770	532.03	2770	544.86	2770	571.92	2770	575.9	2769
579.84	2768	583.78	2767	597.25	2767	608.28	2768	619.31	2769
630.34	2770	641.37	2771	679.44	2772	894.51	2772	904.56	2771
913.16	2770	918.98	2770	922.78	2771	926.49	2772	930.19	2773
933.9	2774	939.14	2774	962.74	2773	967.03	2773	999.74	2774
1400	2780								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
26.87	.045	238.41	.03	514.48	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
238.41 514.48 215.83 225.58 311.98 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2776.33	Element	Left OB	Channel	Right OB

* Vel Head (ft)	*	1.08	* Wt. n-Val.	*	0.045	*	0.030	*	0.045	*
* W.S. Elev (ft)	*	2775.24	* Reach Len. (ft)	*	215.83	*	225.58	*	311.98	*
* Crit W.S. (ft)	*	2773.18	* Flow Area (sq ft)	*	111.09	*	2722.73	*	1931.31	*
* E.G. Slope (ft/ft)	*	0.001638	* Area (sq ft)	*	111.09	*	2722.73	*	1931.31	*
* Q Total (cfs)	*	31000.00	* Flow (cfs)	*	155.74	*	25017.97	*	5826.29	*
* Top Width (ft)	*	947.68	* Top Width (ft)	*	103.37	*	276.07	*	568.24	*
Vel Total (ft/s)	*	6.51	* Avg. Vel. (ft/s)	*	1.40	*	9.19	*	3.02	*
Max Chl Dpth (ft)	*	13.24	* Hydr. Depth (ft)	*	1.07	*	9.86	*	3.40	*
* Conv. Total (cfs)	*	765917.1	* Conv. (cfs)	*	3847.9	*	618119.1	*	143950.1	*
* Length Wtd. (ft)	*	233.67	* Wetted Per. (ft)	*	103.40	*	277.47	*	569.49	*
* Min Ch El (ft)	*	2762.00	* Shear (lb/sq ft)	*	0.11	*	1.00	*	0.35	*
* Alpha	*	1.65	* Stream Power (lb/ft s)	*	0.15	*	9.22	*	1.05	*
* Frctn Loss (ft)	*	0.24	* Cum Volume (acre-ft)	*	10.26	*	124.51	*	40.14	*
* C & E Loss (ft)	*	0.16	* Cum SA (acres)	*	6.91	*	16.90	*	20.03	*

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.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	*	2774.58	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	1.53	* Wt. n-Val.	*	0.045	*	0.030	*	0.045	*
* W.S. Elev (ft)	*	2773.05	* Reach Len. (ft)	*	215.83	*	225.58	*	311.98	*
* Crit W.S. (ft)	*	2771.52	* Flow Area (sq ft)	*	0.06	*	2117.95	*	848.51	*
* E.G. Slope (ft/ft)	*	0.002940	* Area (sq ft)	*	0.06	*	2117.95	*	848.51	*
* Q Total (cfs)	*	24490.00	* Flow (cfs)	*	0.01	*	22051.79	*	2438.20	*
* Top Width (ft)	*	701.48	* Top Width (ft)	*	2.22	*	276.07	*	423.19	*
* Vel Total (ft/s)	*	8.26	* Avg. Vel. (ft/s)	*	0.16	*	10.41	*	2.87	*
* Max Chl Dpth (ft)	*	11.05	* Hydr. Depth (ft)	*	0.03	*	7.67	*	2.01	*
* Conv. Total (cfs)	*	451650.3	* Conv. (cfs)	*	0.2	*	406684.3	*	44965.9	*
* Length Wtd. (ft)	*	229.88	* Wetted Per. (ft)	*	2.22	*	277.47	*	424.27	*
* Min Ch El (ft)	*	2762.00	* Shear (lb/sq ft)	*	0.00	*	1.40	*	0.37	*
* Alpha	*	1.44	* Stream Power (lb/ft s)	*	0.00	*	14.59	*	1.05	*
* Frctn Loss (ft)	*	0.34	* Cum Volume (acre-ft)	*	6.94	*	109.21	*	28.68	*
* C & E Loss (ft)	*	0.29	* Cum SA (acres)	*	6.34	*	16.81	*	19.29	*

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	*	2777.64	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.88	* Wt. n-Val.	*	0.045	*	0.030	*	0.045	*
* W.S. Elev (ft)	*	2776.76	* Reach Len. (ft)	*	215.83	*	225.58	*	311.98	*
* Crit W.S. (ft)	*	2773.66	* Flow Area (sq ft)	*	303.00	*	3140.34	*	2867.21	*
* E.G. Slope (ft/ft)	*	0.001174	* Area (sq ft)	*	303.00	*	3140.34	*	2867.21	*
* Q Total (cfs)	*	36000.00	* Flow (cfs)	*	583.71	*	26868.24	*	8548.05	*
* Top Width (ft)	*	1081.52	* Top Width (ft)	*	136.30	*	276.07	*	669.15	*
* Vel Total (ft/s)	*	5.70	* Avg. Vel. (ft/s)	*	1.93	*	8.56	*	2.98	*
* Max Chl Dpth (ft)	*	14.76	* Hydr. Depth (ft)	*	2.22	*	11.38	*	4.28	*
* Conv. Total (cfs)	*	1050564.0	* Conv. (cfs)	*	17034.1	*	784077.6	*	249451.8	*
* Length Wtd. (ft)	*	235.78	* Wetted Per. (ft)	*	136.39	*	277.47	*	670.41	*
* Min Ch El (ft)	*	2762.00	* Shear (lb/sq ft)	*	0.16	*	0.83	*	0.31	*
* Alpha	*	1.75	* Stream Power (lb/ft s)	*	0.31	*	7.10	*	0.93	*
* Frctn Loss (ft)	*	0.20	* Cum Volume (acre-ft)	*	13.72	*	136.63	*	50.64	*
* C & E Loss (ft)	*	0.09	* Cum SA (acres)	*	9.22	*	16.98	*	21.28	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 190

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-99.71	2778	85.29	2776.24	86.48	2775.5	90.2	2774.75	93.57	2773.75
96.92	2772.75	100.08	2771.75	102.72	2770.75	105.24	2769.76	105.24	2769.75
107.77	2768.75	110.47	2768.2	124.39	2767.75	204.15	2766.75	210.65	2766.39
214.06	2765.75	219.98	2764.75	224.93	2763.09	252.41	2763.52	259.56	2764.25
288.16	2763.13	292.48	2761.87	301.29	2761.46	303.05	2760.65	305.84	2761.23
314.29	2763	332	2762	335.19	2761	387.24	2760.49	390.36	2761
390.36	2761.01	392.23	2764.51	402.23	2762	413.83	2763	425.43	2764
429.38	2764.26	440.47	2765	486.39	2766	526.25	2767	551.56	2768
588.96	2768.96	589.86	2769	593.28	2770	594.72	2769.73	596.66	2771
600.08	2772	603.53	2773	608.4	2774	612.53	2775	616.08	2776
632.62	2776	1014.62	2780						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-99.71	.045	85.29	.03	616.08	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
85.29 616.08 77.8 72.37 83.03 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	*	2775.93	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.56	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2775.37	* Reach Len. (ft)	*	77.80	*	72.37	*	83.03	*
* Crit W.S. (ft)	*	2770.00	* Flow Area (sq ft)	*		*	5152.90	*		*
* E.G. Slope (ft/ft)	*	0.000715	* Area (sq ft)	*		*	5152.90	*		*

Q Total (cfs)	31000.00	Flow (cfs)		31000.00		
Top Width (ft)	525.93	Top Width (ft)		525.93		
Vel Total (ft/s)	6.02	Avg. Vel. (ft/s)		6.02		
Max Chl Dpth (ft)	14.88	Hydr. Depth (ft)		9.80		
Conv. Total (cfs)	1159549.0	Conv. (cfs)		1159549.0		
Length Wtd. (ft)	72.37	Wetted Per. (ft)		532.12		
Min Ch El (ft)	2760.49	Shear (lb/sq ft)		0.43		
Alpha	1.00	Stream Power (lb/ft s)		2.60		
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	9.99	104.12	33.23	
C & E Loss (ft)	0.03	Cum SA (acres)	6.66	14.82	17.99	

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2773.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.55	Wt. n-Val.		0.030	
W.S. Elev (ft)	2773.40	Reach Len. (ft)	77.80	72.37	83.03
Crit W.S. (ft)	2769.25	Flow Area (sq ft)		4132.87	
E.G. Slope (ft/ft)	0.000894	Area (sq ft)		4132.87	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	510.73	Top Width (ft)		510.73	
Vel Total (ft/s)	5.93	Avg. Vel. (ft/s)		5.93	
Max Chl Dpth (ft)	12.91	Hydr. Depth (ft)		8.09	
Conv. Total (cfs)	819022.2	Conv. (cfs)		819022.2	
Length Wtd. (ft)	72.37	Wetted Per. (ft)		516.41	
Min Ch El (ft)	2760.49	Shear (lb/sq ft)		0.45	
Alpha	1.00	Stream Power (lb/ft s)		2.65	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	6.94	93.03	25.64
C & E Loss (ft)	0.03	Cum SA (acres)	6.34	14.78	17.77

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2777.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.58	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2776.77	Reach Len. (ft)	77.80	72.37	83.03
Crit W.S. (ft)	2770.53	Flow Area (sq ft)	14.96	5897.59	41.36
E.G. Slope (ft/ft)	0.000622	Area (sq ft)	14.96	5897.59	41.36
Q Total (cfs)	36000.00	Flow (cfs)	5.10	35974.68	20.21
Top Width (ft)	677.27	Top Width (ft)	56.07	530.79	90.40
Vel Total (ft/s)	6.05	Avg. Vel. (ft/s)	0.34	6.10	0.49
Max Chl Dpth (ft)	16.28	Hydr. Depth (ft)	0.27	11.11	0.46
Conv. Total (cfs)	1443911.0	Conv. (cfs)	204.6	1442895.0	810.8
Length Wtd. (ft)	72.37	Wetted Per. (ft)	56.07	537.21	90.41
Min Ch El (ft)	2760.49	Shear (lb/sq ft)	0.01	0.43	0.02
Alpha	1.02	Stream Power (lb/ft s)	0.00	2.60	0.01
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	12.93	113.23	40.22
C & E Loss (ft)	0.04	Cum SA (acres)	8.74	14.89	18.56

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 180

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
15.05	2776.75	32.58	2776.75	48.65	2776.75	49.95	2775.75	51.72	2774.75
53.59	2773.75	55.5	2772.75	57.44	2771.75	59.59	2770.75	62.1	2769.75
64.56	2768.76	64.56	2768.75	67.13	2767.47	67.71	2767.75	72.88	2766.28
97.35	2766.75	119.19	2765.75	133.29	2765.33	136.67	2764.75	143.41	2762.38
166.6	2762.71	170.36	2763.69	207.2	2762.94	207.2	2762.93	210.09	2761.47
227.57	2761.13	247.23	2760.75	264.13	2759.08	318.52	2763	323.83	2759.53
323.83	2759.52	327.41	2764.6	338.72	2764	354.33	2764.52	369.01	2765
401.74	2766	408.05	2765.89	412.18	2767	414.21	2768	416.27	2769
417.18	2767.25	417.18	2767.26	418.65	2770	421.02	2771	423.39	2772
425.77	2773	428.14	2774	430.51	2775	431.09	2776.49	433.02	2776
461.43	2776	761.43	2780						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
15.05	.045	48.65	.03	433.02	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.65	433.02	44.45	181.54	256.85	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2775.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.030	
W.S. Elev (ft)	2774.95	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2769.77	Flow Area (sq ft)		4095.88	
E.G. Slope (ft/ft)	0.001016	Area (sq ft)		4095.88	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	379.01	Top Width (ft)		379.01	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	15.86	Hydr. Depth (ft)		10.81	
Conv. Total (cfs)	972519.5	Conv. (cfs)		972519.5	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		390.24	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.67	
Alpha	1.00	Stream Power (lb/ft s)		5.04	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	9.99	96.44	33.23
C & E Loss (ft)	0.09	Cum SA (acres)	6.66	14.07	17.99

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

CROSS SECTION OUTPUT Profile #PF 2

```
* E.G. Elev (ft)          * 2773.84  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.82  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)          * 2773.03  * Reach Len. (ft)        *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)          * 2768.86  * Flow Area (sq ft)      *          * 3376.46  *          *
* E.G. Slope (ft/ft)      *0.001170  * Area (sq ft)           *          * 3376.46  *          *
  Q Total (cfs)           *24490.00  * Flow (cfs)             *          *24490.00  *          *
  Top Width (ft)          *  370.86  * Top Width (ft)         *          *  370.86  *          *
  Vel Total (ft/s)        *    7.25  * Avg. Vel. (ft/s)       *          *    7.25  *          *
* Max Chl Dpth (ft)       *   13.95  * Hydr. Depth (ft)       *          *    9.10  *          *
* Conv. Total (cfs)       *715903.5  * Conv. (cfs)            *          *715903.5  *          *
* Length Wtd. (ft)        *  181.54  * Wetted Per. (ft)       *          *  381.23  *          *
* Min Ch El (ft)          * 2759.08  * Shear (lb/sq ft)       *          *    0.65  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *    4.69  *          *
* Frctn Loss (ft)         *    0.28  * Cum Volume (acre-ft)   *    6.94  *   86.79  *   25.64  *
* C & E Loss (ft)         *    0.08  * Cum SA (acres)         *    6.34  *   14.05  *   17.77  *
*****************************************************************************************

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

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)          * 2777.26  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.94  * Wt. n-Val.              *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2776.32  * Reach Len. (ft)        *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)          * 2770.43  * Flow Area (sq ft)      *          * 4617.73  *   12.72  *
* E.G. Slope (ft/ft)      *0.000935  * Area (sq ft)           *          * 4617.73  *   12.72  *
* Q Total (cfs)           *36000.00  * Flow (cfs)             *          *35994.98  *    5.02  *
* Top Width (ft)          *  435.16  * Top Width (ft)         *          *  383.05  *   52.10  *
* Vel Total (ft/s)        *    7.77  * Avg. Vel. (ft/s)       *          *    7.79  *    0.39  *
* Max Chl Dpth (ft)       *   17.24  * Hydr. Depth (ft)       *          *   12.06  *    0.24  *
* Conv. Total (cfs)       *1177014.0  * Conv. (cfs)            *          *1176850.0  *   164.0  *
* Length Wtd. (ft)        *  181.55  * Wetted Per. (ft)       *          *  395.64  *   52.11  *
* Min Ch El (ft)          * 2759.08  * Shear (lb/sq ft)       *          *    0.68  *    0.01  *
* Alpha                   *    1.01  * Stream Power (lb/ft s) *          *    5.31  *    0.01  *
* Frctn Loss (ft)         *    0.23  * Cum Volume (acre-ft)   *   12.92  *  104.49  *   40.17  *
* C & E Loss (ft)         *    0.10  * Cum SA (acres)         *    8.69  *   14.13  *   18.43  *
*****************************************************************************************

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

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 170

 UT
 scription:
Station Elevation Data     num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 2776.75  10.041 2776.75  11.208 2776.56  13.039 2775.75  14.984 2774.75
  17.041 2773.75  19.445 2772.75  21.468 2771.75  23.419 2770.75  25.484 2769.75
  27.471 2768.75  29.409 2767.75  30.901 2767.12  31.424 2766.75  33.545 2765.75
  38.947 2765.75  39.428 2765.75  41.868 2765.12  60.352 2766.13  65.082 2765.97
  66.072 2764.75   69.89 2764.75  71.743 2764.93  72.768 2764.75  85.567 2761.65
 101.392 2761.27 114.672 2763.12 137.165 2763.34 145.296 2760.76  193.16  2760.8
 199.171 2758.99 240.331 2758.49 254.092 2762.23 263.715 2762.13 265.413 2763.75
 266.813 2764.75 268.199 2765.75 269.584 2766.75 270.801 2767.75 271.974 2768.75
 273.155 2769.75 274.336 2770.75 275.524 2771.75 276.705 2772.75 282.843    2777

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .045  10.041     .03 276.705    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        10.041 276.705           130.15  130.15  130.15            .1        .3
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 2775.50  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.78  * Wt. n-Val.              *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2773.71  * Reach Len. (ft)        *  130.15  *  130.15  *  130.15  *
* Crit W.S. (ft)          * 2769.99  * Flow Area (sq ft)      *          * 2891.30  *    0.67  *
* E.G. Slope (ft/ft)      *0.001962  * Area (sq ft)           *          * 2891.30  *    0.67  *
* Q Total (cfs)           *31000.00  * Flow (cfs)             *          *30999.48  *    0.52  *
* Top Width (ft)          *  260.95  * Top Width (ft)         *          *  259.57  *    1.39  *
* Vel Total (ft/s)        *   10.72  * Avg. Vel. (ft/s)       *          *   10.72  *    0.79  *
* Max Chl Dpth (ft)       *   15.22  * Hydr. Depth (ft)       *          *   11.14  *    0.48  *
* Conv. Total (cfs)       *699899.4  * Conv. (cfs)            *          *699887.6  *    11.8  *
* Length Wtd. (ft)        *  130.15  * Wetted Per. (ft)       *          *  267.61  *    1.69  *
* Min Ch El (ft)          * 2758.49  * Shear (lb/sq ft)       *          *    1.32  *    0.05  *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *   14.19  *    0.04  *
* Frctn Loss (ft)         *    0.38  * Cum Volume (acre-ft)   *    9.99  *   81.88  *   33.22  *
* C & E Loss (ft)         *    0.14  * Cum SA (acres)         *    6.66  *   12.74  *   17.99  *
*****************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
 ning: The conveyance ratio (upstream 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 #PF 2
*****************************************************************************************
* E.G. Elev (ft)          * 2773.49  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.58  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)          * 2771.91  * Reach Len. (ft)        *  130.15  *  130.15  *  130.15  *
* Crit W.S. (ft)          * 2768.81  * Flow Area (sq ft)      *          * 2426.93  *          *
```

```
* E.G. Slope (ft/ft)      *0.002132  * Area (sq ft)            *          * 2426.93  *          *
* Q Total (cfs)           *24490.00  * Flow (cfs)              *          *24490.00  *          *
* Top Width (ft)          *  254.55  * Top Width (ft)          *          *  254.55  *          *
* Vel Total (ft/s)        *   10.09  * Avg. Vel. (ft/s)        *          *   10.09  *          *
* Max Chl Dpth (ft)       *   13.41  * Hydr. Depth (ft)        *          *    9.53  *          *
* Conv. Total (cfs)       *530339.3  * Conv. (cfs)             *          *530339.3  *          *
* Length Wtd. (ft)        *  130.15  * Wetted Per. (ft)        *          *  261.89  *          *
* Min Ch El (ft)          * 2758.49  * Shear (lb/sq ft)        *          *    1.23  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *          *   12.45  *          *
* Frctn Loss (ft)         *    0.39  * Cum Volume (acre-ft)    *    6.94  *   74.69  *   25.64  *
* C & E Loss (ft)         *    0.10  * Cum SA (acres)          *    6.34  *   12.74  *   17.77  *
*****************************************************************************************

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 conveyance ratio (upstream 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 #PF 3
*****************************************************************************************
* E.G. Elev (ft)          * 2776.93  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.93  * Wt. n-Val.              *          *    0.030  *    0.045  *
* W.S. Elev (ft)          * 2775.00  * Reach Len. (ft)         *  130.15  *  130.15  *  130.15  *
* Crit W.S. (ft)          * 2770.84  * Flow Area (sq ft)       *          * 3226.60  *    3.64  *
* E.G. Slope (ft/ft)      *0.001862  * Area (sq ft)            *          * 3226.60  *    3.64  *
* Q Total (cfs)           *36000.00  * Flow (cfs)              *          *35995.09  *    4.92  *
* Top Width (ft)          *  265.44  * Top Width (ft)          *          *  262.20  *    3.24  *
* Vel Total (ft/s)        *   11.14  * Avg. Vel. (ft/s)        *          *   11.16  *    1.35  *
* Max Chl Dpth (ft)       *   16.51  * Hydr. Depth (ft)        *          *   12.31  *    1.12  *
* Conv. Total (cfs)       *834367.3  * Conv. (cfs)             *          *834253.3  *   113.9  *
* Length Wtd. (ft)        *  130.15  * Wetted Per. (ft)        *          *  270.54  *    3.94  *
* Min Ch El (ft)          * 2758.49  * Shear (lb/sq ft)        *          *    1.39  *    0.11  *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *          *   15.46  *    0.14  *
* Frctn Loss (ft)         *    0.38  * Cum Volume (acre-ft)    *   12.92  *   88.15  *   40.12  *
* C & E Loss (ft)         *    0.17  * Cum SA (acres)          *    8.69  *   12.79  *   18.26  *
*****************************************************************************************

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: River #1
REACH: Reach #1            RS: 160

INPUT
Description:
Station Elevation Data     num=      84
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 2775.75   5.607 2775.75   12.07 2775.75  19.049 2775.75  29.317 2775.75
  71.828 2774.75  85.786 2773.75  89.067 2773.75 103.188 2774.75 115.831 2774.75
 128.085 2774.75 176.975 2775.75 196.024 2776.75 201.271 2777.75 222.357 2778.36
 223.106 2777.75 224.726 2776.75 226.578 2775.75 228.113 2774.48 228.466 2774.75
 231.408 2773.75 239.405 2772.75  244.73 2772.63 245.868 2771.75 247.233 2770.75
 248.605 2769.75 250.054 2768.75 251.681 2767.76 251.681 2767.75 253.342 2766.75
 254.813 2765.75 256.164 2764.75 257.132 2763.88 262.209  2762.7 273.085 2760.84
  297.19 2760.63 301.164 2761.77 319.273 2761.94 326.146 2760.17 341.547 2760.01
 354.324 2759.87 381.194 2760.68  389.17 2757.67 435.231 2758.17 436.985 2762.55
 442.317 2762.86 444.608 2763.75 445.477 2764.44  445.88 2764.75 447.146 2765.75
 448.419 2766.75 449.692 2767.75 450.979 2768.75 452.237 2769.75 453.482 2770.75
 453.482 2770.76  454.74 2771.75 455.985 2772.75 457.201 2773.75 457.201 2773.76
  458.12  2775.1 458.403 2774.75 466.584 2774.75 469.887 2774.75 478.704 2775.75
 485.853 2776.75 713.195 2776.75 716.745 2776.75 720.132 2776.75 792.165 2775.75
  803.98 2775.75 814.743 2775.75 830.143 2774.75 840.806 2774.75 857.466 2775.75
 873.256 2775.75 926.755 2774.75 940.777 2773.75 941.237 2773.75 945.579 2773.75
 955.669 2773.75  965.18 2773.75 989.002 2773.751007.684 2774.75

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .045  244.73     .03  458.12    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          244.73  458.12           203.69  188.86    197            .1        .3
Blocked Obstructions      num=       3
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*****************************************************************************
     250     254    2780     312     316    2780     374     378    2780
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 2774.98  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    3.17  * Wt. n-Val.              *          *    0.030  *          *
* W.S. Elev (ft)          * 2771.80  * Reach Len. (ft)         *  203.69  *  188.86  *  197.00  *
* Crit W.S. (ft)          * 2769.83  * Flow Area (sq ft)       *          * 2168.83  *          *
* E.G. Slope (ft/ft)      *0.004844  * Area (sq ft)            *          * 2168.83  *          *
* Q Total (cfs)           *31000.00  * Flow (cfs)              *          *31000.00  *          *
* Top Width (ft)          *  197.01  * Top Width (ft)          *          *  197.01  *          *
* Vel Total (ft/s)        *   14.29  * Avg. Vel. (ft/s)        *          *   14.29  *          *
* Max Chl Dpth (ft)       *   14.13  * Hydr. Depth (ft)        *          *   11.01  *          *
* Conv. Total (cfs)       *445397.6  * Conv. (cfs)             *          *445397.6  *          *
* Length Wtd. (ft)        *  188.86  * Wetted Per. (ft)        *          *  256.89  *          *
* Min Ch El (ft)          * 2757.67  * Shear (lb/sq ft)        *          *    2.55  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *          *   36.49  *          *
* Frctn Loss (ft)         *    1.07  * Cum Volume (acre-ft)    *    9.99  *   74.32  *   33.22  *
* C & E Loss (ft)         *    0.13  * Cum SA (acres)          *    6.66  *   12.05  *   17.99  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
```

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2773.00	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.59	Wt. n-Val.		0.030		
W.S. Elev (ft)	2770.41	Reach Len. (ft)	203.69	188.86	197.00	
Crit W.S. (ft)	2768.41	Flow Area (sq ft)		1897.59		
E.G. Slope (ft/ft)	0.004406	Area (sq ft)		1897.59		
Q Total (cfs)	24490.00	Flow (cfs)		24490.00		
Top Width (ft)	193.37	Top Width (ft)		193.37		
Vel Total (ft/s)	12.91	Avg. Vel. (ft/s)		12.91		
Max Chl Dpth (ft)	12.74	Hydr. Depth (ft)		9.81		
Conv. Total (cfs)	368965.5	Conv. (cfs)		368965.5		
Length Wtd. (ft)	188.86	Wetted Per. (ft)		243.97		
Min Ch El (ft)	2757.67	Shear (lb/sq ft)		2.14		
Alpha	1.00	Stream Power (lb/ft s)		27.61		
Frctn Loss (ft)	1.04	Cum Volume (acre-ft)	6.94	68.23	25.64	
C & E Loss (ft)	0.13	Cum SA (acres)	6.34	12.07	17.77	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2776.38	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.61	Wt. n-Val.	0.045	0.030		
W.S. Elev (ft)	2772.77	Reach Len. (ft)	203.69	188.86	197.00	
Crit W.S. (ft)	2770.85	Flow Area (sq ft)	0.44	2361.00		
E.G. Slope (ft/ft)	0.005147	Area (sq ft)	0.44	2361.00		
Q Total (cfs)	36000.00	Flow (cfs)	0.19	35999.81		
Top Width (ft)	204.78	Top Width (ft)	5.50	199.28		
Vel Total (ft/s)	15.24	Avg. Vel. (ft/s)	0.44	15.25		
Max Chl Dpth (ft)	15.10	Hydr. Depth (ft)	0.08	11.85		
Conv. Total (cfs)	501812.0	Conv. (cfs)	2.7	501809.3		
Length Wtd. (ft)	188.86	Wetted Per. (ft)	5.51	265.61		
Min Ch El (ft)	2757.67	Shear (lb/sq ft)	0.03	2.86		
Alpha	1.00	Stream Power (lb/ft s)	0.01	43.55		
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)	12.92	79.80	40.12	
C & E Loss (ft)	0.12	Cum SA (acres)	8.68	12.10	18.26	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 150

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.75	27.415	2773.75	42.03	2773.75	59.892	2773.75	62.416	2773.75
64.078	2773.75	160.259	2772.75	185.715	2772.75	194.744	2773.75	204.594	2773.75
210.718	2773.75	222.774	2774.75	228.183	2774.75	257.019	2774.75	267.81	2774.75
273.007	2773.75	274.803	2772.4	275.015	2772.75	287.29	2772.06	287.545	2771.75
289.737	2770.75	290.925	2770.17	291.165	2769.75	292.615	2768.75	292.615	2768.76
293.301	2770.01	294.086	2767.76	294.086	2767.75	295.641	2766.75	298.583	2765.75
300.223	2764.76	300.223	2764.75	301.687	2763.75	304.049	2762.75	306.828	2761.76
307.153	2761.75	310.201	2760.75	315.32	2759.75	327.928	2759.98	331.711	2761.72
339.341	2762.38	348.858	2761.61	352.302	2760.28	375.078	2761.75	377.814	2761.46
391.136	2760.05	397.352	2762.59	404.677	2759.75	421.315	2760.11	427.849	2757.53
458.495	2758.34	483.223	2757.36	487.119	2761.47	490.188	2761.75	490.492	2761.76
490.492	2761.77	490.584	2761.86	491.482	2762.75	491.482	2762.76	492.726	2763.75
492.726	2763.76	493.964	2764.75	495.201	2765.75	496.467	2766.75	497.853	2767.75
499.401	2768.75	500.936	2769.75	500.936	2769.76	502.477	2770.75	504.047	2771.75
504.294	2771.9	518.734	2772.75	520.388	2772.75	520.388	2772.76	520.685	2773.75
522.75	2774.75	525.055	2775.75	528.562	2776.75	529.291	2777.69	531.794	2776.75
533.505	2777.63	573.768	2775.75	592.796	2774.75	608.727	2774.75	636.672	2774.75
663.471	2774.75	788.445	2774.75	833.707	2773.75	855.161	2773.75	857.438	2774.75
928.516	2774.75	939.879	2773.75	942.008	2773.75	951.829	2774.75	952.204	2774.75
986.569	2773.75	998.018	2773.75	1010.809	2773.75	1012.796	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	287.29	.03	504.047	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
287.29	504.047	262.45	206.64	129.8	.1	.3

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.78	Element	Left OB	Channel	Right OB	
Vel Head (ft)	4.42	Wt. n-Val.		0.030		
W.S. Elev (ft)	2769.35	Reach Len. (ft)	262.45	206.64	129.80	
Crit W.S. (ft)	2769.35	Flow Area (sq ft)		1836.44		
E.G. Slope (ft/ft)	0.006782	Area (sq ft)		1836.44		
Q Total (cfs)	31000.00	Flow (cfs)		31000.00		
Top Width (ft)	207.99	Top Width (ft)		207.99		
Vel Total (ft/s)	16.88	Avg. Vel. (ft/s)		16.88		

Max Chl Dpth (ft)	11.99	Hydr. Depth (ft)		8.83		
Conv. Total (cfs)	376419.2	Conv. (cfs)		376419.2		
Length Wtd. (ft)	205.33	Wetted Per. (ft)		218.15		
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		3.56		
Alpha	1.00	Stream Power (lb/ft s)		60.17		
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	9.99	65.63	33.22	
C & E Loss (ft)	0.37	Cum SA (acres)	6.66	11.18	17.99	

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

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2771.83	Element			
Vel Head (ft)	3.84	Wt. n-Val.		0.030	
W.S. Elev (ft)	2768.00	Reach Len. (ft)	262.45	206.64	129.80
Crit W.S. (ft)	2768.00	Flow Area (sq ft)		1557.52	
E.G. Slope (ft/ft)	0.007077	Area (sq ft)		1557.52	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	204.23	Top Width (ft)		204.23	
Vel Total (ft/s)	15.72	Avg. Vel. (ft/s)		15.72	
Max Chl Dpth (ft)	10.64	Hydr. Depth (ft)		7.63	
Conv. Total (cfs)	291109.0	Conv. (cfs)		291109.0	
Length Wtd. (ft)	206.12	Wetted Per. (ft)		212.48	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		3.24	
Alpha	1.00	Stream Power (lb/ft s)		50.93	
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	6.94	60.74	25.64
C & E Loss (ft)	0.32	Cum SA (acres)	6.34	11.21	17.77

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

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	2775.16	Element			
Vel Head (ft)	4.85	Wt. n-Val.		0.030	
W.S. Elev (ft)	2770.31	Reach Len. (ft)	262.45	206.64	129.80
Crit W.S. (ft)	2770.31	Flow Area (sq ft)		2036.48	
E.G. Slope (ft/ft)	0.006667	Area (sq ft)		2036.48	
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	211.14	Top Width (ft)		211.14	
Vel Total (ft/s)	17.68	Avg. Vel. (ft/s)		17.68	
Max Chl Dpth (ft)	12.94	Hydr. Depth (ft)		9.65	
Conv. Total (cfs)	440907.8	Conv. (cfs)		440907.8	
Length Wtd. (ft)	204.75	Wetted Per. (ft)		222.84	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		3.80	
Alpha	1.00	Stream Power (lb/ft s)		67.24	
Frctn Loss (ft)	1.03	Cum Volume (acre-ft)	12.91	70.27	40.12
C & E Loss (ft)	0.64	Cum SA (acres)	8.67	11.21	18.26

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 139

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2769.75	122.83	2768.75	210.08	2768	238.55	2768	250.4	2768
250.9	2768	353.99	2767.75	571.8	2767.75	580.55	2767.87	584.21	2766.75
587.25	2765.75	590.19	2764.75	592.82	2763.75	595.21	2762.75	597.5	2761.75
599.8	2760.75	601.9	2759.24	661.57	2759.92	666.41	2756.85	691.06	2756.07
697.71	2757.82	779.92	2757.09	782.85	2760.21	803.38	2761.75	805.38	2761.89
809.83	2762.75	817.41	2764.24	820.11	2763.75	852.39	2763.75	884.33	2763.75
918.74	2764.75	974.69	2764.75	981.1	2764.75	999.39	2765.75	1005.92	2766.75
1011.93	2767.75	1018.14	2768.75	1024.29	2769.75	1031.8	2770.75	1039.15	2771.75
1043.88	2772.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	580.55	.03	803.38	.045

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

580.55 803.38 172.75 171.78 164.65 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2771.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	6.25	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.45	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2767.29	Flow Area (sq ft)		1468.72	238.15
E.G. Slope (ft/ft)	0.013412	Area (sq ft)		1468.72	238.15
Q Total (cfs)	31000.00	Flow (cfs)		29944.19	1055.81
Top Width (ft)	405.73	Top Width (ft)		215.24	190.49
Vel Total (ft/s)	18.16	Avg. Vel. (ft/s)		20.39	4.43
Max Chl Dpth (ft)	9.38	Hydr. Depth (ft)		6.82	1.25
Conv. Total (cfs)	267675.2	Conv. (cfs)		258558.6	9116.6
Length Wtd. (ft)	171.40	Wetted Per. (ft)		219.19	190.80
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		5.61	1.05
Alpha	1.22	Stream Power (lb/ft s)		114.39	4.63
Frctn Loss (ft)	1.90	Cum Volume (acre-ft)	9.99	57.80	32.87
C & E Loss (ft)	0.18	Cum SA (acres)	6.66	10.17	17.70

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2769.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.81	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2766.35	Flow Area (sq ft)		1332.37	120.66
E.G. Slope (ft/ft)	0.011932	Area (sq ft)		1332.37	120.66
Q Total (cfs)	24490.00	Flow (cfs)		24155.58	334.42
Top Width (ft)	392.22	Top Width (ft)		213.37	178.85
Vel Total (ft/s)	16.85	Avg. Vel. (ft/s)		18.13	2.77
Max Chl Dpth (ft)	8.74	Hydr. Depth (ft)		6.24	0.67
Conv. Total (cfs)	224196.8	Conv. (cfs)		221135.2	3061.5
Length Wtd. (ft)	171.15	Wetted Per. (ft)		217.21	179.14
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		4.57	0.50
Alpha	1.14	Stream Power (lb/ft s)		82.84	1.39
Frctn Loss (ft)	1.87	Cum Volume (acre-ft)	6.94	53.89	25.46
C & E Loss (ft)	0.12	Cum SA (acres)	6.34	10.22	17.51

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2772.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	7.11	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.88	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2768.62	Flow Area (sq ft)		1562.17	322.22
E.G. Slope (ft/ft)	0.014387	Area (sq ft)		1562.17	322.22
Q Total (cfs)	36000.00	Flow (cfs)		34229.51	1770.49
Top Width (ft)	413.39	Top Width (ft)		216.53	196.86
Vel Total (ft/s)	19.10	Avg. Vel. (ft/s)		21.91	5.49
Max Chl Dpth (ft)	9.81	Hydr. Depth (ft)		7.21	1.64
Conv. Total (cfs)	300138.3	Conv. (cfs)		285377.4	14760.9
Length Wtd. (ft)	171.29	Wetted Per. (ft)		220.55	197.19
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		6.36	1.47
Alpha	1.25	Stream Power (lb/ft s)		139.40	8.06
Frctn Loss (ft)	1.93	Cum Volume (acre-ft)	12.91	61.73	39.64
C & E Loss (ft)	0.23	Cum SA (acres)	8.67	10.20	17.97

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: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 130

INPUT
Description:
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-329.97	2778	-326.97	2777	-324.12	2776	-321.7	2775	-319.71	2774
-317.71	2773	-315.72	2772	-313.73	2771	-311.73	2770	-309.74	2769
-295.4	2768	-239.67	2767	-228.16	2766	-194.92	2766	-129.95	2766
-127.06	2765	-123.98	2764	-120.22	2764	-110.54	2765	-110.53	2765
-.01	2766	0	2766	197.95	2767	197.96	2767	246.6	2767
261.24	2766.28	267.04	2766	267.05	2766	282.58	2764.8	282.59	2764.8
284.05	2765	284.06	2765	289.71	2764	289.72	2764	294.36	2763
294.37	2763	299.03	2762	299.04	2762	303.71	2761	303.72	2761
308.4	2760	308.41	2760	313.09	2759	313.1	2759	314.9	2758.96
314.91	2758.96	326.53	2758.59	326.54	2758.59	334.76	2755.3	334.76	2755.31
335.91	2758	335.92	2758	350.25	2755.25	350.26	2755.25	362.85	2756.77
362.86	2756.77	383.3	2757	429.42	2757.52	429.43	2757.51	436.01	2755.89
436.02	2755.89	456.36	2755.9	456.37	2755.9	476.41	2757.65	476.42	2757.65

495.5	2759.49	495.51	2759.49	507.59	2759.28	512.02	2759.21	512.03	2759.21
522.41	2761.75	522.42	2761.76	528.15	2763.11	528.16	2763.11	555.77	2762.75
555.78	2762.76	560.43	2763.75	560.44	2763.75	684.75	2763.75	684.76	2763.75
743.07	2762.75	743.08	2762.75	773.59	2762.75	773.6	2762.75	795.48	2762.75
795.94	2762.75	809.75	2763.75	809.76	2763.75	826.38	2764.75	866.79	2765.75
889.01	2766.75	894.02	2767.75	896.67	2768.75	896.67	2768.76	899.25	2769.75
901.38	2770.75	903.52	2771.75	911.41	2772.75	945.7	2772.75	951.33	2771.75
957.1	2770.75	961.49	2769.75	968.66	2768.75	968.68	2768.75	977.22	2769.75
981.89	2770.75	985.39	2771.75	990.06	2772.75	994.39	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-329.97	.045	246.6	.03	528.16	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
246.6	528.16	295.76	287.33	274.51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-329.97	197.95	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2769.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.14	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2766.38	Flow Area (sq ft)		1717.40	522.14
E.G. Slope (ft/ft)	0.008922	Area (sq ft)	13.46	1717.40	522.14
Q Total (cfs)	31000.00	Flow (cfs)		28714.42	2285.58
Top Width (ft)	595.82	Top Width (ft)	32.04	249.94	313.85
Vel Total (ft/s)	13.84	Avg. Vel. (ft/s)		16.72	4.38
Max Chl Dpth (ft)	9.89	Hydr. Depth (ft)		6.87	1.66
Conv. Total (cfs)	328199.1	Conv. (cfs)		304001.5	24197.6
Length Wtd. (ft)	285.18	Wetted Per. (ft)		254.20	314.04
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		3.76	0.93
Alpha	1.36	Stream Power (lb/ft s)		62.92	4.05
Frctn Loss (ft)	1.86	Cum Volume (acre-ft)	9.96	51.51	31.43
C & E Loss (ft)	0.66	Cum SA (acres)	6.60	9.26	16.75

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2767.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.82	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.89	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2765.37	Flow Area (sq ft)		1909.06	769.47
E.G. Slope (ft/ft)	0.003800	Area (sq ft)	69.64	1909.06	769.47
Q Total (cfs)	24490.00	Flow (cfs)		21800.10	2689.90
Top Width (ft)	718.73	Top Width (ft)	117.34	259.67	341.72
Vel Total (ft/s)	9.14	Avg. Vel. (ft/s)		11.42	3.50
Max Chl Dpth (ft)	10.64	Hydr. Depth (ft)		7.35	2.25
Conv. Total (cfs)	397259.9	Conv. (cfs)		353626.2	43633.7
Length Wtd. (ft)	285.65	Wetted Per. (ft)		263.96	341.92
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		1.72	0.53
Alpha	1.40	Stream Power (lb/ft s)		19.59	1.87
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	6.80	47.50	23.77
C & E Loss (ft)	0.14	Cum SA (acres)	6.10	9.29	16.52

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2770.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.79	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.43	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2767.00	Flow Area (sq ft)		1792.04	616.93
E.G. Slope (ft/ft)	0.010327	Area (sq ft)	27.94	1792.04	616.93
Q Total (cfs)	36000.00	Flow (cfs)		32832.83	3167.17
Top Width (ft)	645.25	Top Width (ft)	65.65	253.77	325.82
Vel Total (ft/s)	14.94	Avg. Vel. (ft/s)		18.32	5.13
Max Chl Dpth (ft)	10.18	Hydr. Depth (ft)		7.06	1.89
Conv. Total (cfs)	354255.9	Conv. (cfs)		323089.5	31166.4
Length Wtd. (ft)	284.82	Wetted Per. (ft)		258.05	326.02
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		4.48	1.22
Alpha	1.38	Stream Power (lb/ft s)		82.03	6.26
Frctn Loss (ft)	2.07	Cum Volume (acre-ft)	12.86	55.12	37.86
C & E Loss (ft)	0.70	Cum SA (acres)	8.54	9.27	16.98

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

CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 120

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
741.52	2769	-620.87	2768	-551.88	2767	-543.14	2766	-540.36	2766
-537.06	2767	-533.83	2768	-527.7	2768	-488.6	2767	-366.95	2766
-274.11	2765	-186.15	2764	-155.02	2763	-147.68	2762	-131.64	2762
-119.22	2763	-106.8	2764	-35.92	2765	0	2765	50.02	2764
110.9	2763	152.46	2762.03	153.73	2762	168.97	2761	175.86	2760
175.87	2760	179.66	2759	179.67	2759	181.81	2758	183.96	2757
186.11	2756	188.37	2755	192.2	2754	208.49	2754	208.5	2754
217.9	2755	217.91	2755	226.38	2756	226.39	2756	249.43	2757
265.63	2757	283.93	2757	293.22	2757	353.9	2758	388.76	2759
390.5	2760	392.24	2761	392.25	2761	393.98	2762	393.99	2762
396.77	2763	400.02	2764	404.19	2764	422.66	2764	464.57	2763
544.99	2763	709.9	2763	814.02	2762.75	823.72	2763.75	825.7	2763.75
826.66	2763.75	968	2763.75	980.94	2763.75	999.92	2763.75	1093.44	2763.75
1109.22	2764.75	1125.21	2765.75	1136.78	2766.75	1141.28	2767.75	1145.01	2768.75
1148.2	2769.75	1151.41	2770.75	1154.48	2771.75	1157.68	2772.75	1160.12	2773.75
1162.38	2774.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-741.52	.045	0	.03	404.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	404.19	158.39	153.64	149.14	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-741.52	0	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2767.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.67	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.44	Flow Area (sq ft)		2335.00	1637.41
E.G. Slope (ft/ft)	0.004458	Area (sq ft)	446.32	2335.00	1637.41
Q Total (cfs)	31000.00	Flow (cfs)		24756.40	6243.60
Top Width (ft)	1460.10	Top Width (ft)	336.19	404.19	719.72
Vel Total (ft/s)	7.80	Avg. Vel. (ft/s)		10.60	3.81
Max Chl Dpth (ft)	11.67	Hydr. Depth (ft)		5.78	2.28
Conv. Total (cfs)	464316.0	Conv. (cfs)		370799.7	93516.3
Length Wtd. (ft)	152.85	Wetted Per. (ft)		406.74	719.84
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.60	0.63
Alpha	1.52	Stream Power (lb/ft s)		16.94	2.41
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	8.40	38.15	24.63
C & E Loss (ft)	0.02	Cum SA (acres)	5.34	7.10	13.49

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2766.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.02	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2764.98	Flow Area (sq ft)		2074.09	1176.16
E.G. Slope (ft/ft)	0.004660	Area (sq ft)	248.65	2074.09	1176.16
Q Total (cfs)	24490.00	Flow (cfs)		20776.47	3713.53
Top Width (ft)	1389.85	Top Width (ft)	276.26	404.19	709.40
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)		10.02	3.16
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		5.13	1.66
Conv. Total (cfs)	358749.9	Conv. (cfs)		304351.0	54398.9
Length Wtd. (ft)	153.08	Wetted Per. (ft)		406.74	709.50
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.48	0.48
Alpha	1.53	Stream Power (lb/ft s)		14.86	1.52
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	5.72	34.36	17.64
C & E Loss (ft)	0.01	Cum SA (acres)	4.77	7.10	13.21

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2767.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.	.	0.030	0.045
W.S. Elev (ft)	2766.07	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.81	Flow Area (sq ft)		2497.72	1928.23
E.G. Slope (ft/ft)	0.004493	Area (sq ft)	589.49	2497.72	1928.23
Q Total (cfs)	36000.00	Flow (cfs)		27806.80	8193.20
Top Width (ft)	1508.19	Top Width (ft)	379.26	404.19	724.74
Vel Total (ft/s)	8.13	Avg. Vel. (ft/s)		11.13	4.25
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		6.18	2.66
Conv. Total (cfs)	537097.4	Conv. (cfs)		414859.9	122237.5
Length Wtd. (ft)	152.72	Wetted Per. (ft)		406.74	724.88
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.72	0.75
Alpha	1.51	Stream Power (lb/ft s)		19.17	3.17
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	10.76	40.97	29.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.03	7.10	13.67

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 115

NPUT
scription:
ation Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2767	4.83	2766	9.61	2765	11.16	2765	13.74	2766
16.32	2767	24.15	2767	124.55	2766	311.87	2765.02	314.97	2765
395.1	2764	477.26	2763	482.56	2762	505.65	2762	555.24	2763
679.5	2764	697.39	2764	706.13	2763	725.14	2762	747.88	2762
765.91	2762	799.67	2761	831.73	2760	835.05	2759	837.03	2758
839.03	2757	841.23	2756	843.42	2755	845.62	2754	847.82	2753
863.85	2753	869.22	2754	874.61	2755	887.51	2756	990.68	2756
1015.46	2756	1026.66	2757	1037.87	2758	1040.87	2759	1043.78	2760
1046.68	2761	1049.37	2762	1074.62	2763	1080.06	2763	1202.38	2763
1254.26	2763	1359.68	2763	1365.58	2763	1696.27	2762.75	1789.59	2762.75
1848.13	2763.75	1874.7	2764.73	1875.36	2764.75	1890.38	2765.75	1895.84	2766.75
1902.22	2767.75	1908.29	2768.75	1913.86	2769.75	1918.72	2770.75	1920.54	2771.75
1922.37	2772.75	1924.2	2773.75	1926.03	2774.75	1927.8	2775.75	1929.57	2776.75
1931.38	2777.75	1933.2	2778.75	1935.07	2779.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	679.5	.03	1074.62	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
679.5	1074.62	257.93	242.39	227.54	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	679.5	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2766.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.65	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.74	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.74	Flow Area (sq ft)		2381.48	1412.74
E.G. Slope (ft/ft)	0.004600	Area (sq ft)	465.63	2381.48	1412.74
Q Total (cfs)	31000.00	Flow (cfs)		26379.82	4620.18
Top Width (ft)	1539.72	Top Width (ft)	344.05	395.12	800.55
Vel Total (ft/s)	8.17	Avg. Vel. (ft/s)		11.08	3.27
Max Chl Dpth (ft)	11.74	Hydr. Depth (ft)		6.03	1.76
Conv. Total (cfs)	457069.9	Conv. (cfs)		388949.0	68120.9
Length Wtd. (ft)	239.83	Wetted Per. (ft)		397.73	800.58
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.72	0.51
Alpha	1.59	Stream Power (lb/ft s)		19.05	1.66
Frctn Loss (ft)	1.17	Cum Volume (acre-ft)	6.74	29.83	19.40
C & E Loss (ft)	0.05	Cum SA (acres)	4.11	5.69	10.89

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2765.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.16	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.16	Flow Area (sq ft)		2151.22	950.85
E.G. Slope (ft/ft)	0.004527	Area (sq ft)	278.74	2151.22	950.85
Q Total (cfs)	24490.00	Flow (cfs)		22088.98	2401.02
Top Width (ft)	1477.14	Top Width (ft)	297.35	395.12	784.67
Vel Total (ft/s)	7.89	Avg. Vel. (ft/s)		10.27	2.53
Max Chl Dpth (ft)	11.16	Hydr. Depth (ft)		5.44	1.21
Conv. Total (cfs)	364000.3	Conv. (cfs)		328313.5	35686.8
Length Wtd. (ft)	240.55	Wetted Per. (ft)		397.73	784.69
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.53	0.34
Alpha	1.54	Stream Power (lb/ft s)		15.69	0.86
Frctn Loss (ft)	1.15	Cum Volume (acre-ft)	4.76	26.91	14.00
C & E Loss (ft)	0.05	Cum SA (acres)	3.72	5.69	10.65

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2766.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.75	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.15	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2765.15	Flow Area (sq ft)		2543.06	1741.41
E.G. Slope (ft/ft)	0.004615	Area (sq ft)	614.55	2543.06	1741.41
Q Total (cfs)	36000.00	Flow (cfs)		29476.35	6523.65
Top Width (ft)	1597.71	Top Width (ft)	395.79	395.12	806.80
Vel Total (ft/s)	8.40	Avg. Vel. (ft/s)		11.59	3.75
Max Chl Dpth (ft)	12.15	Hydr. Depth (ft)		6.44	2.16

* Conv. Total (cfs)	*529952.8	* Conv. (cfs)	*		*433918.7	* 96034.1	*
* Length Wtd. (ft)	* 239.39	* Wetted Per. (ft)	*		* 397.73	* 806.84	*
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*		* 1.84	* 0.62	*
* Alpha	* 1.59	* Stream Power (lb/ft s)	*		* 21.35	* 2.33	*
* Frctn Loss (ft)	* 1.19	* Cum Volume (acre-ft)	*	8.57	* 32.08	* 23.56	*
C & E Loss (ft)	* 0.04	* Cum SA (acres)	*	5.62	* 5.69	* 11.05	*

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 110

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600.38	2767	-579.98	2766	-400.38	2765	-181.14	2764	-81.76	2763
-57.48	2762	-47.61	2761	0	2761	227.2	2762	237.17	2762
274.46	2761	312.01	2760	358.58	2760	379.63	2760	383.11	2759
386.65	2758	390.19	2757	392.73	2756	392.74	2756	395.22	2755
397.63	2754	410.68	2753	426.46	2753	431.11	2754	435.76	2755
446.04	2756	470.07	2757	481.43	2757	501.92	2756.75	563.14	2756
587.96	2756	594.62	2757	602.49	2758	613.17	2759	626.03	2759.97
626.5	2760	890.32	2761	967.13	2761	1086.65	2761	1302.26	2762
1331.06	2761.75	1340.58	2761.75	1426.39	2761.75	1446.33	2761.75	1459.98	2761.75
1515.86	2762.75	1570.65	2763.75	1587.84	2764.75	1592.77	2765.75	1597.63	2766.75
1602.74	2767.75	1607.53	2768.75	1611.47	2769.75	1613.74	2770.75	1616.01	2771.75
1618.28	2772.75	1620.53	2773.75	1622.77	2774.75	1624.98	2775.75	1627.19	2776.75
1629.4	2777.75	1631.62	2778.75	1633.89	2779.75	1636.29	2780.75	1638.58	2781.75
1640.84	2782.75	1643.09	2783.75	1645.32	2784.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600.38	.045	227.2	.03	626.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
227.2	626.5	308.04	322.72	332.25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-600.38	227.2	2770	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2764.92	* Element	*	Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.08	* Wt. n-Val.	*		* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2762.85	* Reach Len. (ft)	*	308.04	* 322.72	* 332.25	*
* Crit W.S. (ft)	* 2763.33	* Flow Area (sq ft)	*		* 1956.99	* 1473.46	*
* E.G. Slope (ft/ft)	*0.007990	* Area (sq ft)	*	415.36	* 1956.99	* 1473.46	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*		*24934.30	* 6065.70	*
* Top Width (ft)	* 1599.06	* Top Width (ft)	*	305.20	* 399.30	* 894.56	*
* Vel Total (ft/s)	* 9.04	* Avg. Vel. (ft/s)	*		* 12.74	* 4.12	*
* Max Chl Dpth (ft)	* 9.84	* Hydr. Depth (ft)	*		* 4.90	* 1.65	*
* Conv. Total (cfs)	*346800.4	* Conv. (cfs)	*		*278942.8	* 67857.6	*
* Length Wtd. (ft)	* 324.49	* Wetted Per. (ft)	*		* 400.88	* 894.58	*
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*		* 2.44	* 0.82	*
* Alpha	* 1.64	* Stream Power (lb/ft s)	*		* 31.03	* 3.38	*
* Frctn Loss (ft)	* 1.43	* Cum Volume (acre-ft)	*	4.13	* 17.76	* 11.87	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	*	2.19	* 3.48	* 6.46	*

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2764.24	* Element	*	Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.82	* Wt. n-Val.	*		* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2762.42	* Reach Len. (ft)	*	308.04	* 322.72	* 332.25	*
* Crit W.S. (ft)	* 2762.82	* Flow Area (sq ft)	*		* 1787.46	* 1098.66	*
* E.G. Slope (ft/ft)	*0.007531	* Area (sq ft)	*	287.97	* 1787.46	* 1098.66	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*20814.43	* 3675.57	*
* Top Width (ft)	* 1565.13	* Top Width (ft)	*	294.89	* 399.30	* 870.94	*
* Vel Total (ft/s)	* 8.49	* Avg. Vel. (ft/s)	*		* 11.64	* 3.35	*
* Max Chl Dpth (ft)	* 9.42	* Hydr. Depth (ft)	*		* 4.48	* 1.26	*
* Conv. Total (cfs)	*282197.7	* Conv. (cfs)	*		*239844.2	* 42353.5	*
* Length Wtd. (ft)	* 324.13	* Wetted Per. (ft)	*		* 400.88	* 870.95	*
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*		* 2.10	* 0.59	*
* Alpha	* 1.62	* Stream Power (lb/ft s)	*		* 24.41	* 1.98	*
* Frctn Loss (ft)	* 1.38	* Cum Volume (acre-ft)	*	3.08	* 15.95	* 8.65	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	*	1.97	* 3.48	* 6.33	*

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2765.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2763.14	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2763.67	Flow Area (sq ft)		2074.07	1738.11
E.G. Slope (ft/ft)	0.008280	Area (sq ft)	506.61	2074.07	1738.11
Q Total (cfs)	36000.00	Flow (cfs)		27964.04	8035.96
Top Width (ft)	1632.62	Top Width (ft)	322.69	399.30	910.63
Vel Total (ft/s)	9.44	Avg. Vel. (ft/s)		13.48	4.62
Max Chl Dpth (ft)	10.14	Hydr. Depth (ft)		5.19	1.91
Conv. Total (cfs)	395617.6	Conv. (cfs)		307307.4	88310.2
Length Wtd. (ft)	324.71	Wetted Per. (ft)		400.88	910.65
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		2.67	0.99
Alpha	1.64	Stream Power (lb/ft s)		36.06	4.56
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	5.25	19.23	14.47
C & E Loss (ft)	0.05	Cum SA (acres)	3.49	3.48	6.56

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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 100

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-1079.5	2765	-908.05	2764	-796.29	2763	-637.85	2762	-590.66	2762
-582.71	2762	-429.48	2762	-343.01	2762	-257.47	2761	-240.37	2760
-236.92	2759	-233.51	2758	-230.22	2757	-227.02	2756	-223.93	2755
-185.04	2755	-174.13	2756	-169.65	2757	-165.16	2758	-160.66	2759
-156.1	2760	-123.66	2760	-99.38	2760	0	2760	48.99	2759
69.53	2759	69.54	2759	92.94	2759	92.95	2759	136.19	2758
136.2	2758	181.29	2757	186.69	2757	207.37	2758	220.09	2758
222.63	2757	222.64	2757	225.18	2756	227.72	2755	227.73	2755
230.27	2754	232.22	2753.36	233.31	2753	236.48	2752	271.72	2752
275.17	2753	279.24	2754	328.16	2755	339.63	2756	339.64	2756
380.46	2756	380.47	2756	390.22	2755.86	451.75	2755	486.38	2754
497.38	2754	501.1	2755	504.87	2756	504.88	2756	507.69	2757
539.73	2758	571.48	2759	643.34	2760	716.38	2760	890.83	2759
890.84	2759	1036.2	2759	1036.21	2759	1095.21	2760	1202.49	2760
1202.5	2760	1304.69	2760	1327.57	2761	1346.89	2762	1361.89	2763
1372.87	2764	1372.88	2764	1398.46	2765				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-1079.5	.045	0	.03	539.73	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	539.73	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-1079.5	-156.1	2764	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2762.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.65	Reach Len. (ft)			
Crit W.S. (ft)	2761.20	Flow Area (sq ft)	257.55	2837.18	1638.16
E.G. Slope (ft/ft)	0.003515	Area (sq ft)	753.97	2837.18	1638.16
Q Total (cfs)	31000.00	Flow (cfs)	703.96	25126.95	5169.09
Top Width (ft)	1653.19	Top Width (ft)	313.06	539.73	800.40
Vel Total (ft/s)	6.55	Avg. Vel. (ft/s)	2.73	8.86	3.16
Max Chl Dpth (ft)	9.65	Hydr. Depth (ft)	1.65	5.26	2.05
Conv. Total (cfs)	522910.6	Conv. (cfs)	11874.5	423843.4	87192.6
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	800.47
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.36	1.15	0.45
Alpha	1.52	Stream Power (lb/ft s)	0.99	10.18	1.42
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2762.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.06	Reach Len. (ft)			
Crit W.S. (ft)	2760.72	Flow Area (sq ft)	165.48	2518.82	1169.41
E.G. Slope (ft/ft)	0.003685	Area (sq ft)	584.19	2518.82	1169.41
Q Total (cfs)	24490.00	Flow (cfs)	344.82	21098.36	3046.82
Top Width (ft)	1591.34	Top Width (ft)	262.61	539.73	789.00
Vel Total (ft/s)	6.35	Avg. Vel. (ft/s)	2.08	8.38	2.61
Max Chl Dpth (ft)	9.06	Hydr. Depth (ft)	1.06	4.67	1.48
Conv. Total (cfs)	403456.7	Conv. (cfs)	5680.7	347581.5	50194.4
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	789.06
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.24	1.07	0.34
Alpha	1.52	Stream Power (lb/ft s)	0.51	8.96	0.89

* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
te: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2763.17	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.00	* Wt. n-Val.	* 0.045	* 0.030	* 0.045
* W.S. Elev (ft)	* 2762.17	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 2761.51	* Flow Area (sq ft)	* 338.72	* 3117.85	* 2056.93
* E.G. Slope (ft/ft)	*0.003152	* Area (sq ft)	* 979.48	* 3117.85	* 2056.93
* Q Total (cfs)	*36000.00	* Flow (cfs)	* 1052.54	*27848.25	* 7099.21
* Top Width (ft)	* 2014.21	* Top Width (ft)	* 664.77	* 539.73	* 809.71
* Vel Total (ft/s)	* 6.53	* Avg. Vel. (ft/s)	* 3.11	* 8.93	* 3.45
* Max Chl Dpth (ft)	* 10.17	* Hydr. Depth (ft)	* 2.17	* 5.78	* 2.54
* Conv. Total (cfs)	*641195.8	* Conv. (cfs)	* 18746.7	*496005.0	*126444.0
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 809.80
* Min Ch El (ft)	* 2752.00	* Shear (lb/sq ft)	* 0.43	* 1.13	* 0.50
* Alpha	* 1.51	* Stream Power (lb/ft s)	* 1.33	* 10.12	* 1.73
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

SUMMARY OF MANNING'S N VALUES

River:River #1

Reach	River Sta.	n1	n2	n3
*Reach #1	225	.045	.03	.045
*Reach #1	220	.045	.03	.045
*Reach #1	215	.045	.03	.045
*Reach #1	210	.045	.03	.045
*Reach #1	205	.045	.03	.045
*Reach #1	200	.045	.03	.045
*Reach #1	195	.045	.03	.045
*Reach #1	190	.045	.03	.045
*Reach #1	180	.045	.03	.045
*Reach #1	170	.045	.03	.045
*Reach #1	160	.045	.03	.045
*Reach #1	150	.045	.03	.045
*Reach #1	139	.045	.03	.045
*Reach #1	130	.045	.03	.045
*Reach #1	120	.045	.03	.045
*Reach #1	115	.045	.03	.045
*Reach #1	110	.045	.03	.045
*Reach #1	100	.045	.03	.045

SUMMARY OF REACH LENGTHS

River: River #1

Reach	River Sta.	Left	Channel	Right
*Reach #1	225	299.75	282.05	262.04
*Reach #1	220	277.65	269.4	261.19
*Reach #1	215	294.95	268.22	230.48
*Reach #1	210	283.6	269.08	254.74
*Reach #1	205	280.12	286.64	293.88
*Reach #1	200	179.8	195.07	210.23
*Reach #1	195	215.83	225.58	311.98
*Reach #1	190	77.8	72.37	83.03
*Reach #1	180	44.45	181.54	256.85
*Reach #1	170	130.15	130.15	130.15
*Reach #1	160	203.69	188.86	197
*Reach #1	150	262.45	206.64	129.8
*Reach #1	139	172.75	171.78	164.65
*Reach #1	130	295.76	287.33	274.51
*Reach #1	120	158.39	153.64	149.14
*Reach #1	115	257.93	242.39	227.54
*Reach #1	110	308.04	322.72	332.25
*Reach #1	100			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River #1

Reach	River Sta.	Contr.	Expan.
Reach #1	225	.1	.3
Reach #1	220	.1	.3
Reach #1	215	.1	.3
*Reach #1	210	.1	.3
*Reach #1	205	.1	.3
*Reach #1	200	.1	.3
*Reach #1	195	.1	.3
*Reach #1	190	.1	.3
*Reach #1	180	.1	.3
*Reach #1	170	.1	.3

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*Reach #1        *    160     *       .1*       .3*
*Reach #1        *    150     *       .1*       .3*
*Reach #1        *    139     *       .1*       .3*
*Reach #1        *    130     *       .1*       .3*
*Reach #1        *    120     *       .1*       .3*
*Reach #1        *    115     *       .1*       .3*
 each #1         *    110     *       .1*       .3*
 each #1         *    100     *       .1*       .3*
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Profile Output - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #1	225	PF 1	31000.00	2768.00	2783.79	2781.42	2786.45	0.003148	13.09	2368.69	849.40	0.71
Reach #1	225	PF 2	24490.00	2768.00	2782.23	2780.05	2784.51	0.003108	12.10	2023.49	754.54	0.70
Reach #1	225	PF 3	36000.00	2768.00	2784.84	2782.42	2787.78	0.003262	13.77	2613.48	1215.25	0.73
Reach #1	220	PF 1	31000.00	2767.00	2780.92	2780.92	2785.06	0.006598	16.33	1897.98	904.77	1.00
Reach #1	220	PF 2	24490.00	2767.00	2780.16	2779.58	2783.28	0.005463	14.17	1728.23	784.47	0.90
Reach #1	220	PF 3	36000.00	2767.00	2781.82	2781.82	2786.37	0.006460	17.10	2104.79	1075.72	1.00
Reach #1	215	PF 1	31000.00	2767.00	2780.49	2779.67	2783.03	0.004711	12.82	2425.80	1271.30	0.83
Reach #1	215	PF 2	24490.00	2767.00	2779.44	2777.92	2781.60	0.004906	11.81	2075.45	903.76	0.83
Reach #1	215	PF 3	36000.00	2767.00	2779.41	2780.35	2784.13	0.010772	17.44	2065.33	892.30	1.22
Reach #1	210	PF 1	31000.00	2766.00	2778.66	2778.66	2781.45	0.007383	13.40	2313.85	1097.58	1.00
Reach #1	210	PF 2	24490.00	2766.00	2776.84	2776.53	2780.03	0.006179	14.33	1708.58	503.53	0.95
Reach #1	210	PF 3	36000.00	2766.00	2779.29	2779.29	2782.30	0.007343	13.93	2585.10	1350.50	1.00
Reach #1	205	PF 1	31000.00	2765.00	2776.22	2777.30	2779.34	0.008080	14.33	2410.89	793.24	1.05
Reach #1	205	PF 2	24490.00	2765.00	2775.69	2775.69	2778.12	0.006333	12.57	2054.88	564.95	0.92
Reach #1	205	PF 3	36000.00	2765.00	2776.61	2777.75	2780.06	0.009177	15.23	2725.49	821.56	1.12
Reach #1	200	PF 1	31000.00	2763.00	2774.60	2774.99	2777.48	0.004947	14.42	2953.93	818.81	0.87
Reach #1	200	PF 2	24490.00	2763.00	2773.47	2773.95	2776.37	0.005630	14.06	2140.17	639.31	0.91
Reach #1	200	PF 3	36000.00	2763.00	2776.55	2775.91	2778.20	0.002457	11.67	4915.53	1110.90	0.64
Reach #1	195	PF 1	31000.00	2762.00	2775.24	2773.18	2776.33	0.001638	9.19	4765.12	947.68	0.52
Reach #1	195	PF 2	24490.00	2762.00	2773.05	2771.52	2774.58	0.002940	10.41	2966.52	701.48	0.66
Reach #1	195	PF 3	36000.00	2762.00	2776.76	2773.66	2777.64	0.001174	8.56	6310.54	1081.52	0.45
Reach #1	190	PF 1	31000.00	2760.49	2775.37	2770.00	2775.93	0.000715	6.02	5152.90	525.93	0.34
Reach #1	190	PF 2	24490.00	2760.49	2773.40	2769.25	2773.95	0.000894	5.93	4132.87	510.73	0.37
Reach #1	190	PF 3	36000.00	2760.49	2776.77	2770.53	2777.35	0.000622	6.10	5953.91	677.27	0.32
Reach #1	180	PF 1	31000.00	2759.08	2774.95	2769.77	2775.83	0.001016	7.57	4095.88	379.01	0.41
Reach #1	180	PF 2	24490.00	2759.08	2773.03	2768.86	2773.84	0.001170	7.25	3376.46	370.86	0.42
Reach #1	180	PF 3	36000.00	2759.08	2776.32	2770.43	2777.26	0.000935	7.79	4630.45	435.16	0.40
Reach #1	170	PF 1	31000.00	2758.49	2773.71	2769.99	2775.50	0.001962	10.72	2891.96	260.95	0.57
Reach #1	170	PF 2	24490.00	2758.49	2771.91	2768.81	2773.49	0.002132	10.09	2426.93	254.55	0.58
Reach #1	170	PF 3	36000.00	2758.49	2775.00	2770.84	2776.93	0.001862	11.16	3230.24	265.44	0.56
Reach #1	160	PF 1	31000.00	2757.67	2771.80	2769.83	2774.98	0.004844	14.29	2168.83	197.01	0.76
Reach #1	160	PF 2	24490.00	2757.67	2770.41	2768.41	2773.00	0.004406	12.91	1897.59	193.37	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.77	2770.85	2776.38	0.005147	15.25	2361.44	204.78	0.78
Reach #1	150	PF 1	31000.00	2757.36	2769.35	2769.35	2773.78	0.006782	16.88	1836.44	207.99	1.00
Reach #1	150	PF 2	24490.00	2757.36	2768.00	2768.00	2771.83	0.007077	15.72	1557.52	204.23	1.00
Reach #1	150	PF 3	36000.00	2757.36	2770.31	2770.31	2775.16	0.006667	17.68	2036.48	211.14	1.00
Reach #1	139	PF 1	31000.00	2756.07	2765.45	2767.29	2771.69	0.013412	20.39	1706.88	405.73	1.38
Reach #1	139	PF 2	24490.00	2756.07	2764.81	2766.35	2769.85	0.011932	18.13	1453.04	392.22	1.28
Reach #1	139	PF 3	36000.00	2756.07	2765.88	2768.62	2772.99	0.014387	21.91	1884.39	413.39	1.44
Reach #1	130	PF 1	31000.00	2755.25	2765.14	2766.38	2769.18	0.008922	16.72	2239.54	595.82	1.12
Reach #1	130	PF 2	24490.00	2755.25	2765.89	2765.37	2767.71	0.003800	11.42	2678.53	718.73	0.74
Reach #1	130	PF 3	36000.00	2755.25	2765.43	2767.00	2770.22	0.010327	18.32	2408.98	645.25	1.22
Reach #1	120	PF 1	31000.00	2754.00	2765.67	2765.44	2767.11	0.004458	10.60	3972.41	1460.10	0.78
Reach #1	120	PF 2	24490.00	2754.00	2765.02	2764.98	2766.37	0.004660	10.02	3250.25	1389.85	0.78
Reach #1	120	PF 3	36000.00	2754.00	2766.07	2765.81	2767.62	0.004493	11.13	4425.95	1508.19	0.79
Reach #1	115	PF 1	31000.00	2753.00	2764.74	2764.74	2766.39	0.004600	11.08	3794.22	1539.72	0.80
Reach #1	115	PF 2	24490.00	2753.00	2764.16	2764.16	2765.65	0.004527	10.27	3102.07	1477.14	0.78
Reach #1	115	PF 3	36000.00	2753.00	2765.15	2765.15	2766.90	0.004615	11.59	4284.47	1597.71	0.81
Reach #1	110	PF 1	31000.00	2753.00	2762.85	2763.33	2764.92	0.007990	12.74	3430.45	1599.06	1.01
Reach #1	110	PF 2	24490.00	2753.00	2762.42	2762.82	2764.24	0.007531	11.64	2886.12	1565.13	0.97
Reach #1	110	PF 3	36000.00	2753.00	2763.14	2763.67	2765.41	0.008280	13.48	3812.18	1632.62	1.04
Reach #1	100	PF 1	31000.00	2752.00	2761.65	2761.20	2762.67	0.003515	8.86	4732.88	1653.19	0.68
Reach #1	100	PF 2	24490.00	2752.00	2761.06	2760.72	2762.01	0.003685	8.38	3853.71	1591.34	0.68
Reach #1	100	PF 3	36000.00	2752.00	2762.17	2761.51	2763.17	0.003152	8.93	5513.50	2014.21	0.65

****

ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Alt 1

ver: River #1 Reach: Reach #1 RS: 225 Profile: PF 1
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 1
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:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
ver: River #1 Reach: Reach #1 RS: 205 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 3
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 2
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
ver: River #1 Reach: Reach #1 RS: 180 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

```
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
            water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
            program defaulted to critical depth.
ver: River #1  Reach: Reach #1     RS: 139     Profile: PF 1
    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:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 2
    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:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 3
    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:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 1
    Warning:Divided flow computed for this cross-section.
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 2
    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.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 3
    Warning:Divided flow computed for this cross-section.
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 1
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
iver: River #1  Reach: Reach #1     RS: 120     Profile: PF 2
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
ver: River #1  Reach: Reach #1     RS: 120     Profile: PF 3
    Warning:Divided flow computed for this cross-section.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 1
    Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
            for the water surface and continued on with the calculations.
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
            water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
            program defaulted to critical depth.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 2
    Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
            for the water surface and continued on with the calculations.
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
            water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
            program defaulted to critical depth.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 3
    Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
            for the water surface and continued on with the calculations.
    Warning:Divided flow computed for this cross-section.
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
            water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
            program defaulted to critical depth.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 1
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Program found supercritical flow starting at this cross section.
iver: River #1  Reach: Reach #1     RS: 110     Profile: PF 2
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 3
    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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Program found supercritical flow starting at this cross section.

River: River #1 Reach: Reach #1 RS: 100 Profile: PF 1

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

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

ver: River #1 Reach: Reach #1 RS: 100 Profile: PF 2

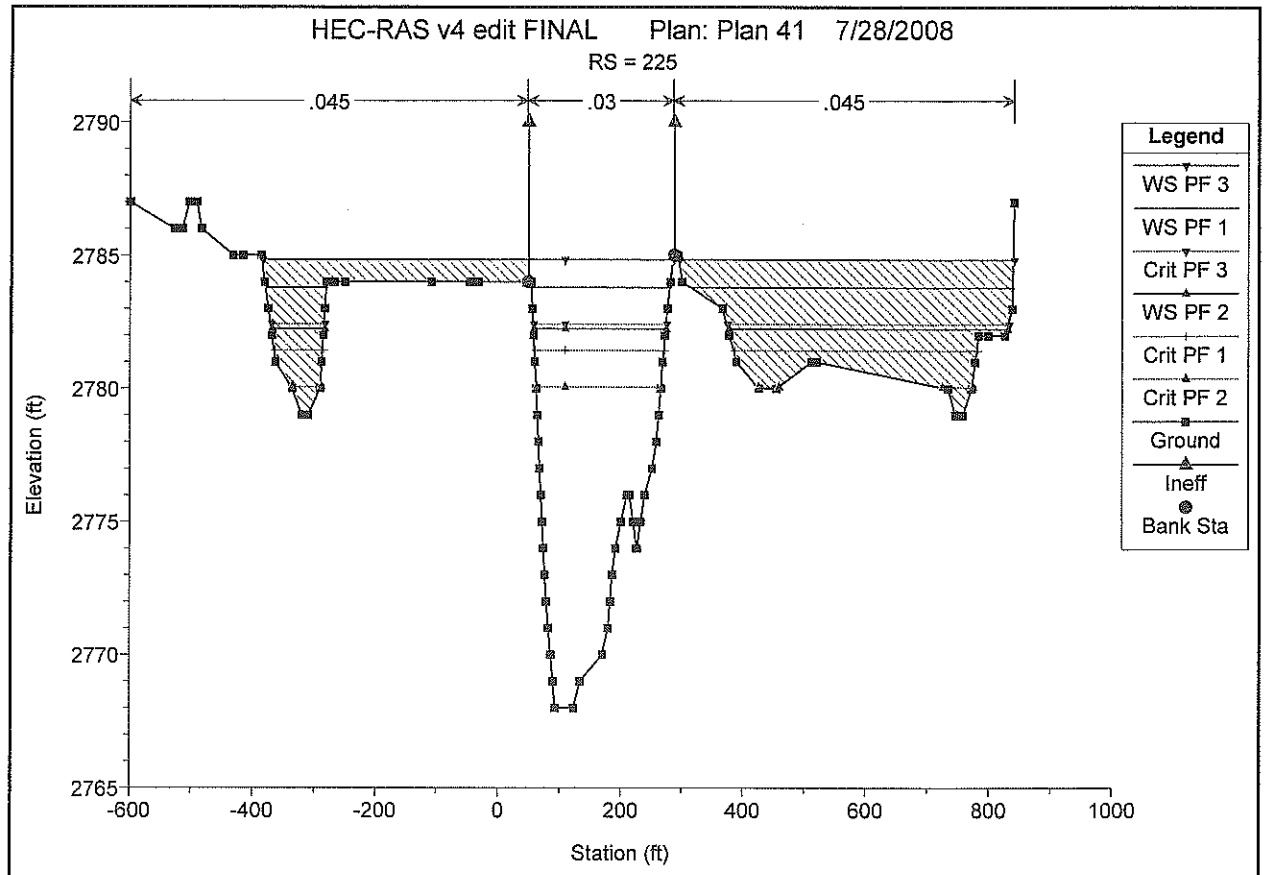
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

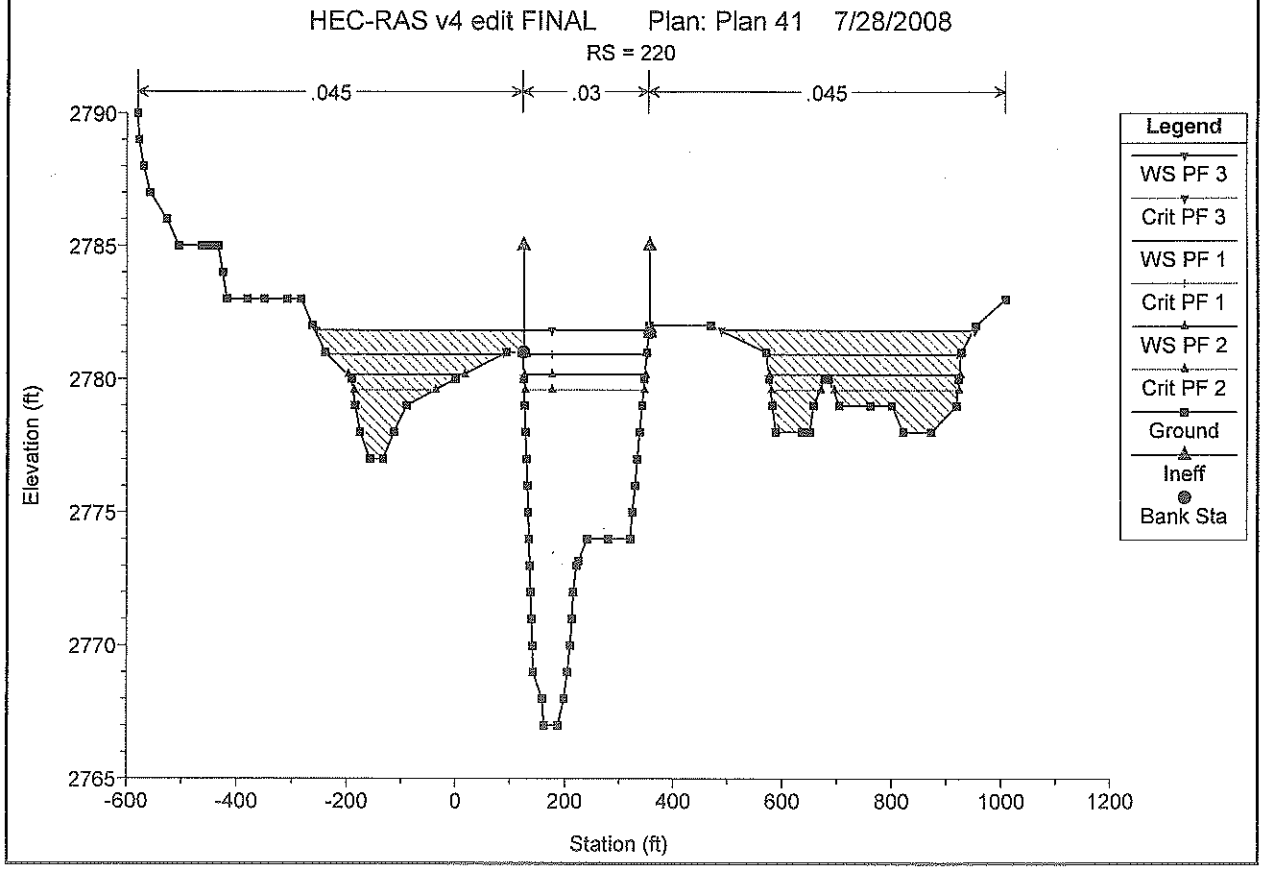
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

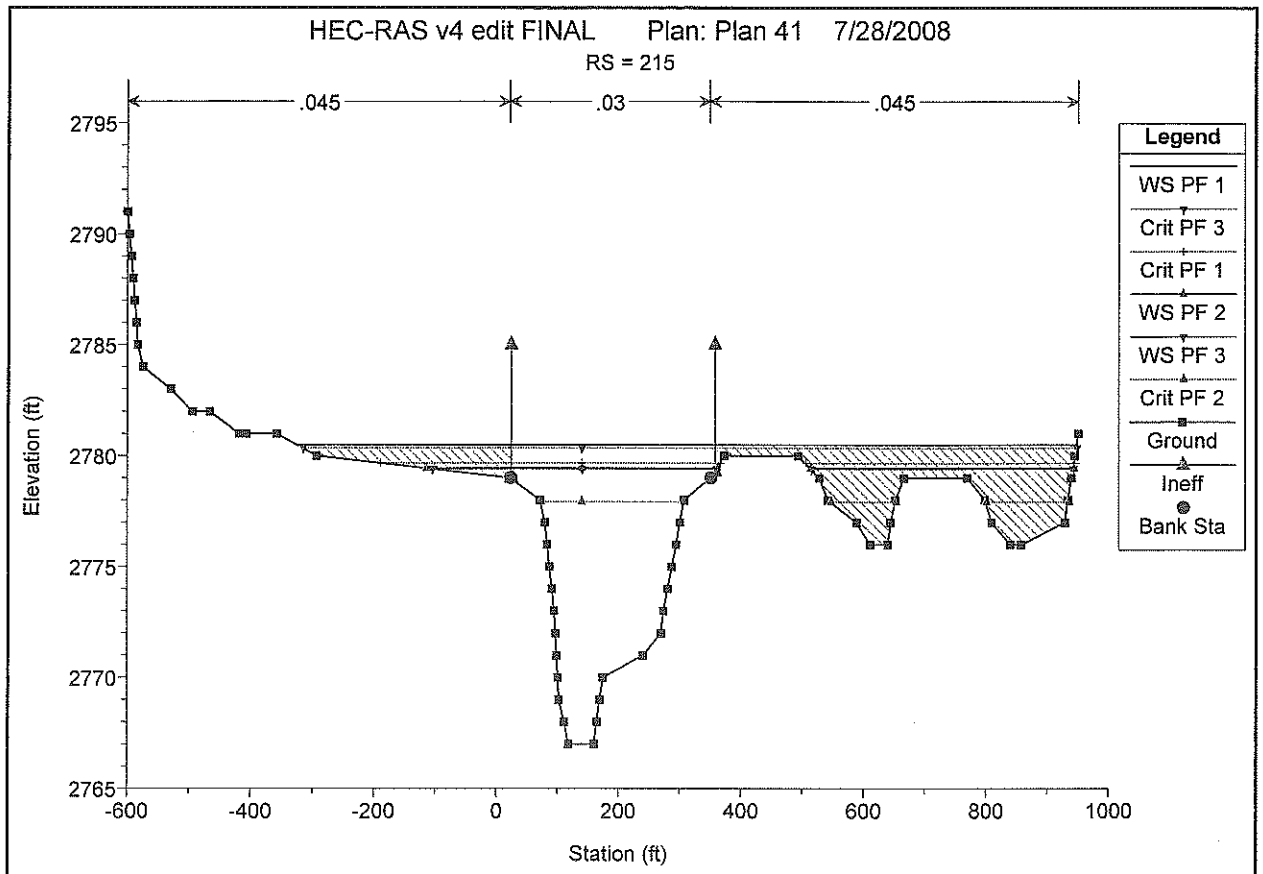
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 3

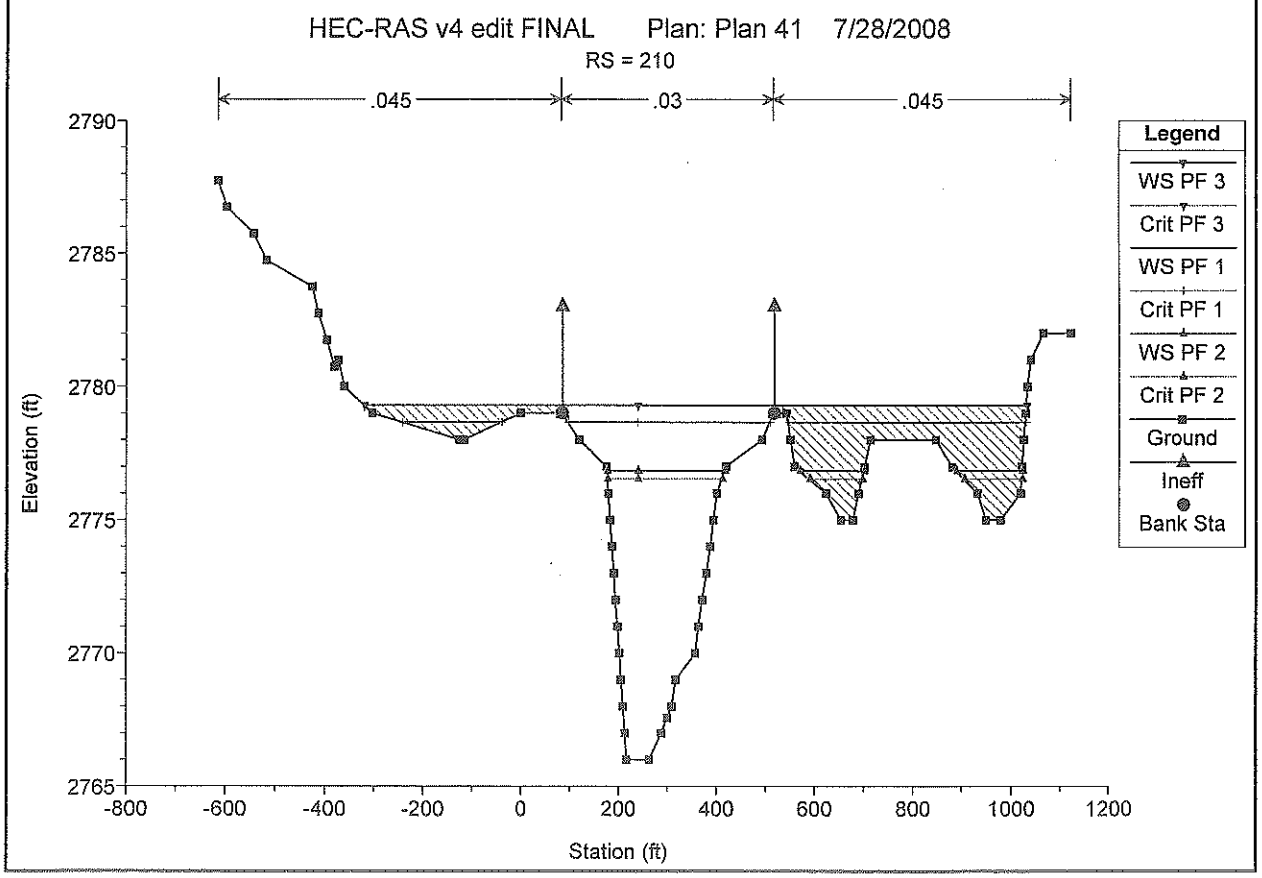
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

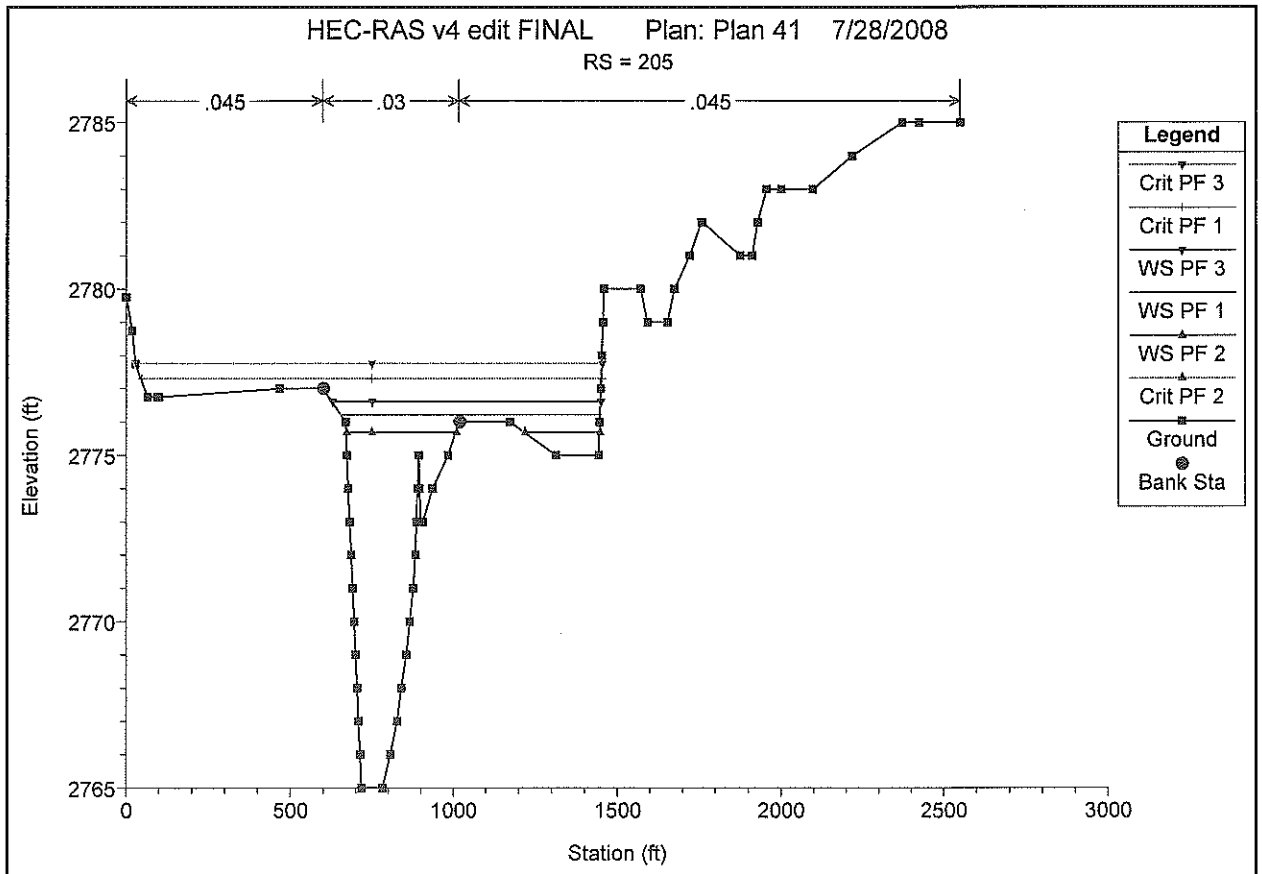
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

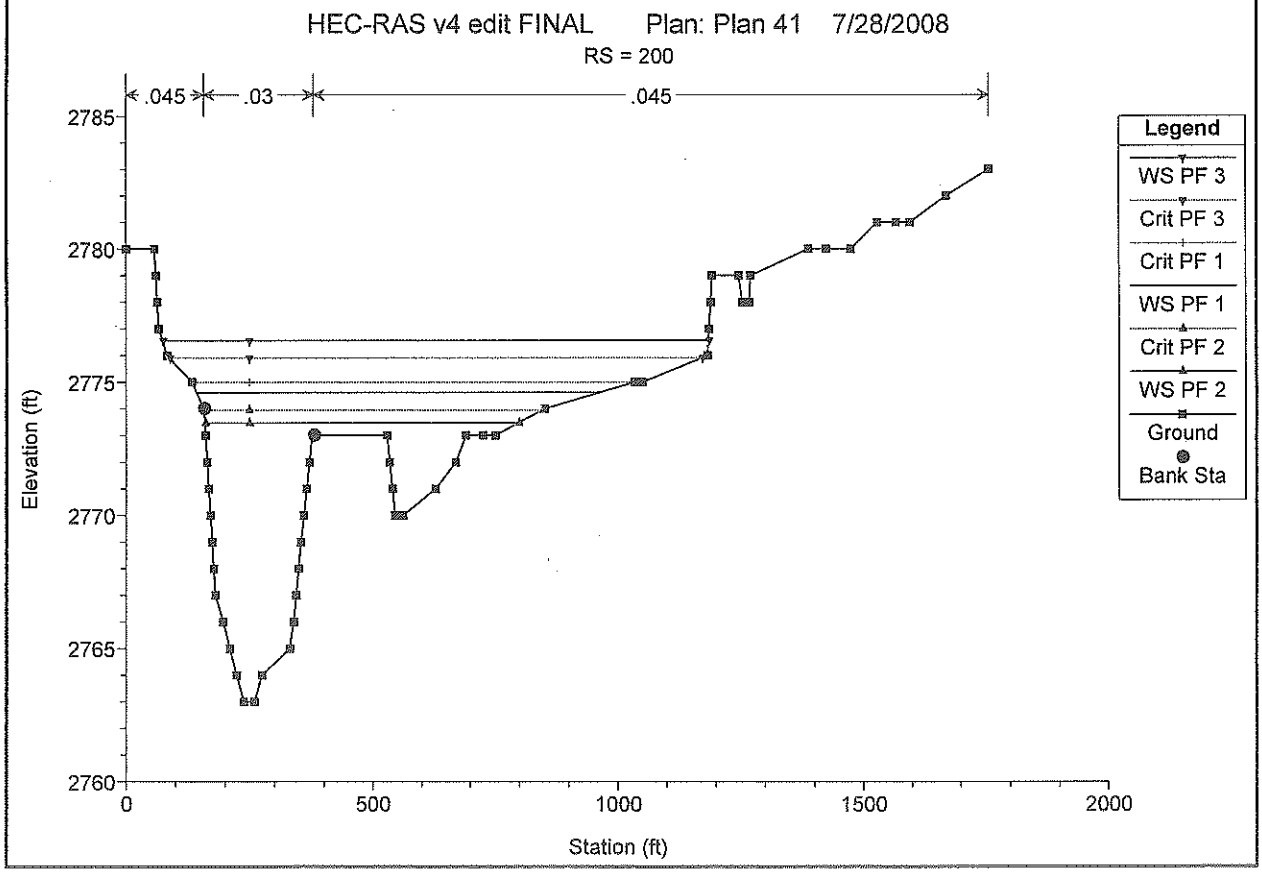

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 225
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Ineff
Bank Sta

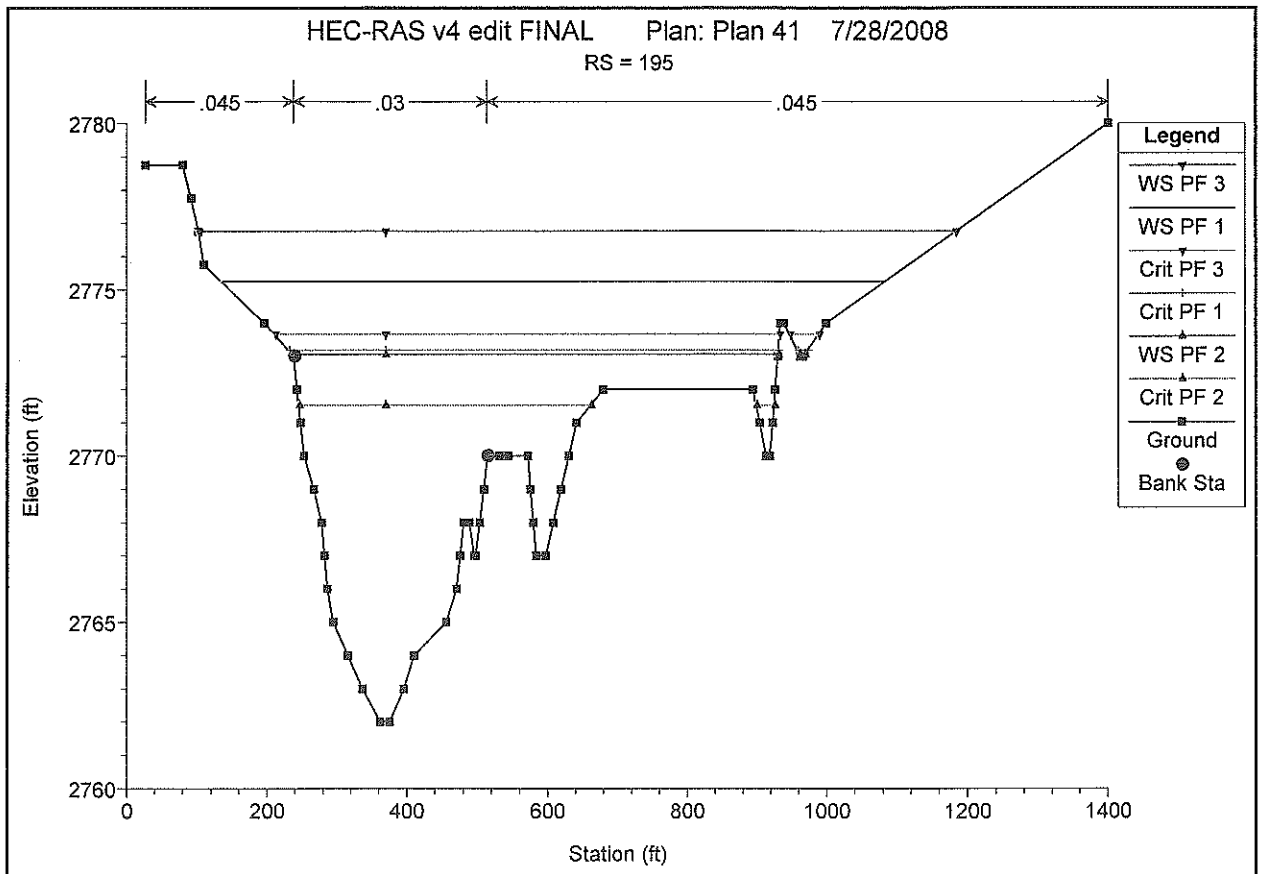

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 220
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta

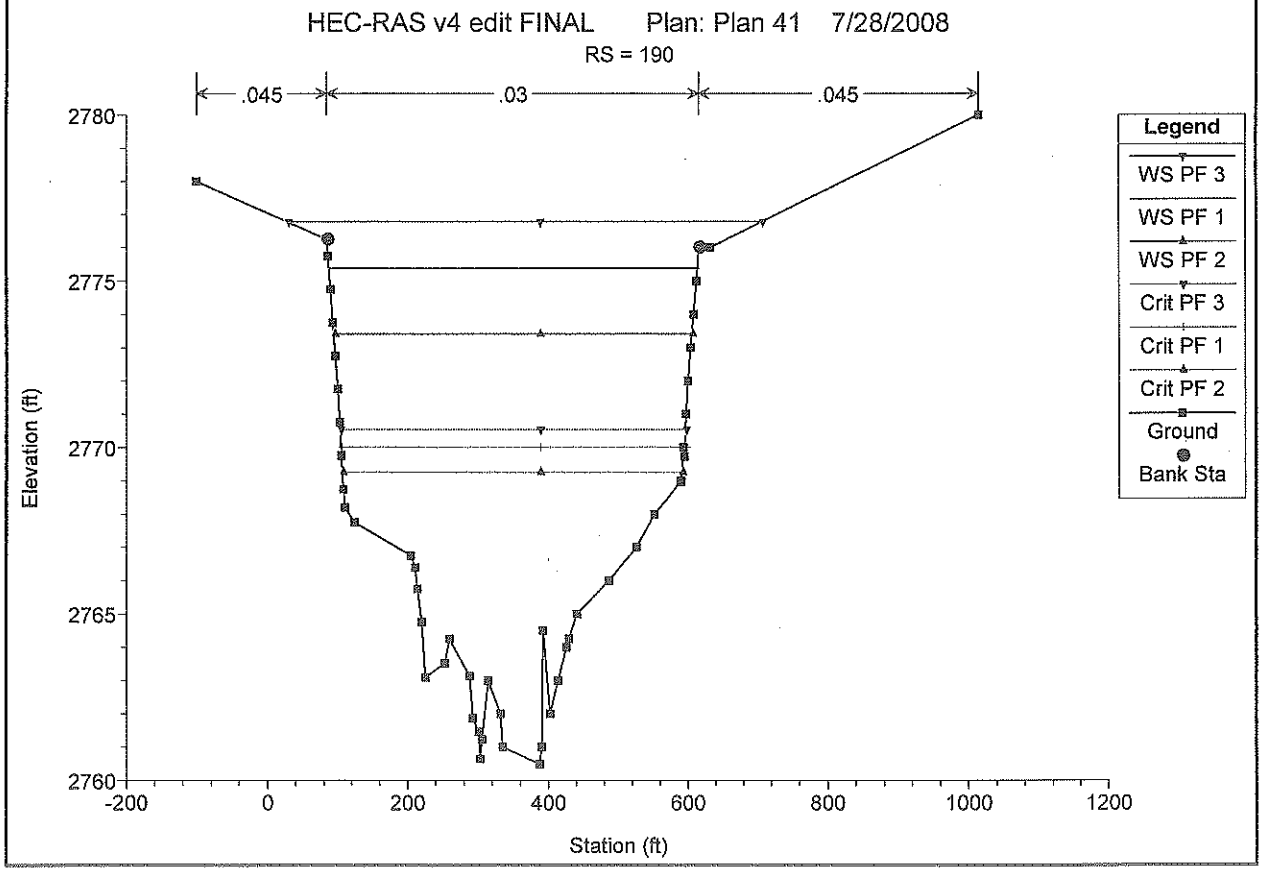

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 215
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
Ground
Ineff
Bank Sta

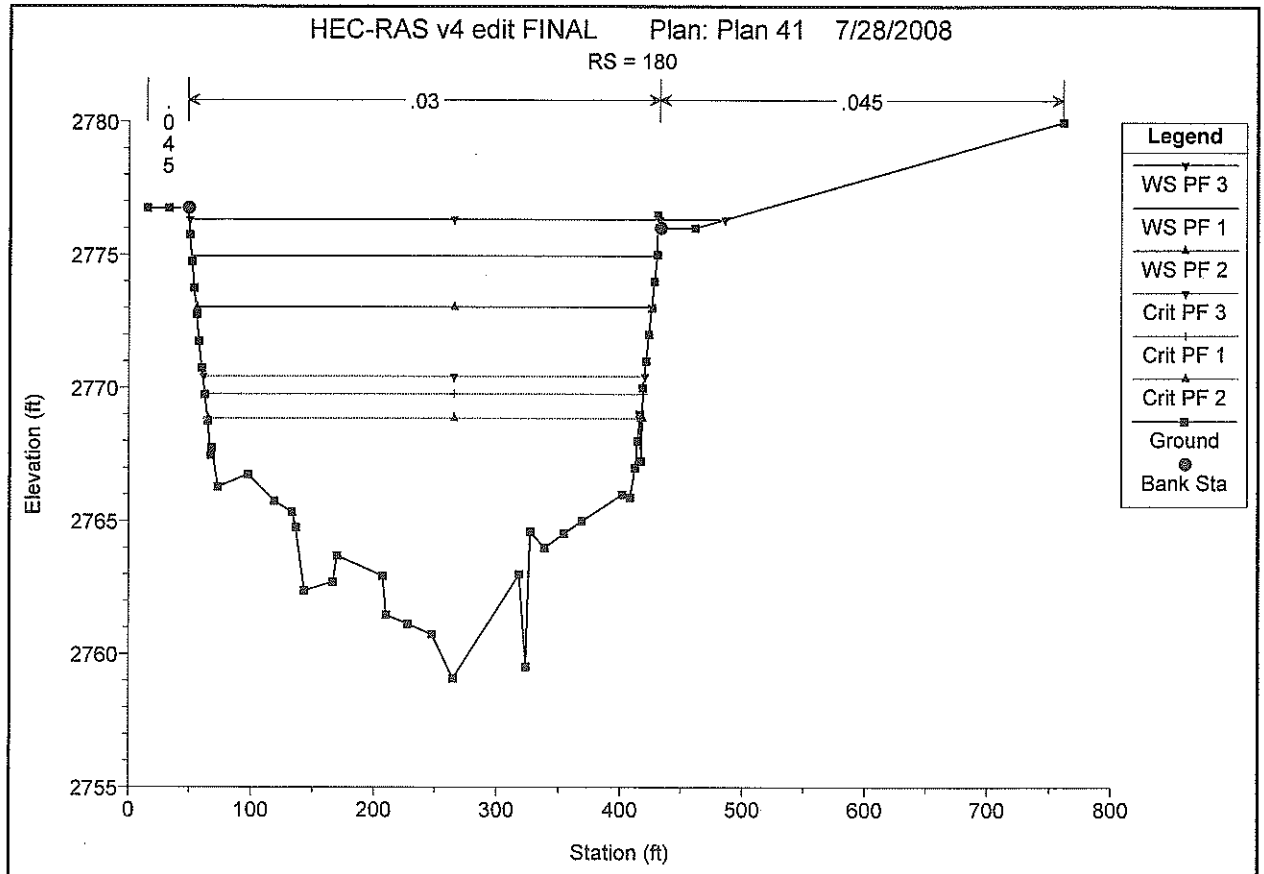

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 210
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta

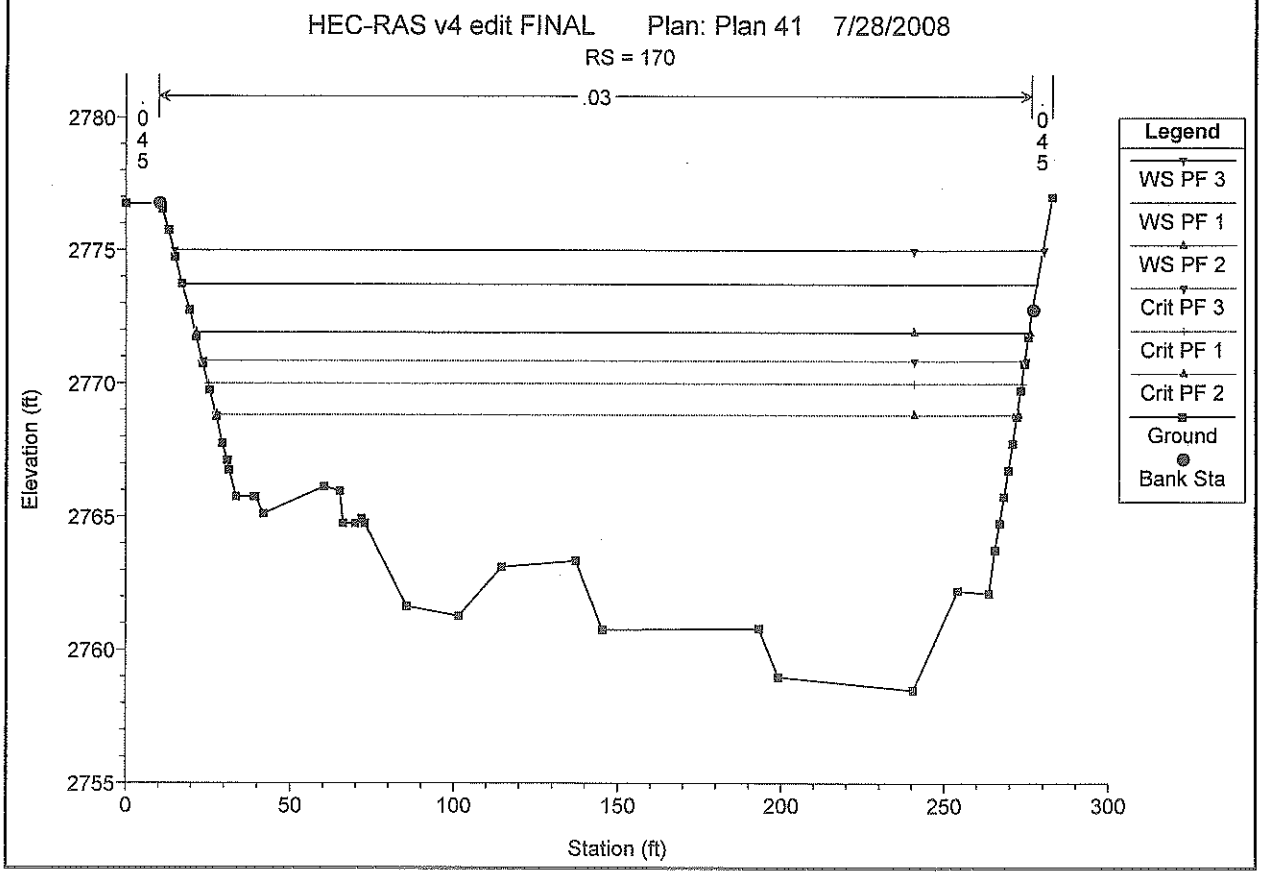

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 205
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta

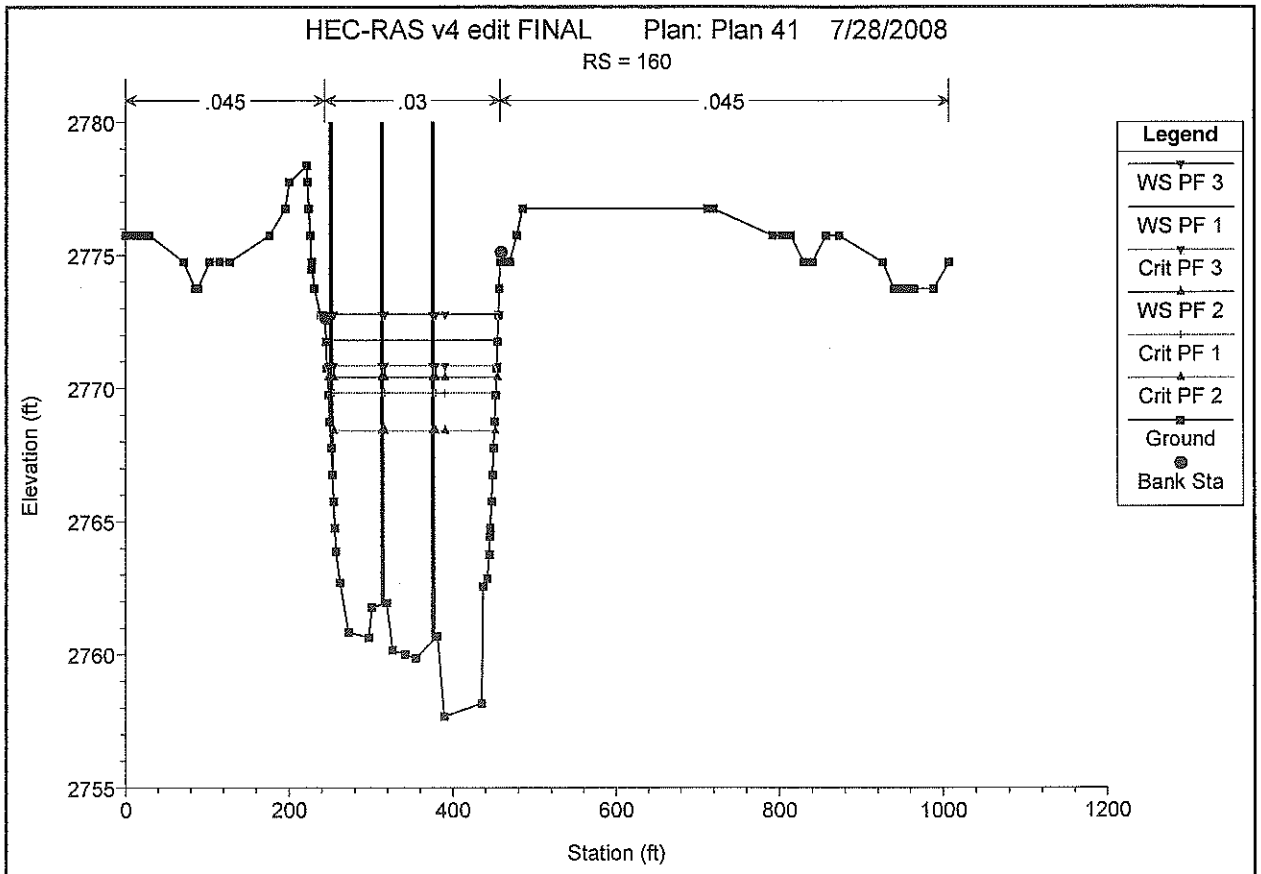

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 200
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
Ground
Bank Sta

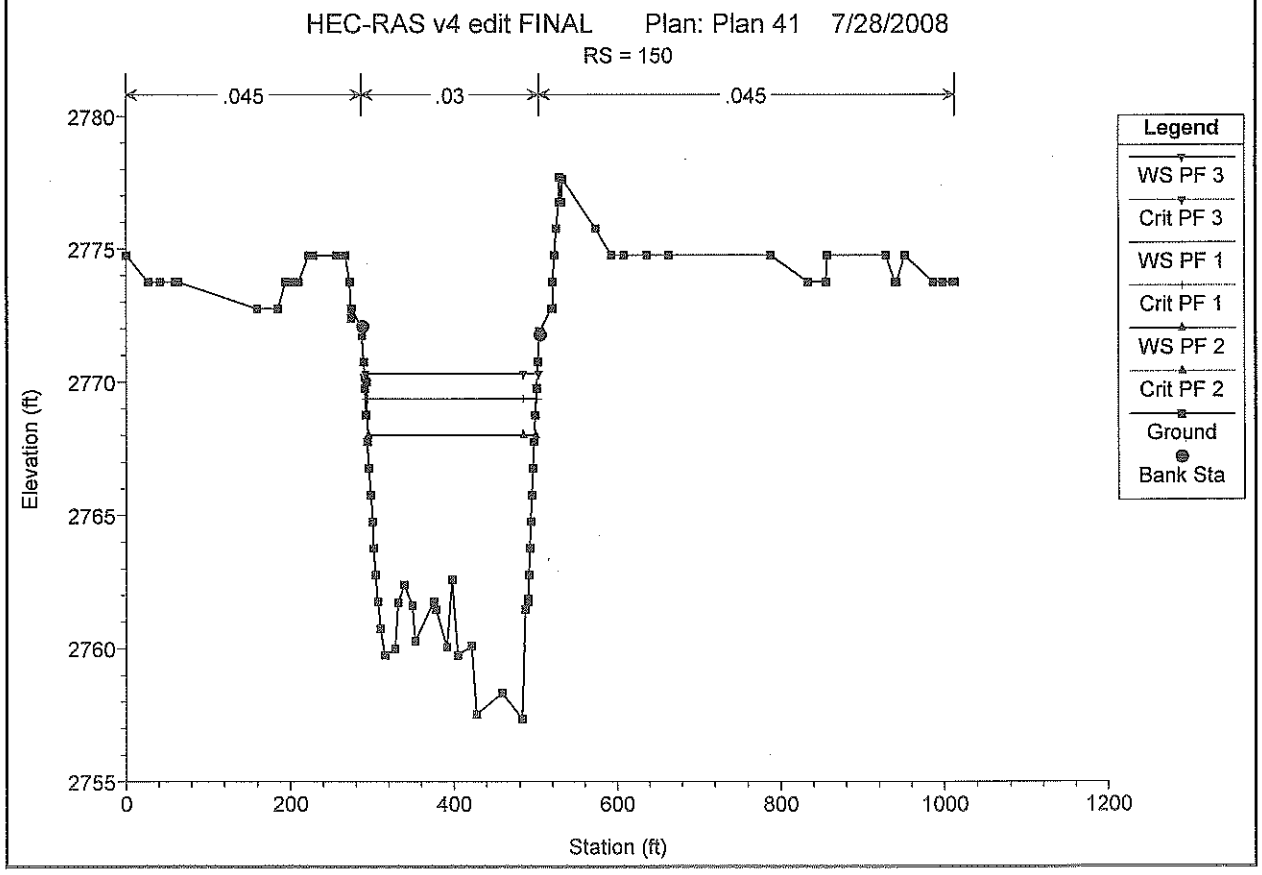

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 195
.045
.03
.045
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta
Elevation (ft)
2780
2775
2770
2765
2760
0
200
400
600
800
1000
1200
1400
Station (ft)

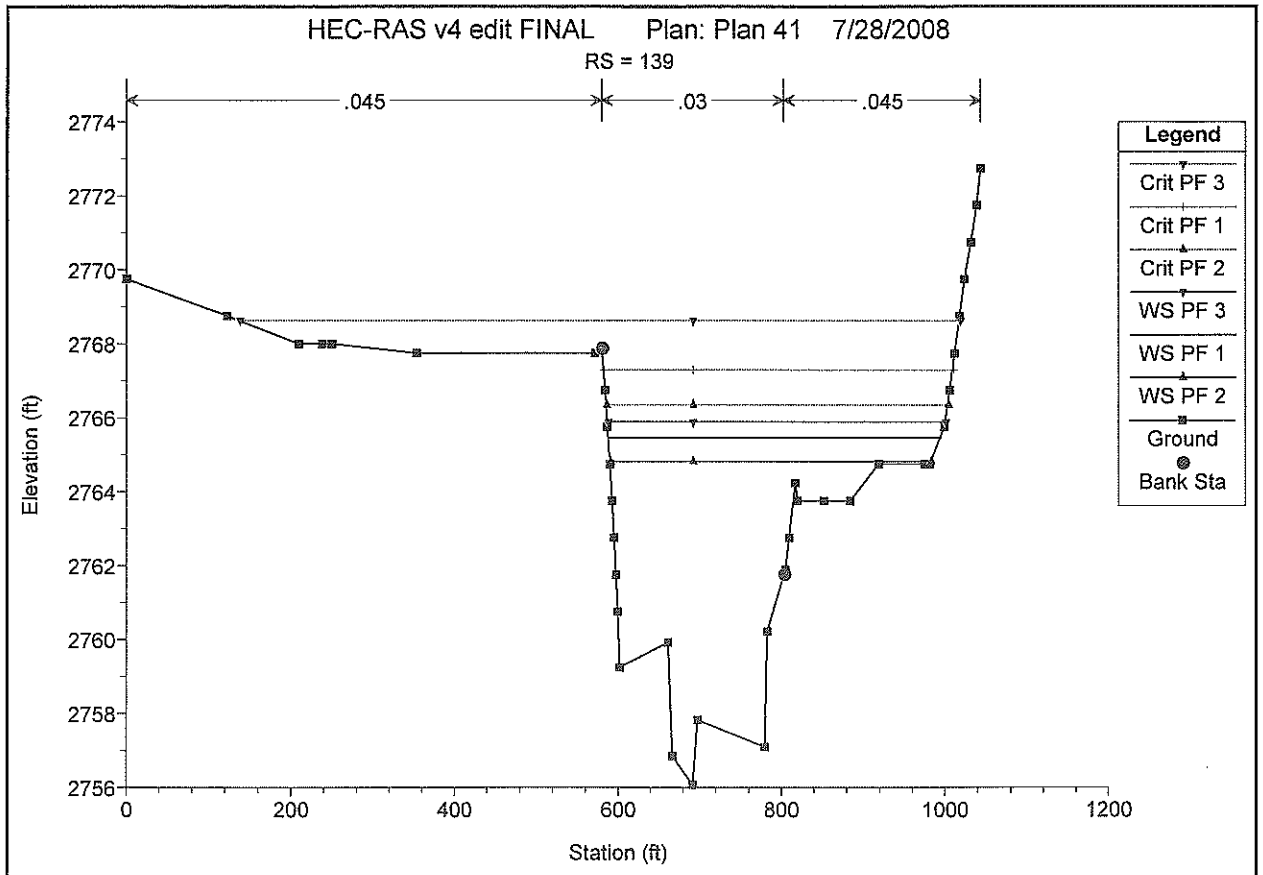

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 190
.045
.03
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
2780
2775
2770
2765
2760
-200
0
200
400
600
800
1000
1200
Station (ft)

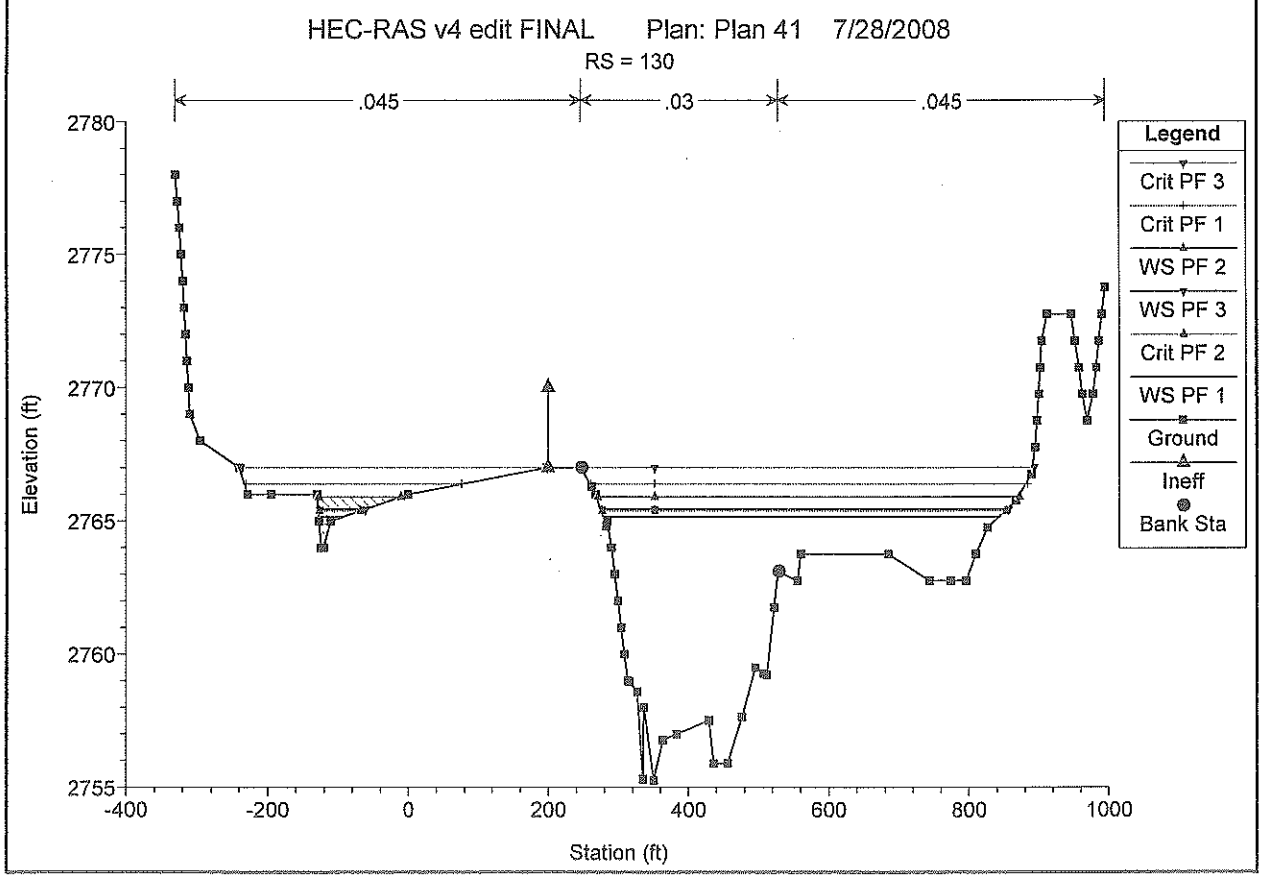

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 180
.03
.045
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2780
2775
2770
2765
2760
2755
0
100
200
300
400
500
600
700
800

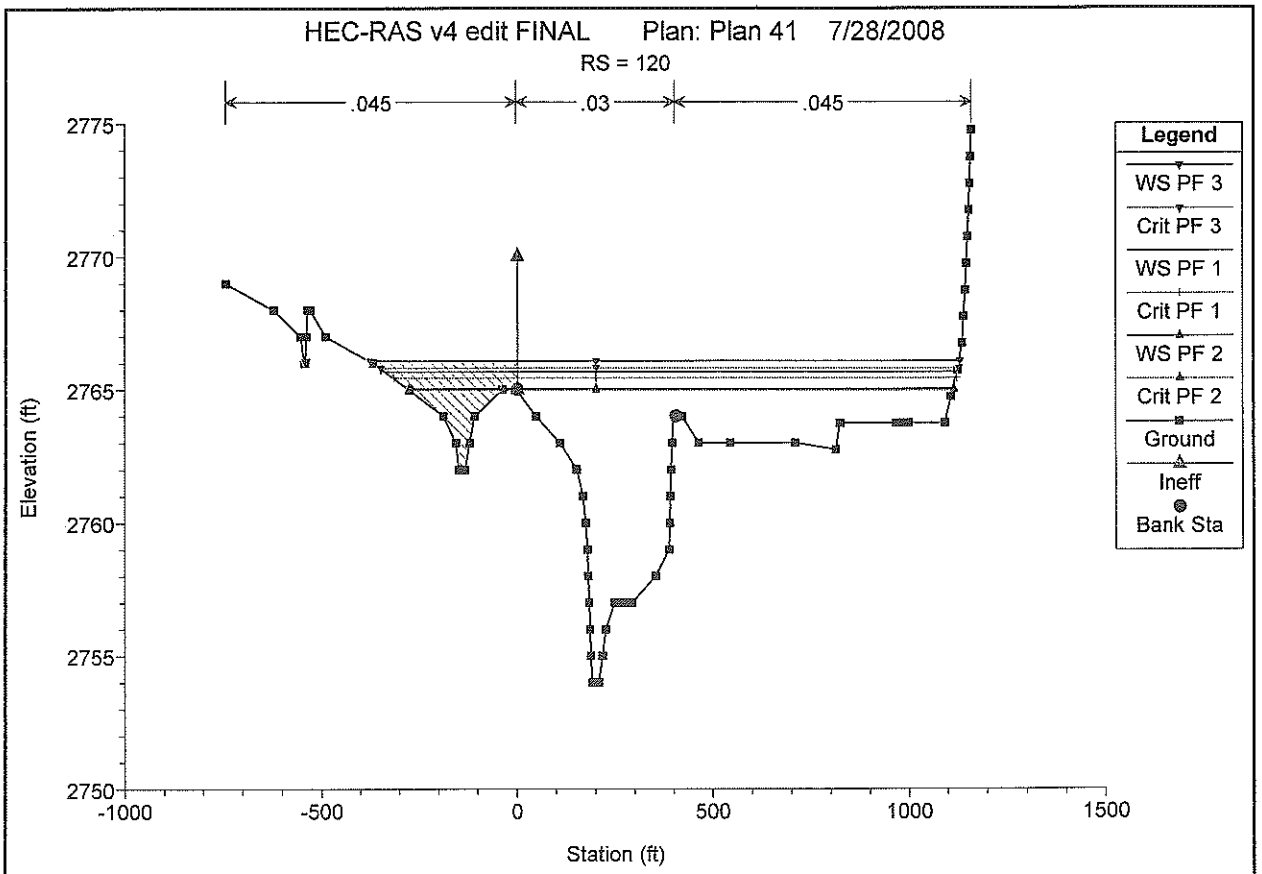

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 170
.03
.045
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2780
2775
2770
2765
2760
2755
0
50
100
150
200
250
300

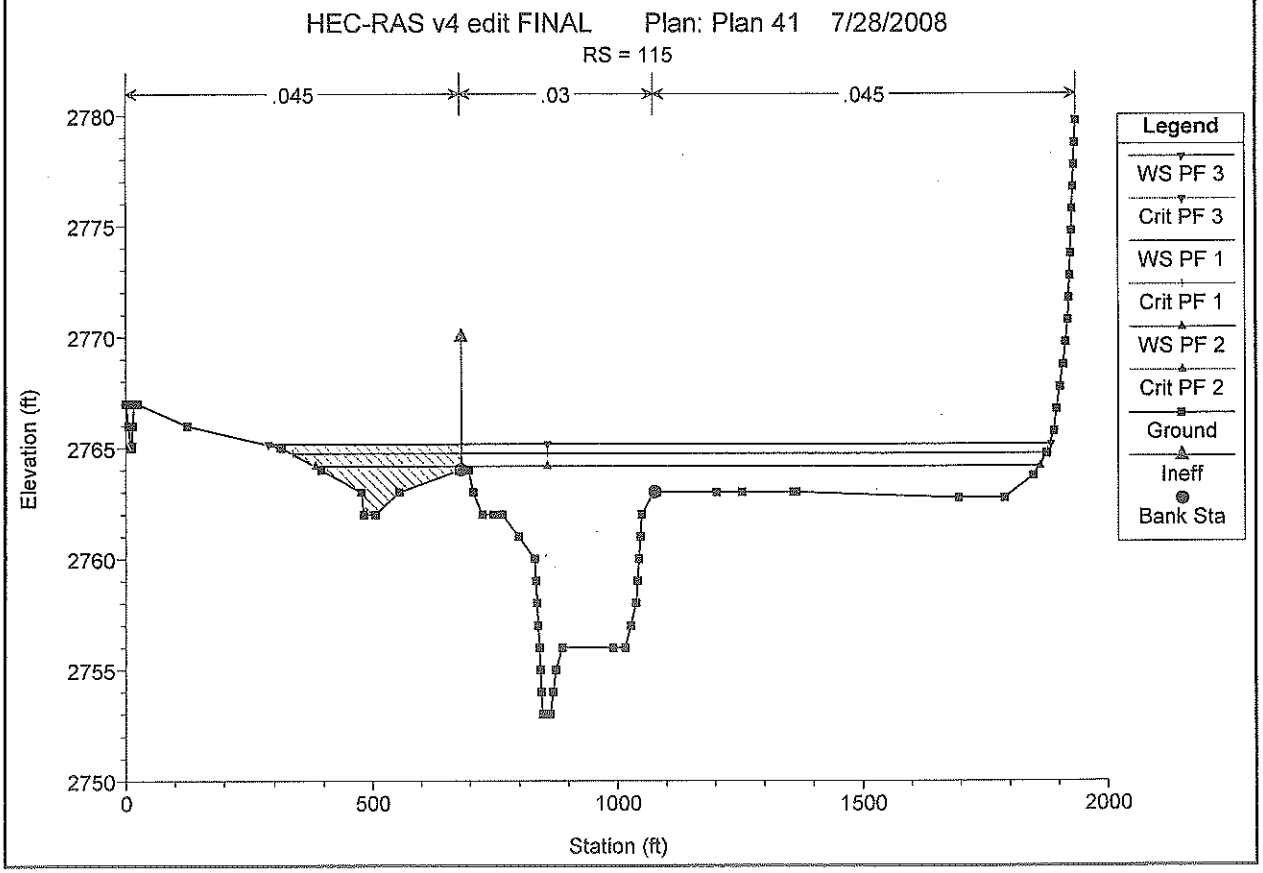

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 160
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta

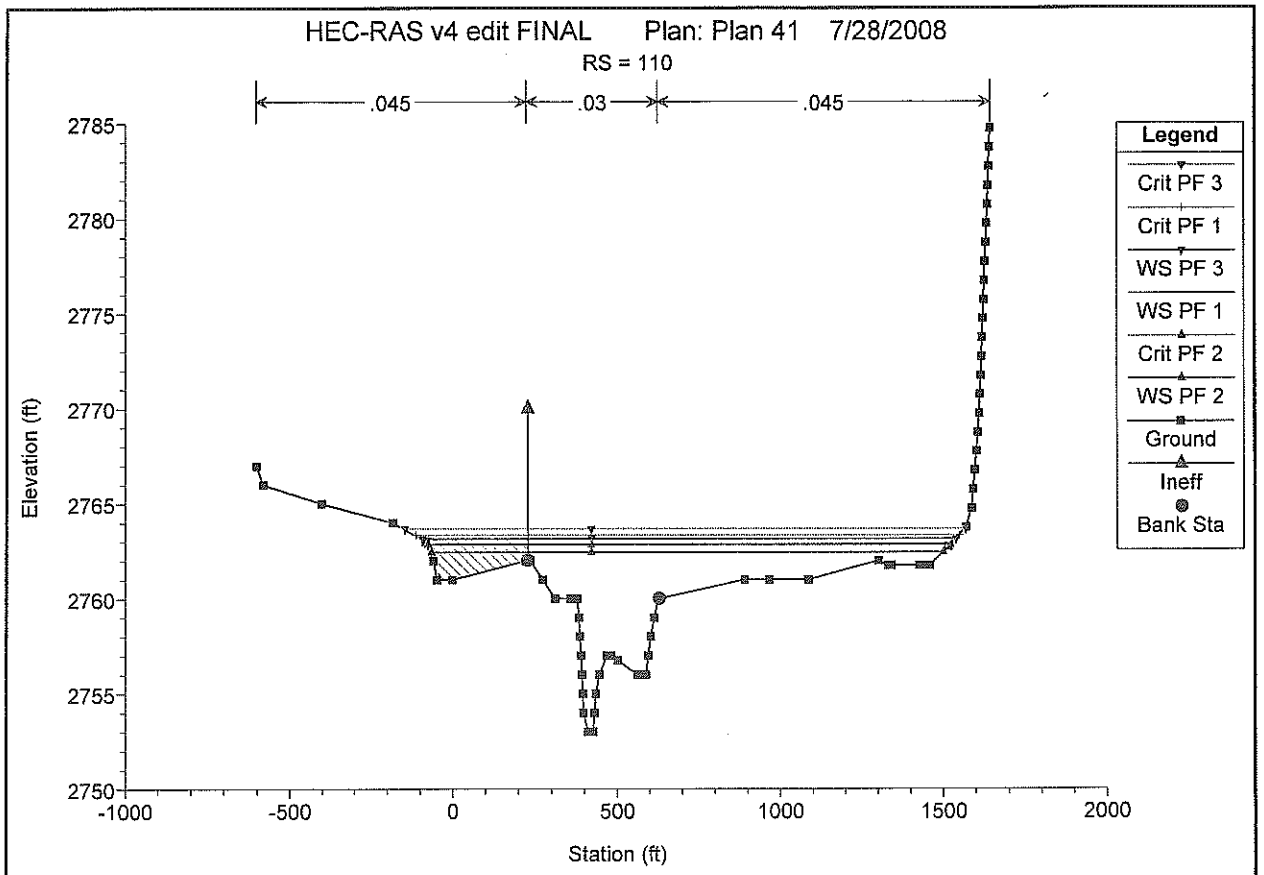

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 150
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta

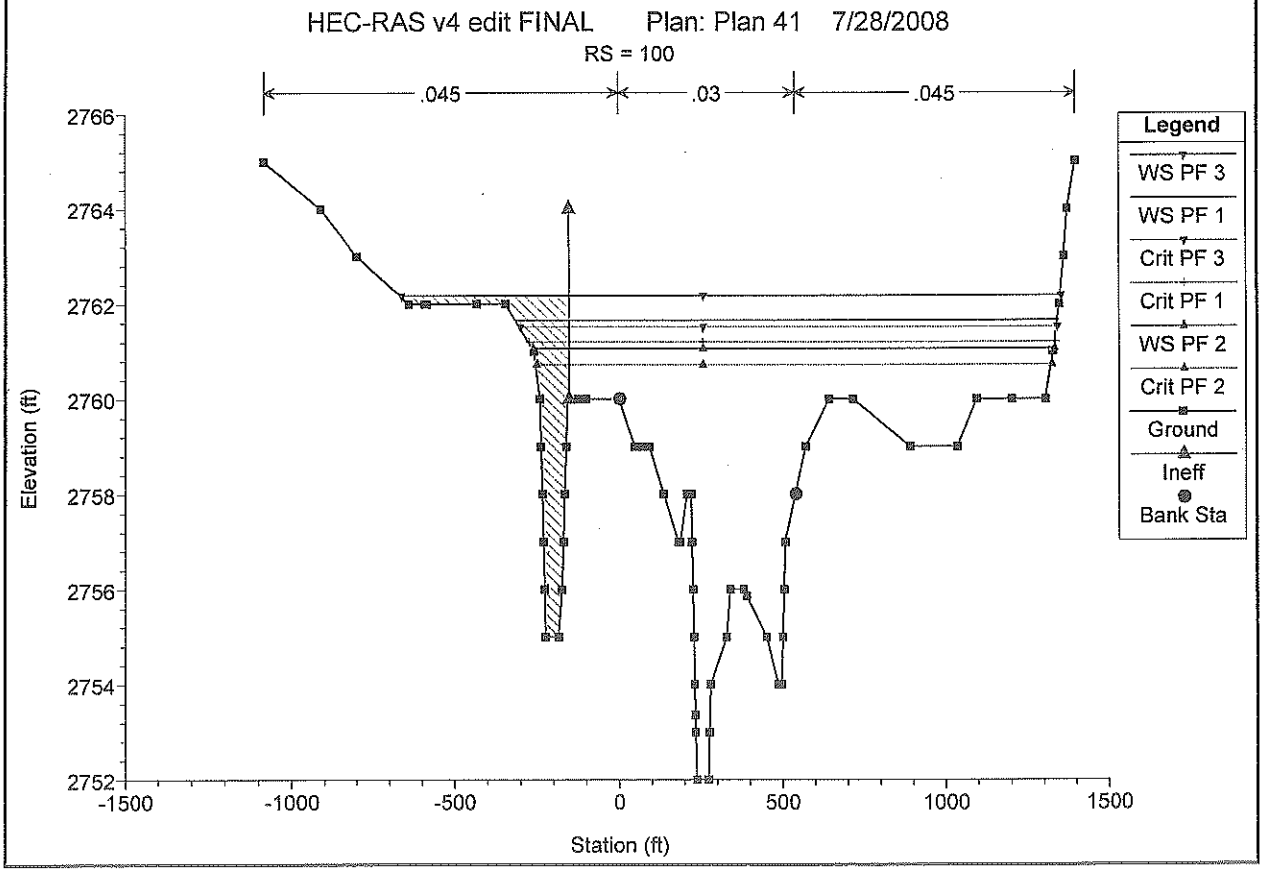

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 139
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Ground
Bank Sta

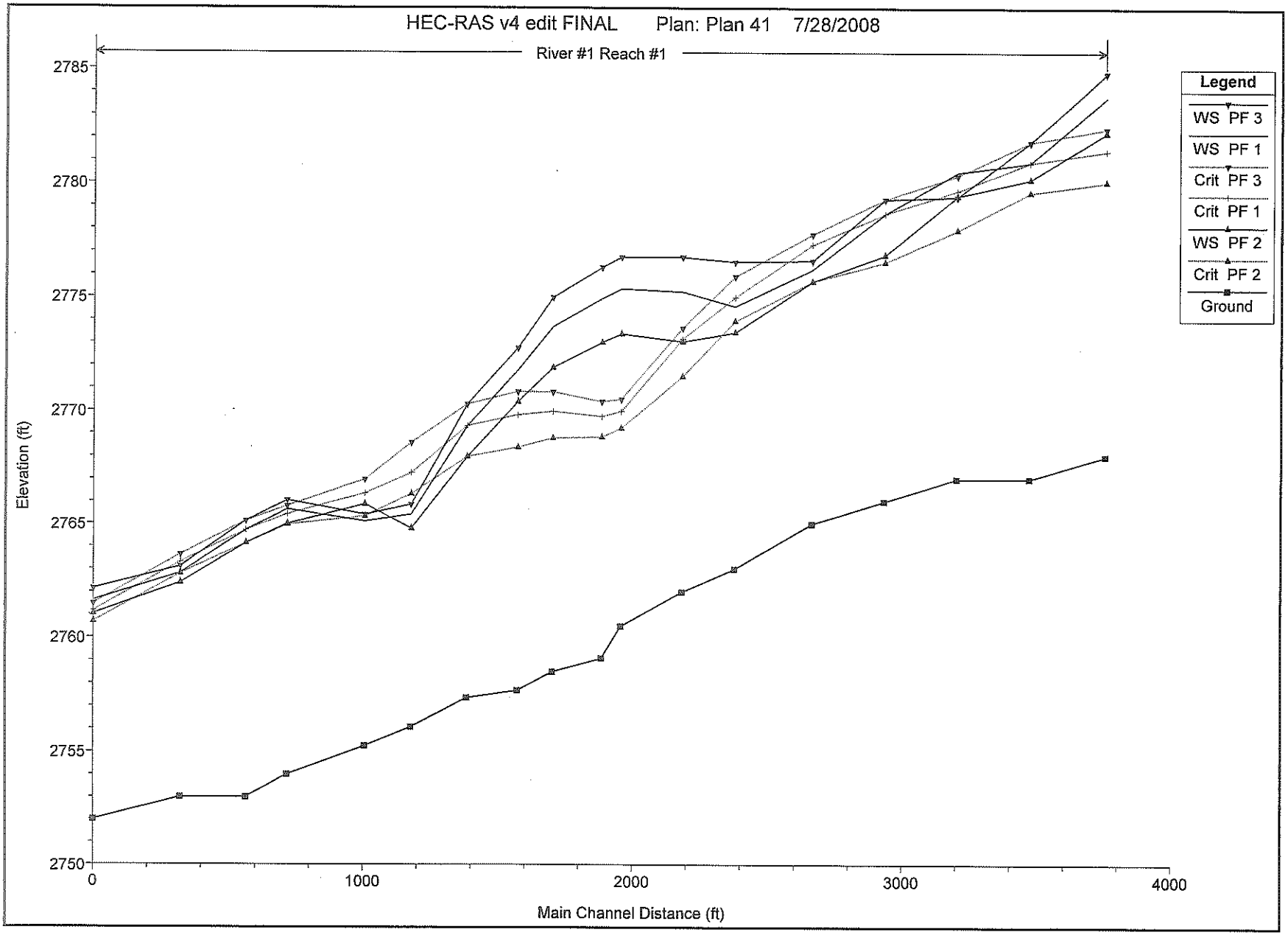

HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 130
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
WS PF 1
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 120
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 115
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 110
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
Crit PF 2
WS PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
RS = 100
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 41 7/28/2008
River #1 Reach #1
Elevation (ft)
2785
2780
2775
2770
2765
2760
2755
2750
0
1000
2000
3000
4000
Main Channel Distance (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground

ALTERNATIVE 2

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

****

PROJECT DATA
Project Title: HEC-RAS v4 edit FINAL
Project File : v4_FINAL.prj
Run Date and Time: 7/28/2008 2:10:26 PM

Project in English units

****

PLAN DATA

Plan Title: Plan 42
Plan File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.p42

Geometry Title: Alternative 2
Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g10

Flow Title : Flow Profiles
Flow File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Plan Summary Information:

Number of:	Cross Sections =	18	Multiple Openings =	0
	Culverts =	0	Inline Structures =	0
	Bridges =	0	Lateral Structures =	0

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

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

****

FLOW DATA

Flow Title: Flow Profiles
Flow File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2	PF 3
River #1	Reach #1	225	31000	24490	36000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River #1	Reach #1	PF 1	Known WS = 2784.88	Known WS = 2761.65
River #1	Reach #1	PF 2	Known WS = 2783.7	Known WS = 2761.06
River #1	Reach #1	PF 3	Known WS = 2785.58	Known WS = 2762.17

****

GEOMETRY DATA

Geometry Title: Alternative 2
Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g10

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 225

INPUT
Description:
Station Elevation Data num= 87

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600	2787	-527.4	2786	-514.33	2786	-503	2787	-490.5	2787
-483.14	2786	-430.62	2785	-415.31	2785	-385.29	2785	-379.5	2784
-373.64	2783	-367.89	2782	-362.54	2781	-335.28	2780	-319.81	2779
-309.13	2779	-289.6	2780	-286.98	2781	-284.35	2782	-281.73	2783
-279.1	2784	-265.97	2784	-248.75	2784	-107.38	2784	-45.25	2784
-31.61	2784	48.35	2784	54.16	2784	56.16	2783	58.16	2782
60.16	2781	62.16	2780	64.15	2779	66.14	2778	68.14	2777

70.13	2776	72.11	2775	74.12	2774	76.14	2773	78.74	2772
82.21	2771	85.67	2770	89.14	2769	92.61	2768	122.93	2768
133.3	2769	169.83	2770	179.3	2771	182.56	2772	185.85	2773
191.57	2774	200.62	2775	210.54	2776	215.34	2776	220.78	2775
226.28	2774	226.63	2774	232.86	2775	239.08	2776	251.88	2777
259.19	2778	262.5	2779	265.81	2780	269.11	2781	272.46	2782
277.36	2783	282.24	2784	287.11	2785	294.48	2785	301.44	2784
367.61	2783	378.84	2782	390.07	2781	426.4	2780	455.43	2780
512.28	2781	521.82	2781	734.04	2780	745.89	2779	758.18	2779
772.24	2780	777.86	2781	783.57	2782	799.74	2782	826.6	2782
838.75	2783	841.94	2787						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	48.35	.03	287.11	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.35	287.11	299.75	282.05	262.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	48.35	2790	F
287.11	841.94	2790	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2786.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.66	Wt. n-Val.		0.030	
W.S. Elev (ft)	2783.79	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2781.42	Flow Area (sq ft)		2368.69	
E.G. Slope (ft/ft)	0.003148	Area (sq ft)	331.46	2368.69	1497.45
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	849.40	Top Width (ft)	98.63	226.64	524.13
Vel Total (ft/s)	13.09	Avg. Vel. (ft/s)		13.09	
Max Chl Dpth (ft)	15.79	Hydr. Depth (ft)		10.45	
Conv. Total (cfs)	552522.3	Conv. (cfs)		552522.3	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		231.77	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.01	
Alpha	1.00	Stream Power (lb/ft s)		26.29	
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	17.64	203.66	75.58
C & E Loss (ft)	0.15	Cum SA (acres)	13.35	27.77	37.33

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2784.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	2782.23	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2780.05	Flow Area (sq ft)		2023.49	
E.G. Slope (ft/ft)	0.003108	Area (sq ft)	187.89	2023.49	748.39
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	754.54	Top Width (ft)	85.48	215.90	453.17
Vel Total (ft/s)	12.10	Avg. Vel. (ft/s)		12.10	
Max Chl Dpth (ft)	14.23	Hydr. Depth (ft)		9.37	
Conv. Total (cfs)	439315.6	Conv. (cfs)		439315.6	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		220.49	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		1.78	
Alpha	1.00	Stream Power (lb/ft s)		21.55	
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)	9.77	176.48	46.41
C & E Loss (ft)	0.08	Cum SA (acres)	9.02	26.38	31.65

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2787.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.95	Wt. n-Val.		0.030	
W.S. Elev (ft)	2784.84	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2782.42	Flow Area (sq ft)		2613.48	
E.G. Slope (ft/ft)	0.003262	Area (sq ft)	712.12	2613.48	2061.12
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1215.25	Top Width (ft)	432.69	237.96	544.60
Vel Total (ft/s)	13.77	Avg. Vel. (ft/s)		13.77	
Max Chl Dpth (ft)	16.84	Hydr. Depth (ft)		10.98	
Conv. Total (cfs)	630296.7	Conv. (cfs)		630296.7	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		243.24	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.19	
Alpha	1.00	Stream Power (lb/ft s)		30.14	
Frctn Loss (ft)	1.26	Cum Volume (acre-ft)	25.16	221.98	101.75
C & E Loss (ft)	0.16	Cum SA (acres)	17.59	28.21	40.26

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 220

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-581.45	2790	-578.15	2789	-569.74	2788	-557.64	2787	-527.23	2786
-505.43	2785	-463.74	2785	-455.79	2785	-443.54	2785	-433.72	2785
-425.53	2784	-417.97	2783	-380.36	2783	-349.98	2783	-307.83	2783
-282.84	2783	-261.98	2782	-239.35	2781	-190.7	2780	-183.94	2779
-175.54	2778	-157.15	2777	-133.21	2777	-112.75	2778	-89.46	2779
0	2780	93.96	2781	93.97	2781	123.68	2781	123.69	2781
125.31	2780	126.91	2779	128.5	2778	128.51	2778	130.1	2777
131.69	2776	131.7	2775.99	133.28	2775	134.86	2774	134.87	2774
136.44	2773	136.45	2772.99	138.01	2772	138.02	2772	139.58	2771
139.59	2770.99	141.14	2770	141.15	2769.99	142.52	2769	159.27	2768
159.28	2768	162.78	2767	187.06	2767	198.25	2768	198.26	2768
204.67	2769	210.08	2770	213.61	2771	215.17	2772	215.18	2772
221.37	2773	224.62	2773.16	241.47	2774	241.48	2774	279.56	2774
320.64	2774	324.91	2775	324.92	2775	329.19	2776	333.46	2777
333.47	2777	337.74	2778	342.02	2779	346.29	2780	346.3	2780
351.04	2781	354.75	2781.74	356.06	2782	468.74	2782	570.77	2781
570.78	2781	576.15	2780	582.31	2779	588.49	2778	588.5	2778
635.74	2778	648.28	2778	648.29	2778	650.75	2778	650.76	2778
657.91	2779	677.66	2780	677.67	2780	685.61	2780	704.82	2779
761.06	2779	800.38	2779	800.39	2779	821.89	2778	871.9	2778
871.91	2778	918.79	2779	922.82	2780	922.83	2780	927.55	2781
927.56	2781	954.11	2782	954.12	2782	1008.32	2783	1008.33	2783

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-581.45	.045	123.69	.03	354.75	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
123.69	354.75	277.65	269.4	261.19	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-581.45	123.69	2785	F
354.75	1008.33	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2785.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.92	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2780.92	Flow Area (sq ft)		1897.98	
E.G. Slope (ft/ft)	0.006598	Area (sq ft)	500.52	1897.98	790.65
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	904.77	Top Width (ft)	321.96	226.84	355.97
Vel Total (ft/s)	16.33	Avg. Vel. (ft/s)		16.33	
Max Chl Dpth (ft)	13.92	Hydr. Depth (ft)		8.37	
Conv. Total (cfs)	381638.5	Conv. (cfs)		381638.5	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		232.04	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.37	
Alpha	1.00	Stream Power (lb/ft s)		55.03	
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)	14.78	189.85	68.69
C & E Loss (ft)	0.48	Cum SA (acres)	11.90	26.30	34.68

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: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2783.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.12	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.16	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2779.58	Flow Area (sq ft)		1728.23	
E.G. Slope (ft/ft)	0.005463	Area (sq ft)	297.80	1728.23	524.30
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	784.47	Top Width (ft)	214.10	222.03	348.34
Vel Total (ft/s)	14.17	Avg. Vel. (ft/s)		14.17	
Max Chl Dpth (ft)	13.16	Hydr. Depth (ft)		7.78	
Conv. Total (cfs)	331339.7	Conv. (cfs)		331339.7	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		226.94	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.60	
Alpha	1.00	Stream Power (lb/ft s)		36.81	
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	8.10	164.33	42.58
C & E Loss (ft)	0.29	Cum SA (acres)	7.98	24.96	29.24

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

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2786.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.54	Wt. n-Val.		0.030	
W.S. Elev (ft)	2781.82	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2781.82	Flow Area (sq ft)		2104.79	
E.G. Slope (ft/ft)	0.006460	Area (sq ft)	832.95	2104.79	1156.10
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1075.72	Top Width (ft)	381.66	231.06	463.00
Vel Total (ft/s)	17.10	Avg. Vel. (ft/s)		17.10	
Max Chl Dpth (ft)	14.82	Hydr. Depth (ft)		9.11	
Conv. Total (cfs)	447891.0	Conv. (cfs)		447891.0	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		236.36	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.59	
Alpha	1.00	Stream Power (lb/ft s)		61.43	
Frctn Loss (ft)	1.57	Cum Volume (acre-ft)	19.85	206.70	92.07
C & E Loss (ft)	0.44	Cum SA (acres)	14.79	26.70	37.23

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 215

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600	2791	-597.36	2790	-594.38	2789	-591.34	2788	-588.34	2787
-585.87	2786	-583.46	2785	-574.84	2784	-529.58	2783	-494.62	2782
-493.31	2782	-466.31	2782	-418.17	2781	-406.34	2781	-357.18	2781
-292.94	2780	22.72	2779	71.36	2778	79.77	2777	83.57	2776
87.37	2775	91.17	2774	94.97	2773	97.27	2772	99.2	2771
101.13	2770	103.06	2769	111.41	2768	118.38	2767	160.1	2767
165.01	2768	169.93	2769	174.87	2770	240.22	2771	270.17	2772
274.15	2773	280.87	2774	287.59	2775	294.31	2776	301.03	2777
307.75	2778	350.35	2779	373.61	2780	494.04	2780	528.29	2779
542.52	2778	588.86	2777	611.04	2776	639.44	2776	644.41	2777
652.37	2778	665.66	2779	769.93	2779	798.66	2778	809.36	2777
839.56	2776	858.07	2776	928.58	2777	933.82	2778	939.05	2779
944.29	2780	950.35	2781						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	22.72	.03	350.35	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
22.72	350.35	294.95	268.22	230.48	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	22.72	2785	F
357.15	950.35	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2783.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2780.49	Reach Len. (ft)	294.95	268.22	230.48
Crit W.S. (ft)	2779.67	Flow Area (sq ft)		2416.70	9.10
E.G. Slope (ft/ft)	0.004711	Area (sq ft)	318.35	2416.70	1327.16
Q Total (cfs)	31000.00	Flow (cfs)		30974.96	25.04
Top Width (ft)	1271.30	Top Width (ft)	346.79	327.63	596.88
Vel Total (ft/s)	12.78	Avg. Vel. (ft/s)		12.82	2.75
Max Chl Dpth (ft)	13.48	Hydr. Depth (ft)		7.38	1.34
Conv. Total (cfs)	451664.8	Conv. (cfs)		451300.0	364.8
Length Wtd. (ft)	268.20	Wetted Per. (ft)		330.12	6.81
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.15	0.39
Alpha	1.01	Stream Power (lb/ft s)		27.59	1.08
Frctn Loss (ft)	1.56	Cum Volume (acre-ft)	12.17	176.51	62.34
C & E Loss (ft)	0.02	Cum SA (acres)	9.77	24.59	31.82

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2781.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.17	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2779.44	Reach Len. (ft)	294.95	268.22	230.48
Crit W.S. (ft)	2777.92	Flow Area (sq ft)		2073.47	1.98
E.G. Slope (ft/ft)	0.004906	Area (sq ft)	30.14	2073.47	781.98

* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24487.99	* 2.01	*
* Top Width (ft)	* 903.76	* Top Width (ft)	*	137.95	* 327.63	* 438.18	*
* Vel Total (ft/s)	* 11.80	* Avg. Vel. (ft/s)	*		* 11.81	* 1.01	*
* Max Chl Dpth (ft)	* 12.44	* Hydr. Depth (ft)	*		* 6.33	* 0.29	*
* Conv. Total (cfs)	*349644.7	* Conv. (cfs)	*		*349616.0	* 28.7	*
* Length Wtd. (ft)	* 268.22	* Wetted Per. (ft)	*		* 330.12	* 6.81	*
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 1.92	* 0.09	*
Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 22.72	* 0.09	*
Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	*	7.05	* 152.57	* 38.67	*
C & E Loss (ft)	* 0.10	* Cum SA (acres)	*	6.86	* 23.26	* 26.89	*

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2784.13	* Element	*	Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.72	* Wt. n-Val.	*		* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2779.41	* Reach Len. (ft)	*	294.95	* 268.22	* 230.48	*
* Crit W.S. (ft)	* 2780.35	* Flow Area (sq ft)	*		* 2063.55	* 1.77	*
* E.G. Slope (ft/ft)	*0.010772	* Area (sq ft)	*	26.11	* 2063.55	* 768.74	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*35997.52	* 2.48	*
* Top Width (ft)	* 892.30	* Top Width (ft)	*	128.39	* 327.63	* 436.28	*
* Vel Total (ft/s)	* 17.43	* Avg. Vel. (ft/s)	*		* 17.44	* 1.40	*
* Max Chl Dpth (ft)	* 12.41	* Hydr. Depth (ft)	*		* 6.30	* 0.26	*
* Conv. Total (cfs)	*346857.0	* Conv. (cfs)	*		*346833.1	* 23.9	*
* Length Wtd. (ft)	* 268.20	* Wetted Per. (ft)	*		* 330.12	* 6.81	*
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 4.20	* 0.18	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 73.33	* 0.24	*
* Frctn Loss (ft)	* 2.21	* Cum Volume (acre-ft)	*	17.11	* 193.81	* 86.30	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	13.16	* 24.97	* 34.53	*

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 210

PUT
scription:
cation Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-614.23	2787.75	-596.1	2786.75	-542.4	2785.75	-516.9	2784.75	-424.44	2783.75
-412.49	2782.75	-394.83	2781.75	-379.82	2780.75	-371.56	2781	-360.26	2780
-302.66	2779	-125.77	2778	-116.44	2778	0	2779	83.98	2779
120.42	2778	175.57	2777	179.48	2776	183.19	2775	186.89	2774
190.59	2773	194.29	2772	198	2771	201.7	2770	205.4	2769
209.11	2768	212.81	2767	216.2	2766	262.35	2766	287.31	2767
299.68	2767.58	308.47	2768	316.57	2769	356.57	2770	363.17	2771
371.31	2772	379.21	2773	387.12	2774	393.96	2775	400.77	2776
419.08	2777	420.22	2777.02	492.78	2778	516.88	2779	542.96	2779
542.97	2779	551.39	2778	559.71	2777	623.32	2776	653.95	2775
677.99	2775	689.88	2776	701.76	2777	713.64	2778	846.55	2778
880.52	2777	931.83	2776	949.52	2775	978.42	2775	1020.01	2776
1023.25	2777	1026.61	2778	1029.97	2779	1033.37	2780	1041.03	2781
1066.33	2782	1122.14	2782						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-614.23	.045	83.98	.03	516.88	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
83.98	516.88	283.6	269.08	254.74	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-614.23	83.98	2783	F
516.88	1122.14	2783	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2781.45	* Element	*	Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.79	* Wt. n-Val.	*		* 0.030	*	*
* W.S. Elev (ft)	* 2778.66	* Reach Len. (ft)	*	283.60	* 269.08	* 254.74	*
* Crit W.S. (ft)	* 2778.66	* Flow Area (sq ft)	*		* 2313.85	*	*
* E.G. Slope (ft/ft)	*0.007383	* Area (sq ft)	*	69.68	* 2313.85	* 952.49	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*		*31000.00	*	*
* Top Width (ft)	* 1097.58	* Top Width (ft)	*	202.40	* 412.21	* 482.97	*
* Vel Total (ft/s)	* 13.40	* Avg. Vel. (ft/s)	*		* 13.40	*	*
* Max Chl Dpth (ft)	* 12.66	* Hydr. Depth (ft)	*		* 5.61	*	*
* Conv. Total (cfs)	*360784.2	* Conv. (cfs)	*		*360784.2	*	*
* Length Wtd. (ft)	* 268.92	* Wetted Per. (ft)	*		* 414.26	*	*
* Min Ch El (ft)	* 2766.00	* Shear (lb/sq ft)	*		* 2.57	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 34.49	*	*
Frctn Loss (ft)	* 1.53	* Cum Volume (acre-ft)	*	10.86	* 161.94	* 56.31	*
* C & E Loss (ft)	* 0.31	* Cum SA (acres)	*	7.91	* 22.31	* 28.97	*

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

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2780.03	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.19	Wt. n-Val.		0.030		
W.S. Elev (ft)	2776.84	Reach Len. (ft)	283.60	269.08	254.74	
Crit W.S. (ft)	2776.53	Flow Area (sq ft)		1708.58		
E.G. Slope (ft/ft)	0.006179	Area (sq ft)		1708.58	279.01	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00		
Top Width (ft)	503.53	Top Width (ft)		239.90	263.64	
Vel Total (ft/s)	14.33	Avg. Vel. (ft/s)		14.33		
Max Chl Dpth (ft)	10.84	Hydr. Depth (ft)		7.12		
Conv. Total (cfs)	311544.8	Conv. (cfs)		311544.8		
Length Wtd. (ft)	269.02	Wetted Per. (ft)		241.89		
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72		
Alpha	1.00	Stream Power (lb/ft s)		39.06		
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	6.95	140.93	35.86	
C & E Loss (ft)	0.23	Cum SA (acres)	6.40	21.51	25.03	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2782.30	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.01	Wt. n-Val.		0.030		
W.S. Elev (ft)	2779.29	Reach Len. (ft)	283.60	269.08	254.74	
Crit W.S. (ft)	2779.29	Flow Area (sq ft)		2585.10		
E.G. Slope (ft/ft)	0.007343	Area (sq ft)	271.74	2585.10	1268.72	
Q Total (cfs)	36000.00	Flow (cfs)		36000.00		
Top Width (ft)	1350.50	Top Width (ft)	403.52	432.90	514.09	
Vel Total (ft/s)	13.93	Avg. Vel. (ft/s)		13.93		
Max Chl Dpth (ft)	13.29	Hydr. Depth (ft)		5.97		
Conv. Total (cfs)	420112.1	Conv. (cfs)		420112.1		
Length Wtd. (ft)	268.78	Wetted Per. (ft)		434.97		
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72		
Alpha	1.00	Stream Power (lb/ft s)		37.94		
Frctn Loss (ft)	1.51	Cum Volume (acre-ft)	16.10	179.50	80.91	
C & E Loss (ft)	0.36	Cum SA (acres)	11.36	22.63	32.02	

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 205

INPUT
Description:
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2779.75	17.21	2778.75	28.7	2777.75	66.51	2776.75	94.56	2776.75
100.85	2776.75	468.23	2777	600.71	2777	670.1	2776	673.71	2775
677.6	2774	681.95	2773	686.31	2772	690.66	2771	695.01	2770
699.36	2769	703.71	2768	708.06	2767	712.41	2766	716.76	2765
780.93	2765	805.65	2766	827.39	2767	839.98	2768	855.27	2769
866.08	2770	876.89	2771	884.28	2772	887.51	2773	890.74	2774
893.96	2775	894.82	2775	897.09	2774	899.36	2773	907.15	2773
937.24	2774	983.75	2775	1019.24	2776	1175.04	2776	1314.05	2775
1444.32	2775	1447.57	2776	1450.85	2777	1454.14	2778	1457.58	2779
1460.79	2780	1572.29	2780	1594.22	2779	1655.34	2779	1675.82	2780
1723.5	2781	1758.89	2782	1762.13	2782	1876.53	2781	1913.81	2781
1931.12	2782	1958.13	2783	2003.69	2783	2099.98	2783	2221.07	2784
2374.26	2785	2425.16	2785	2552.13	2785				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	600.71	.03	1019.24	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
600.71	1019.24	280.12	286.64	293.88	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2779.34	Element	Left OB	Channel	Right OB	

* Vel Head (ft)	* 3.12	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.22	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.30	* Flow Area (sq ft)	*	* 2116.44	* 294.44	*
* E.G. Slope (ft/ft)	*0.008080	* Area (sq ft)	*	* 2116.44	* 294.44	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30320.23	* 679.77	*
* Top Width (ft)	* 793.24	* Top Width (ft)	*	* 364.20	* 429.04	*
* Vel Total (ft/s)	* 12.86	* Avg. Vel. (ft/s)	*	* 14.33	* 2.31	*
Max Chl Dpth (ft)	* 11.22	* Hydr. Depth (ft)	*	* 5.81	* 0.69	*
Conv. Total (cfs)	*344871.9	* Conv. (cfs)	*	*337309.5	* 7562.4	*
* Length Wtd. (ft)	* 287.14	* Wetted Per. (ft)	*	* 366.68	* 429.23	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.91	* 0.35	*
* Alpha	* 1.21	* Stream Power (lb/ft s)	*	* 41.71	* 0.80	*
* Frctn Loss (ft)	* 2.08	* Cum Volume (acre-ft)	* 10.63	* 148.26	* 52.67	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 7.26	* 19.91	* 26.30	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2778.12	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.43	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2775.69	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2775.69	* Flow Area (sq ft)	*	* 1931.75	* 123.12	*
* E.G. Slope (ft/ft)	*0.006333	* Area (sq ft)	*	* 1931.75	* 123.12	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24275.54	* 214.46	*
* Top Width (ft)	* 564.95	* Top Width (ft)	*	* 336.91	* 228.04	*
* Vel Total (ft/s)	* 11.92	* Avg. Vel. (ft/s)	*	* 12.57	* 1.74	*
* Max Chl Dpth (ft)	* 10.69	* Hydr. Depth (ft)	*	* 5.73	* 0.54	*
* Conv. Total (cfs)	*307743.6	* Conv. (cfs)	*	*305048.6	* 2695.0	*
* Length Wtd. (ft)	* 286.88	* Wetted Per. (ft)	*	* 339.34	* 228.14	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.25	* 0.21	*
* Alpha	* 1.10	* Stream Power (lb/ft s)	*	* 28.28	* 0.37	*
* Frctn Loss (ft)	* 1.49	* Cum Volume (acre-ft)	* 6.95	* 129.69	* 34.68	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 6.40	* 19.73	* 23.59	*

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: 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 #PF 3

E.G. Elev (ft)	* 2780.06	* Element	* Left OB	* Channel	* Right OB	*
Vel Head (ft)	* 3.45	* Wt. n-Val.	*	* 0.030	* 0.045	*
W.S. Elev (ft)	* 2776.61	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.75	* Flow Area (sq ft)	*	* 2263.62	* 461.87	*
* E.G. Slope (ft/ft)	*0.009177	* Area (sq ft)	*	* 2263.62	* 461.87	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*34469.06	* 1530.94	*
* Top Width (ft)	* 821.56	* Top Width (ft)	*	* 391.24	* 430.32	*
* Vel Total (ft/s)	* 13.21	* Avg. Vel. (ft/s)	*	* 15.23	* 3.31	*
* Max Chl Dpth (ft)	* 11.61	* Hydr. Depth (ft)	*	* 5.79	* 1.07	*
* Conv. Total (cfs)	*375805.2	* Conv. (cfs)	*	*359823.7	* 15981.5	*
* Length Wtd. (ft)	* 287.82	* Wetted Per. (ft)	*	* 393.72	* 430.56	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 3.29	* 0.61	*
* Alpha	* 1.28	* Stream Power (lb/ft s)	*	* 50.16	* 2.04	*
* Frctn Loss (ft)	* 2.20	* Cum Volume (acre-ft)	* 15.22	* 164.52	* 75.85	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 10.05	* 20.08	* 29.26	*

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.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 200

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2780	57.36	2780	60.61	2779	63.64	2778	66.72	2777
82.64	2776	133.38	2775	157.32	2774	160.71	2773	164.05	2772
167.4	2771	170.76	2770	174.13	2769	177.5	2768	180.93	2767
196.35	2766	210.46	2765	223.84	2764	238.32	2763	259.65	2763
259.7	2763	274.72	2764	330.68	2765	338.84	2766	343.67	2767
348.5	2768	354.06	2769	359.85	2770	365.64	2771	371.43	2772
377.22	2773	380.61	2773	529.52	2773	534.88	2772	540.16	2771
545.4	2770	561.87	2770	628.9	2771	670.42	2772	691.36	2773
726.72	2773	751.79	2773	852.22	2774	1033.68	2775	1050.22	2775
1183.08	2776	1186.05	2777	1189.02	2778	1191.99	2779	1246.04	2779
1253.82	2778	1267.34	2778	1270.81	2779	1388.57	2780	1424.17	2780
1424.18	2780	1474.73	2780	1528.93	2781	1568.19	2781	1595.98	2781
1670.08	2782	1757.29	2783						

ning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	157.32	.03	380.61	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
157.32 380.61 179.8 195.07 210.23 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2777.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.87	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2774.60	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2774.99	Flow Area (sq ft)	4.36	1897.21	1052.36
E.G. Slope (ft/ft)	0.004947	Area (sq ft)	4.36	1897.21	1052.36
Q Total (cfs)	31000.00	Flow (cfs)	4.55	27365.53	3629.92
Top Width (ft)	818.81	Top Width (ft)	14.44	223.29	581.08
Vel Total (ft/s)	10.49	Avg. Vel. (ft/s)	1.04	14.42	3.45
Max Chl Dpth (ft)	11.60	Hydr. Depth (ft)	0.30	8.50	1.81
Conv. Total (cfs)	440756.3	Conv. (cfs)	64.7	389081.7	51610.0
Length Wtd. (ft)	197.55	Wetted Per. (ft)	14.45	225.19	581.41
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.09	2.60	0.56
Alpha	1.68	Stream Power (lb/ft s)	0.10	37.53	1.93
Frctn Loss (ft)	1.79	Cum Volume (acre-ft)	10.61	135.05	48.12
C & E Loss (ft)	0.07	Cum SA (acres)	7.21	17.98	22.89

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 #PF 2

E.G. Elev (ft)	2776.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2773.47	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2773.95	Flow Area (sq ft)		1643.45	496.72
E.G. Slope (ft/ft)	0.005630	Area (sq ft)		1643.45	496.72
Q Total (cfs)	24490.00	Flow (cfs)		23109.66	1380.34
Top Width (ft)	639.31	Top Width (ft)		221.48	417.84
Vel Total (ft/s)	11.44	Avg. Vel. (ft/s)		14.06	2.78
Max Chl Dpth (ft)	10.46	Hydr. Depth (ft)		7.42	1.19
Conv. Total (cfs)	326395.8	Conv. (cfs)		307999.0	18396.8
Length Wtd. (ft)	196.56	Wetted Per. (ft)		223.29	418.17
Min Ch El (ft)	2763.00	Shear (lb/sq ft)		2.59	0.42
Alpha	1.43	Stream Power (lb/ft s)		36.37	1.16
Frctn Loss (ft)	1.71	Cum Volume (acre-ft)	6.95	117.92	32.59
C & E Loss (ft)	0.05	Cum SA (acres)	6.40	17.89	21.41

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2778.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2776.84	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2775.91	Flow Area (sq ft)	129.70	2396.84	2708.99
E.G. Slope (ft/ft)	0.002126	Area (sq ft)	129.70	2396.84	2708.99
Q Total (cfs)	36000.00	Flow (cfs)	255.50	26485.92	9258.58
Top Width (ft)	1116.32	Top Width (ft)	88.07	223.29	804.97
Vel Total (ft/s)	6.88	Avg. Vel. (ft/s)	1.97	11.05	3.42
Max Chl Dpth (ft)	13.84	Hydr. Depth (ft)	1.47	10.73	3.37
Conv. Total (cfs)	780785.1	Conv. (cfs)	5541.4	574439.2	200804.4
Length Wtd. (ft)	198.68	Wetted Per. (ft)	88.12	225.19	805.44
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.20	1.41	0.45
Alpha	1.96	Stream Power (lb/ft s)	0.38	15.61	1.53
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	14.80	149.19	65.16
C & E Loss (ft)	0.19	Cum SA (acres)	9.76	18.06	25.09

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 195

INPUT
Description:
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
26.87	2778.75	80.18	2778.75	91.81	2777.75	102.18	2776.75	109.95	2775.75
196.7	2774	238.41	2773	243.26	2772	248.12	2771	252.97	2770
267.11	2769	278.26	2768	282.3	2767	286.64	2766	294.54	2765
315.54	2764	336.81	2763	362.46	2762	375.59	2762	395.84	2763
410.49	2764	456.09	2765	471.11	2766	476.14	2767	481.17	2768
488.94	2768	495.94	2767	498.12	2767	504.07	2768	509.82	2769
514.48	2770	532.03	2770	544.86	2770	571.92	2770	575.9	2769
579.84	2768	583.78	2767	597.25	2767	608.28	2768	619.31	2769
630.34	2770	641.37	2771	679.44	2772	894.51	2772	904.56	2771
913.16	2770	918.98	2770	922.78	2771	926.49	2772	930.19	2773
933.9	2774	939.14	2774	962.74	2773	967.03	2773	999.74	2774
1400	2780								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
26.87	.045	238.41	.03	514.48	.045

ık Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
238.41	514.48	215.83	225.58	311.98	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2776.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.00	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2775.47	Reach Len. (ft)	215.83	225.58	311.98

Crit W.S. (ft)	2773.18	Flow Area (sq ft)	135.84	2785.41	2062.05	
E.G. Slope (ft/ft)	0.001484	Area (sq ft)	135.84	2785.41	2062.05	
Q Total (cfs)	31000.00	Flow (cfs)	193.44	24729.52	6077.04	
Top Width (ft)	974.08	Top Width (ft)	114.63	276.07	583.39	
Vel Total (ft/s)	6.22	Avg. Vel. (ft/s)	1.42	8.88	2.95	
Max Chl Dpth (ft)	13.47	Hydr. Depth (ft)	1.19	10.09	3.53	
Conv. Total (cfs)	804808.9	Conv. (cfs)	5022.1	642017.4	157769.4	
Length Wtd. (ft)	234.02	Wetted Per. (ft)	114.65	277.47	584.64	
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.11	0.93	0.33	
Alpha	1.67	Stream Power (lb/ft s)	0.16	8.26	0.96	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	10.32	124.57	40.61	
C & E Loss (ft)	0.14	Cum SA (acres)	6.94	16.86	20.08	

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.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2774.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.37	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2773.31	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2771.52	Flow Area (sq ft)	2.04	2189.66	960.47
E.G. Slope (ft/ft)	0.002552	Area (sq ft)	2.04	2189.66	960.47
Q Total (cfs)	24490.00	Flow (cfs)	0.99	21716.72	2772.29
Top Width (ft)	727.91	Top Width (ft)	13.05	276.07	438.79
Vel Total (ft/s)	7.77	Avg. Vel. (ft/s)	0.48	9.92	2.89
Max Chl Dpth (ft)	11.31	Hydr. Depth (ft)	0.16	7.93	2.19
Conv. Total (cfs)	484791.1	Conv. (cfs)	19.6	429892.8	54878.7
Length Wtd. (ft)	230.47	Wetted Per. (ft)	13.06	277.47	439.91
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.02	1.26	0.35
Alpha	1.46	Stream Power (lb/ft s)	0.01	12.47	1.00
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	6.94	109.34	29.08
C & E Loss (ft)	0.25	Cum SA (acres)	6.37	16.78	19.35

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2777.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.82	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2776.98	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2773.66	Flow Area (sq ft)	333.97	3202.55	3019.69
E.G. Slope (ft/ft)	0.001075	Area (sq ft)	333.97	3202.55	3019.69
Q Total (cfs)	36000.00	Flow (cfs)	649.49	26564.15	8786.36
Top Width (ft)	1098.89	Top Width (ft)	138.64	276.07	684.18
Vel Total (ft/s)	5.49	Avg. Vel. (ft/s)	1.94	8.29	2.91
Max Chl Dpth (ft)	14.98	Hydr. Depth (ft)	2.41	11.60	4.41
Conv. Total (cfs)	1097904.0	Conv. (cfs)	19807.8	810135.8	267960.5
Length Wtd. (ft)	236.08	Wetted Per. (ft)	138.74	277.47	685.45
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.16	0.77	0.30
Alpha	1.75	Stream Power (lb/ft s)	0.31	6.43	0.86
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	13.84	136.65	51.33
C & E Loss (ft)	0.08	Cum SA (acres)	9.30	16.94	21.50

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 190

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-99.71	2778	85.29	2776.24	86.48	2775.75	90.2	2774.75	93.57	2773.75
96.92	2772.75	100.08	2771.75	102.72	2770.75	105.24	2769.76	105.24	2769.75
107.77	2768.75	110.47	2768.2	124.39	2767.75	204.15	2766.75	210.65	2766.39
214.06	2765.75	219.98	2764.75	224.93	2763.09	252.41	2763.52	259.56	2764.25
288.16	2763.13	292.48	2761.87	301.29	2761.46	303.05	2760.65	305.84	2761.23
314.29	2763	332	2762	335.19	2761	387.24	2760.49	390.36	2761
390.36	2761.01	392.23	2764.51	402.23	2762	413.83	2763	425.43	2764
429.38	2764.26	440.47	2765	486.39	2766	526.25	2767	551.56	2768
588.96	2768.96	589.86	2769	593.28	2770	594.72	2769.73	596.66	2771
600.08	2772	603.53	2773	608.4	2774	612.53	2775	616.08	2776
632.62	2776	1014.62	2780						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-99.71	.045	85.29	.03	616.08	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
85.29	616.08	77.8	72.37	83.03	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2776.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.54	Wt. n-Val.		0.030	
W.S. Elev (ft)	2775.57	Reach Len. (ft)	77.80	72.37	83.03
Crit W.S. (ft)	2770.00	Flow Area (sq ft)		5260.27	
E.G. Slope (ft/ft)	0.000670	Area (sq ft)		5260.27	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	527.41	Top Width (ft)		527.41	
Vel Total (ft/s)	5.89	Avg. Vel. (ft/s)		5.89	
Max Chl Dpth (ft)	15.08	Hydr. Depth (ft)		9.97	

```
* Conv. Total (cfs)       *1197790.0  * Conv. (cfs)              *          *1197790.0  *          *
* Length Wtd. (ft)        *   72.37  * Wetted Per. (ft)         *          *  533.65  *          *
* Min Ch El (ft)          * 2760.49  * Shear (lb/sq ft)         *          *    0.41  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)    *          *    2.43  *          *
* Frctn Loss (ft)         *    0.06  * Cum Volume (acre-ft)      *    9.99  *  103.74  *   33.22  *
* C & E Loss (ft)         *    0.03  * Cum SA (acres)            *    6.66  *   14.78  *   17.99  *
*****************************************************************************************

 .OSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)          * 2774.12  * Element                   *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.52  * Wt. n-Val.                *          *    0.030  *          *
* W.S. Elev (ft)          * 2773.60  * Reach Len. (ft)           *   77.80  *   72.37  *   83.03  *
* Crit W.S. (ft)          * 2769.25  * Flow Area (sq ft)         *          * 4232.78  *          *
* E.G. Slope (ft/ft)      *0.000829  * Area (sq ft)              *          * 4232.78  *          *
* Q Total (cfs)           *24490.00  * Flow (cfs)                *          *24490.00  *          *
* Top Width (ft)          *  512.34  * Top Width (ft)            *          *  512.34  *          *
* Vel Total (ft/s)        *    5.79  * Avg. Vel. (ft/s)          *          *    5.79  *          *
* Max Chl Dpth (ft)       *   13.11  * Hydr. Depth (ft)          *          *    8.26  *          *
* Conv. Total (cfs)       *850471.6  * Conv. (cfs)               *          *850471.6  *          *
* Length Wtd. (ft)        *   72.37  * Wetted Per. (ft)          *          *  518.07  *          *
* Min Ch El (ft)          * 2760.49  * Shear (lb/sq ft)          *          *    0.42  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)    *          *    2.45  *          *
* Frctn Loss (ft)         *    0.07  * Cum Volume (acre-ft)      *    6.94  *   92.71  *   25.64  *
* C & E Loss (ft)         *    0.03  * Cum SA (acres)            *    6.34  *   14.74  *   17.77  *
*****************************************************************************************

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)          * 2777.54  * Element                   *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.55  * Wt. n-Val.                *   0.045  *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2776.99  * Reach Len. (ft)           *   77.80  *   72.37  *   83.03  *
* Crit W.S. (ft)          * 2770.53  * Flow Area (sq ft)         *   29.24  * 6010.34  *   62.71  *
* E.G. Slope (ft/ft)      *0.000583  * Area (sq ft)              *   29.24  * 6010.34  *   62.71  *
* Q Total (cfs)           *36000.00  * Flow (cfs)                *   12.08  *35953.69  *   34.23  *
* Top Width (ft)          *  719.88  * Top Width (ft)            *   78.40  *  530.79  *  110.69  *
* Vel Total (ft/s)        *    5.90  * Avg. Vel. (ft/s)          *    0.41  *    5.98  *    0.55  *
* Max Chl Dpth (ft)       *   16.50  * Hydr. Depth (ft)          *    0.37  *   11.32  *    0.57  *
* Conv. Total (cfs)       *1491078.0  * Conv. (cfs)              *   500.2  *1489160.0  *  1417.9  *
* Length Wtd. (ft)        *   72.38  * Wetted Per. (ft)          *   78.40  *  537.21  *  110.69  *
* Min Ch El (ft)          * 2760.49  * Shear (lb/sq ft)          *    0.01  *    0.41  *    0.02  *
* Alpha                   *    1.03  * Stream Power (lb/ft s)    *    0.01  *    2.44  *    0.01  *
* Frctn Loss (ft)         *    0.05  * Cum Volume (acre-ft)      *   12.94  *  112.80  *   40.30  *
* C & E Loss (ft)         *    0.04  * Cum SA (acres)            *    8.76  *   14.85  *   18.65  *
*****************************************************************************************

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 180

 .PUT
 .scription:
 .cation Elevation Data     num=      52
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
    15.05 2776.75   32.58 2776.75   48.65 2776.75   49.95 2775.75   51.72 2774.75
    53.59 2773.75    55.5 2772.75   57.44 2771.75   59.59 2770.75    62.1 2769.75
    64.56 2768.76   64.56 2768.75   67.13 2767.47   67.71 2767.75   72.88 2766.28
    97.35 2766.75  119.19 2765.75  133.29 2765.33  136.67 2764.75  143.41 2762.38
    166.6 2762.71  170.36 2763.69   207.2 2762.94   207.2 2762.93  210.09 2761.47
   227.57 2761.13  247.23 2760.75  264.13 2759.08  318.52    2763  323.83 2759.53
   323.83 2759.52  327.41  2764.6  338.72    2764  354.33 2764.52  369.01    2765
   401.74    2766  408.05 2765.89  412.18    2767  414.21    2768  416.27    2769
   417.18 2767.25  417.18 2767.26  418.65    2770  421.02    2771  423.39    2772
   425.77    2773  428.14    2774  430.51    2775  431.09 2776.49  433.02    2776
   461.43    2776  761.43    2780

Manning's n Values         num=       3
      Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
    15.05    .045   48.65     .03  433.02    .045

Bank Sta: Left   Right     Lengths: Left Channel   Right     Coeff Contr.   Expan.
          48.65  433.02             44.45  181.54  256.85          .1          .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 2776.02  * Element                   *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.85  * Wt. n-Val.                *          *    0.030  *          *
* W.S. Elev (ft)          * 2775.17  * Reach Len. (ft)           *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)          * 2769.77  * Flow Area (sq ft)         *          * 4180.06  *          *
* E.G. Slope (ft/ft)      *0.000952  * Area (sq ft)              *          * 4180.06  *          *
* Q Total (cfs)           *31000.00  * Flow (cfs)                *          *31000.00  *          *
* Top Width (ft)          *  379.59  * Top Width (ft)            *          *  379.59  *          *
* Vel Total (ft/s)        *    7.42  * Avg. Vel. (ft/s)          *          *    7.42  *          *
* Max Chl Dpth (ft)       *   16.09  * Hydr. Depth (ft)          *          *   11.01  *          *
* Conv. Total (cfs)       *1004737.0  * Conv. (cfs)              *          *1004737.0  *          *
* Length Wtd. (ft)        *  181.54  * Wetted Per. (ft)          *          *  391.01  *          *
* Min Ch El (ft)          * 2759.08  * Shear (lb/sq ft)          *          *    0.64  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)    *          *    4.71  *          *
* Frctn Loss (ft)         *    0.29  * Cum Volume (acre-ft)      *    9.99  *   95.89  *   33.22  *
* C & E Loss (ft)         *    0.12  * Cum SA (acres)            *    6.66  *   14.02  *   17.99  *
*****************************************************************************************

 Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
          additional cross sections.
   ning: The conveyance ratio (upstream 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 #PF 2
*****************************************************************************************
* E.G. Elev (ft)          * 2774.02  * Element                   *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.78  * Wt. n-Val.                *          *    0.030  *          *
```

* W.S. Elev (ft)	* 2773.24	* Reach Len. (ft)	* 44.45	* 181.54	* 256.85	*
* Crit W.S. (ft)	* 2768.85	* Flow Area (sq ft)	*	* 3455.69	*	*
* E.G. Slope (ft/ft)	*0.001087	* Area (sq ft)	*	* 3455.69	*	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24490.00	*	*
* Top Width (ft)	* 371.77	* Top Width (ft)	*	* 371.77	*	*
* Vel Total (ft/s)	* 7.09	* Avg. Vel. (ft/s)	*	* 7.09	*	*
* Max Chl Dpth (ft)	* 14.16	* Hydr. Depth (ft)	*	* 9.30	*	*
Conv. Total (cfs)	*742810.8	* Conv. (cfs)	*	*742810.8	*	*
Length Wtd. (ft)	* 181.54	* Wetted Per. (ft)	*	* 382.24	*	*
* Min Ch El (ft)	* 2759.08	* Shear (lb/sq ft)	*	* 0.61	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 4.35	*	*
* Frctn Loss (ft)	* 0.33	* Cum Volume (acre-ft)	* 6.94	* 86.32	* 25.64	*
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 6.34	* 14.00	* 17.77	*

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 conveyance ratio (upstream 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 #PF 3

* E.G. Elev (ft)	* 2777.45	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.91	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.55	* Reach Len. (ft)	* 44.45	* 181.54	* 256.85	*
* Crit W.S. (ft)	* 2770.43	* Flow Area (sq ft)	*	* 4706.06	* 26.70	*
* E.G. Slope (ft/ft)	*0.000882	* Area (sq ft)	*	* 4706.06	* 26.70	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*35986.15	* 13.85	*
* Top Width (ft)	* 453.48	* Top Width (ft)	*	* 384.11	* 69.37	*
* Vel Total (ft/s)	* 7.61	* Avg. Vel. (ft/s)	*	* 7.65	* 0.52	*
* Max Chl Dpth (ft)	* 17.47	* Hydr. Depth (ft)	*	* 12.25	* 0.38	*
* Conv. Total (cfs)	*1212478.0	* Conv. (cfs)	*	*1212011.0	* 466.5	*
* Length Wtd. (ft)	* 181.56	* Wetted Per. (ft)	*	* 396.91	* 69.37	*
* Min Ch El (ft)	* 2759.08	* Shear (lb/sq ft)	*	* 0.65	* 0.02	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*	* 4.99	* 0.01	*
* Frctn Loss (ft)	* 0.28	* Cum Volume (acre-ft)	* 12.92	* 103.90	* 40.21	*
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 8.69	* 14.09	* 18.48	*

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: River #1
REACH: Reach #1 RS: 170

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2776.75	10.041	2776.75	11.208	2776.56	13.039	2775.75	14.984	2774.75
17.041	2773.75	19.445	2772.75	21.468	2771.75	23.419	2770.75	25.484	2769.75
27.471	2768.75	29.409	2767.75	30.901	2767.12	31.424	2766.75	33.545	2765.75
38.947	2765.75	39.428	2765.75	41.868	2765.12	60.352	2766.13	65.082	2765.97
66.072	2764.75	69.89	2764.75	71.743	2764.93	72.768	2764.75	85.567	2761.65
101.392	2761.27	114.672	2763.12	137.165	2763.34	145.296	2760.76	193.16	2760.8
199.171	2758.99	240.331	2758.49	254.092	2762.23	263.715	2762.13	265.413	2763.75
266.813	2764.75	268.199	2765.75	269.584	2766.75	270.801	2767.75	271.974	2768.75
273.155	2769.75	274.336	2770.75	275.524	2771.75	276.705	2772.75	282.843	2777

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	10.041	.03	276.705	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
10.041	276.705	130.15	130.15	130.15	.1	.3

Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
85	89	2780	147	151	2780	209	213	2780

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2775.61	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.06	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2773.55	* Reach Len. (ft)	* 130.15	* 130.15	* 130.15	*
* Crit W.S. (ft)	* 2770.35	* Flow Area (sq ft)	*	* 2690.82	* 0.46	*
* E.G. Slope (ft/ft)	*0.003348	* Area (sq ft)	*	* 2690.82	* 0.46	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30999.59	* 0.41	*
* Top Width (ft)	* 248.32	* Top Width (ft)	*	* 247.17	* 1.15	*
* Vel Total (ft/s)	* 11.52	* Avg. Vel. (ft/s)	*	* 11.52	* 0.91	*
* Max Chl Dpth (ft)	* 15.05	* Hydr. Depth (ft)	*	* 10.89	* 0.40	*
* Conv. Total (cfs)	*535776.1	* Conv. (cfs)	*	*535769.0	* 7.1	*
* Length Wtd. (ft)	* 130.15	* Wetted Per. (ft)	*	* 333.85	* 1.40	*
* Min Ch El (ft)	* 2758.49	* Shear (lb/sq ft)	*	* 1.68	* 0.07	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 19.41	* 0.06	*
* Frctn Loss (ft)	* 0.52	* Cum Volume (acre-ft)	* 9.99	* 81.58	* 33.22	*
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 6.66	* 12.72	* 17.99	*

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.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2773.59	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.84	* Wt. n-Val.	*	* 0.030	*	*

* W.S. Elev (ft)	* 2771.75	* Reach Len. (ft)	* 130.15	* 130.15	* 130.15	*
* Crit W.S. (ft)	* 2769.11	* Flow Area (sq ft)	*	* 2251.21	*	*
* E.G. Slope (ft/ft)	*0.003537	* Area (sq ft)	*	* 2251.21	*	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24490.00	*	*
* Top Width (ft)	* 242.05	* Top Width (ft)	*	* 242.05	*	*
* Vel Total (ft/s)	* 10.88	* Avg. Vel. (ft/s)	*	* 10.88	*	*
* Max Chl Dpth (ft)	* 13.26	* Hydr. Depth (ft)	*	* 9.30	*	*
* Conv. Total (cfs)	*411790.7	* Conv. (cfs)	*	*411790.7	*	*
* Length Wtd. (ft)	* 130.15	* Wetted Per. (ft)	*	* 317.20	*	*
* Min Ch El (ft)	* 2758.49	* Shear (lb/sq ft)	*	* 1.57	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 17.05	*	*
* Frctn Loss (ft)	* 0.51	* Cum Volume (acre-ft)	* 6.94	* 74.43	* 25.64	*
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 6.34	* 12.72	* 17.77	*

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.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2777.05	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.22	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2774.82	* Reach Len. (ft)	* 130.15	* 130.15	* 130.15	*
* Crit W.S. (ft)	* 2771.24	* Flow Area (sq ft)	*	* 3008.37	* 3.10	*
* E.G. Slope (ft/ft)	*0.003245	* Area (sq ft)	*	* 3008.37	* 3.10	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*35994.76	* 5.24	*
* Top Width (ft)	* 252.85	* Top Width (ft)	*	* 249.86	* 2.99	*
* Vel Total (ft/s)	* 11.95	* Avg. Vel. (ft/s)	*	* 11.96	* 1.69	*
* Max Chl Dpth (ft)	* 16.33	* Hydr. Depth (ft)	*	* 12.04	* 1.04	*
* Conv. Total (cfs)	*631968.9	* Conv. (cfs)	*	*631876.9	* 92.0	*
* Length Wtd. (ft)	* 130.15	* Wetted Per. (ft)	*	* 344.50	* 3.64	*
* Min Ch El (ft)	* 2758.49	* Shear (lb/sq ft)	*	* 1.77	* 0.17	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 21.17	* 0.29	*
* Frctn Loss (ft)	* 0.52	* Cum Volume (acre-ft)	* 12.92	* 87.82	* 40.12	*
* C & E Loss (ft)	* 0.14	* Cum SA (acres)	* 8.69	* 12.77	* 18.26	*

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.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 160

INPUT
Description:
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2775.75	5.607	2775.75	12.07	2775.75	19.049	2775.75	29.317	2775.75
71.828	2774.75	85.786	2773.75	89.067	2773.75	103.188	2774.75	115.831	2774.75
128.085	2774.75	176.975	2775.75	196.024	2776.75	201.271	2777.75	222.357	2778.36
223.106	2777.75	224.726	2776.75	226.578	2775.75	228.113	2774.48	228.466	2774.75
231.408	2773.75	239.405	2772.75	244.73	2772.63	245.868	2771.75	247.233	2770.75
248.605	2769.75	250.054	2768.75	251.681	2767.76	251.681	2767.75	253.342	2766.75
254.813	2765.75	256.164	2764.75	257.132	2763.88	262.209	2762.7	273.085	2760.84
297.19	2760.63	301.164	2761.77	319.273	2761.94	326.146	2760.17	341.547	2760.01
354.324	2759.87	381.194	2760.68	389.17	2757.67	435.231	2758.17	436.985	2762.55
442.317	2762.86	444.608	2763.75	445.477	2764.44	445.88	2764.75	447.146	2765.75
448.419	2766.75	449.692	2767.75	450.979	2768.75	452.237	2769.75	453.482	2770.75
453.482	2770.76	454.74	2771.75	455.985	2772.75	457.201	2773.75	457.201	2773.76
458.12	2775.1	458.403	2774.75	466.584	2774.75	469.887	2774.75	478.704	2775.75
485.853	2776.75	713.195	2776.75	716.745	2776.75	720.132	2776.75	792.165	2775.75
803.98	2775.75	814.743	2775.75	830.143	2774.75	840.806	2774.75	857.466	2775.75
873.256	2775.75	926.755	2774.75	940.777	2773.75	941.237	2773.75	945.579	2773.75
955.669	2773.75	965.18	2773.75	989.002	2773.75	1007.684	2774.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	244.73	.03	458.12	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
244.73	458.12	203.69	188.86	197	.1	.3

Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
250	254	2780	312	316	2780	374	378	2780

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2774.98	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 3.17	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2771.80	* Reach Len. (ft)	* 203.69	* 188.86	* 197.00	*
* Crit W.S. (ft)	* 2769.83	* Flow Area (sq ft)	*	* 2168.83	*	*
* E.G. Slope (ft/ft)	*0.004844	* Area (sq ft)	*	* 2168.83	*	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*31000.00	*	*
* Top Width (ft)	* 197.01	* Top Width (ft)	*	* 197.01	*	*
* Vel Total (ft/s)	* 14.29	* Avg. Vel. (ft/s)	*	* 14.29	*	*
* Max Chl Dpth (ft)	* 14.13	* Hydr. Depth (ft)	*	* 11.01	*	*
* Conv. Total (cfs)	*445397.6	* Conv. (cfs)	*	*445397.6	*	*
* Length Wtd. (ft)	* 188.86	* Wetted Per. (ft)	*	* 256.89	*	*
* Min Ch El (ft)	* 2757.67	* Shear (lb/sq ft)	*	* 2.55	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 36.49	*	*
* Frctn Loss (ft)	* 1.07	* Cum Volume (acre-ft)	* 9.99	* 74.32	* 33.22	*
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 6.66	* 12.05	* 17.99	*

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2773.00	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.59	Wt. n-Val.		0.030		
W.S. Elev (ft)	2770.41	Reach Len. (ft)	203.69	188.86	197.00	
Crit W.S. (ft)	2768.41	Flow Area (sq ft)		1897.59		
E.G. Slope (ft/ft)	0.004406	Area (sq ft)		1897.59		
Q Total (cfs)	24490.00	Flow (cfs)		24490.00		
Top Width (ft)	193.37	Top Width (ft)		193.37		
Vel Total (ft/s)	12.91	Avg. Vel. (ft/s)		12.91		
Max Chl Dpth (ft)	12.74	Hydr. Depth (ft)		9.81		
Conv. Total (cfs)	368965.5	Conv. (cfs)		368965.5		
Length Wtd. (ft)	188.86	Wetted Per. (ft)		243.97		
Min Ch El (ft)	2757.67	Shear (lb/sq ft)		2.14		
Alpha	1.00	Stream Power (lb/ft s)		27.61		
Frctn Loss (ft)	1.04	Cum Volume (acre-ft)	6.94	68.23	25.64	
C & E Loss (ft)	0.13	Cum SA (acres)	6.34	12.07	17.77	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2776.38	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.61	Wt. n-Val.	0.045	0.030		
W.S. Elev (ft)	2772.77	Reach Len. (ft)	203.69	188.86	197.00	
Crit W.S. (ft)	2770.85	Flow Area (sq ft)	0.44	2361.00		
E.G. Slope (ft/ft)	0.005147	Area (sq ft)	0.44	2361.00		
Q Total (cfs)	36000.00	Flow (cfs)	0.19	35999.81		
Top Width (ft)	204.78	Top Width (ft)	5.50	199.28		
Vel Total (ft/s)	15.24	Avg. Vel. (ft/s)	0.44	15.25		
Max Chl Dpth (ft)	15.10	Hydr. Depth (ft)	0.08	11.85		
Conv. Total (cfs)	501812.0	Conv. (cfs)	2.7	501809.3		
Length Wtd. (ft)	188.86	Wetted Per. (ft)	5.51	265.61		
Min Ch El (ft)	2757.67	Shear (lb/sq ft)	0.03	2.86		
Alpha	1.00	Stream Power (lb/ft s)	0.01	43.55		
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)	12.92	79.80	40.12	
C & E Loss (ft)	0.12	Cum SA (acres)	8.68	12.10	18.26	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 150

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.75	27.415	2773.75	42.03	2773.75	59.892	2773.75	62.416	2773.75
64.078	2773.75	160.259	2772.75	185.715	2772.75	194.744	2773.75	204.594	2773.75
210.718	2773.75	222.774	2774.75	228.183	2774.75	257.019	2774.75	267.81	2774.75
273.007	2773.75	274.803	2772.4	275.015	2772.75	287.29	2772.06	287.545	2771.75
289.737	2770.75	290.925	2770.17	291.165	2769.75	292.615	2768.75	292.615	2768.76
293.301	2770.01	294.086	2767.76	294.086	2767.75	295.641	2766.75	298.583	2765.75
300.223	2764.76	300.223	2764.75	301.687	2763.75	304.049	2762.75	306.828	2761.76
307.153	2761.75	310.201	2760.75	315.32	2759.75	327.928	2759.98	331.711	2761.72
339.341	2762.38	348.858	2761.61	352.302	2760.28	375.078	2761.75	377.814	2761.46
391.136	2760.05	397.352	2762.59	404.677	2759.75	421.315	2760.11	427.849	2757.53
458.495	2758.34	483.223	2757.36	487.119	2761.47	490.188	2761.75	490.492	2761.76
490.492	2761.77	490.584	2761.86	491.482	2762.75	491.482	2762.76	492.726	2763.75
492.726	2763.76	493.964	2764.75	495.201	2765.75	496.467	2766.75	497.853	2767.75
499.401	2768.75	500.936	2769.75	500.936	2769.76	502.477	2770.75	504.047	2771.75
504.294	2771.9	518.734	2772.75	520.388	2772.75	520.388	2772.76	520.685	2773.75
522.75	2774.75	525.055	2775.75	528.562	2776.75	529.291	2777.69	531.794	2776.75
533.505	2777.63	573.768	2775.75	592.796	2774.75	608.727	2774.75	636.672	2774.75
663.471	2774.75	788.445	2774.75	833.707	2773.75	855.161	2773.75	857.438	2774.75
928.516	2774.75	939.879	2773.75	942.008	2773.75	951.829	2774.75	952.204	2774.75
986.569	2773.75	998.018	2773.75	1010.809	2773.75	1012.796	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	287.29	.03	504.047	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
287.29	504.047	262.45	206.64	129.8	.1	.3

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.78	Element	Left OB	Channel	Right OB	
Vel Head (ft)	4.42	Wt. n-Val.		0.030		
W.S. Elev (ft)	2769.35	Reach Len. (ft)	262.45	206.64	129.80	
Crit W.S. (ft)	2769.35	Flow Area (sq ft)		1836.44		
E.G. Slope (ft/ft)	0.006782	Area (sq ft)		1836.44		
Q Total (cfs)	31000.00	Flow (cfs)		31000.00		
Top Width (ft)	207.99	Top Width (ft)		207.99		
Vel Total (ft/s)	16.88	Avg. Vel. (ft/s)		16.88		

* Max Chl Dpth (ft)	* 11.99	* Hydr. Depth (ft)	*		* 8.83	*		*
* Conv. Total (cfs)	*376419.2	* Conv. (cfs)	*		*376419.2	*		*
* Length Wtd. (ft)	* 205.33	* Wetted Per. (ft)	*		* 218.15	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.56	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 60.17	*		*
* Frctn Loss (ft)	* 1.23	* Cum Volume (acre-ft)	*	9.99	* 65.63	*	33.22	*
* C & E Loss (ft)	* 0.37	* Cum SA (acres)	*	6.66	* 11.18	*	17.99	*

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

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2771.83	* Element	*	Left OB	* Channel	*	Right OB	*
* Vel Head (ft)	* 3.84	* Wt. n-Val.	*		* 0.030	*		*
* W.S. Elev (ft)	* 2768.00	* Reach Len. (ft)	*	262.45	* 206.64	*	129.80	*
* Crit W.S. (ft)	* 2768.00	* Flow Area (sq ft)	*		* 1557.52	*		*
* E.G. Slope (ft/ft)	*0.007077	* Area (sq ft)	*		* 1557.52	*		*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24490.00	*		*
* Top Width (ft)	* 204.23	* Top Width (ft)	*		* 204.23	*		*
* Vel Total (ft/s)	* 15.72	* Avg. Vel. (ft/s)	*		* 15.72	*		*
* Max Chl Dpth (ft)	* 10.64	* Hydr. Depth (ft)	*		* 7.63	*		*
* Conv. Total (cfs)	*291109.0	* Conv. (cfs)	*		*291109.0	*		*
* Length Wtd. (ft)	* 206.12	* Wetted Per. (ft)	*		* 212.48	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.24	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 50.93	*		*
* Frctn Loss (ft)	* 1.24	* Cum Volume (acre-ft)	*	6.94	* 60.74	*	25.64	*
* C & E Loss (ft)	* 0.32	* Cum SA (acres)	*	6.34	* 11.21	*	17.77	*

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

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2775.16	* Element	*	Left OB	* Channel	*	Right OB	*
Vel Head (ft)	* 4.85	* Wt. n-Val.	*		* 0.030	*		*
W.S. Elev (ft)	* 2770.31	* Reach Len. (ft)	*	262.45	* 206.64	*	129.80	*
Crit W.S. (ft)	* 2770.31	* Flow Area (sq ft)	*		* 2036.48	*		*
* E.G. Slope (ft/ft)	*0.006667	* Area (sq ft)	*		* 2036.48	*		*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*36000.00	*		*
* Top Width (ft)	* 211.14	* Top Width (ft)	*		* 211.14	*		*
* Vel Total (ft/s)	* 17.68	* Avg. Vel. (ft/s)	*		* 17.68	*		*
* Max Chl Dpth (ft)	* 12.94	* Hydr. Depth (ft)	*		* 9.65	*		*
* Conv. Total (cfs)	*440907.8	* Conv. (cfs)	*		*440907.8	*		*
* Length Wtd. (ft)	* 204.75	* Wetted Per. (ft)	*		* 222.84	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.80	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 67.24	*		*
* Frctn Loss (ft)	* 1.03	* Cum Volume (acre-ft)	*	12.91	* 70.27	*	40.12	*
* C & E Loss (ft)	* 0.64	* Cum SA (acres)	*	8.67	* 11.21	*	18.26	*

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 139

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2769.75	122.83	2768.75	210.08	2768	238.55	2768	250.4	2768
250.9	2768	353.99	2767.75	571.8	2767.75	580.55	2767.87	584.21	2766.75
587.25	2765.75	590.19	2764.75	592.82	2763.75	595.21	2762.75	597.5	2761.75
599.8	2760.75	601.9	2759.24	661.57	2759.92	666.41	2756.85	691.06	2756.07
697.71	2757.82	779.92	2757.09	782.85	2760.21	803.38	2761.75	805.38	2761.89
809.83	2762.75	817.41	2764.24	820.11	2763.75	852.39	2763.75	884.33	2763.75
918.74	2764.75	974.69	2764.75	981.1	2764.75	999.39	2765.75	1005.92	2766.75
1011.93	2767.75	1018.14	2768.75	1024.29	2769.75	1031.8	2770.75	1039.15	2771.75
1043.88	2772.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	580.55	.03	803.38	.045

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

580.55 803.38 172.75 171.78 164.65 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2771.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	6.25	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.45	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2767.29	Flow Area (sq ft)		1468.72	238.15
E.G. Slope (ft/ft)	0.013412	Area (sq ft)		1468.72	238.15
Q Total (cfs)	31000.00	Flow (cfs)		29944.19	1055.81
Top Width (ft)	405.73	Top Width (ft)		215.24	190.49
Vel Total (ft/s)	18.16	Avg. Vel. (ft/s)		20.39	4.43
Max Chl Dpth (ft)	9.38	Hydr. Depth (ft)		6.82	1.25
Conv. Total (cfs)	267675.2	Conv. (cfs)		258558.6	9116.6
Length Wtd. (ft)	171.40	Wetted Per. (ft)		219.19	190.80
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		5.61	1.05
Alpha	1.22	Stream Power (lb/ft s)		114.39	4.63
Frctn Loss (ft)	1.90	Cum Volume (acre-ft)	9.99	57.80	32.87
C & E Loss (ft)	0.18	Cum SA (acres)	6.66	10.17	17.70

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2769.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.81	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2766.35	Flow Area (sq ft)		1332.37	120.66
E.G. Slope (ft/ft)	0.011932	Area (sq ft)		1332.37	120.66
Q Total (cfs)	24490.00	Flow (cfs)		24155.58	334.42
Top Width (ft)	392.22	Top Width (ft)		213.37	178.85
Vel Total (ft/s)	16.85	Avg. Vel. (ft/s)		18.13	2.77
Max Chl Dpth (ft)	8.74	Hydr. Depth (ft)		6.24	0.67
Conv. Total (cfs)	224196.8	Conv. (cfs)		221135.2	3061.5
Length Wtd. (ft)	171.15	Wetted Per. (ft)		217.21	179.14
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		4.57	0.50
Alpha	1.14	Stream Power (lb/ft s)		82.84	1.39
Frctn Loss (ft)	1.87	Cum Volume (acre-ft)	6.94	53.89	25.46
C & E Loss (ft)	0.12	Cum SA (acres)	6.34	10.22	17.51

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2772.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	7.11	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.88	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2768.62	Flow Area (sq ft)		1562.17	322.22
E.G. Slope (ft/ft)	0.014387	Area (sq ft)		1562.17	322.22
Q Total (cfs)	36000.00	Flow (cfs)		34229.51	1770.49
Top Width (ft)	413.39	Top Width (ft)		216.53	196.86
Vel Total (ft/s)	19.10	Avg. Vel. (ft/s)		21.91	5.49
Max Chl Dpth (ft)	9.81	Hydr. Depth (ft)		7.21	1.64
Conv. Total (cfs)	300138.3	Conv. (cfs)		285377.4	14760.9
Length Wtd. (ft)	171.29	Wetted Per. (ft)		220.55	197.19
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		6.36	1.47
Alpha	1.25	Stream Power (lb/ft s)		139.40	8.06
Frctn Loss (ft)	1.93	Cum Volume (acre-ft)	12.91	61.73	39.64
C & E Loss (ft)	0.23	Cum SA (acres)	8.67	10.20	17.97

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: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 130

INPUT
Description:
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-329.97	2778	-326.97	2777	-324.12	2776	-321.7	2775	-319.71	2774
-317.71	2773	-315.72	2772	-313.73	2771	-311.73	2770	-309.74	2769
-295.4	2768	-239.67	2767	-228.16	2766	-194.92	2766	-129.95	2766
-127.06	2765	-123.98	2764	-120.22	2764	-110.54	2765	-110.53	2765
-.01	2766	0	2766	197.95	2767	197.96	2767	246.6	2767
61.24	2766.28	267.04	2766	267.05	2766	282.58	2764.8	282.59	2764.8
34.05	2765	284.06	2765	289.71	2764	289.72	2764	294.36	2763
94.37	2763	299.03	2762	299.04	2762	303.71	2761	303.72	2761
308.4	2760	308.41	2760	313.09	2759	313.1	2759	314.9	2758.96
314.91	2758.96	326.53	2758.59	326.54	2758.59	334.76	2755.3	334.76	2755.31
335.91	2758	335.92	2758	350.25	2755.25	350.26	2755.25	362.85	2756.77
362.86	2756.77	383.3	2757	429.42	2757.52	429.43	2757.51	436.01	2755.89
436.02	2755.89	456.36	2755.9	456.37	2755.9	476.41	2757.65	476.42	2757.65

495.5	2759.49	495.51	2759.49	507.59	2759.28	512.02	2759.21	512.03	2759.21
522.41	2761.75	522.42	2761.76	528.15	2763.11	528.16	2763.11	555.77	2762.75
555.78	2762.76	560.43	2763.75	560.44	2763.75	684.75	2763.75	684.76	2763.75
743.07	2762.75	743.08	2762.75	773.59	2762.75	773.6	2762.75	795.48	2762.75
795.94	2762.75	809.75	2763.75	809.76	2763.75	826.38	2764.75	866.79	2765.75
889.01	2766.75	894.02	2767.75	896.67	2768.75	896.67	2768.76	899.25	2769.75
901.38	2770.75	903.52	2771.75	911.41	2772.75	945.7	2772.75	951.33	2771.75
957.1	2770.75	961.49	2769.75	968.66	2768.75	968.68	2768.75	977.22	2769.75
981.89	2770.75	985.39	2771.75	990.06	2772.75	994.39	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-329.97	.045	246.6	.03	528.16	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
246.6	528.16	295.76	287.33	274.51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-329.97	197.95	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2769.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.14	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2766.38	Flow Area (sq ft)		1717.40	522.14
E.G. Slope (ft/ft)	0.008922	Area (sq ft)	13.46	1717.40	522.14
Q Total (cfs)	31000.00	Flow (cfs)		28714.42	2285.58
Top Width (ft)	595.82	Top Width (ft)	32.04	249.94	313.85
Vel Total (ft/s)	13.84	Avg. Vel. (ft/s)		16.72	4.38
Max Chl Dpth (ft)	9.89	Hydr. Depth (ft)		6.87	1.66
Conv. Total (cfs)	328199.1	Conv. (cfs)		304001.5	24197.6
Length Wtd. (ft)	285.18	Wetted Per. (ft)		254.20	314.04
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		3.76	0.93
Alpha	1.36	Stream Power (lb/ft s)		62.92	4.05
Frctn Loss (ft)	1.86	Cum Volume (acre-ft)	9.96	51.51	31.43
C & E Loss (ft)	0.66	Cum SA (acres)	6.60	9.26	16.75

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2767.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.82	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.89	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2765.37	Flow Area (sq ft)		1909.06	769.47
E.G. Slope (ft/ft)	0.003800	Area (sq ft)	69.64	1909.06	769.47
Q Total (cfs)	24490.00	Flow (cfs)		21800.10	2689.90
Top Width (ft)	718.73	Top Width (ft)	117.34	259.67	341.72
Vel Total (ft/s)	9.14	Avg. Vel. (ft/s)		11.42	3.50
Max Chl Dpth (ft)	10.64	Hydr. Depth (ft)		7.35	2.25
Conv. Total (cfs)	397259.9	Conv. (cfs)		353626.2	43633.7
Length Wtd. (ft)	285.65	Wetted Per. (ft)		263.96	341.92
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		1.72	0.53
Alpha	1.40	Stream Power (lb/ft s)		19.59	1.87
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	6.80	47.50	23.77
C & E Loss (ft)	0.14	Cum SA (acres)	6.10	9.29	16.52

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2770.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.79	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.43	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2767.00	Flow Area (sq ft)		1792.04	616.93
E.G. Slope (ft/ft)	0.010327	Area (sq ft)	27.94	1792.04	616.93
Q Total (cfs)	36000.00	Flow (cfs)		32832.83	3167.17
Top Width (ft)	645.25	Top Width (ft)	65.65	253.77	325.82
Vel Total (ft/s)	14.94	Avg. Vel. (ft/s)		18.32	5.13
Max Chl Dpth (ft)	10.18	Hydr. Depth (ft)		7.06	1.89
Conv. Total (cfs)	354255.9	Conv. (cfs)		323089.5	31166.4
Length Wtd. (ft)	284.82	Wetted Per. (ft)		258.05	326.02
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		4.48	1.22
Alpha	1.38	Stream Power (lb/ft s)		82.03	6.26
Frctn Loss (ft)	2.07	Cum Volume (acre-ft)	12.86	55.12	37.86
C & E Loss (ft)	0.70	Cum SA (acres)	8.54	9.27	16.98

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 120

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-741.52	2769	-620.87	2768	-551.88	2767	-543.14	2766	-540.36	2766
-537.06	2767	-533.83	2768	-527.7	2768	-488.6	2767	-366.95	2766
-274.11	2765	-186.15	2764	-155.02	2763	-147.68	2762	-131.64	2762
-119.22	2763	-106.8	2764	-35.92	2765	0	2765	50.02	2764
110.9	2763	152.46	2762.03	153.73	2762	168.97	2761	175.86	2760
175.87	2760	179.66	2759	179.67	2759	181.81	2758	183.96	2757
186.11	2756	188.37	2755	192.2	2754	208.49	2754	208.5	2754
217.9	2755	217.91	2755	226.38	2756	226.39	2756	249.43	2757
265.63	2757	283.93	2757	293.22	2757	353.9	2758	388.76	2759
390.5	2760	392.24	2761	392.25	2761	393.98	2762	393.99	2762
396.77	2763	400.02	2764	404.19	2764	422.66	2764	464.57	2763
544.99	2763	709.9	2763	814.02	2762.75	823.72	2763.75	825.7	2763.75
826.66	2763.75	968	2763.75	980.94	2763.75	999.92	2763.75	1093.44	2763.75
1109.22	2764.75	1125.21	2765.75	1136.78	2766.75	1141.28	2767.75	1145.01	2768.75
1148.2	2769.75	1151.41	2770.75	1154.48	2771.75	1157.68	2772.75	1160.12	2773.75
1162.38	2774.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-741.52	.045	0	.03	404.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	404.19	158.39	153.64	149.14	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-741.52	0	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2767.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.67	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.44	Flow Area (sq ft)		2335.00	1637.41
E.G. Slope (ft/ft)	0.004458	Area (sq ft)	446.32	2335.00	1637.41
Q Total (cfs)	31000.00	Flow (cfs)		24756.40	6243.60
Top Width (ft)	1460.10	Top Width (ft)	336.19	404.19	719.72
Vel Total (ft/s)	7.80	Avg. Vel. (ft/s)		10.60	3.81
Max Chl Dpth (ft)	11.67	Hydr. Depth (ft)		5.78	2.28
Conv. Total (cfs)	464316.0	Conv. (cfs)		370799.7	93516.3
Length Wtd. (ft)	152.85	Wetted Per. (ft)		406.74	719.84
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.60	0.63
Alpha	1.52	Stream Power (lb/ft s)		16.94	2.41
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	8.40	38.15	24.63
C & E Loss (ft)	0.02	Cum SA (acres)	5.34	7.10	13.49

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2766.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.02	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2764.98	Flow Area (sq ft)		2074.09	1176.16
E.G. Slope (ft/ft)	0.004660	Area (sq ft)	248.65	2074.09	1176.16
Q Total (cfs)	24490.00	Flow (cfs)		20776.47	3713.53
Top Width (ft)	1389.85	Top Width (ft)	276.26	404.19	709.40
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)		10.02	3.16
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		5.13	1.66
Conv. Total (cfs)	358749.9	Conv. (cfs)		304351.0	54398.9
Length Wtd. (ft)	153.08	Wetted Per. (ft)		406.74	709.50
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.48	0.48
Alpha	1.53	Stream Power (lb/ft s)		14.86	1.52
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	5.72	34.36	17.64
C & E Loss (ft)	0.01	Cum SA (acres)	4.77	7.10	13.21

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2767.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.07	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.81	Flow Area (sq ft)		2497.72	1928.23
E.G. Slope (ft/ft)	0.004493	Area (sq ft)	589.49	2497.72	1928.23
Q Total (cfs)	36000.00	Flow (cfs)		27806.80	8193.20
Top Width (ft)	1508.19	Top Width (ft)	379.26	404.19	724.74
Vel Total (ft/s)	8.13	Avg. Vel. (ft/s)		11.13	4.25
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		6.18	2.66
Conv. Total (cfs)	537097.4	Conv. (cfs)		414859.9	122237.5
Length Wtd. (ft)	152.72	Wetted Per. (ft)		406.74	724.88
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.72	0.75
Alpha	1.51	Stream Power (lb/ft s)		19.17	3.17
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	10.76	40.97	29.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.03	7.10	13.67

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 115

INPUT
Description:
:ation Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2767	4.83	2766	9.61	2765	11.16	2765	13.74	2766
16.32	2767	24.15	2767	124.55	2766	311.87	2765.02	314.97	2765
395.1	2764	477.26	2763	482.56	2762	505.65	2762	555.24	2763
679.5	2764	697.39	2764	706.13	2763	725.14	2762	747.88	2762
765.91	2762	799.67	2761	831.73	2760	835.05	2759	837.03	2758
839.03	2757	841.23	2756	843.42	2755	845.62	2754	847.82	2753
863.85	2753	869.22	2754	874.61	2755	887.51	2756	990.68	2756
1015.46	2756	1026.66	2757	1037.87	2758	1040.87	2759	1043.78	2760
1046.68	2761	1049.37	2762	1074.62	2763	1080.06	2763	1202.38	2763
1254.26	2763	1359.68	2763	1365.58	2763	1696.27	2762.75	1789.59	2762.75
1848.13	2763.75	1874.7	2764.73	1875.36	2764.75	1890.38	2765.75	1895.84	2766.75
1902.22	2767.75	1908.29	2768.75	1913.86	2769.75	1918.72	2770.75	1920.54	2771.75
1922.37	2772.75	1924.2	2773.75	1926.03	2774.75	1927.8	2775.75	1929.57	2776.75
1931.38	2777.75	1933.2	2778.75	1935.07	2779.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	679.5	.03	1074.62	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
679.5	1074.62	257.93	242.39	227.54	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	679.5	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2766.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.65	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.74	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.74	Flow Area (sq ft)		2381.48	1412.74
E.G. Slope (ft/ft)	0.004600	Area (sq ft)	465.63	2381.48	1412.74
Q Total (cfs)	31000.00	Flow (cfs)		26379.82	4620.18
Top Width (ft)	1539.72	Top Width (ft)	344.05	395.12	800.55
Vel Total (ft/s)	8.17	Avg. Vel. (ft/s)		11.08	3.27
Max Chl Dpth (ft)	11.74	Hydr. Depth (ft)		6.03	1.76
Conv. Total (cfs)	457069.9	Conv. (cfs)		388949.0	68120.9
Length Wtd. (ft)	239.83	Wetted Per. (ft)		397.73	800.58
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.72	0.51
Alpha	1.59	Stream Power (lb/ft s)		19.05	1.66
Frctn Loss (ft)	1.17	Cum Volume (acre-ft)	6.74	29.83	19.40
C & E Loss (ft)	0.05	Cum SA (acres)	4.11	5.69	10.89

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2765.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.16	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.16	Flow Area (sq ft)		2151.22	950.85
E.G. Slope (ft/ft)	0.004527	Area (sq ft)	278.74	2151.22	950.85
Q Total (cfs)	24490.00	Flow (cfs)		22088.98	2401.02
Top Width (ft)	1477.14	Top Width (ft)	297.35	395.12	784.67
Vel Total (ft/s)	7.89	Avg. Vel. (ft/s)		10.27	2.53
Max Chl Dpth (ft)	11.16	Hydr. Depth (ft)		5.44	1.21
Conv. Total (cfs)	364000.3	Conv. (cfs)		328313.5	35686.8
Length Wtd. (ft)	240.55	Wetted Per. (ft)		397.73	784.69
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.53	0.34
Alpha	1.54	Stream Power (lb/ft s)		15.69	0.86
Frctn Loss (ft)	1.15	Cum Volume (acre-ft)	4.76	26.91	14.00
C & E Loss (ft)	0.05	Cum SA (acres)	3.72	5.69	10.65

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2766.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.75	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.15	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2765.15	Flow Area (sq ft)		2543.06	1741.41
E.G. Slope (ft/ft)	0.004615	Area (sq ft)	614.55	2543.06	1741.41
Q Total (cfs)	36000.00	Flow (cfs)		29476.35	6523.65
Top Width (ft)	1597.71	Top Width (ft)	395.79	395.12	806.80
Vel Total (ft/s)	8.40	Avg. Vel. (ft/s)		11.59	3.75
Max Chl Dpth (ft)	12.15	Hydr. Depth (ft)		6.44	2.16

* Conv. Total (cfs)	*529952.8	* Conv. (cfs)	*	*433918.7	* 96034.1	*
* Length Wtd. (ft)	* 239.39	* Wetted Per. (ft)	*	* 397.73	* 806.84	*
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*	* 1.84	* 0.62	*
* Alpha	* 1.59	* Stream Power (lb/ft s)	*	* 21.35	* 2.33	*
* Frctn Loss (ft)	* 1.19	* Cum Volume (acre-ft)	* 8.57	* 32.08	* 23.56	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 5.62	* 5.69	* 11.05	*

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rning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 110

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600.38	2767	-579.98	2766	-400.38	2765	-181.14	2764	-81.76	2763
-57.48	2762	-47.61	2761	0	2761	227.2	2762	237.17	2762
274.46	2761	312.01	2760	358.58	2760	379.63	2760	383.11	2759
386.65	2758	390.19	2757	392.73	2756	392.74	2756	395.22	2755
397.63	2754	410.68	2753	426.46	2753	431.11	2754	435.76	2755
446.04	2756	470.07	2757	481.43	2757	501.92	2756.75	563.14	2756
587.96	2756	594.62	2757	602.49	2758	613.17	2759	626.03	2759.97
626.5	2760	890.32	2761	967.13	2761	1086.65	2761	1302.26	2762
1331.06	2761.75	1340.58	2761.75	1426.39	2761.75	1446.33	2761.75	1459.98	2761.75
1515.86	2762.75	1570.65	2763.75	1587.84	2764.75	1592.77	2765.75	1597.63	2766.75
1602.74	2767.75	1607.53	2768.75	1611.47	2769.75	1613.74	2770.75	1616.01	2771.75
1618.28	2772.75	1620.53	2773.75	1622.77	2774.75	1624.98	2775.75	1627.19	2776.75
1629.4	2777.75	1631.62	2778.75	1633.89	2779.75	1636.29	2780.75	1638.58	2781.75
1640.84	2782.75	1643.09	2783.75	1645.32	2784.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600.38	.045	227.2	.03	626.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
227.2	626.5	308.04	322.72	332.25	.1	.3

effective Flow num= 1

Sta L	Sta R	Elev	Permanent
-600.38	227.2	2770	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2764.92	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.08	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2762.85	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25	*
* Crit W.S. (ft)	* 2763.33	* Flow Area (sq ft)	*	* 1956.99	* 1473.46	*
* E.G. Slope (ft/ft)	*0.007990	* Area (sq ft)	* 415.36	* 1956.99	* 1473.46	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*24934.30	* 6065.70	*
* Top Width (ft)	* 1599.06	* Top Width (ft)	* 305.20	* 399.30	* 894.56	*
* Vel Total (ft/s)	* 9.04	* Avg. Vel. (ft/s)	*	* 12.74	* 4.12	*
* Max Chl Dpth (ft)	* 9.84	* Hydr. Depth (ft)	*	* 4.90	* 1.65	*
* Conv. Total (cfs)	*346800.4	* Conv. (cfs)	*	*278942.8	* 67857.6	*
* Length Wtd. (ft)	* 324.49	* Wetted Per. (ft)	*	* 400.88	* 894.58	*
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*	* 2.44	* 0.82	*
* Alpha	* 1.64	* Stream Power (lb/ft s)	*	* 31.03	* 3.38	*
* Frctn Loss (ft)	* 1.43	* Cum Volume (acre-ft)	* 4.13	* 17.76	* 11.87	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 2.19	* 3.48	* 6.46	*

****

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2764.24	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.82	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2762.42	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25	*
* Crit W.S. (ft)	* 2762.82	* Flow Area (sq ft)	*	* 1787.46	* 1098.66	*
* E.G. Slope (ft/ft)	*0.007531	* Area (sq ft)	* 287.97	* 1787.46	* 1098.66	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*20814.43	* 3675.57	*
* Top Width (ft)	* 1565.13	* Top Width (ft)	* 294.89	* 399.30	* 870.94	*
* Vel Total (ft/s)	* 8.49	* Avg. Vel. (ft/s)	*	* 11.64	* 3.35	*
* Max Chl Dpth (ft)	* 9.42	* Hydr. Depth (ft)	*	* 4.48	* 1.26	*
* Conv. Total (cfs)	*282197.7	* Conv. (cfs)	*	*239844.2	* 42353.5	*
* Length Wtd. (ft)	* 324.13	* Wetted Per. (ft)	*	* 400.88	* 870.95	*
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*	* 2.10	* 0.59	*
* Alpha	* 1.62	* Stream Power (lb/ft s)	*	* 24.41	* 1.98	*
* Frctn Loss (ft)	* 1.38	* Cum Volume (acre-ft)	* 3.08	* 15.95	* 8.65	*
* & E Loss (ft)	* 0.03	* Cum SA (acres)	* 1.97	* 3.48	* 6.33	*

****

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2765.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2763.14	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2763.67	Flow Area (sq ft)		2074.07	1738.11
E.G. Slope (ft/ft)	0.008280	Area (sq ft)	506.61	2074.07	1738.11
Q Total (cfs)	36000.00	Flow (cfs)		27964.04	8035.96
Top Width (ft)	1632.62	Top Width (ft)	322.69	399.30	910.63
Vel Total (ft/s)	9.44	Avg. Vel. (ft/s)		13.48	4.62
Max Chl Dpth (ft)	10.14	Hydr. Depth (ft)		5.19	1.91
Conv. Total (cfs)	395617.6	Conv. (cfs)		307307.4	88310.2
Length Wtd. (ft)	324.71	Wetted Per. (ft)		400.88	910.65
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		2.67	0.99
Alpha	1.64	Stream Power (lb/ft s)		36.06	4.56
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	5.25	19.23	14.47
C & E Loss (ft)	0.05	Cum SA (acres)	3.49	3.48	6.56

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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 100

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-1079.5	2765	-908.05	2764	-796.29	2763	-637.85	2762	-590.66	2762
-582.71	2762	-429.48	2762	-343.01	2762	-257.47	2761	-240.37	2760
-236.92	2759	-233.51	2758	-230.22	2757	-227.02	2756	-223.93	2755
-185.04	2755	-174.13	2756	-169.65	2757	-165.16	2758	-160.66	2759
-156.1	2760	-123.66	2760	-99.38	2760	0	2760	48.99	2759
69.53	2759	69.54	2759	92.94	2759	92.95	2759	136.19	2758
136.2	2758	181.29	2757	186.69	2757	207.37	2758	220.09	2758
222.63	2757	222.64	2757	225.18	2756	227.72	2755	227.73	2755
230.27	2754	232.22	2753.36	233.31	2753	236.48	2752	271.72	2752
275.17	2753	279.24	2754	328.16	2755	339.63	2756	339.64	2756
380.46	2756	380.47	2756	390.22	2755.86	451.75	2755	486.38	2754
497.38	2754	501.1	2755	504.87	2756	504.88	2756	507.69	2757
539.73	2758	571.48	2759	643.34	2760	716.38	2760	890.83	2759
990.84	2759	1036.2	2759	1036.21	2759	1095.21	2760	1202.49	2760
1202.5	2760	1304.69	2760	1327.57	2761	1346.89	2762	1361.89	2763
1372.87	2764	1372.88	2764	1398.46	2765				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-1079.5	.045	0	.03	539.73	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	539.73	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-1079.5	-156.1	2764	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2762.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.65	Reach Len. (ft)			
Crit W.S. (ft)	2761.20	Flow Area (sq ft)	257.55	2837.18	1638.16
E.G. Slope (ft/ft)	0.003515	Area (sq ft)	753.97	2837.18	1638.16
Q Total (cfs)	31000.00	Flow (cfs)	703.96	25126.95	5169.09
Top Width (ft)	1653.19	Top Width (ft)	313.06	539.73	800.40
Vel Total (ft/s)	6.55	Avg. Vel. (ft/s)	2.73	8.86	3.16
Max Chl Dpth (ft)	9.65	Hydr. Depth (ft)	1.65	5.26	2.05
Conv. Total (cfs)	522910.6	Conv. (cfs)	11874.5	423843.4	87192.6
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	800.47
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.36	1.15	0.45
Alpha	1.52	Stream Power (lb/ft s)	0.99	10.18	1.42
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2762.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.06	Reach Len. (ft)			
Crit W.S. (ft)	2760.72	Flow Area (sq ft)	165.48	2518.82	1169.41
E.G. Slope (ft/ft)	0.003685	Area (sq ft)	584.19	2518.82	1169.41
Q Total (cfs)	24490.00	Flow (cfs)	344.82	21098.36	3046.82
Top Width (ft)	1591.34	Top Width (ft)	262.61	539.73	789.00
Vel Total (ft/s)	6.35	Avg. Vel. (ft/s)	2.08	8.38	2.61
Max Chl Dpth (ft)	9.06	Hydr. Depth (ft)	1.06	4.67	1.48
Conv. Total (cfs)	403456.7	Conv. (cfs)	5680.7	347581.5	50194.4
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	789.06
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.24	1.07	0.34
Alpha	1.52	Stream Power (lb/ft s)	0.51	8.96	0.89

* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2763.17	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.00	* Wt. n-Val.	* 0.045	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2762.17	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 2761.51	* Flow Area (sq ft)	* 338.72	* 3117.85	* 2056.93 *
* E.G. Slope (ft/ft)	*0.003152	* Area (sq ft)	* 979.48	* 3117.85	* 2056.93 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	* 1052.54	*27848.25	* 7099.21 *
* Top Width (ft)	* 2014.21	* Top Width (ft)	* 664.77	* 539.73	* 809.71 *
* Vel Total (ft/s)	* 6.53	* Avg. Vel. (ft/s)	* 3.11	* 8.93	* 3.45 *
* Max Chl Dpth (ft)	* 10.17	* Hydr. Depth (ft)	* 2.17	* 5.78	* 2.54 *
* Conv. Total (cfs)	*641195.8	* Conv. (cfs)	* 18746.7	*496005.0	*126444.0 *
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 809.80 *
* Min Ch El (ft)	* 2752.00	* Shear (lb/sq ft)	* 0.43	* 1.13	* 0.50 *
* Alpha	* 1.51	* Stream Power (lb/ft s)	* 1.33	* 10.12	* 1.73 *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

SUMMARY OF MANNING'S N VALUES

River:River #1

Reach	River Sta.	n1	n2	n3
Reach #1	225	.045	.03	.045
Reach #1	220	.045	.03	.045
Reach #1	215	.045	.03	.045
Reach #1	210	.045	.03	.045
Reach #1	205	.045	.03	.045
Reach #1	200	.045	.03	.045
Reach #1	195	.045	.03	.045
Reach #1	190	.045	.03	.045
Reach #1	180	.045	.03	.045
Reach #1	170	.045	.03	.045
Reach #1	160	.045	.03	.045
Reach #1	150	.045	.03	.045
Reach #1	139	.045	.03	.045
Reach #1	130	.045	.03	.045
Reach #1	120	.045	.03	.045
Reach #1	115	.045	.03	.045
Reach #1	110	.045	.03	.045
Reach #1	100	.045	.03	.045

SUMMARY OF REACH LENGTHS

River: River #1

Reach	River Sta.	Left	Channel	Right
Reach #1	225	299.75	282.05	262.04
Reach #1	220	277.65	269.4	261.19
Reach #1	215	294.95	268.22	230.48
Reach #1	210	283.6	269.08	254.74
Reach #1	205	280.12	286.64	293.88
Reach #1	200	179.8	195.07	210.23
Reach #1	195	215.83	225.58	311.98
Reach #1	190	77.8	72.37	83.03
Reach #1	180	44.45	181.54	256.85
Reach #1	170	130.15	130.15	130.15
Reach #1	160	203.69	188.86	197
Reach #1	150	262.45	206.64	129.8
Reach #1	139	172.75	171.78	164.65
Reach #1	130	295.76	287.33	274.51
Reach #1	120	158.39	153.64	149.14
Reach #1	115	257.93	242.39	227.54
Reach #1	110	308.04	322.72	332.25
Reach #1	100			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River #1

Reach	River Sta.	Contr.	Expan.
Reach #1	225	.1	.3
Reach #1	220	.1	.3
Reach #1	215	.1	.3
Reach #1	210	.1	.3
Reach #1	205	.1	.3
Reach #1	200	.1	.3
Reach #1	195	.1	.3
Reach #1	190	.1	.3
Reach #1	180	.1	.3
Reach #1	170	.1	.3

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*Reach #1        *    160     *       .1*       .3*
*Reach #1        *    150     *       .1*       .3*
*Reach #1        *    139     *       .1*       .3*
*Reach #1        *    130     *       .1*       .3*
*Reach #1        *    120     *       .1*       .3*
*Reach #1        *    115     *       .1*       .3*
*Reach #1        *    110     *       .1*       .3*
`Reach #1        *    100     *       .1*       .3*
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Profile Outp ble - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #1	225	PF 1	31000.00	2768.00	2783.79	2781.42	2786.45	0.003148	13.09	2368.69	849.40	0.71
Reach #1	225	PF 2	24490.00	2768.00	2782.23	2780.05	2784.51	0.003108	12.10	2023.49	754.54	0.70
Reach #1	225	PF 3	36000.00	2768.00	2784.84	2782.42	2787.78	0.003262	13.77	2613.48	1215.25	0.73
Reach #1	220	PF 1	31000.00	2767.00	2780.92	2780.92	2785.06	0.006598	16.33	1897.98	904.77	1.00
Reach #1	220	PF 2	24490.00	2767.00	2780.16	2779.58	2783.28	0.005463	14.17	1728.23	784.47	0.90
Reach #1	220	PF 3	36000.00	2767.00	2781.82	2781.82	2786.37	0.006460	17.10	2104.79	1075.72	1.00
Reach #1	215	PF 1	31000.00	2767.00	2780.49	2779.67	2783.03	0.004711	12.82	2425.80	1271.30	0.83
Reach #1	215	PF 2	24490.00	2767.00	2779.44	2777.92	2781.60	0.004906	11.81	2075.45	903.76	0.83
Reach #1	215	PF 3	36000.00	2767.00	2779.41	2780.35	2784.13	0.010772	17.44	2065.33	892.30	1.22
Reach #1	210	PF 1	31000.00	2766.00	2778.66	2778.66	2781.45	0.007383	13.40	2313.85	1097.58	1.00
Reach #1	210	PF 2	24490.00	2766.00	2776.84	2776.53	2780.03	0.006179	14.33	1708.58	503.53	0.95
Reach #1	210	PF 3	36000.00	2766.00	2779.29	2779.29	2782.30	0.007343	13.93	2585.10	1350.50	1.00
Reach #1	205	PF 1	31000.00	2765.00	2776.22	2777.30	2779.34	0.008080	14.33	2410.89	793.24	1.05
Reach #1	205	PF 2	24490.00	2765.00	2775.69	2775.69	2778.12	0.006333	12.57	2054.88	564.95	0.92
Reach #1	205	PF 3	36000.00	2765.00	2776.61	2777.75	2780.06	0.009177	15.23	2725.49	821.56	1.12
Reach #1	200	PF 1	31000.00	2763.00	2774.60	2774.99	2777.48	0.004947	14.42	2953.93	818.81	0.87
Reach #1	200	PF 2	24490.00	2763.00	2773.47	2773.95	2776.37	0.005630	14.06	2140.17	639.31	0.91
Reach #1	200	PF 3	36000.00	2763.00	2776.84	2775.91	2778.28	0.002126	11.05	5235.53	1116.32	0.59
Reach #1	195	PF 1	31000.00	2762.00	2775.47	2773.18	2776.47	0.001484	8.88	4983.29	974.08	0.49
Reach #1	195	PF 2	24490.00	2762.00	2773.31	2771.52	2774.68	0.002552	9.92	3152.17	727.91	0.62
Reach #1	195	PF 3	36000.00	2762.00	2776.98	2773.66	2777.80	0.001075	8.29	6556.21	1098.89	0.43
Reach #1	190	PF 1	31000.00	2760.49	2775.57	2770.00	2776.11	0.000670	5.89	5260.27	527.41	0.33
Reach #1	190	PF 2	24490.00	2760.49	2773.60	2769.25	2774.12	0.000829	5.79	4232.78	512.34	0.35
Reach #1	190	PF 3	36000.00	2760.49	2776.99	2770.53	2777.54	0.000583	5.98	6102.29	719.88	0.31
Reach #1	180	PF 1	31000.00	2759.08	2775.17	2769.77	2776.02	0.000952	7.42	4180.06	379.59	0.39
Reach #1	180	PF 2	24490.00	2759.08	2773.24	2768.85	2774.02	0.001087	7.09	3455.69	371.77	0.41
Reach #1	180	PF 3	36000.00	2759.08	2776.55	2770.43	2777.45	0.000882	7.65	4732.77	453.48	0.38
Reach #1	170	PF 1	31000.00	2758.49	2773.55	2770.35	2775.61	0.003348	11.52	2691.28	248.32	0.62
Reach #1	170	PF 2	24490.00	2758.49	2771.75	2769.11	2773.59	0.003537	10.88	2251.21	242.05	0.63
Reach #1	170	PF 3	36000.00	2758.49	2774.82	2771.24	2777.05	0.003245	11.96	3011.47	252.85	0.61
Reach #1	160	PF 1	31000.00	2757.67	2771.80	2769.83	2774.98	0.004844	14.29	2168.83	197.01	0.76
Reach #1	160	PF 2	24490.00	2757.67	2770.41	2768.41	2773.00	0.004406	12.91	1897.59	193.37	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.77	2770.85	2776.38	0.005147	15.25	2361.44	204.78	0.78
Reach #1	150	PF 1	31000.00	2757.36	2769.35	2769.35	2773.78	0.006782	16.88	1836.44	207.99	1.00
Reach #1	150	PF 2	24490.00	2757.36	2768.00	2768.00	2771.83	0.007077	15.72	1557.52	204.23	1.00
Reach #1	150	PF 3	36000.00	2757.36	2770.31	2770.31	2775.16	0.006667	17.68	2036.48	211.14	1.00
Reach #1	139	PF 1	31000.00	2756.07	2765.45	2767.29	2771.69	0.013412	20.39	1706.88	405.73	1.38
Reach #1	139	PF 2	24490.00	2756.07	2764.81	2766.35	2769.85	0.011932	18.13	1453.04	392.22	1.28
Reach #1	139	PF 3	36000.00	2756.07	2765.88	2768.62	2772.99	0.014387	21.91	1884.39	413.39	1.44
Reach #1	130	PF 1	31000.00	2755.25	2765.14	2766.38	2769.18	0.008922	16.72	2239.54	595.82	1.12
Reach #1	130	PF 2	24490.00	2755.25	2765.89	2765.37	2767.71	0.003800	11.42	2678.53	718.73	0.74
Reach #1	130	PF 3	36000.00	2755.25	2765.43	2767.00	2770.22	0.010327	18.32	2408.98	645.25	1.22
Reach #1	120	PF 1	31000.00	2754.00	2765.67	2765.44	2767.11	0.004458	10.60	3972.41	1460.10	0.78
Reach #1	120	PF 2	24490.00	2754.00	2765.02	2764.98	2766.37	0.004660	10.02	3250.25	1389.85	0.78
Reach #1	120	PF 3	36000.00	2754.00	2766.07	2765.81	2767.62	0.004493	11.13	4425.95	1508.19	0.79
Reach #1	115	PF 1	31000.00	2753.00	2764.74	2764.74	2766.39	0.004600	11.08	3794.22	1539.72	0.80
Reach #1	115	PF 2	24490.00	2753.00	2764.16	2764.16	2765.65	0.004527	10.27	3102.07	1477.14	0.78
Reach #1	115	PF 3	36000.00	2753.00	2765.15	2765.15	2766.90	0.004615	11.59	4284.47	1597.71	0.81
Reach #1	110	PF 1	31000.00	2753.00	2762.85	2763.33	2764.92	0.007990	12.74	3430.45	1599.06	1.01
Reach #1	110	PF 2	24490.00	2753.00	2762.42	2762.82	2764.24	0.007531	11.64	2886.12	1565.13	0.97
Reach #1	110	PF 3	36000.00	2753.00	2763.14	2763.67	2765.41	0.008280	13.48	3812.18	1632.62	1.04
Reach #1	100	PF 1	31000.00	2752.00	2761.65	2761.20	2762.67	0.003515	8.86	4732.88	1653.19	0.68
Reach #1	100	PF 2	24490.00	2752.00	2761.06	2760.72	2762.01	0.003685	8.38	3853.71	1591.34	0.68
Reach #1	100	PF 3	36000.00	2752.00	2762.17	2761.51	2763.17	0.003152	8.93	5513.50	2014.21	0.65

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Alt 2

River: River #1 Reach: Reach #1 RS: 225 Profile: PF 1
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 1
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:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 1
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 2
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 3
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 1
Warning: The conveyance ratio (upstream 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: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 2
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 2
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.
ver: River #1 Reach: Reach #1 RS: 180 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 1
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 2
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 3
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 1
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 2
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
ver: River #1 Reach: Reach #1 RS: 150 Profile: PF 3
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 1
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 3
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 2
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 2
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
er: River #1 Reach: Reach #1 RS: 110 Profile: PF 3
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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

```
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 1
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 2
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
 iver: River #1  Reach: Reach #1     RS: 100     Profile: PF 3
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
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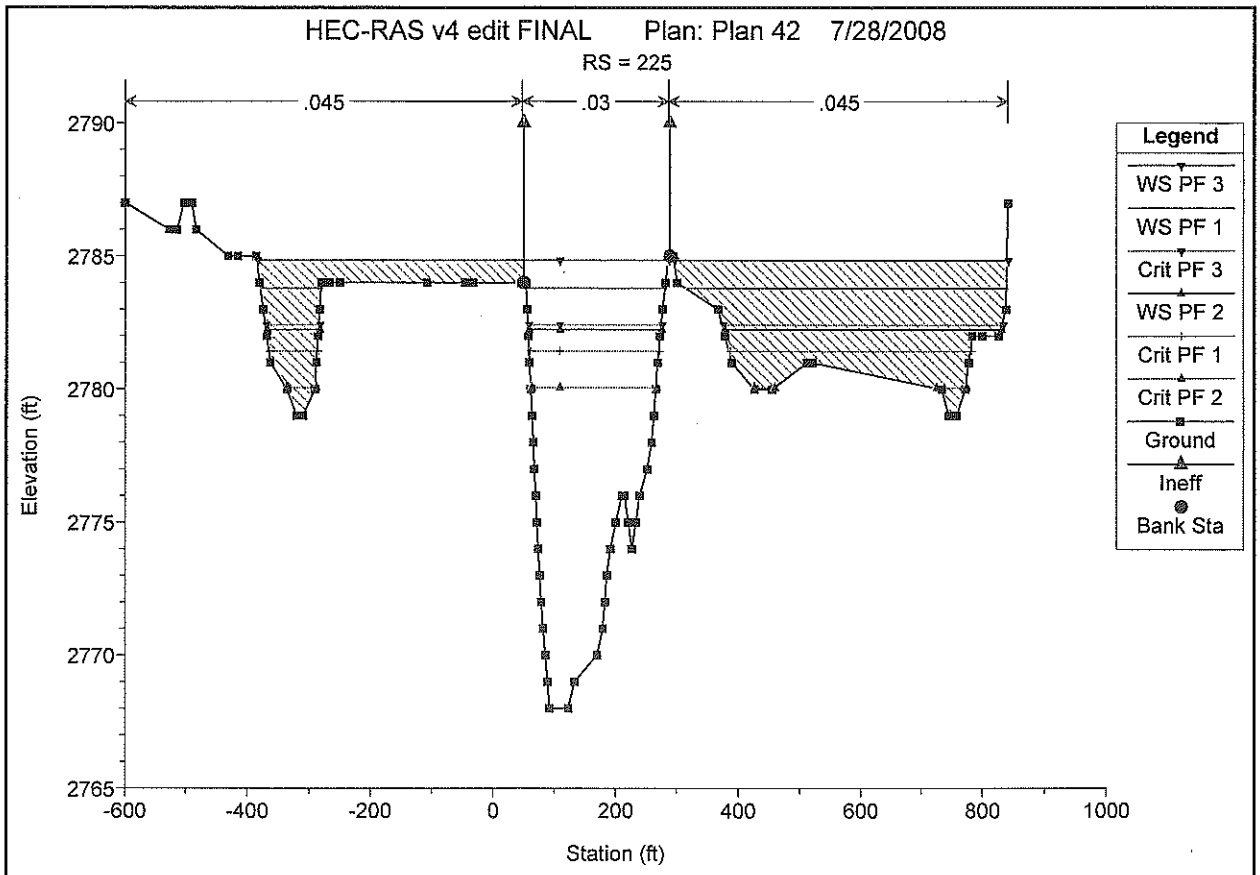
HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 225
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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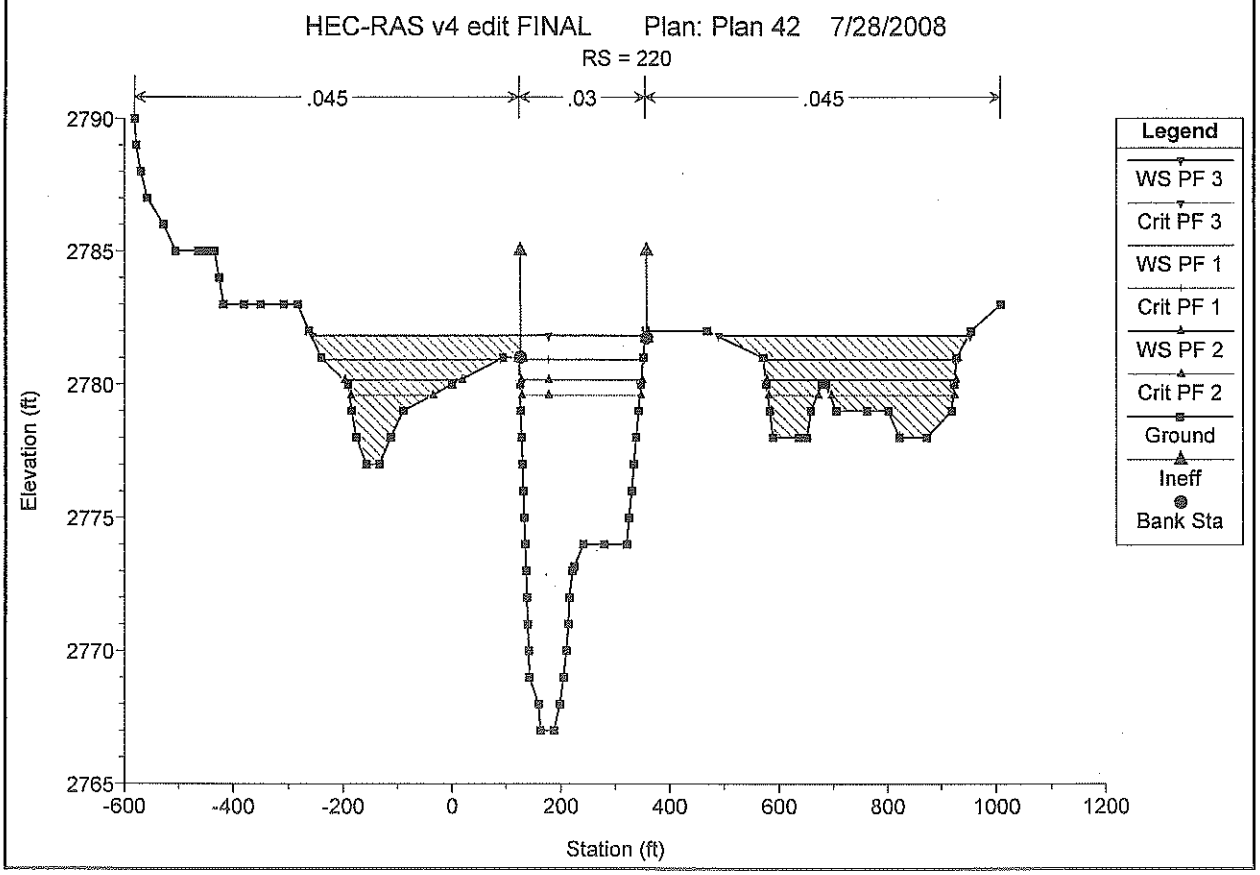
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 220
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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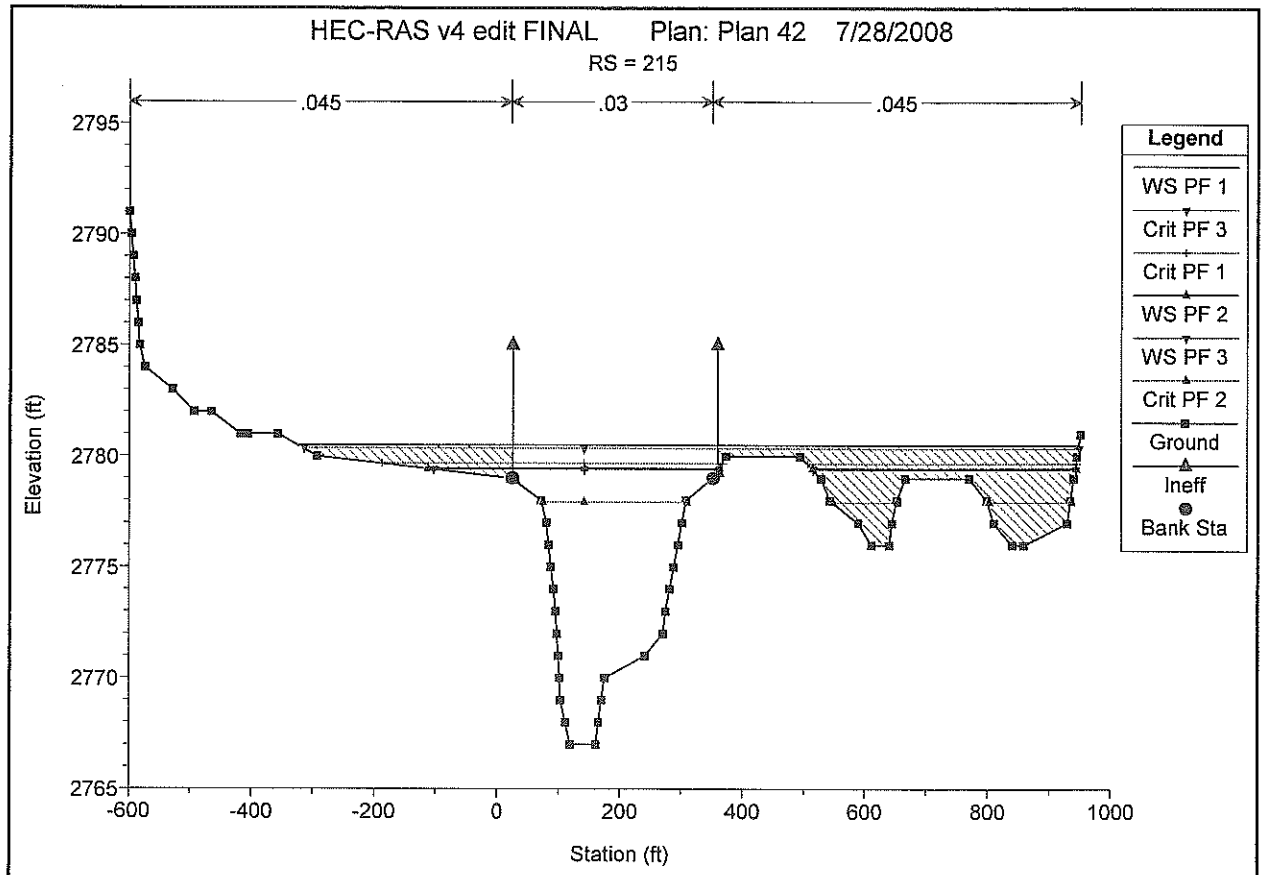
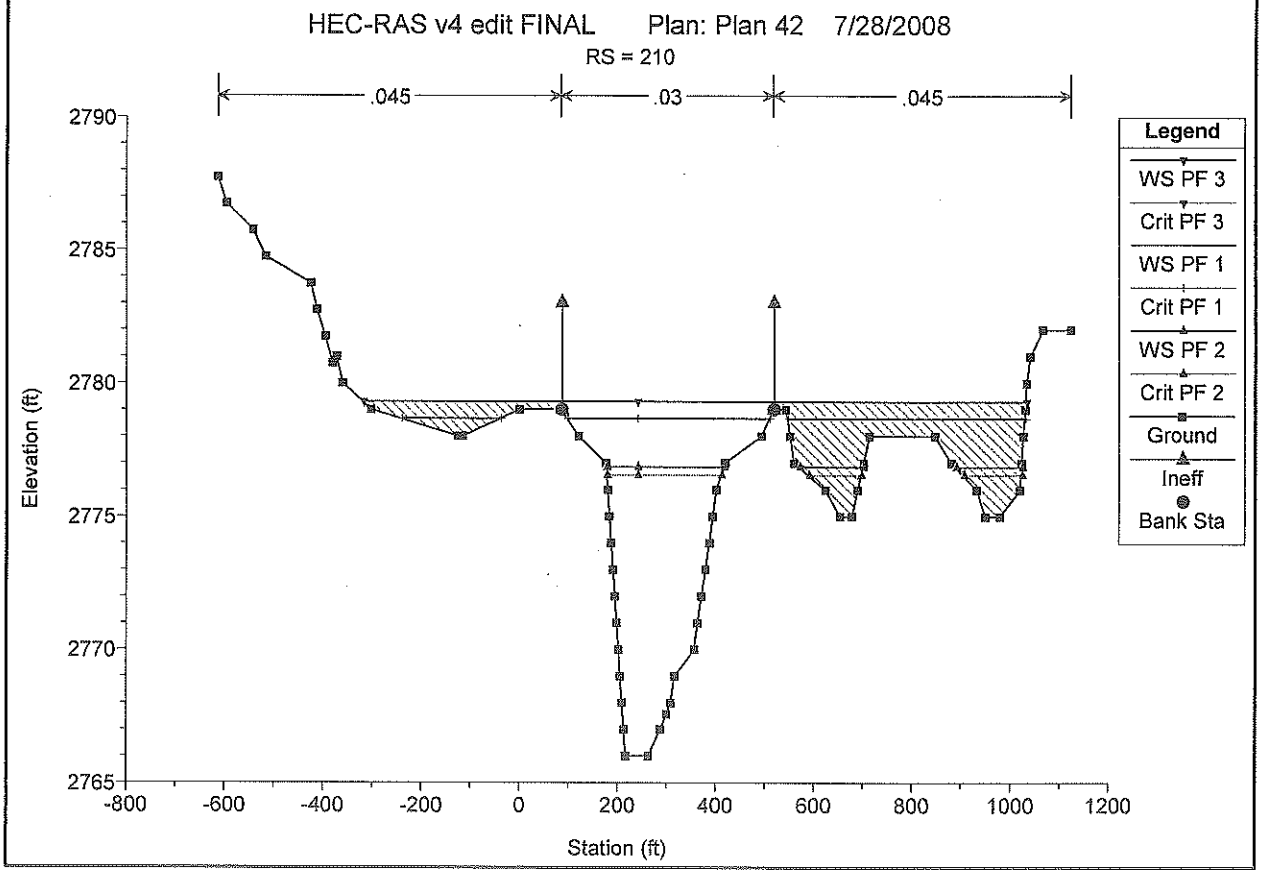
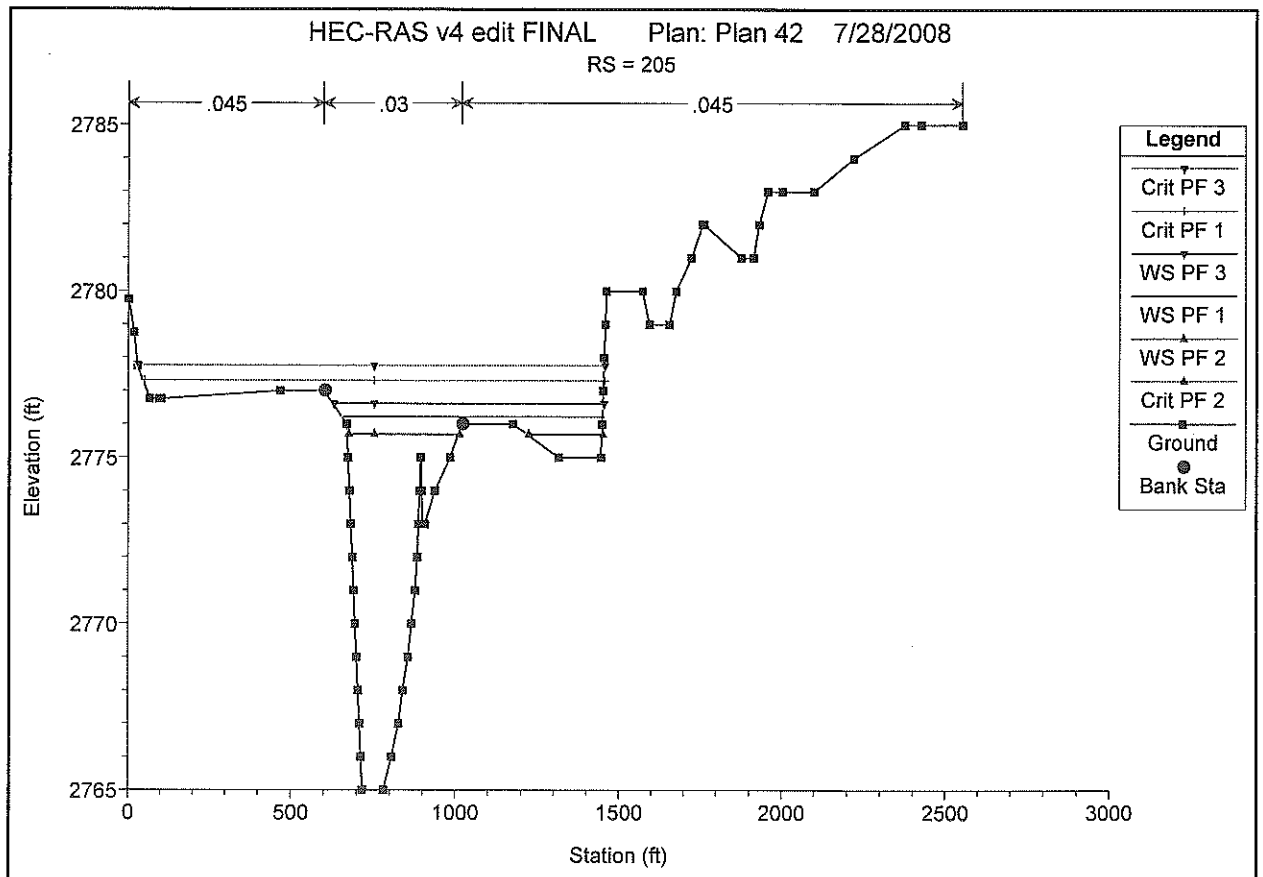
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 215
.045
.03
.045
Legend
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 210
.045
.03
.045
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 205
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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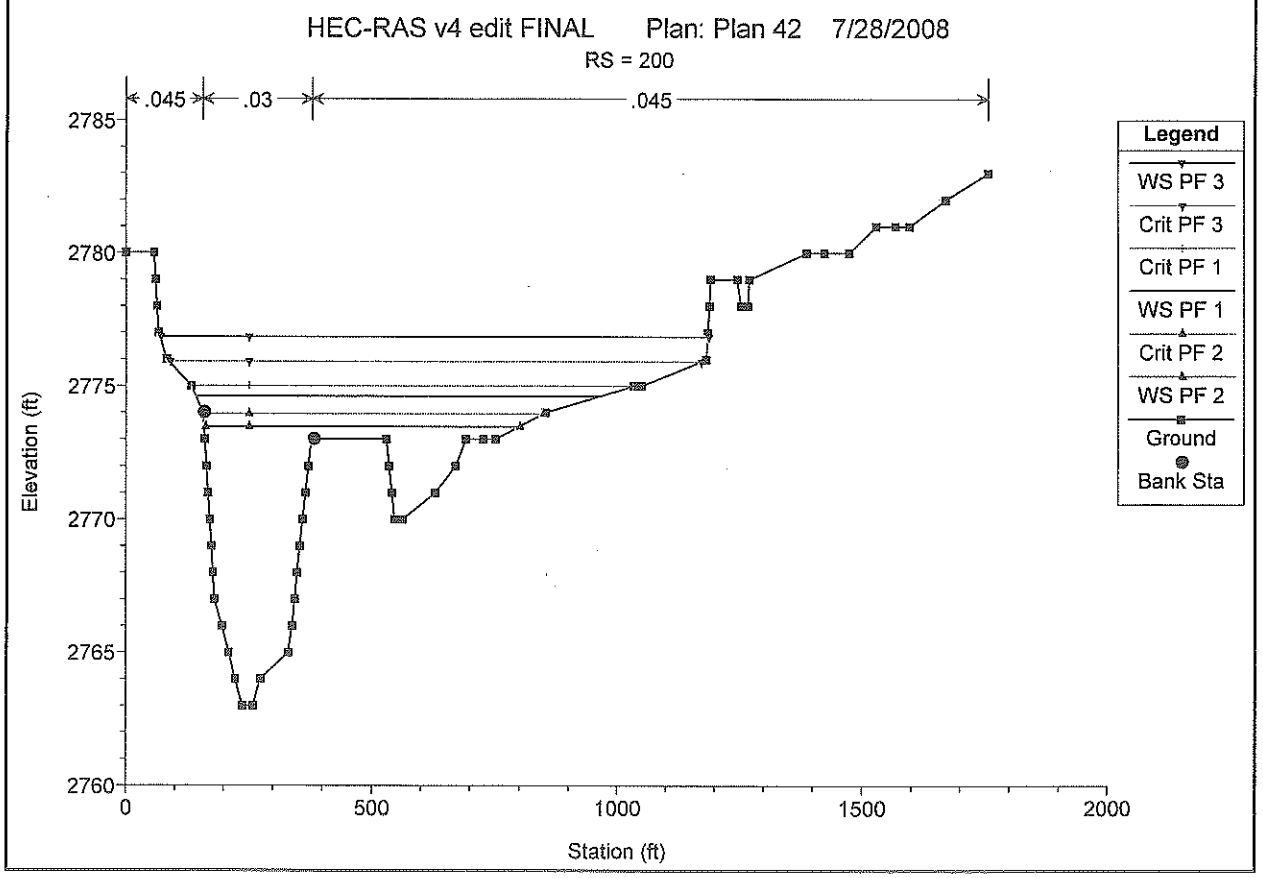
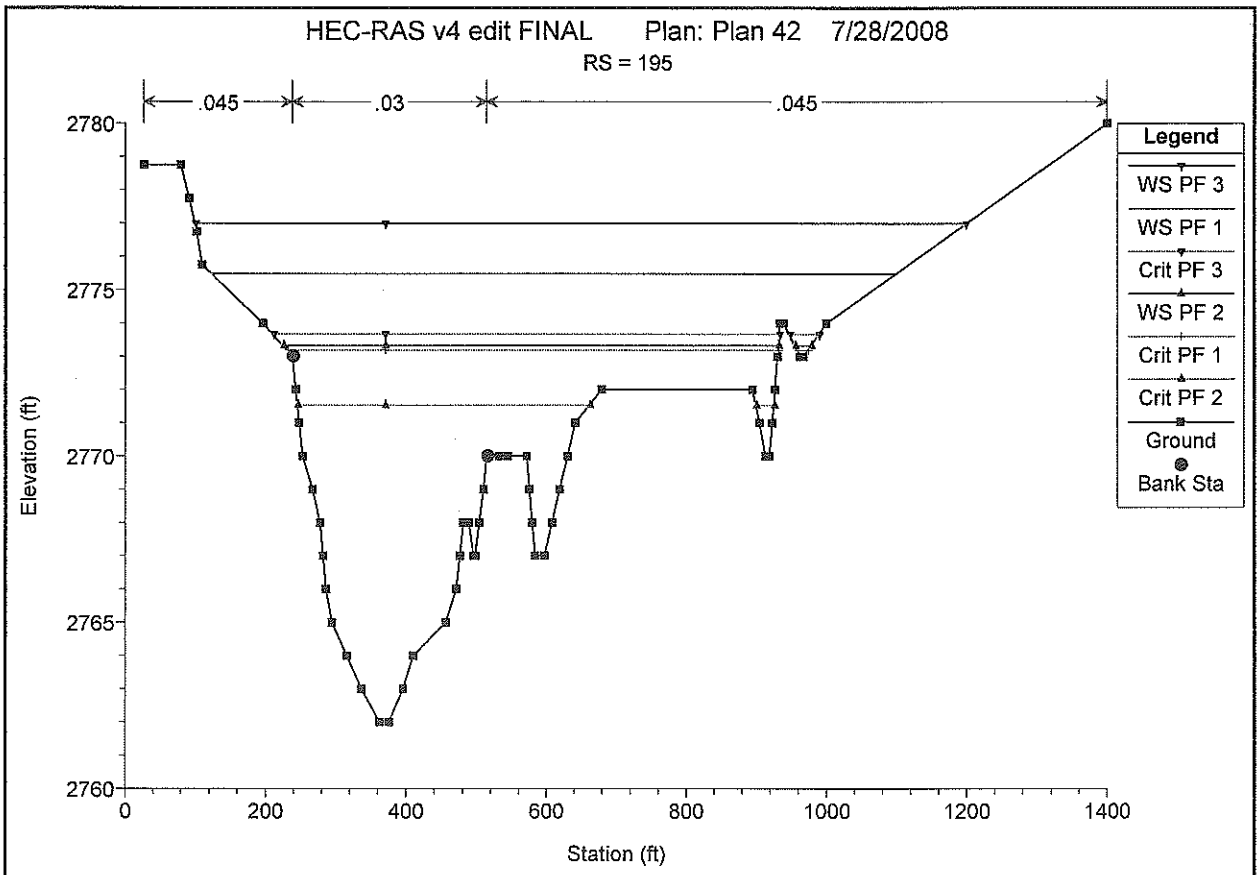
Crit PF 1
WS PF 3
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 200
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 195
.045
.03
.045
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
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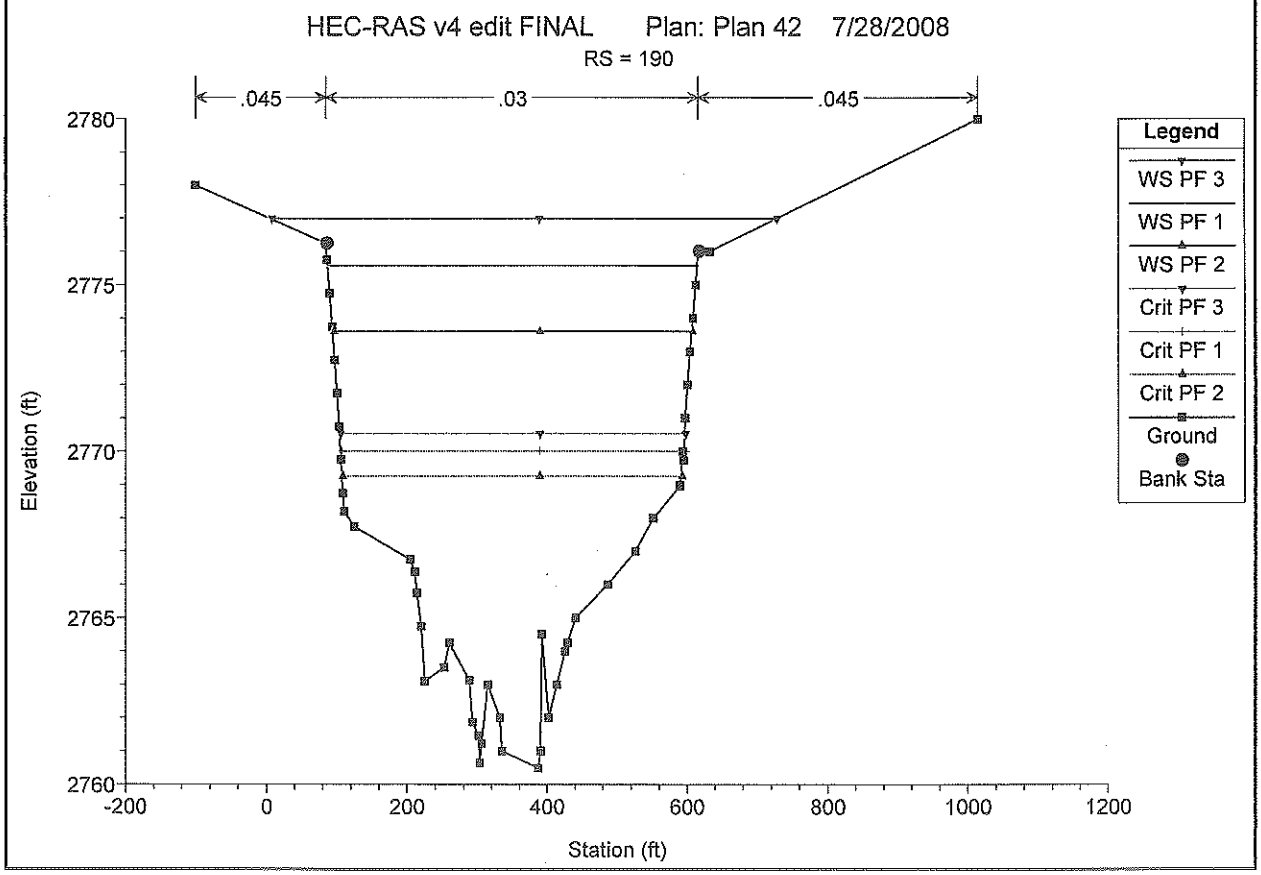
2775
2770
2765
2760
0
200
400
600
800
1000
1200
1400
Station (ft)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.045
.03
.045
Legend
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WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
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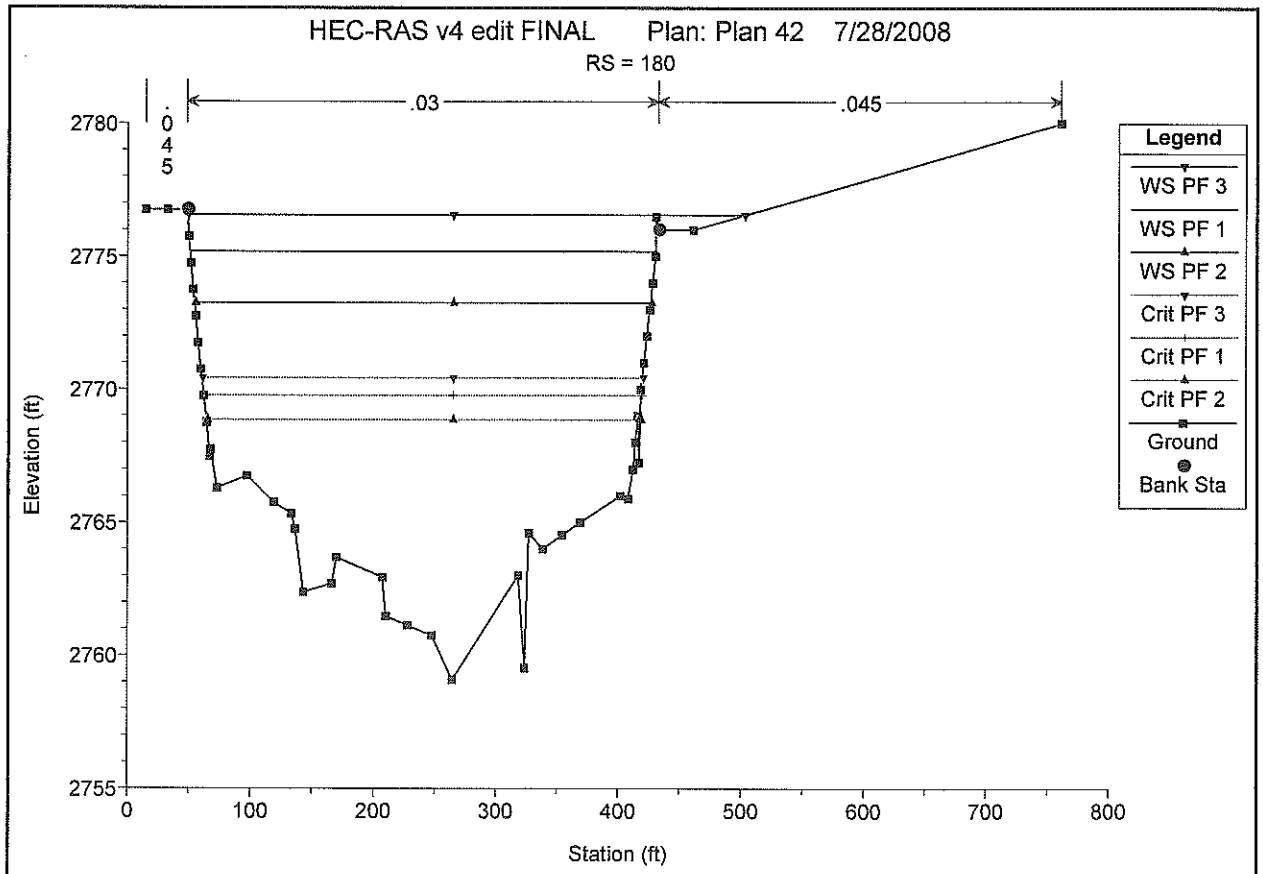
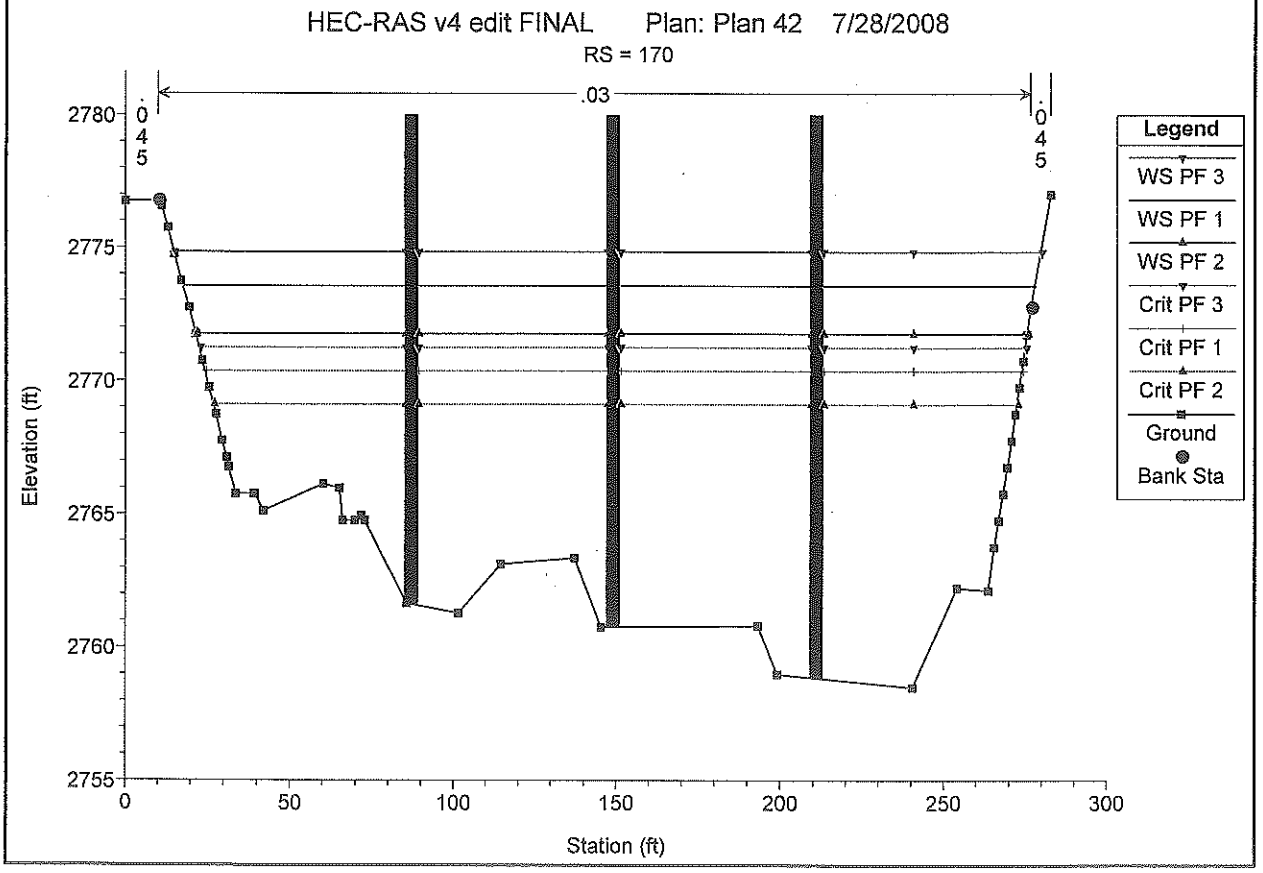
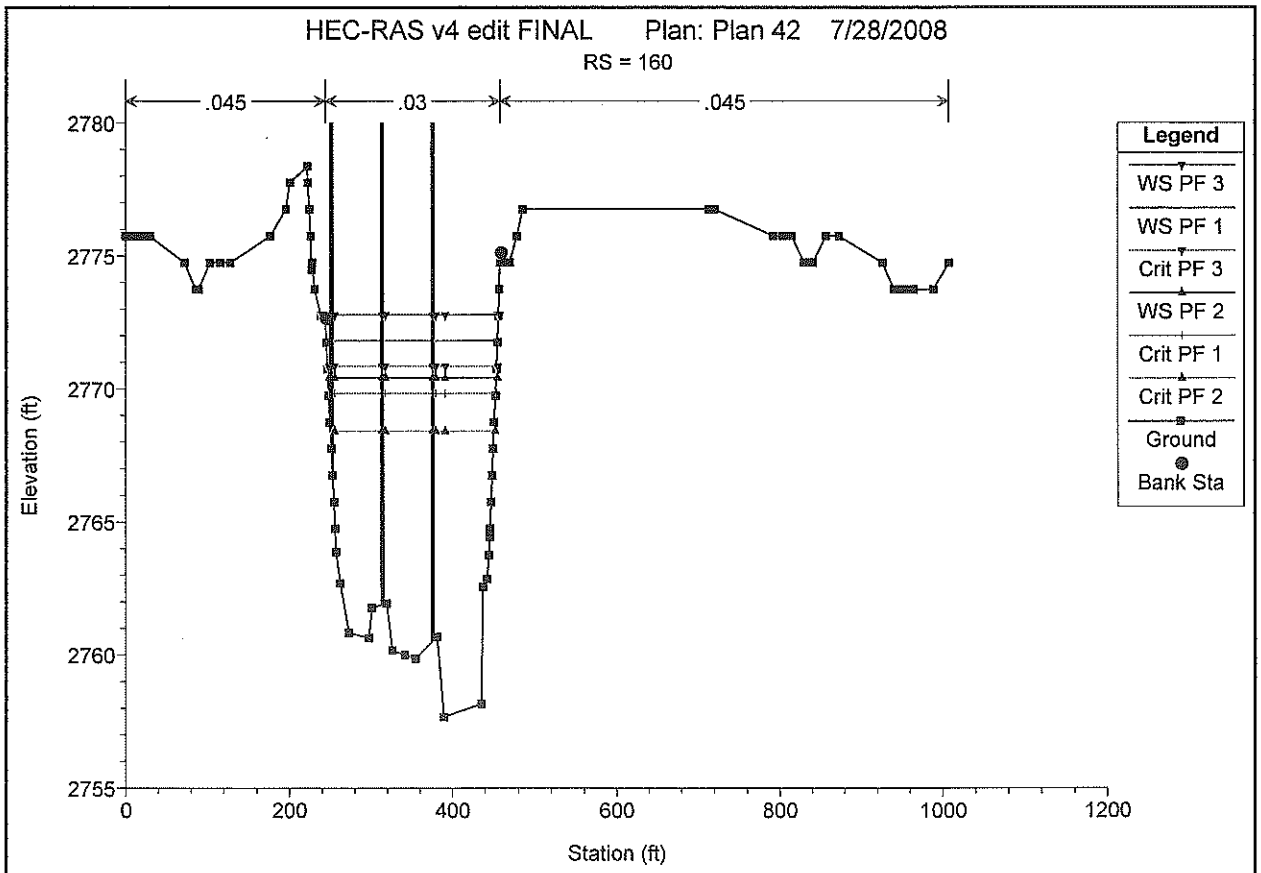
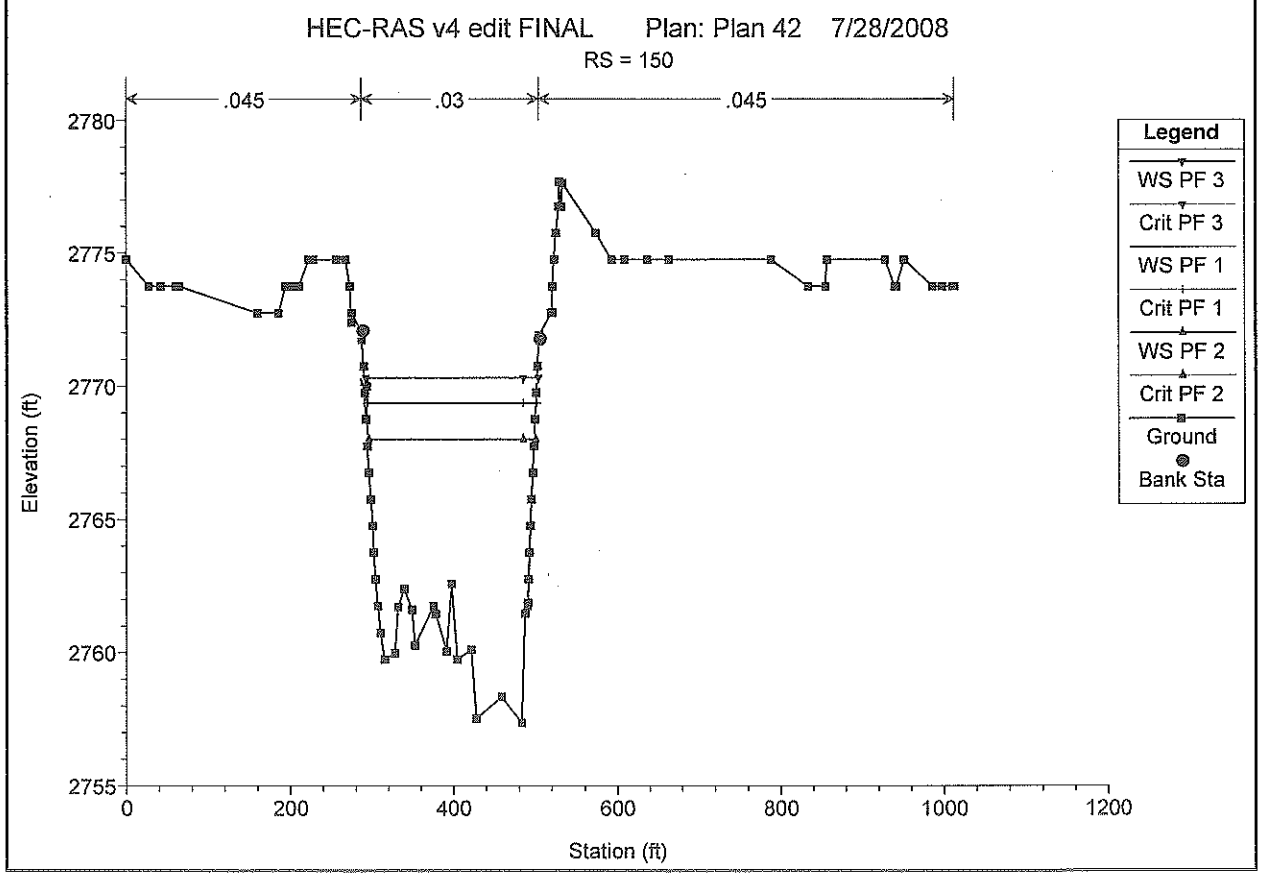
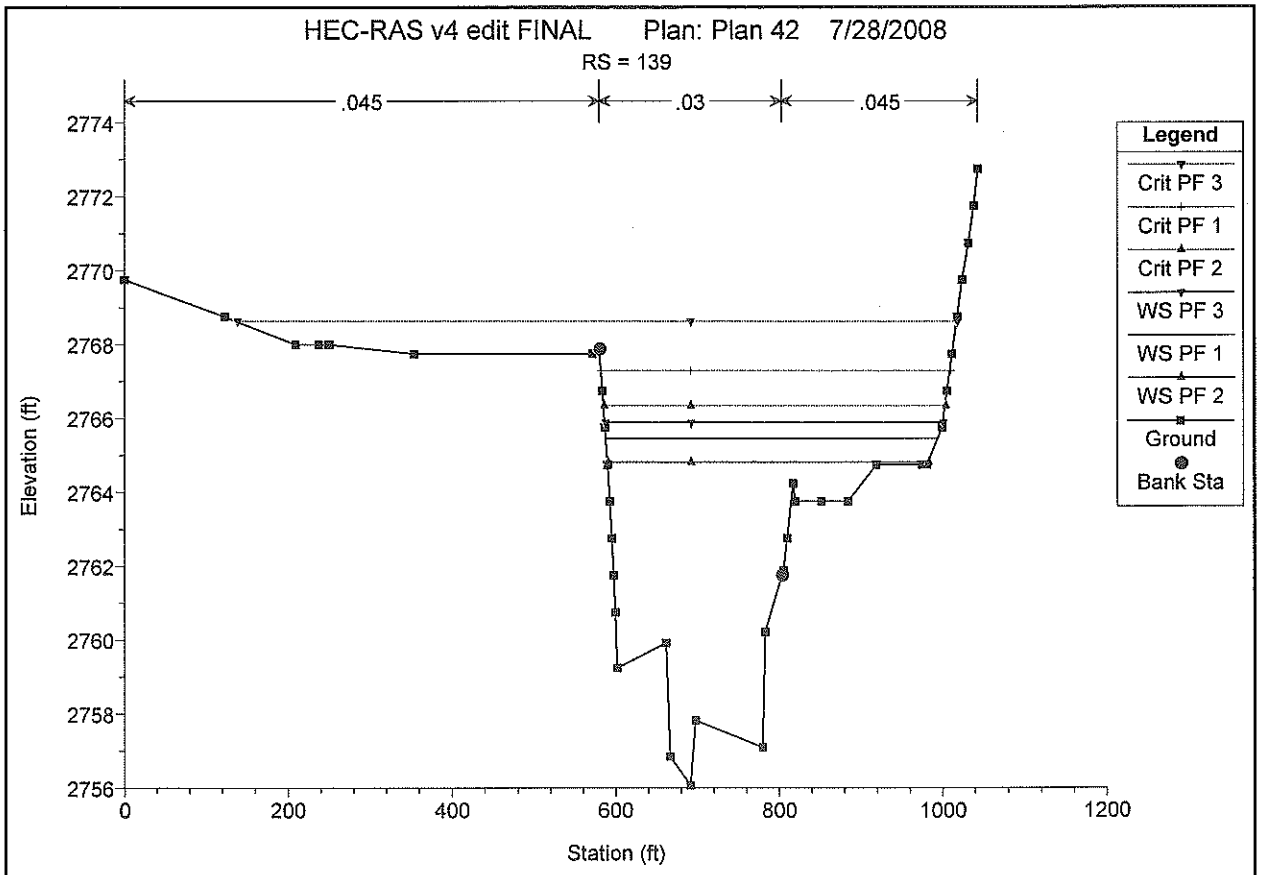
2775
2770
2765
2760
-200
0
200
400
600
800
1000
1200
Station (ft)

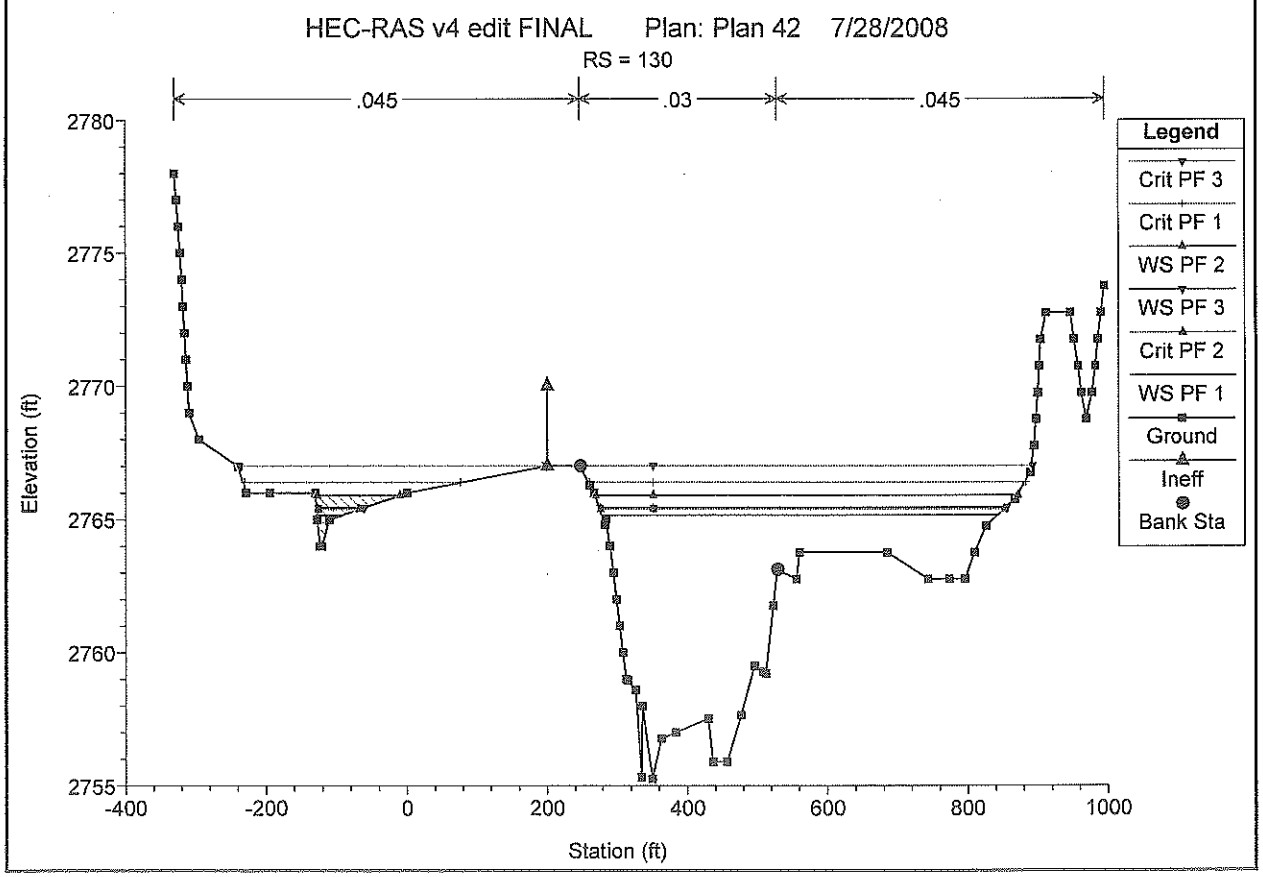

HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 180
.03
.045
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2755
2760
2765
2770
2775
2780
0
100
200
300
400
500
600
700
800

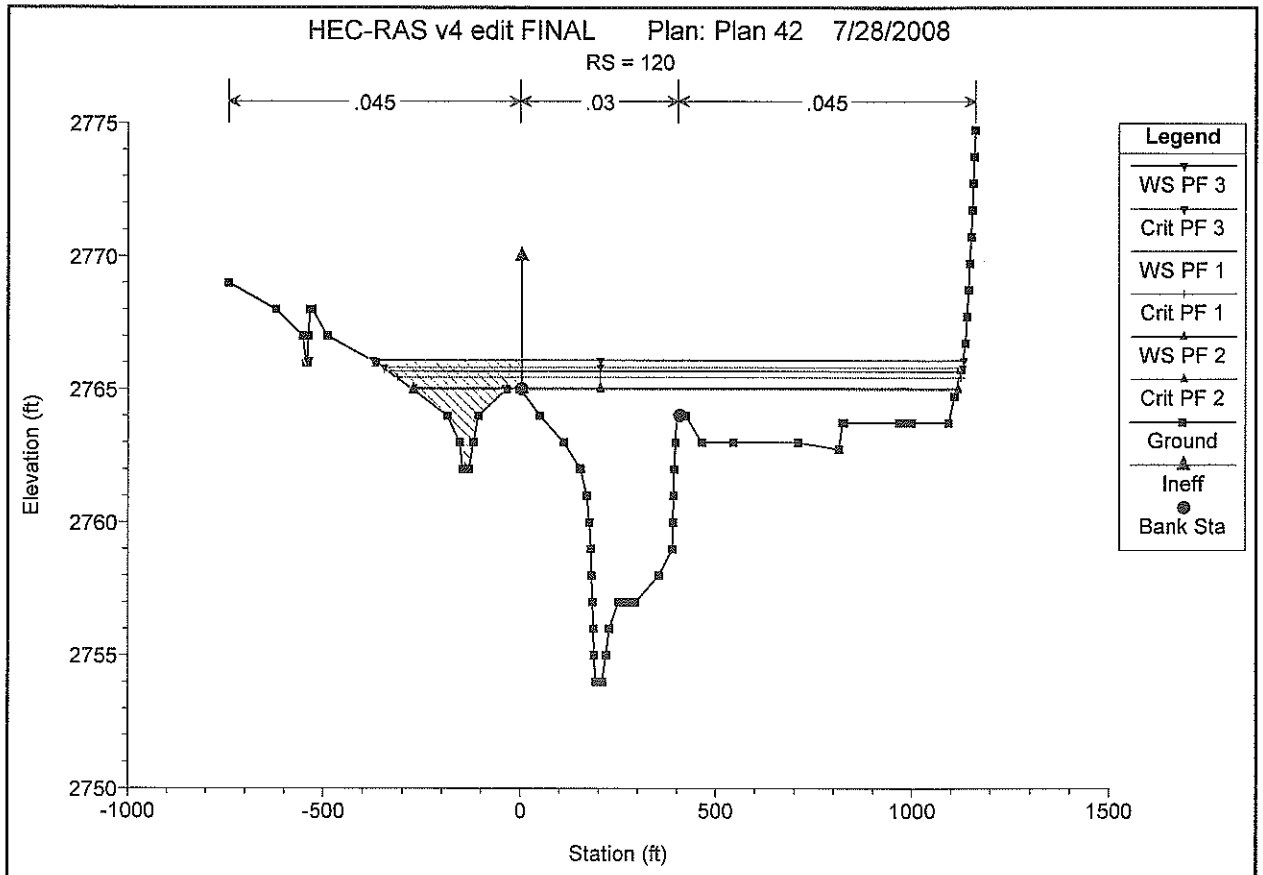

HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 170
.03
.045
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2755
2760
2765
2770
2775
2780
0
50
100
150
200
250
300

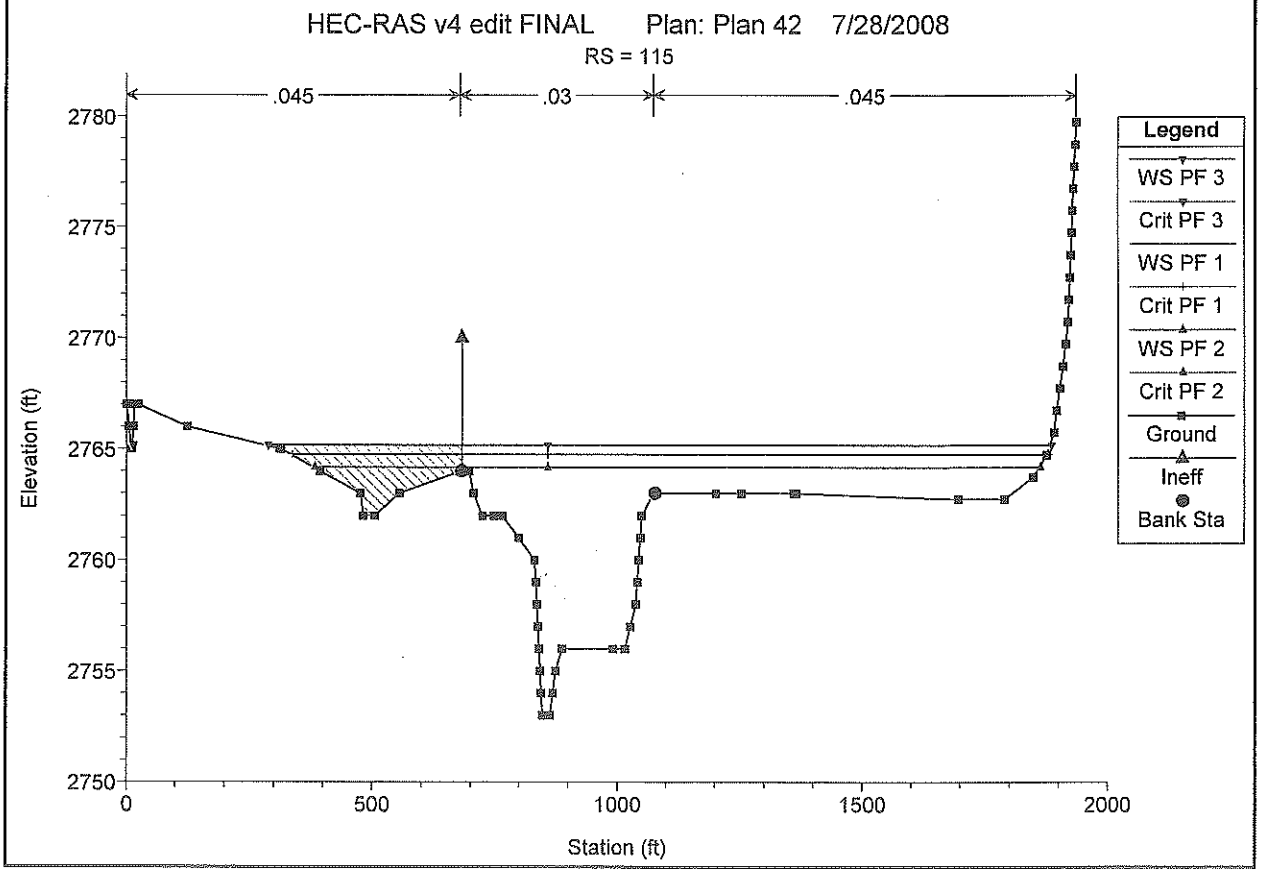

HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 160
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta

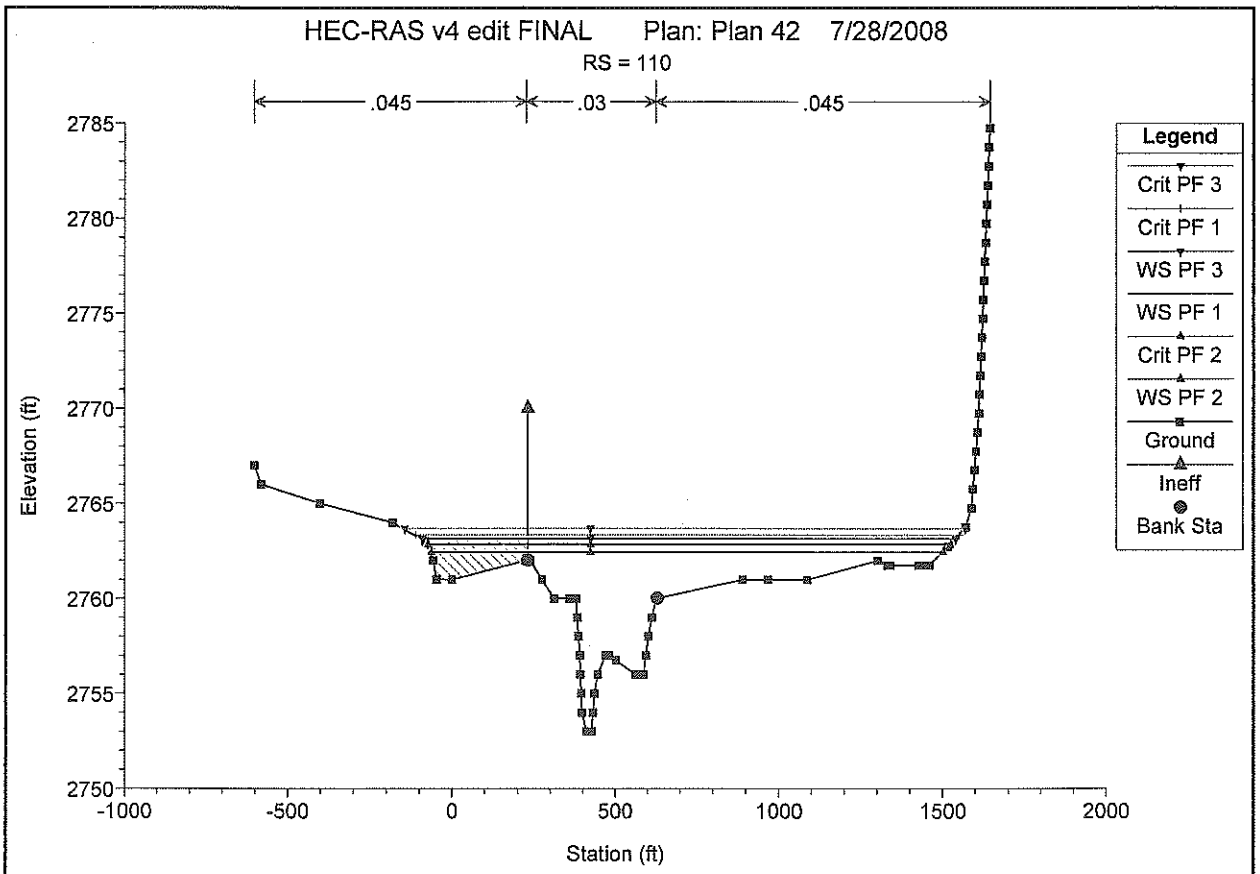

HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 150
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta

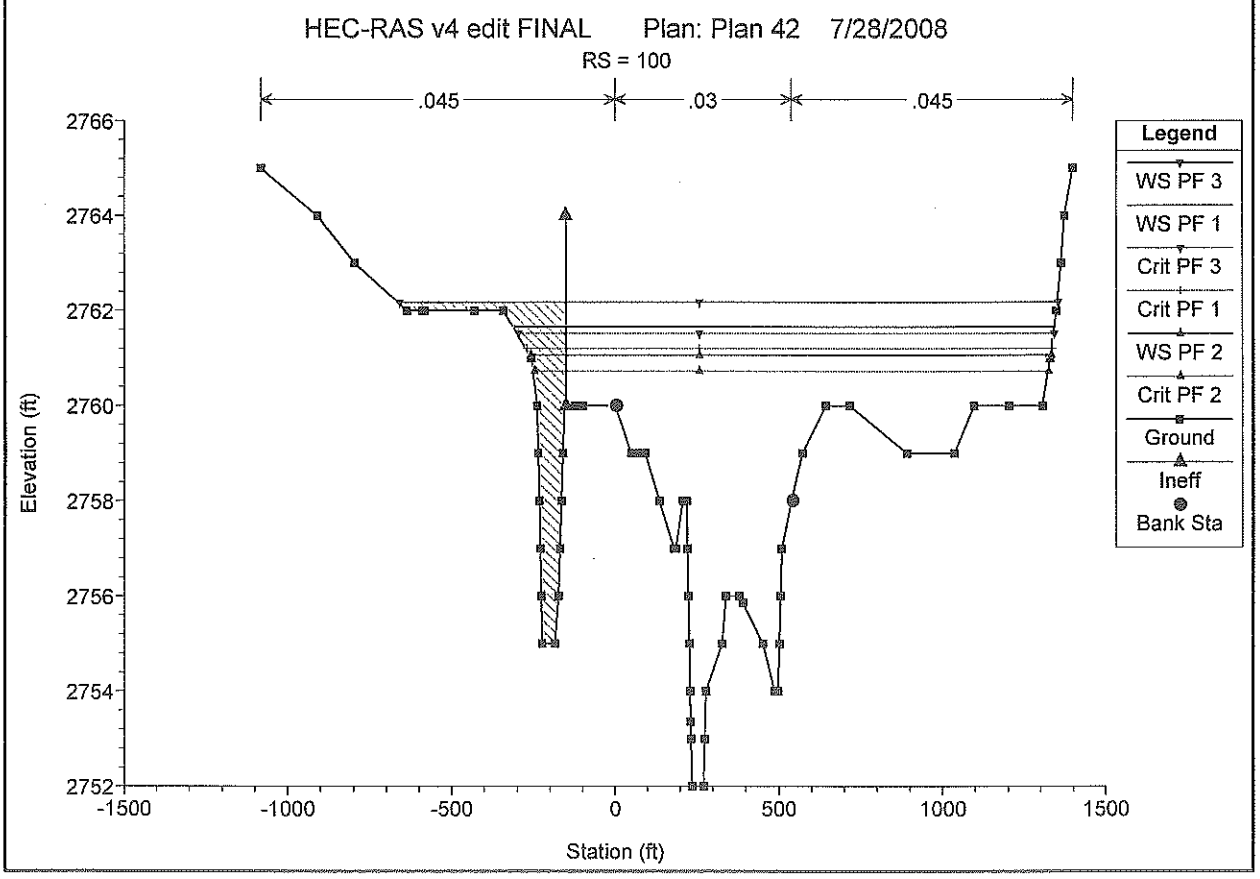

HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 139
.045
.03
.045
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)

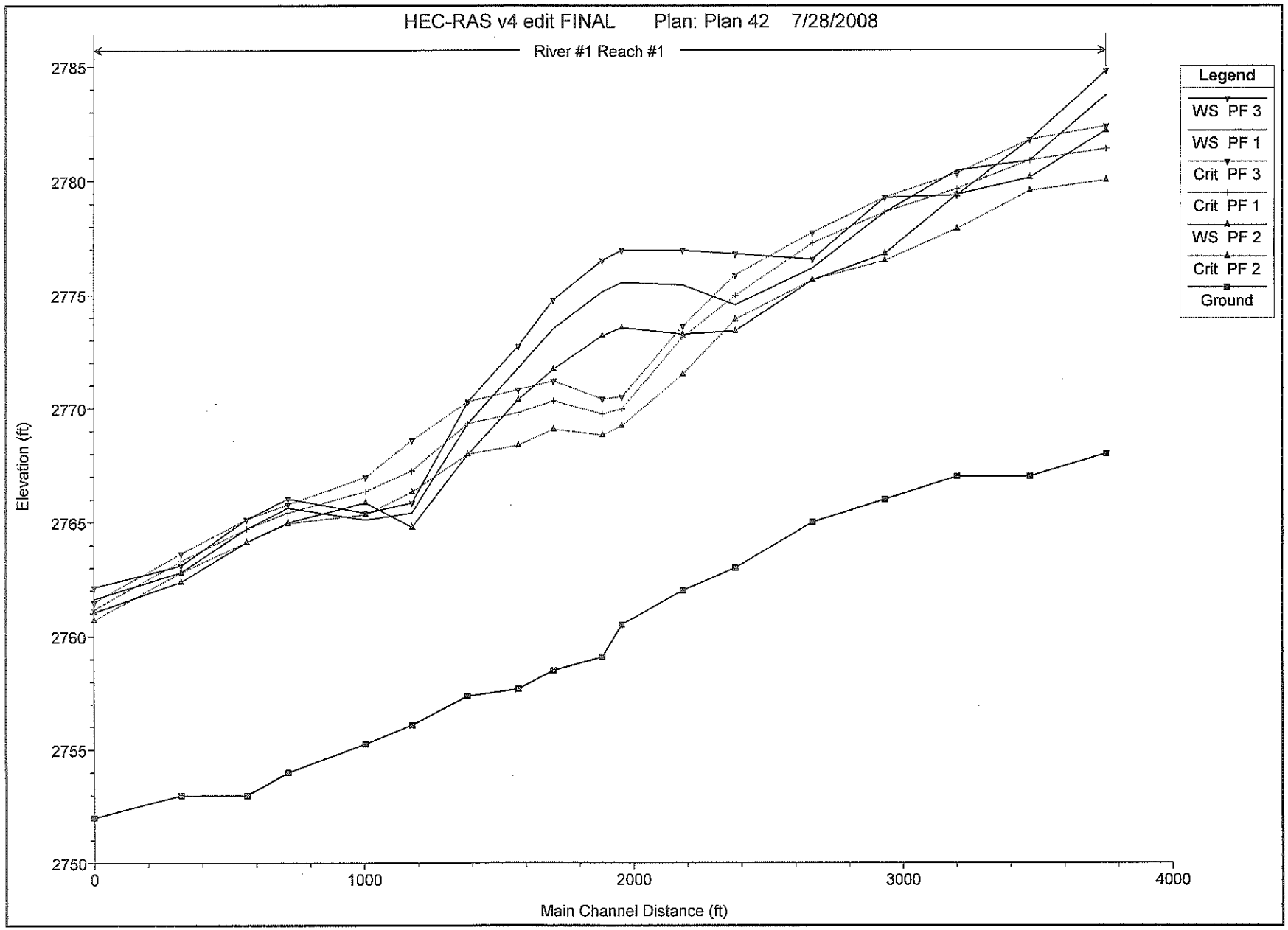

HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 130
.045
.03
.045
Legend
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 120
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 115
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 110
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
Crit PF 2
WS PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
RS = 100
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 42 7/28/2008
River #1 Reach #1
Elevation (ft)
2785
2780
2775
2770
2765
2760
2755
2750
0
1000
2000
3000
4000
Main Channel Distance (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground

ALTERNATIVE 2A

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX


*******************************************************************************

PROJECT DATA
Project Title: HEC-RAS v4 edit FINAL
Project File : v4_FINAL.prj
Run Date and Time: 8/20/2008 2:51:18 PM

Project in English units

*******************************************************************************

PLAN DATA

Plan Title: Plan 49
Plan File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.p49

          Geometry Title: Alternative 2a
          Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g04

          Flow Title    : Flow Profiles
          Flow File     : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Plan Summary Information:
Number of:  Cross Sections =   18    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

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

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


*******************************************************************************

FLOW DATA

Flow Title: Flow Profiles
Flow File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Flow Data (cfs)
*********************************************************************************************
* River           Reach           RS      *            PF 1            PF 2            PF 3 *
* River #1        Reach #1        225     *           31000           24490           36000 *
*********************************************************************************************

Boundary Conditions
*****************************************************************************************************
* River           Reach           Profile         *           Upstream                Downstream    *
*****************************************************************************************************
* River #1        Reach #1        PF 1            *       Known WS = 2784.88      Known WS = 2761.65 *
* River #1        Reach #1        PF 2            *        Known WS = 2783.7      Known WS = 2761.06 *
* River #1        Reach #1        PF 3            *       Known WS = 2785.58      Known WS = 2762.17 *
*****************************************************************************************************

*******************************************************************************

GEOMETRY DATA

Geometry Title: Alternative 2a
Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g04

CROSS SECTION


RIVER: River #1
REACH: Reach #1           RS: 225

INPUT
Description:
 ation Elevation Data    num=      87
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*******************************************************************************
    -600     2787  -527.4     2786 -514.33     2786    -503     2787  -490.5     2787
 -483.14     2786 -430.62     2785 -415.31     2785 -385.29     2785  -379.5     2784
 -373.64     2783 -367.89     2782 -362.54     2781 -335.28     2780 -319.81     2779
 -309.13     2779  -289.6     2780 -286.98     2781 -284.35     2782 -281.73     2783
  -279.1     2784 -265.97     2784 -248.75     2784 -107.38     2784  -45.25     2784
  -31.61     2784   48.35     2784   54.16     2784   56.16     2783   58.16     2782
   60.16     2781   62.16     2780   64.15     2779   66.14     2778   68.14     2777
```

70.13	2776	72.11	2775	74.12	2774	76.14	2773	78.74	2772
82.21	2771	85.67	2770	89.14	2769	92.61	2768	122.93	2768
133.3	2769	169.83	2770	179.3	2771	182.56	2772	185.85	2773
191.57	2774	200.62	2775	210.54	2776	215.34	2776	220.78	2775
226.28	2774	226.63	2774	232.86	2775	239.08	2776	251.88	2777
259.19	2778	262.5	2779	265.81	2780	269.11	2781	272.46	2782
277.36	2783	282.24	2784	287.11	2785	294.48	2785	301.44	2784
367.61	2783	378.84	2782	390.07	2781	426.4	2780	455.43	2780
512.28	2781	521.82	2781	734.04	2780	745.89	2779	758.18	2779
772.24	2780	777.86	2781	783.57	2782	799.74	2782	826.6	2782
838.75	2783	841.94	2787						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	48.35	.03	287.11	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.35	287.11	299.75	282.05	262.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	48.35	2790	F
287.11	841.94	2790	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2786.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.66	Wt. n-Val.		0.030	
W.S. Elev (ft)	2783.79	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2781.42	Flow Area (sq ft)		2368.69	
E.G. Slope (ft/ft)	0.003148	Area (sq ft)	331.46	2368.69	1497.45
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	849.40	Top Width (ft)	98.63	226.64	524.13
Vel Total (ft/s)	13.09	Avg. Vel. (ft/s)		13.09	
Max Chl Dpth (ft)	15.79	Hydr. Depth (ft)		10.45	
Conv. Total (cfs)	552522.3	Conv. (cfs)		552522.3	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		231.77	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.01	
Alpha	1.00	Stream Power (lb/ft s)		26.29	
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	18.23	207.18	82.59
C & E Loss (ft)	0.15	Cum SA (acres)	13.69	27.73	38.84

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2784.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	2782.23	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2780.05	Flow Area (sq ft)		2023.49	
E.G. Slope (ft/ft)	0.003108	Area (sq ft)	187.89	2023.49	748.39
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	754.54	Top Width (ft)	85.48	215.90	453.17
Vel Total (ft/s)	12.10	Avg. Vel. (ft/s)		12.10	
Max Chl Dpth (ft)	14.23	Hydr. Depth (ft)		9.37	
Conv. Total (cfs)	439315.6	Conv. (cfs)		439315.6	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		220.49	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		1.78	
Alpha	1.00	Stream Power (lb/ft s)		21.55	
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)	9.84	178.48	48.12
C & E Loss (ft)	0.08	Cum SA (acres)	9.13	26.34	31.88

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2787.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.95	Wt. n-Val.		0.030	
W.S. Elev (ft)	2784.84	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2782.42	Flow Area (sq ft)		2613.48	
E.G. Slope (ft/ft)	0.003262	Area (sq ft)	712.12	2613.48	2061.12
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1215.25	Top Width (ft)	432.69	237.96	544.60
Vel Total (ft/s)	13.77	Avg. Vel. (ft/s)		13.77	
Max Chl Dpth (ft)	16.84	Hydr. Depth (ft)		10.98	
Conv. Total (cfs)	630296.7	Conv. (cfs)		630296.7	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		243.24	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.19	
Alpha	1.00	Stream Power (lb/ft s)		30.14	
Frctn Loss (ft)	1.26	Cum Volume (acre-ft)	26.23	225.06	108.88
C & E Loss (ft)	0.16	Cum SA (acres)	17.90	28.16	41.03

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 220

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-581.45	2790	-578.15	2789	-569.74	2788	-557.64	2787	-527.23	2786
-505.43	2785	-463.74	2785	-455.79	2785	-443.54	2785	-433.72	2785
-425.53	2784	-417.97	2783	-380.36	2783	-349.98	2783	-307.83	2783
-282.84	2783	-261.98	2782	-239.35	2781	-190.7	2780	-183.94	2779
-175.54	2778	-157.15	2777	-133.21	2777	-112.75	2778	-89.46	2779
0	2780	93.96	2781	93.97	2781	123.68	2781	123.69	2781
125.31	2780	126.91	2779	128.5	2778	128.51	2778	130.1	2777
131.69	2776	131.7	2775.99	133.28	2775	134.86	2774	134.87	2774
136.44	2773	136.45	2772.99	138.01	2772	138.02	2772	139.58	2771
139.59	2770.99	141.14	2770	141.15	2769.99	142.52	2769	159.27	2768
159.28	2768	162.78	2767	187.06	2767	198.25	2768	198.26	2768
204.67	2769	210.08	2770	213.61	2771	215.17	2772	215.18	2772
221.37	2773	224.62	2773.16	241.47	2774	241.48	2774	279.56	2774
320.64	2774	324.91	2775	324.92	2775	329.19	2776	333.46	2777
333.47	2777	337.74	2778	342.02	2779	346.29	2780	346.3	2780
351.04	2781	354.75	2781.74	356.06	2782	468.74	2782	570.77	2781
570.78	2781	576.15	2780	582.31	2779	588.49	2778	588.5	2778
635.74	2778	648.28	2778	648.29	2778	650.75	2778	650.76	2778
657.91	2779	677.66	2780	677.67	2780	685.61	2780	704.82	2779
761.06	2779	800.38	2779	800.39	2779	821.89	2778	871.9	2778
871.91	2778	918.79	2779	922.82	2780	922.83	2780	927.55	2781
927.56	2781	954.11	2782	954.12	2782	1008.32	2783	1008.33	2783

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-581.45	.045	123.69	.03	354.75	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
123.69	354.75	277.65	269.4	261.19	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-581.45	123.69	2785	F
354.75	1008.33	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2785.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.92	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2780.92	Flow Area (sq ft)		1897.98	
E.G. Slope (ft/ft)	0.006598	Area (sq ft)	500.52	1897.98	790.65
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	904.77	Top Width (ft)	321.96	226.84	355.97
Vel Total (ft/s)	16.33	Avg. Vel. (ft/s)		16.33	
Max Chl Dpth (ft)	13.92	Hydr. Depth (ft)		8.37	
Conv. Total (cfs)	381638.5	Conv. (cfs)		381638.5	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		232.04	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.37	
Alpha	1.00	Stream Power (lb/ft s)		55.03	
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)	15.36	193.37	75.71
C & E Loss (ft)	0.48	Cum SA (acres)	12.24	26.26	36.19

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: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2783.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.12	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.16	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2779.58	Flow Area (sq ft)		1728.23	
E.G. Slope (ft/ft)	0.005463	Area (sq ft)	297.80	1728.23	524.30
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	784.47	Top Width (ft)	214.10	222.03	348.34
Vel Total (ft/s)	14.17	Avg. Vel. (ft/s)		14.17	
Max Chl Dpth (ft)	13.16	Hydr. Depth (ft)		7.78	
Conv. Total (cfs)	331339.7	Conv. (cfs)		331339.7	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		226.94	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.60	
Alpha	1.00	Stream Power (lb/ft s)		36.81	
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	8.17	166.33	44.29
C & E Loss (ft)	0.29	Cum SA (acres)	8.10	24.93	29.47

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

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2786.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.54	Wt. n-Val.		0.030	
W.S. Elev (ft)	2781.82	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2781.82	Flow Area (sq ft)		2104.79	
E.G. Slope (ft/ft)	0.006460	Area (sq ft)	832.95	2104.79	1156.10
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1075.72	Top Width (ft)	381.66	231.06	463.00
Vel Total (ft/s)	17.10	Avg. Vel. (ft/s)		17.10	
Max Chl Dpth (ft)	14.82	Hydr. Depth (ft)		9.11	
Conv. Total (cfs)	447891.0	Conv. (cfs)		447891.0	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		236.36	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.59	
Alpha	1.00	Stream Power (lb/ft s)		61.43	
Frctn Loss (ft)	1.57	Cum Volume (acre-ft)	20.92	209.78	99.20
C & E Loss (ft)	0.44	Cum SA (acres)	15.10	26.64	38.00

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: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 215

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600	2791	-597.36	2790	-594.38	2789	-591.34	2788	-588.34	2787
-585.87	2786	-583.46	2785	-574.84	2784	-529.58	2783	-494.62	2782
-493.31	2782	-466.31	2782	-418.17	2781	-406.34	2781	-357.18	2781
-292.94	2780	22.72	2779	71.36	2778	79.77	2777	83.57	2776
87.37	2775	91.17	2774	94.97	2773	97.27	2772	99.2	2771
101.13	2770	103.06	2769	111.41	2768	118.38	2767	160.1	2767
165.01	2768	169.93	2769	174.87	2770	240.22	2771	270.17	2772
274.15	2773	280.87	2774	287.59	2775	294.31	2776	301.03	2777
307.75	2778	350.35	2779	373.61	2780	494.04	2780	528.29	2779
542.52	2778	588.86	2777	611.04	2776	639.44	2776	644.41	2777
652.37	2778	665.66	2779	769.93	2779	798.66	2778	809.36	2777
839.56	2776	858.07	2776	928.58	2777	933.82	2778	939.05	2779
944.29	2780	950.35	2781						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	22.72	.03	350.35	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
22.72	350.35	294.95	268.22	230.48	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	22.72	2785	F
357.15	950.35	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2783.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2780.49	Reach Len. (ft)	294.95	268.22	230.48
Crit W.S. (ft)	2779.67	Flow Area (sq ft)		2416.70	9.10
E.G. Slope (ft/ft)	0.004711	Area (sq ft)	318.35	2416.70	1327.16
Q Total (cfs)	31000.00	Flow (cfs)		30974.96	25.04
Top Width (ft)	1271.30	Top Width (ft)	346.79	327.63	596.88
Vel Total (ft/s)	12.78	Avg. Vel. (ft/s)		12.82	2.75
Max Chl Dpth (ft)	13.48	Hydr. Depth (ft)		7.38	1.34
Conv. Total (cfs)	451664.8	Conv. (cfs)		451300.0	364.8
Length Wtd. (ft)	268.20	Wetted Per. (ft)		330.12	6.81
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.15	0.39
Alpha	1.01	Stream Power (lb/ft s)		27.59	1.08
Frctn Loss (ft)	1.56	Cum Volume (acre-ft)	12.75	180.03	69.36
C & E Loss (ft)	0.02	Cum SA (acres)	10.11	24.54	33.34

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2781.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.17	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2779.44	Reach Len. (ft)	294.95	268.22	230.48
Crit W.S. (ft)	2777.92	Flow Area (sq ft)		2073.47	1.98
E.G. Slope (ft/ft)	0.004906	Area (sq ft)	30.14	2073.47	781.98

* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24487.99	*	2.01 *
* Top Width (ft)	* 903.76	* Top Width (ft)	*	137.95	* 327.63	*	438.18 *
* Vel Total (ft/s)	* 11.80	* Avg. Vel. (ft/s)	*		* 11.81	*	1.01 *
* Max Chl Dpth (ft)	* 12.44	* Hydr. Depth (ft)	*		* 6.33	*	0.29 *
* Conv. Total (cfs)	*349644.7	* Conv. (cfs)	*		*349616.0	*	28.7 *
* Length Wtd. (ft)	* 268.22	* Wetted Per. (ft)	*		* 330.12	*	6.81 *
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 1.92	*	0.09 *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 22.72	*	0.09 *
* Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	*	7.12	* 154.58	*	40.38 *
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	*	6.98	* 23.23	*	27.11 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2784.13	* Element	*	Left OB	* Channel	*	Right OB *
* Vel Head (ft)	* 4.72	* Wt. n-Val.	*		* 0.030	*	0.045 *
* W.S. Elev (ft)	* 2779.41	* Reach Len. (ft)	*	294.95	* 268.22	*	230.48 *
* Crit W.S. (ft)	* 2780.35	* Flow Area (sq ft)	*		* 2063.55	*	1.77 *
* E.G. Slope (ft/ft)	*0.010772	* Area (sq ft)	*	26.11	* 2063.55	*	768.74 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*35997.52	*	2.48 *
* Top Width (ft)	* 892.30	* Top Width (ft)	*	128.39	* 327.63	*	436.28 *
* Vel Total (ft/s)	* 17.43	* Avg. Vel. (ft/s)	*		* 17.44	*	1.40 *
* Max Chl Dpth (ft)	* 12.41	* Hydr. Depth (ft)	*		* 6.30	*	0.26 *
* Conv. Total (cfs)	*346857.0	* Conv. (cfs)	*		*346833.1	*	23.9 *
* Length Wtd. (ft)	* 268.20	* Wetted Per. (ft)	*		* 330.12	*	6.81 *
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 4.20	*	0.18 *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 73.33	*	0.24 *
* Frctn Loss (ft)	* 2.21	* Cum Volume (acre-ft)	*	18.18	* 196.90	*	93.43 *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	13.47	* 24.91	*	35.30 *

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 210

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-614.23	2787.75	-596.1	2786.75	-542.4	2785.75	-516.9	2784.75	-424.44	2783.75
-412.49	2782.75	-394.83	2781.75	-379.82	2780.75	-371.56	2781	-360.26	2780
-302.66	2779	-125.77	2778	-116.44	2778	0	2779	83.98	2779
120.42	2778	175.57	2777	179.48	2776	183.19	2775	186.89	2774
190.59	2773	194.29	2772	198	2771	201.7	2770	205.4	2769
209.11	2768	212.81	2767	216.2	2766	262.35	2766	287.31	2767
299.68	2767.58	308.47	2768	316.57	2769	356.57	2770	363.17	2771
371.31	2772	379.21	2773	387.12	2774	393.96	2775	400.77	2776
419.08	2777	420.22	2777.02	492.78	2778	516.88	2779	542.96	2779
542.97	2779	551.39	2778	559.71	2777	623.32	2776	653.95	2775
677.99	2775	689.88	2776	701.76	2777	713.64	2778	846.55	2778
880.52	2777	931.83	2776	949.52	2775	978.42	2775	1020.01	2776
1023.25	2777	1026.61	2778	1029.97	2779	1033.37	2780	1041.03	2781
1066.33	2782	1122.14	2782						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-614.23	.045	83.98	.03	516.88	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
83.98	516.88	283.6	269.08	254.74	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-614.23	83.98	2783	F
516.88	1122.14	2783	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2781.45	* Element	*	Left OB	* Channel	*	Right OB *
* Vel Head (ft)	* 2.79	* Wt. n-Val.	*		* 0.030	*	*
* W.S. Elev (ft)	* 2778.66	* Reach Len. (ft)	*	283.60	* 269.08	*	254.74 *
* Crit W.S. (ft)	* 2778.66	* Flow Area (sq ft)	*		* 2313.85	*	*
* E.G. Slope (ft/ft)	*0.007383	* Area (sq ft)	*	69.68	* 2313.85	*	952.49 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*		*31000.00	*	*
* Top Width (ft)	* 1097.58	* Top Width (ft)	*	202.40	* 412.21	*	482.97 *
* Vel Total (ft/s)	* 13.40	* Avg. Vel. (ft/s)	*		* 13.40	*	*
* Max Chl Dpth (ft)	* 12.66	* Hydr. Depth (ft)	*		* 5.61	*	*
* Conv. Total (cfs)	*360784.2	* Conv. (cfs)	*		*360784.2	*	*
* Length Wtd. (ft)	* 268.92	* Wetted Per. (ft)	*		* 414.26	*	*
* Min Ch El (ft)	* 2766.00	* Shear (lb/sq ft)	*		* 2.57	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 34.49	*	*
* Frctn Loss (ft)	* 1.53	* Cum Volume (acre-ft)	*	11.44	* 165.47	*	63.33 *
* C & E Loss (ft)	* 0.31	* Cum SA (acres)	*	8.25	* 22.27	*	30.48 *

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

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2780.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.19	Wt. n-Val.		0.030	
W.S. Elev (ft)	2776.84	Reach Len. (ft)	283.60	269.08	254.74
Crit W.S. (ft)	2776.53	Flow Area (sq ft)		1708.58	
E.G. Slope (ft/ft)	0.006179	Area (sq ft)		1708.58	279.01
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	503.53	Top Width (ft)		239.90	263.64
Vel Total (ft/s)	14.33	Avg. Vel. (ft/s)		14.33	
Max Chl Dpth (ft)	10.84	Hydr. Depth (ft)		7.12	
Conv. Total (cfs)	311544.8	Conv. (cfs)		311544.8	
Length Wtd. (ft)	269.02	Wetted Per. (ft)		241.89	
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72	
Alpha	1.00	Stream Power (lb/ft s)		39.06	
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	7.02	142.93	37.57
C & E Loss (ft)	0.23	Cum SA (acres)	6.51	21.48	25.25

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2782.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.01	Wt. n-Val.		0.030	
W.S. Elev (ft)	2779.29	Reach Len. (ft)	283.60	269.08	254.74
Crit W.S. (ft)	2779.29	Flow Area (sq ft)		2585.10	
E.G. Slope (ft/ft)	0.007343	Area (sq ft)	271.74	2585.10	1268.72
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1350.50	Top Width (ft)	403.52	432.90	514.09
Vel Total (ft/s)	13.93	Avg. Vel. (ft/s)		13.93	
Max Chl Dpth (ft)	13.29	Hydr. Depth (ft)		5.97	
Conv. Total (cfs)	420112.1	Conv. (cfs)		420112.1	
Length Wtd. (ft)	268.78	Wetted Per. (ft)		434.97	
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72	
Alpha	1.00	Stream Power (lb/ft s)		37.94	
Frctn Loss (ft)	1.51	Cum Volume (acre-ft)	17.17	182.58	88.04
C & E Loss (ft)	0.36	Cum SA (acres)	11.67	22.57	32.79

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 energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 205

INPUT
Description:
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2779.75	17.21	2778.75	28.7	2777.75	66.51	2776.75	94.56	2776.75
100.85	2776.75	468.23	2777	600.71	2777	670.1	2776	673.71	2775
677.6	2774	681.95	2773	686.31	2772	690.66	2771	695.01	2770
699.36	2769	703.71	2768	708.06	2767	712.41	2766	716.76	2765
780.93	2765	805.65	2766	827.39	2767	839.98	2768	855.27	2769
866.08	2770	876.89	2771	884.28	2772	887.51	2773	890.74	2774
893.96	2775	894.82	2775	897.09	2774	899.36	2773	907.15	2773
937.24	2774	983.75	2775	1019.24	2776	1175.04	2776	1314.05	2775
1444.32	2775	1447.57	2776	1450.85	2777	1454.14	2778	1457.58	2779
1460.79	2780	1572.29	2780	1594.22	2779	1655.34	2779	1675.82	2780
1723.5	2781	1758.89	2782	1762.13	2782	1876.53	2781	1913.81	2781
1931.12	2782	1958.13	2783	2003.69	2783	2099.98	2783	2221.07	2784
2374.26	2785	2425.16	2785	2552.13	2785				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	600.71	.03	1019.24	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
600.71	1019.24	280.12	286.64	293.88	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2779.34	Element	Left OB	Channel	Right OB

Vel Head (ft)	3.12	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2776.22	Reach Len. (ft)	280.12	286.64	293.88	
Crit W.S. (ft)	2777.30	Flow Area (sq ft)		2116.44	294.44	
E.G. Slope (ft/ft)	0.008080	Area (sq ft)		2116.44	294.44	
Q Total (cfs)	31000.00	Flow (cfs)		30320.23	679.77	
Top Width (ft)	793.24	Top Width (ft)		364.20	429.04	
Vel Total (ft/s)	12.86	Avg. Vel. (ft/s)		14.33	2.31	
Max Chl Dpth (ft)	11.22	Hydr. Depth (ft)		5.81	0.69	
Conv. Total (cfs)	344871.9	Conv. (cfs)		337309.5	7562.4	
Length Wtd. (ft)	287.57	Wetted Per. (ft)		366.68	429.23	
Min Ch El (ft)	2765.00	Shear (lb/sq ft)		2.91	0.35	
Alpha	1.21	Stream Power (lb/ft s)		41.71	0.80	
Frctn Loss (ft)	2.08	Cum Volume (acre-ft)	11.21	151.78	59.69	
C & E Loss (ft)	0.03	Cum SA (acres)	7.59	19.87	27.81	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2778.12	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.43	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2775.69	Reach Len. (ft)	280.12	286.64	293.88	
Crit W.S. (ft)	2775.69	Flow Area (sq ft)		1931.75	123.12	
E.G. Slope (ft/ft)	0.006333	Area (sq ft)		1931.75	123.12	
Q Total (cfs)	24490.00	Flow (cfs)		24275.54	214.46	
Top Width (ft)	564.95	Top Width (ft)		336.91	228.04	
Vel Total (ft/s)	11.92	Avg. Vel. (ft/s)		12.57	1.74	
Max Chl Dpth (ft)	10.69	Hydr. Depth (ft)		5.73	0.54	
Conv. Total (cfs)	307743.6	Conv. (cfs)		305048.6	2695.0	
Length Wtd. (ft)	286.88	Wetted Per. (ft)		339.34	228.14	
Min Ch El (ft)	2765.00	Shear (lb/sq ft)		2.25	0.21	
Alpha	1.10	Stream Power (lb/ft s)		28.28	0.37	
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)	7.02	131.69	36.39	
C & E Loss (ft)	0.02	Cum SA (acres)	6.51	19.70	23.82	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: 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 #PF 3

E.G. Elev (ft)	2780.06	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.45	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2776.61	Reach Len. (ft)	280.12	286.64	293.88	
Crit W.S. (ft)	2777.75	Flow Area (sq ft)		2263.62	461.87	
E.G. Slope (ft/ft)	0.009177	Area (sq ft)		2263.62	461.87	
Q Total (cfs)	36000.00	Flow (cfs)		34469.06	1530.94	
Top Width (ft)	821.56	Top Width (ft)		391.24	430.32	
Vel Total (ft/s)	13.21	Avg. Vel. (ft/s)		15.23	3.31	
Max Chl Dpth (ft)	11.61	Hydr. Depth (ft)		5.79	1.07	
Conv. Total (cfs)	375805.2	Conv. (cfs)		359823.7	15981.5	
Length Wtd. (ft)	287.97	Wetted Per. (ft)		393.72	430.56	
Min Ch El (ft)	2765.00	Shear (lb/sq ft)		3.29	0.61	
Alpha	1.28	Stream Power (lb/ft s)		50.16	2.04	
Frctn Loss (ft)	2.20	Cum Volume (acre-ft)	16.29	167.61	82.98	
C & E Loss (ft)	0.04	Cum SA (acres)	10.36	20.02	30.02	

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

RIVER: River #1
REACH: Reach #1 RS: 200

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2780	57.36	2780	60.61	2779	63.64	2778	66.72	2777
82.64	2776	133.38	2775	157.32	2774	160.71	2773	164.05	2772
167.4	2771	170.76	2770	174.13	2769	177.5	2768	180.93	2767
196.35	2766	210.46	2765	223.84	2764	238.32	2763	259.65	2763
259.7	2763	274.72	2764	330.68	2765	338.84	2766	343.67	2767
348.5	2768	354.06	2769	359.85	2770	365.64	2771	371.43	2772
377.22	2773	380.61	2773	529.52	2773	534.88	2772	540.16	2771
545.4	2770	561.87	2770	628.9	2771	670.42	2772	691.36	2773
726.72	2773	751.79	2773	852.22	2774	1033.68	2775	1050.22	2775
1183.08	2776	1186.05	2777	1189.02	2778	1191.99	2779	1246.04	2779
1253.82	2778	1267.34	2778	1270.81	2779	1388.57	2780	1424.17	2780
1424.18	2780	1474.73	2780	1528.93	2781	1568.19	2781	1595.98	2781
1670.08	2782	1757.29	2783						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	157.32	.03	380.61	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
157.32	380.61	179.8	195.07	210.23	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2777.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.74	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2775.79	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2774.99	Flow Area (sq ft)	46.53	2161.55	1865.38
E.G. Slope (ft/ft)	0.002710	Area (sq ft)	46.53	2161.55	1865.38
Q Total (cfs)	31000.00	Flow (cfs)	64.74	25173.80	5761.46
Top Width (ft)	1061.35	Top Width (ft)	63.88	223.29	774.19
Vel Total (ft/s)	7.61	Avg. Vel. (ft/s)	1.39	11.65	3.09
Max Chl Dpth (ft)	12.79	Hydr. Depth (ft)	0.73	9.68	2.41
Conv. Total (cfs)	595483.4	Conv. (cfs)	1243.5	483567.1	110672.7
Length Wtd. (ft)	198.03	Wetted Per. (ft)	63.91	225.19	774.52
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.12	1.62	0.41
Alpha	1.93	Stream Power (lb/ft s)	0.17	18.91	1.26
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	11.06	137.71	52.40
C & E Loss (ft)	0.28	Cum SA (acres)	7.39	17.93	23.76

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2776.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2773.47	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2773.95	Flow Area (sq ft)		1643.45	496.72
E.G. Slope (ft/ft)	0.005630	Area (sq ft)		1643.45	496.72
Q Total (cfs)	24490.00	Flow (cfs)		23109.66	1380.34
Top Width (ft)	639.31	Top Width (ft)		221.48	417.84
Vel Total (ft/s)	11.44	Avg. Vel. (ft/s)		14.06	2.78
Max Chl Dpth (ft)	10.46	Hydr. Depth (ft)		7.42	1.19
Conv. Total (cfs)	326395.8	Conv. (cfs)		307999.0	18396.8
Length Wtd. (ft)	196.79	Wetted Per. (ft)		223.29	418.17
Min Ch El (ft)	2763.00	Shear (lb/sq ft)		2.59	0.42
Alpha	1.43	Stream Power (lb/ft s)		36.37	1.16
Frctn Loss (ft)	1.71	Cum Volume (acre-ft)	7.02	119.93	34.30
C & E Loss (ft)	0.05	Cum SA (acres)	6.51	17.86	21.64

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2778.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.04	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2777.61	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2775.91	Flow Area (sq ft)	199.88	2568.88	3330.11
E.G. Slope (ft/ft)	0.001471	Area (sq ft)	199.88	2568.88	3330.11
Q Total (cfs)	36000.00	Flow (cfs)	422.73	24733.35	10843.92
Top Width (ft)	1123.03	Top Width (ft)	92.48	223.29	807.26
Vel Total (ft/s)	5.90	Avg. Vel. (ft/s)	2.11	9.63	3.26
Max Chl Dpth (ft)	14.61	Hydr. Depth (ft)	2.16	11.50	4.13
Conv. Total (cfs)	938512.9	Conv. (cfs)	11020.5	644793.6	282698.8
Length Wtd. (ft)	199.08	Wetted Per. (ft)	92.64	225.19	807.86
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.20	1.05	0.38
Alpha	1.92	Stream Power (lb/ft s)	0.42	10.09	1.23
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	15.64	151.71	70.19
C & E Loss (ft)	0.11	Cum SA (acres)	10.06	18.00	25.85

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 195

INPUT
Description:
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
26.87	2778.75	80.18	2778.75	91.81	2777.75	102.18	2776.75	109.95	2775.75
196.7	2774	238.41	2773	243.26	2772	248.12	2771	252.97	2770
267.11	2769	278.26	2768	282.3	2767	286.64	2766	294.54	2765
315.54	2764	336.81	2763	362.46	2762	375.59	2762	395.84	2763
410.49	2764	456.09	2765	471.11	2766	476.14	2767	481.17	2768
488.94	2768	495.94	2767	498.12	2767	504.07	2768	509.82	2769
514.48	2770	532.03	2770	544.86	2770	571.92	2770	575.9	2769
579.84	2768	583.78	2767	597.25	2767	608.28	2768	619.31	2769
630.34	2770	641.37	2771	679.44	2772	894.51	2772	904.56	2771
913.16	2770	918.98	2770	922.78	2771	926.49	2772	930.19	2773
933.9	2774	939.14	2774	962.74	2773	967.03	2773	999.74	2774
1400	2780								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
26.87	.045	238.41	.03	514.48	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
238.41	514.48	215.83	225.58	311.98	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2776.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.81	Wt. n-Val.	0.045	0.030	0.045

W.S. Elev (ft)	2776.10	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2773.18	Flow Area (sq ft)	215.65	2960.04	2444.43
E.G. Slope (ft/ft)	0.001134	Area (sq ft)	215.65	2960.04	2444.43
Q Total (cfs)	31000.00	Flow (cfs)	333.95	23930.63	6735.43
Top Width (ft)	1032.86	Top Width (ft)	131.21	276.07	625.59
Vel Total (ft/s)	5.52	Avg. Vel. (ft/s)	1.55	8.08	2.76
Max Chl Dpth (ft)	14.10	Hydr. Depth (ft)	1.64	10.72	3.91
Conv. Total (cfs)	920384.8	Conv. (cfs)	9914.8	710496.2	199973.7
Length Wtd. (ft)	234.91	Wetted Per. (ft)	131.26	277.47	626.84
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.12	0.76	0.28
Alpha	1.71	Stream Power (lb/ft s)	0.18	6.11	0.76
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	10.52	126.24	42.00
C & E Loss (ft)	0.10	Cum SA (acres)	6.98	16.82	20.38

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2775.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.06	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2773.94	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2771.52	Flow Area (sq ft)	18.28	2361.73	1245.62
E.G. Slope (ft/ft)	0.001844	Area (sq ft)	18.28	2361.73	1245.62
Q Total (cfs)	24490.00	Flow (cfs)	15.63	20943.34	3531.03
Top Width (ft)	791.32	Top Width (ft)	39.05	276.07	476.20
Vel Total (ft/s)	6.75	Avg. Vel. (ft/s)	0.85	8.87	2.83
Max Chl Dpth (ft)	11.94	Hydr. Depth (ft)	0.47	8.55	2.62
Conv. Total (cfs)	570242.3	Conv. (cfs)	363.9	487659.5	82218.9
Length Wtd. (ft)	231.81	Wetted Per. (ft)	39.06	277.47	477.42
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.05	0.98	0.30
Alpha	1.50	Stream Power (lb/ft s)	0.05	8.69	0.85
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	6.98	110.96	30.10
C & E Loss (ft)	0.18	Cum SA (acres)	6.43	16.75	19.48

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2778.32	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.67	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2777.65	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2773.66	Flow Area (sq ft)	429.53	3388.17	3494.79
E.G. Slope (ft/ft)	0.000834	Area (sq ft)	429.53	3388.17	3494.79
Q Total (cfs)	36000.00	Flow (cfs)	841.85	25695.72	9462.43
Top Width (ft)	1150.72	Top Width (ft)	145.61	276.07	729.04
Vel Total (ft/s)	4.92	Avg. Vel. (ft/s)	1.96	7.58	2.71
Max Chl Dpth (ft)	15.65	Hydr. Depth (ft)	2.95	12.27	4.79
Conv. Total (cfs)	1246756.0	Conv. (cfs)	29154.9	889897.1	327703.8
Length Wtd. (ft)	236.94	Wetted Per. (ft)	145.74	277.47	730.30
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.15	0.64	0.25
Alpha	1.78	Stream Power (lb/ft s)	0.30	4.82	0.67
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	14.34	138.37	53.72
C & E Loss (ft)	0.05	Cum SA (acres)	9.57	16.88	22.14

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 190

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-99.71	2778	85.29	2776.24	86.48	2775.75	90.2	2774.75	93.57	2773.75
96.92	2772.75	100.08	2771.75	102.72	2770.75	105.24	2769.76	105.24	2769.75
107.77	2768.75	110.47	2768.2	124.39	2767.75	204.15	2766.75	210.65	2766.39
214.06	2765.75	219.98	2764.75	224.93	2763.09	252.41	2763.52	259.56	2764.25
288.16	2763.13	292.48	2761.87	301.29	2761.46	303.05	2760.65	305.84	2761.23
314.29	2763	332	2762	335.19	2761	387.24	2760.49	390.36	2761
390.36	2761.01	392.23	2764.51	402.23	2762	413.83	2763	425.43	2764
429.38	2764.26	440.47	2765	486.39	2766	526.25	2767	551.56	2768
588.96	2768.96	589.86	2769	593.28	2770	594.72	2769.73	596.66	2771
600.08	2772	603.53	2773	608.4	2774	612.53	2775	616.08	2776
632.62	2776	1014.62	2780						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-99.71	.045	85.29	.03	616.08	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
85.29	616.08	77.8	72.37	83.03	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2776.63	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2776.15	Reach Len. (ft)	77.80	72.37	83.03
Crit W.S. (ft)	2770.00	Flow Area (sq ft)		5567.68	3.61
E.G. Slope (ft/ft)	0.000559	Area (sq ft)		5567.68	3.61
Q Total (cfs)	31000.00	Flow (cfs)		30999.33	0.67
Top Width (ft)	561.62	Top Width (ft)		530.58	31.04
Vel Total (ft/s)	5.56	Avg. Vel. (ft/s)		5.57	0.19
Max Chl Dpth (ft)	15.66	Hydr. Depth (ft)		10.49	0.12
Conv. Total (cfs)	1311296.0	Conv. (cfs)		1311268.0	28.4
Length Wtd. (ft)	72.37	Wetted Per. (ft)		536.98	31.04
Min Ch El (ft)	2760.49	Shear (lb/sq ft)		0.36	0.00

```
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    2.01  *    0.00  *
* Frctn Loss (ft)        *    0.05  * Cum Volume (acre-ft)   *    9.99  *  104.16  *   33.23  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)         *    6.66  *   14.73  *   18.03  *
*****************************************************************************************

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 2774.57  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.46  * Wt. n-Val.             *          *    0.030  *          *
* W.S. Elev (ft)         * 2774.11  * Reach Len. (ft)        *   77.80  *   72.37  *   83.03  *
* Crit W.S. (ft)         * 2769.25  * Flow Area (sq ft)      *          * 4498.68  *          *
* E.G. Slope (ft/ft)     *0.000684  * Area (sq ft)           *          * 4498.68  *          *
* Q Total (cfs)          *24490.00  * Flow (cfs)             *          *24490.00  *          *
* Top Width (ft)         *  516.51  * Top Width (ft)         *          *  516.51  *          *
* Vel Total (ft/s)       *    5.44  * Avg. Vel. (ft/s)       *          *    5.44  *          *
* Max Chl Dpth (ft)      *   13.62  * Hydr. Depth (ft)       *          *    8.71  *          *
* Conv. Total (cfs)      *936189.0  * Conv. (cfs)            *          *936189.0  *          *
* Length Wtd. (ft)       *   72.37  * Wetted Per. (ft)       *          *  522.37  *          *
* Min Ch El (ft)         * 2760.49  * Shear (lb/sq ft)       *          *    0.37  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    2.00  *          *
* Frctn Loss (ft)        *    0.06  * Cum Volume (acre-ft)   *    6.94  *   93.19  *   25.64  *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)         *    6.34  *   14.69  *   17.77  *
*****************************************************************************************

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)         * 2778.12  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.49  * Wt. n-Val.             *   0.045  *   0.030  *   0.045  *
* W.S. Elev (ft)         * 2777.63  * Reach Len. (ft)        *   77.80  *   72.37  *   83.03  *
* Crit W.S. (ft)         * 2770.53  * Flow Area (sq ft)      *  101.56  * 6352.32  *  153.85  *
* E.G. Slope (ft/ft)     *0.000482  * Area (sq ft)           *  101.56  * 6352.32  *  153.85  *
* Q Total (cfs)          *36000.00  * Flow (cfs)             *   57.75  *35838.84  *  103.41  *
* Top Width (ft)         *  849.13  * Top Width (ft)         *  146.12  *  530.79  *  172.22  *
* Vel Total (ft/s)       *    5.45  * Avg. Vel. (ft/s)       *    0.57  *    5.64  *    0.67  *
* Max Chl Dpth (ft)      *   17.14  * Hydr. Depth (ft)       *    0.70  *   11.97  *    0.89  *
* Conv. Total (cfs)      *1640384.0  * Conv. (cfs)           *  2631.5  *1633041.0  *  4712.0  *
* Length Wtd. (ft)       *   72.40  * Wetted Per. (ft)       *  146.13  *  537.21  *  172.23  *
* Min Ch El (ft)         * 2760.49  * Shear (lb/sq ft)       *    0.02  *    0.36  *    0.03  *
* Alpha                  *    1.07  * Stream Power (lb/ft s) *    0.01  *    2.01  *    0.02  *
* Frctn Loss (ft)        *    0.04  * Cum Volume (acre-ft)   *   13.03  *  113.15  *   40.65  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)         *    8.85  *   14.79  *   18.92  *
*****************************************************************************************

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 180

INPUT
Description:
Station Elevation Data     num=      52
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
   15.05 2776.75   32.58 2776.75   48.65 2776.75   49.95 2775.75   51.72 2774.75
   53.59 2773.75    55.5 2772.75   57.44 2771.75   59.59 2770.75    62.1 2769.75
   64.56 2768.76   64.56 2768.75   67.13 2767.47   67.71 2767.75   72.88 2766.28
   97.35 2766.75  119.19 2765.75  133.29 2765.33  136.67 2764.75  143.41 2762.38
   166.6 2762.71  170.36 2763.69   207.2 2762.94   207.3 2762.93  210.09 2761.47
  227.57 2761.13  247.23 2760.75  264.13 2759.08  318.52    2763  323.83 2759.53
  323.83 2759.52  327.41  2764.6  338.72    2764  354.33 2764.53  369.01    2765
  401.74    2766  408.05 2765.89  412.18    2767  414.21    2768  416.27    2769
  417.18 2767.25  417.18 2767.26  418.65    2770  421.02    2771  423.39    2772
  425.77    2773  428.14    2774  430.51    2775  431.09 2776.49  433.02    2776
  461.43    2776  761.43    2780

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
   15.05    .045   48.65     .03  433.02    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          48.65  433.02             44.45  181.54  256.85          .1        .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 2776.56  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.76  * Wt. n-Val.             *          *    0.030  *          *
* W.S. Elev (ft)         * 2775.79  * Reach Len. (ft)        *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)         * 2769.77  * Flow Area (sq ft)      *          * 4417.73  *          *
* E.G. Slope (ft/ft)     *0.000797  * Area (sq ft)           *          * 4417.73  *          *
* Q Total (cfs)          *31000.00  * Flow (cfs)             *          *31000.00  *          *
* Top Width (ft)         *  380.92  * Top Width (ft)         *          *  380.92  *          *
* Vel Total (ft/s)       *    7.02  * Avg. Vel. (ft/s)       *          *    7.02  *          *
* Max Chl Dpth (ft)      *   16.71  * Hydr. Depth (ft)       *          *   11.60  *          *
* Conv. Total (cfs)      *1098141.0  * Conv. (cfs)           *          *1098141.0  *          *
* Length Wtd. (ft)       *  181.54  * Wetted Per. (ft)       *          *  392.94  *          *
* Min Ch El (ft)         * 2759.08  * Shear (lb/sq ft)       *          *    0.56  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    3.93  *          *
* Frctn Loss (ft)        *    0.27  * Cum Volume (acre-ft)   *    9.99  *   95.86  *   33.23  *
* C & E Loss (ft)        *    0.12  * Cum SA (acres)         *    6.66  *   13.97  *   18.00  *
*****************************************************************************************

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 #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 2774.49  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.69  * Wt. n-Val.             *          *    0.030  *          *
* W.S. Elev (ft)         * 2773.80  * Reach Len. (ft)        *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)         * 2768.85  * Flow Area (sq ft)      *          * 3663.85  *          *
* E.G. Slope (ft/ft)     *0.000903  * Area (sq ft)           *          * 3663.85  *          *
```

```
* Q Total (cfs)          *24490.00  * Flow (cfs)              *          *24490.00  *          *
* Top Width (ft)         *  374.16  * Top Width (ft)          *          *  374.16  *          *
* Vel Total (ft/s)       *    6.68  * Avg. Vel. (ft/s)        *          *    6.68  *          *
* Max Chl Dpth (ft)      *   14.72  * Hydr. Depth (ft)        *          *    9.79  *          *
* Conv. Total (cfs)      *815126.1  * Conv. (cfs)             *          *815126.1  *          *
  Length Wtd. (ft)       *  181.54  * Wetted Per. (ft)        *          *  384.87  *          *
  Min Ch El (ft)         * 2759.08  * Shear (lb/sq ft)        *          *    0.54  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    3.59  *          *
* Frctn Loss (ft)        *    0.30  * Cum Volume (acre-ft)   *    6.94  *   86.41  *   25.64  *
* C & E Loss (ft)        *    0.10  * Cum SA (acres)         *    6.34  *   13.95  *   17.77  *
*****************************************************************************************

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 conveyance ratio (upstream 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 #PF 3
*****************************************************************************************
* E.G. Elev (ft)         * 2778.05  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.81  * Wt. n-Val.             *   0.045  *   0.030  *   0.045  *
* W.S. Elev (ft)         * 2777.24  * Reach Len. (ft)        *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)         * 2770.43  * Flow Area (sq ft)      *   16.44  * 4972.45  *   92.80  *
* E.G. Slope (ft/ft)     *0.000732  * Area (sq ft)           *   16.44  * 4972.45  *   92.80  *
* Q Total (cfs)          *36000.00  * Flow (cfs)             *    9.03  *35921.65  *   69.32  *
* Top Width (ft)         *  539.32  * Top Width (ft)          *   33.60  *  384.37  *  121.35  *
* Vel Total (ft/s)       *    7.08  * Avg. Vel. (ft/s)        *    0.55  *    7.22  *    0.75  *
* Max Chl Dpth (ft)      *   18.16  * Hydr. Depth (ft)        *    0.49  *   12.94  *    0.76  *
* Conv. Total (cfs)      *1330649.0  * Conv. (cfs)            *   333.8  *1327753.0  *  2562.3  *
* Length Wtd. (ft)       *  181.61  * Wetted Per. (ft)        *   34.09  *  397.25  *  121.36  *
* Min Ch El (ft)         * 2759.08  * Shear (lb/sq ft)        *    0.02  *    0.57  *    0.03  *
* Alpha                  *    1.04  * Stream Power (lb/ft s) *    0.01  *    4.13  *    0.03  *
* Frctn Loss (ft)        *    0.25  * Cum Volume (acre-ft)   *   12.92  *  103.74  *   40.42  *
* C & E Loss (ft)        *    0.13  * Cum SA (acres)         *    8.69  *   14.03  *   18.64  *
*****************************************************************************************

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: River #1
REACH: Reach #1            RS: 170

INPUT
Description:
Station Elevation Data     num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 2776.75  10.041 2776.75  11.208 2776.56  13.039 2775.75  14.984 2774.75
  17.041 2773.75  19.445 2772.75  21.468 2771.75  23.419 2770.75  25.484 2769.75
  27.471 2768.75  29.409 2767.12  30.901 2767.12  31.424 2766.75  33.545 2765.75
  38.947 2765.75  39.428 2765.75  41.868 2765.12  60.352 2766.13  65.082 2765.97
  66.072 2764.75   69.89 2764.75  71.743 2764.93  72.768 2764.75  85.567 2761.65
 101.392 2761.27 114.672 2763.12 137.165 2763.34 145.296 2760.76  193.16  2760.8
 199.171 2758.99 240.331 2758.49 254.092 2762.23 263.715 2762.13 265.413 2763.75
 266.813 2764.75 268.199 2765.75 269.584 2766.75 270.801 2767.75 271.974 2768.75
 273.155 2769.75 274.336 2770.75 275.524 2771.75 276.705 2772.75 282.843    2777

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .045  10.041     .03 276.705    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        10.041 276.705            130.15  130.15  130.15            .1        .3
Blocked Obstructions      num=       5
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*****************************************************************************
      85      89    2780     116     120    2780     147     151    2780
     178     182    2780     209     213    2780
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 2776.17  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.96  * Wt. n-Val.             *          *   0.030  *   0.045  *
* W.S. Elev (ft)         * 2774.20  * Reach Len. (ft)        *  130.15  *  130.15  *  130.15  *
* Crit W.S. (ft)         * 2770.56  * Flow Area (sq ft)      *          * 2756.20  *    1.52  *
* E.G. Slope (ft/ft)     *0.003676  * Area (sq ft)           *          * 2756.20  *    1.52  *
* Q Total (cfs)          *31000.00  * Flow (cfs)             *          *30997.83  *    2.17  *
* Top Width (ft)         *  242.69  * Top Width (ft)          *          *  240.60  *    2.10  *
* Vel Total (ft/s)       *   11.24  * Avg. Vel. (ft/s)        *          *   11.25  *    1.42  *
* Max Chl Dpth (ft)      *   15.71  * Hydr. Depth (ft)        *          *   11.46  *    0.73  *
* Conv. Total (cfs)      *511290.2  * Conv. (cfs)             *          *511254.5  *    35.7  *
* Length Wtd. (ft)       *  130.15  * Wetted Per. (ft)        *          *  380.31  *    2.55  *
* Min Ch El (ft)         * 2758.49  * Shear (lb/sq ft)        *          *    1.66  *    0.14  *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   18.71  *    0.19  *
* Frctn Loss (ft)        *    0.70  * Cum Volume (acre-ft)   *    9.99  *   80.91  *   33.23  *
* C & E Loss (ft)        *    0.19  * Cum SA (acres)         *    6.66  *   12.68  *   17.99  *
*****************************************************************************************

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

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 2774.09  * Element                *  Left OB *  Channel * Right OB *
```

```
* Vel Head (ft)          *    1.74  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)         * 2772.35  * Reach Len. (ft)        *  130.15  *  130.15  *  130.15  *
* Crit W.S. (ft)         * 2769.31  * Flow Area (sq ft)      *          * 2315.34  *          *
* E.G. Slope (ft/ft)     *0.003766  * Area (sq ft)           *          * 2315.34  *          *
* Q Total (cfs)          *24490.00  * Flow (cfs)             *          *24490.00  *          *
* Top Width (ft)         *  235.99  * Top Width (ft)         *          *  235.99  *          *
* Vel Total (ft/s)       *   10.58  * Avg. Vel. (ft/s)       *          *   10.58  *          *
* Max Chl Dpth (ft)      *   13.86  * Hydr. Depth (ft)       *          *    9.81  *          *
* Conv. Total (cfs)      *399072.1  * Conv. (cfs)            *          *399072.1  *          *
* Length Wtd. (ft)       *  130.15  * Wetted Per. (ft)       *          *  356.67  *          *
* Min Ch El (ft)         * 2758.49  * Shear (lb/sq ft)       *          *    1.53  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   16.14  *          *
* Frctn Loss (ft)        *    0.67  * Cum Volume (acre-ft)   *    6.94  *   73.95  *   25.64  *
* C & E Loss (ft)        *    0.13  * Cum SA (acres)         *    6.34  *   12.68  *   17.77  *
*****************************************************************************************

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

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)         * 2777.66  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    2.12  * Wt. n-Val.             *          *   0.030  *   0.045  *
* W.S. Elev (ft)         * 2775.55  * Reach Len. (ft)       *  130.15  *  130.15  *  130.15  *
* Crit W.S. (ft)         * 2771.45  * Flow Area (sq ft)     *          * 3081.15  *    5.65  *
* E.G. Slope (ft/ft)     *0.003616  * Area (sq ft)          *          * 3081.15  *    5.65  *
* Q Total (cfs)          *36000.00  * Flow (cfs)            *          *35987.70  *   12.30  *
* Top Width (ft)         *  247.31  * Top Width (ft)        *          *  243.27  *    4.04  *
* Vel Total (ft/s)       *   11.66  * Avg. Vel. (ft/s)      *          *   11.68  *    2.18  *
* Max Chl Dpth (ft)      *   17.06  * Hydr. Depth (ft)      *          *   12.67  *    1.40  *
* Conv. Total (cfs)      *598707.1  * Conv. (cfs)           *          *598502.6  *   204.6  *
* Length Wtd. (ft)       *  130.15  * Wetted Per. (ft)      *          *  396.73  *    4.91  *
* Min Ch El (ft)         * 2758.49  * Shear (lb/sq ft)      *          *    1.75  *    0.26  *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   20.48  *    0.57  *
* Frctn Loss (ft)        *    0.73  * Cum Volume (acre-ft)   *   12.91  *   86.96  *   40.13  *
* C & E Loss (ft)        *    0.25  * Cum SA (acres)         *    8.67  *   12.73  *   18.27  *
*****************************************************************************************

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

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 160

INPUT
Description:
Station Elevation Data     num=      84
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
       0 2775.75   5.607 2775.75   12.07 2775.75  19.049 2775.75  29.317 2775.75
  71.828 2774.75  85.786 2773.75  89.067 2773.75 103.188 2774.75 115.831 2774.75
 128.085 2774.75 176.975 2775.75 196.024 2776.75 201.271 2777.75 222.357 2778.36
 223.106 2777.75 224.726 2776.75 226.578 2775.75 228.113 2774.48 228.466 2774.75
 231.408 2773.75 239.405 2772.75  244.73 2772.63 245.868 2771.75 247.233 2770.75
 248.605 2769.75 250.054 2768.75 251.681 2767.76 251.681 2767.75 253.342 2766.75
 254.813 2765.75 256.164 2764.75 257.132 2763.88 262.209  2762.7 273.085 2760.84
  297.19 2760.63 301.164 2761.77 319.273 2761.94 326.146 2760.17 341.547 2760.01
 354.324 2759.87 381.194 2760.68  389.17 2757.67 435.231 2758.17 436.985 2762.55
 442.317 2762.86 444.608 2763.75 445.477 2764.44  445.88 2764.75 447.146 2765.75
 448.419 2766.75 449.692 2767.75 450.979 2768.75 452.237 2769.75 453.482 2770.75
 453.482 2770.76  454.74 2771.75 455.985 2772.75 457.201 2773.75 457.201 2773.76
  458.12  2775.1 458.403 2774.75 466.584 2774.75 469.887 2774.75 478.704 2775.75
 485.853 2776.75 713.195 2776.75 716.745 2776.75 720.132 2776.75 792.165 2775.75
  803.98 2775.75 814.743 2775.75 830.143 2774.75 840.806 2774.75 857.466 2775.75
 873.256 2775.75 926.755 2774.75 940.777 2773.75 941.237 2773.75 945.579 2773.75
 955.669 2773.75  965.18 2773.75 989.002 2773.751007.684 2774.75

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
       0    .045  244.73     .03  458.12    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        244.73  458.12            203.69  188.86     197            .1        .3
Blocked Obstructions      num=        5
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*********************************************************************
     286     290    2780     317     321    2780     348     352    2780
     379     383    2780     410     414    2780
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 2775.27  * Element               *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.88  * Wt. n-Val.             *          *   0.030  *          *
* W.S. Elev (ft)         * 2771.39  * Reach Len. (ft)       *  203.69  *  188.86  *  197.00  *
* Crit W.S. (ft)         * 2770.34  * Flow Area (sq ft)     *          * 1961.09  *          *
* E.G. Slope (ft/ft)     *0.008706  * Area (sq ft)          *          * 1961.09  *          *
* Q Total (cfs)          *31000.00  * Flow (cfs)            *          *31000.00  *          *
* Top Width (ft)         *  187.93  * Top Width (ft)        *          *  187.93  *          *
* Vel Total (ft/s)       *   15.81  * Avg. Vel. (ft/s)      *          *   15.81  *          *
* Max Chl Dpth (ft)      *   13.72  * Hydr. Depth (ft)      *          *   10.43  *          *
* Conv. Total (cfs)      *332243.2  * Conv. (cfs)           *          *332243.2  *          *
* Length Wtd. (ft)       *  188.86  * Wetted Per. (ft)      *          *  310.01  *          *
* Min Ch El (ft)         * 2757.67  * Shear (lb/sq ft)      *          *    3.44  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   54.35  *          *
```

* Frctn Loss (ft)	*	1.45	* Cum Volume (acre-ft)	*	9.99	*	73.87	*	33.22	*
* C & E Loss (ft)	*	0.05	* Cum SA (acres)	*	6.66	*	12.04	*	17.99	*

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	*	2773.29	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	3.07	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2770.21	* Reach Len. (ft)	*	203.69	*	188.86	*	197.00	*
* Crit W.S. (ft)	*	2768.88	* Flow Area (sq ft)	*		*	1740.90	*		*
* E.G. Slope (ft/ft)	*	0.007540	* Area (sq ft)	*		*	1740.90	*		*
* Q Total (cfs)	*	24490.00	* Flow (cfs)	*		*	24490.00	*		*
* Top Width (ft)	*	184.84	* Top Width (ft)	*		*	184.84	*		*
* Vel Total (ft/s)	*	14.07	* Avg. Vel. (ft/s)	*		*	14.07	*		*
* Max Chl Dpth (ft)	*	12.54	* Hydr. Depth (ft)	*		*	9.42	*		*
* Conv. Total (cfs)	*	282035.8	* Conv. (cfs)	*		*	282035.8	*		*
* Length Wtd. (ft)	*	188.86	* Wetted Per. (ft)	*		*	294.30	*		*
* Min Ch El (ft)	*	2757.67	* Shear (lb/sq ft)	*		*	2.78	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	39.17	*		*
* Frctn Loss (ft)	*	1.38	* Cum Volume (acre-ft)	*	6.94	*	67.89	*	25.64	*
* C & E Loss (ft)	*	0.08	* Cum SA (acres)	*	6.34	*	12.05	*	17.77	*

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	*	2776.69	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	4.58	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2772.11	* Reach Len. (ft)	*	203.69	*	188.86	*	197.00	*
* Crit W.S. (ft)	*	2771.39	* Flow Area (sq ft)	*		*	2096.10	*		*
* E.G. Slope (ft/ft)	*	0.009790	* Area (sq ft)	*		*	2096.10	*		*
* Q Total (cfs)	*	36000.00	* Flow (cfs)	*		*	36000.00	*		*
* Top Width (ft)	*	189.78	* Top Width (ft)	*		*	189.78	*		*
* Vel Total (ft/s)	*	17.17	* Avg. Vel. (ft/s)	*		*	17.17	*		*
* Max Chl Dpth (ft)	*	14.44	* Hydr. Depth (ft)	*		*	11.04	*		*
* Conv. Total (cfs)	*	363848.4	* Conv. (cfs)	*		*	363848.4	*		*
* Length Wtd. (ft)	*	188.86	* Wetted Per. (ft)	*		*	319.49	*		*
* Min Ch El (ft)	*	2757.67	* Shear (lb/sq ft)	*		*	4.01	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	68.87	*		*
* Frctn Loss (ft)	*	1.51	* Cum Volume (acre-ft)	*	12.91	*	79.22	*	40.12	*
* C & E Loss (ft)	*	0.03	* Cum SA (acres)	*	8.67	*	12.08	*	18.26	*

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 150

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.75	27.415	2773.75	42.03	2773.75	59.892	2773.75	62.416	2773.75
64.078	2773.75	160.259	2772.75	185.715	2772.75	194.744	2773.75	204.594	2773.75
210.718	2773.75	222.774	2774.75	228.183	2774.75	257.019	2774.75	267.81	2774.75
273.007	2773.75	274.803	2772.4	275.015	2772.75	287.29	2772.06	287.545	2771.75
289.737	2770.75	290.925	2770.17	291.165	2769.75	292.615	2768.75	292.615	2768.76
293.301	2770.01	294.086	2767.76	294.086	2767.75	295.641	2766.75	298.583	2765.75
300.223	2764.76	300.223	2764.75	301.687	2763.75	304.049	2762.75	306.828	2761.76
307.153	2761.75	310.201	2760.75	315.32	2759.75	327.928	2759.98	331.711	2761.72
339.341	2762.38	348.858	2761.61	352.302	2760.28	375.078	2761.75	377.814	2761.46
391.136	2760.05	397.352	2762.59	404.677	2759.75	421.315	2760.11	427.849	2757.53
458.495	2758.34	483.223	2757.36	487.119	2761.47	490.188	2761.75	490.492	2761.76
490.492	2761.77	490.584	2761.86	491.482	2762.75	491.482	2762.76	492.726	2763.75
492.726	2763.76	493.964	2764.75	495.201	2765.75	496.467	2766.75	497.853	2767.75
499.401	2768.75	500.936	2769.75	500.936	2769.76	502.477	2770.75	504.047	2771.75
504.294	2771.9	518.734	2772.75	520.388	2772.75	520.388	2772.76	520.685	2773.75
522.75	2774.75	525.055	2775.75	528.562	2776.75	529.291	2777.69	531.794	2776.75
533.505	2777.63	573.768	2775.75	592.796	2774.75	608.727	2774.75	636.672	2774.75
663.471	2774.75	788.445	2774.75	833.707	2773.75	855.161	2773.75	857.438	2774.75
928.516	2774.75	939.879	2773.75	942.008	2773.75	951.829	2774.75	952.204	2774.75
986.569	2773.75	998.018	2773.75	1010.809	2773.75	1012.796	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	287.29	.03	504.047	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
287.29	504.047	262.45	206.64	129.8	.1	.3

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	*	2773.78	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	4.42	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2769.35	* Reach Len. (ft)	*	262.45	*	206.64	*	129.80	*
* Crit W.S. (ft)	*	2769.35	* Flow Area (sq ft)	*		*	1836.44	*		*

* E.G. Slope (ft/ft)	*0.006782	* Area (sq ft)	*		* 1836.44	*		*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*		*31000.00	*		*
* Top Width (ft)	* 207.99	* Top Width (ft)	*		* 207.99	*		*
* Vel Total (ft/s)	* 16.88	* Avg. Vel. (ft/s)	*		* 16.88	*		*
* Max Chl Dpth (ft)	* 11.99	* Hydr. Depth (ft)	*		* 8.83	*		*
Conv. Total (cfs)	*376419.2	* Conv. (cfs)	*		*376419.2	*		*
Length Wtd. (ft)	* 205.33	* Wetted Per. (ft)	*		* 218.15	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.56	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 60.17	*		*
* Frctn Loss (ft)	* 1.23	* Cum Volume (acre-ft)	*	9.99	* 65.63	*	33.22	*
* C & E Loss (ft)	* 0.37	* Cum SA (acres)	*	6.66	* 11.18	*	17.99	*

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

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2771.83	* Element	*	Left OB	* Channel	*	Right OB	*
* Vel Head (ft)	* 3.84	* Wt. n-Val.	*		* 0.030	*		*
* W.S. Elev (ft)	* 2768.00	* Reach Len. (ft)	*	262.45	* 206.64	*	129.80	*
* Crit W.S. (ft)	* 2768.00	* Flow Area (sq ft)	*		* 1557.52	*		*
* E.G. Slope (ft/ft)	*0.007077	* Area (sq ft)	*		* 1557.52	*		*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24490.00	*		*
* Top Width (ft)	* 204.23	* Top Width (ft)	*		* 204.23	*		*
* Vel Total (ft/s)	* 15.72	* Avg. Vel. (ft/s)	*		* 15.72	*		*
* Max Chl Dpth (ft)	* 10.64	* Hydr. Depth (ft)	*		* 7.63	*		*
* Conv. Total (cfs)	*291109.0	* Conv. (cfs)	*		*291109.0	*		*
* Length Wtd. (ft)	* 206.12	* Wetted Per. (ft)	*		* 212.48	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.24	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 50.93	*		*
* Frctn Loss (ft)	* 1.24	* Cum Volume (acre-ft)	*	6.94	* 60.74	*	25.64	*
* C & E Loss (ft)	* 0.32	* Cum SA (acres)	*	6.34	* 11.21	*	17.77	*

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

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2775.16	* Element	*	Left OB	* Channel	*	Right OB	*
* Vel Head (ft)	* 4.85	* Wt. n-Val.	*		* 0.030	*		*
* W.S. Elev (ft)	* 2770.31	* Reach Len. (ft)	*	262.45	* 206.64	*	129.80	*
* Crit W.S. (ft)	* 2770.31	* Flow Area (sq ft)	*		* 2036.48	*		*
* E.G. Slope (ft/ft)	*0.006667	* Area (sq ft)	*		* 2036.48	*		*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*36000.00	*		*
* Top Width (ft)	* 211.14	* Top Width (ft)	*		* 211.14	*		*
* Vel Total (ft/s)	* 17.68	* Avg. Vel. (ft/s)	*		* 17.68	*		*
* Max Chl Dpth (ft)	* 12.94	* Hydr. Depth (ft)	*		* 9.65	*		*
* Conv. Total (cfs)	*440907.8	* Conv. (cfs)	*		*440907.8	*		*
* Length Wtd. (ft)	* 204.75	* Wetted Per. (ft)	*		* 222.84	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.80	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 67.24	*		*
* Frctn Loss (ft)	* 1.03	* Cum Volume (acre-ft)	*	12.91	* 70.27	*	40.12	*
* C & E Loss (ft)	* 0.64	* Cum SA (acres)	*	8.67	* 11.21	*	18.26	*

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 139

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2769.75	122.83	2768.75	210.08	2768	238.55	2768	250.4	2768
250.9	2768	353.99	2767.75	571.8	2767.75	580.55	2767.87	584.21	2766.75
587.25	2765.75	590.19	2764.75	592.82	2763.75	595.21	2762.75	597.5	2761.75
599.8	2760.75	601.9	2759.24	661.57	2759.92	666.41	2756.85	691.06	2756.07
697.71	2757.82	779.92	2757.09	782.85	2760.21	803.38	2761.75	805.38	2761.89
809.83	2762.75	817.41	2764.24	820.11	2763.75	852.39	2763.75	884.33	2763.75
918.74	2764.75	974.69	2764.75	981.1	2764.75	999.39	2765.75	1005.92	2766.75
1011.93	2767.75	1018.14	2768.75	1024.29	2769.75	1031.8	2770.75	1039.15	2771.75
1043.88	2772.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
**************************************************
       0    .045  580.55     .03  803.38    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        580.55  803.38            172.75  171.78  164.65              .1       .3

 CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 2771.69  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    6.25  * Wt. n-Val.              *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2765.45  * Reach Len. (ft)         *  172.75  *  171.78  *  164.65  *
* Crit W.S. (ft)          * 2767.29  * Flow Area (sq ft)       *          * 1468.72  *  238.15  *
* E.G. Slope (ft/ft)      *0.013412  * Area (sq ft)            *          * 1468.72  *  238.15  *
* Q Total (cfs)           *31000.00  * Flow (cfs)              *          *29944.19  * 1055.81  *
* Top Width (ft)          *  405.73  * Top Width (ft)          *          *  215.24  *  190.49  *
* Vel Total (ft/s)        *   18.16  * Avg. Vel. (ft/s)        *          *   20.39  *    4.43  *
* Max Chl Dpth (ft)       *    9.38  * Hydr. Depth (ft)        *          *    6.82  *    1.25  *
* Conv. Total (cfs)       *267675.2  * Conv. (cfs)             *          *258558.6  *  9116.6  *
* Length Wtd. (ft)        *  171.40  * Wetted Per. (ft)        *          *  219.19  *  190.80  *
* Min Ch El (ft)          * 2756.07  * Shear (lb/sq ft)        *          *    5.61  *    1.05  *
* Alpha                   *    1.22  * Stream Power (lb/ft s)  *          *  114.39  *    4.63  *
* Frctn Loss (ft)         *    1.90  * Cum Volume (acre-ft)    *    9.99  *   57.80  *   32.87  *
* C & E Loss (ft)         *    0.18  * Cum SA (acres)          *    6.66  *   10.17  *   17.70  *
*****************************************************************************************

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:    Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)          * 2769.85  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    5.04  * Wt. n-Val.              *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2764.81  * Reach Len. (ft)         *  172.75  *  171.78  *  164.65  *
* Crit W.S. (ft)          * 2766.35  * Flow Area (sq ft)       *          * 1332.37  *  120.66  *
* E.G. Slope (ft/ft)      *0.011932  * Area (sq ft)            *          * 1332.37  *  120.66  *
* Q Total (cfs)           *24490.00  * Flow (cfs)              *          *24155.58  *  334.42  *
* Top Width (ft)          *  392.22  * Top Width (ft)          *          *  213.37  *  178.85  *
* Vel Total (ft/s)        *   16.85  * Avg. Vel. (ft/s)        *          *   18.13  *    2.77  *
* Max Chl Dpth (ft)       *    8.74  * Hydr. Depth (ft)        *          *    6.24  *    0.67  *
* Conv. Total (cfs)       *224196.8  * Conv. (cfs)             *          *221135.2  *  3061.5  *
* Length Wtd. (ft)        *  171.15  * Wetted Per. (ft)        *          *  217.21  *  179.14  *
* Min Ch El (ft)          * 2756.07  * Shear (lb/sq ft)        *          *    4.57  *    0.50  *
* Alpha                   *    1.14  * Stream Power (lb/ft s)  *          *   82.84  *    1.39  *
* Frctn Loss (ft)         *    1.87  * Cum Volume (acre-ft)    *    6.94  *   53.89  *   25.46  *
* C & E Loss (ft)         *    0.12  * Cum SA (acres)          *    6.34  *   10.22  *   17.51  *
*****************************************************************************************

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:    Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)          * 2772.99  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    7.11  * Wt. n-Val.              *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2765.88  * Reach Len. (ft)         *  172.75  *  171.78  *  164.65  *
* Crit W.S. (ft)          * 2768.62  * Flow Area (sq ft)       *          * 1562.17  *  322.22  *
* E.G. Slope (ft/ft)      *0.014387  * Area (sq ft)            *          * 1562.17  *  322.22  *
* Q Total (cfs)           *36000.00  * Flow (cfs)              *          *34229.51  * 1770.49  *
* Top Width (ft)          *  413.39  * Top Width (ft)          *          *  216.53  *  196.86  *
* Vel Total (ft/s)        *   19.10  * Avg. Vel. (ft/s)        *          *   21.91  *    5.49  *
* Max Chl Dpth (ft)       *    9.81  * Hydr. Depth (ft)        *          *    7.21  *    1.64  *
* Conv. Total (cfs)       *300138.3  * Conv. (cfs)             *          *285377.4  * 14760.9  *
* Length Wtd. (ft)        *  171.29  * Wetted Per. (ft)        *          *  220.55  *  197.19  *
* Min Ch El (ft)          * 2756.07  * Shear (lb/sq ft)        *          *    6.36  *    1.47  *
* Alpha                   *    1.25  * Stream Power (lb/ft s)  *          *  139.40  *    8.06  *
* Frctn Loss (ft)         *    1.93  * Cum Volume (acre-ft)    *   12.91  *   61.73  *   39.64  *
* C & E Loss (ft)         *    0.23  * Cum SA (acres)          *    8.67  *   10.20  *   17.97  *
*****************************************************************************************

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:    Program found supercritical flow starting at this cross section.

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 130

INPUT
Description:
Station Elevation Data     num=      109
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************************
 -329.97     2778  -326.97     2777  -324.12     2776   -321.7     2775  -319.71     2774
 -317.71     2773  -315.72     2772  -313.73     2771  -311.73     2770  -309.74     2769
  -295.4     2768  -239.67     2767  -228.16     2766  -194.92     2766  -129.95     2766
 -127.06     2765  -123.98     2764  -120.22     2764  -110.54     2765  -110.53     2765
    -.01     2766        0     2766  197.95     2767   197.96     2767   246.6     2767
  261.24  2766.28   267.04     2766  267.05     2766   282.58   2764.8   282.59   2764.8
  284.05     2765   284.06     2765  289.71     2764   289.72     2764   294.36     2763
  294.37     2763   299.03     2762  299.04     2762   303.71     2761   303.72     2761
   308.4     2760   308.41     2760  313.09     2759    313.1     2759    314.9  2758.96
```

314.91	2758.96	326.53	2758.59	326.54	2758.59	334.76	2755.3	334.76	2755.31
335.91	2758	335.92	2758	350.25	2755.25	350.26	2755.25	362.85	2756.77
362.86	2756.77	383.3	2757	429.42	2757.52	429.43	2757.51	436.01	2755.89
436.02	2755.89	456.36	2755.9	456.37	2755.9	476.41	2757.65	476.42	2757.65
495.5	2759.49	495.51	2759.49	507.59	2759.28	512.02	2759.21	512.03	2759.21
522.41	2761.75	522.42	2761.76	528.15	2763.11	528.16	2763.11	555.77	2762.75
555.78	2762.76	560.43	2763.75	560.44	2763.75	684.75	2763.75	684.76	2763.75
743.07	2762.75	743.08	2762.75	773.59	2762.75	773.6	2762.75	795.48	2762.75
795.94	2762.75	809.75	2763.75	809.76	2763.75	826.38	2764.75	866.79	2765.75
889.01	2766.75	894.02	2767.75	896.67	2768.75	896.67	2768.76	899.25	2769.75
901.38	2770.75	903.52	2771.75	911.41	2772.75	945.7	2772.75	951.33	2771.75
957.1	2770.75	961.49	2769.75	968.66	2768.75	968.68	2768.75	977.22	2769.75
981.89	2770.75	985.39	2771.75	990.06	2772.75	994.39	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-329.97	.045	246.6	.03	528.16	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
246.6	528.16	295.76	287.33	274.51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-329.97	197.95	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2769.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.14	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2766.38	Flow Area (sq ft)		1717.40	522.14
E.G. Slope (ft/ft)	0.008922	Area (sq ft)	13.46	1717.40	522.14
Q Total (cfs)	31000.00	Flow (cfs)		28714.42	2285.58
Top Width (ft)	595.82	Top Width (ft)	32.04	249.94	313.85
Vel Total (ft/s)	13.84	Avg. Vel. (ft/s)		16.72	4.38
Max Chl Dpth (ft)	9.89	Hydr. Depth (ft)		6.87	1.66
Conv. Total (cfs)	328199.1	Conv. (cfs)		304001.5	24197.6
Length Wtd. (ft)	285.18	Wetted Per. (ft)		254.20	314.04
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		3.76	0.93
Alpha	1.36	Stream Power (lb/ft s)		62.92	4.05
Frctn Loss (ft)	1.86	Cum Volume (acre-ft)	9.96	51.51	31.43
C & E Loss (ft)	0.66	Cum SA (acres)	6.60	9.26	16.75

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2767.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.82	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.89	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2765.37	Flow Area (sq ft)		1909.06	769.47
E.G. Slope (ft/ft)	0.003800	Area (sq ft)	69.64	1909.06	769.47
Q Total (cfs)	24490.00	Flow (cfs)		21800.10	2689.90
Top Width (ft)	718.73	Top Width (ft)	117.34	259.67	341.72
Vel Total (ft/s)	9.14	Avg. Vel. (ft/s)		11.42	3.50
Max Chl Dpth (ft)	10.64	Hydr. Depth (ft)		7.35	2.25
Conv. Total (cfs)	397259.9	Conv. (cfs)		353626.2	43633.7
Length Wtd. (ft)	285.65	Wetted Per. (ft)		263.96	341.92
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		1.72	0.53
Alpha	1.40	Stream Power (lb/ft s)		19.59	1.87
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	6.80	47.50	23.77
C & E Loss (ft)	0.14	Cum SA (acres)	6.10	9.29	16.52

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2770.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.79	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.43	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2767.00	Flow Area (sq ft)		1792.04	616.93
E.G. Slope (ft/ft)	0.010327	Area (sq ft)	27.94	1792.04	616.93
Q Total (cfs)	36000.00	Flow (cfs)		32832.83	3167.17
Top Width (ft)	645.25	Top Width (ft)	65.65	253.77	325.82
Vel Total (ft/s)	14.94	Avg. Vel. (ft/s)		18.32	5.13
Max Chl Dpth (ft)	10.18	Hydr. Depth (ft)		7.06	1.89
Conv. Total (cfs)	354255.9	Conv. (cfs)		323089.5	31166.4
Length Wtd. (ft)	284.82	Wetted Per. (ft)		258.05	326.02
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		4.48	1.22
Alpha	1.38	Stream Power (lb/ft s)		82.03	6.26
Frctn Loss (ft)	2.07	Cum Volume (acre-ft)	12.86	55.12	37.86
C & E Loss (ft)	0.70	Cum SA (acres)	8.54	9.27	16.98

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 120

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-741.52	2769	-620.87	2768	-551.88	2767	-543.14	2766	-540.36	2766
-537.06	2767	-533.83	2768	-527.7	2768	-488.6	2767	-366.95	2766
-274.11	2765	-186.15	2764	-155.02	2763	-147.68	2762	-131.64	2762
-119.22	2763	-106.8	2764	-35.92	2765	0	2765	50.02	2764
110.9	2763	152.46	2762.03	153.73	2762	168.97	2761	175.86	2760
175.87	2760	179.66	2759	179.67	2759	181.81	2758	183.96	2757
186.11	2756	188.37	2755	192.2	2754	208.49	2754	208.5	2754
217.9	2755	217.91	2755	226.38	2756	226.39	2756	249.43	2757
265.63	2757	283.93	2757	293.22	2757	353.9	2758	388.76	2759
390.5	2760	392.24	2761	392.25	2761	393.98	2762	393.99	2762
396.77	2763	400.02	2764	404.19	2764	422.66	2764	464.57	2763
544.99	2763	709.9	2763	814.02	2762.75	823.72	2763.75	825.7	2763.75
826.66	2763.75	968	2763.75	980.94	2763.75	999.92	2763.75	1093.44	2763.75
1109.22	2764.75	1125.21	2765.75	1136.78	2766.75	1141.28	2767.75	1145.01	2768.75
1148.2	2769.75	1151.41	2770.75	1154.48	2771.75	1157.68	2772.75	1160.12	2773.75
1162.38	2774.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-741.52	.045	0	.03	404.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	404.19	158.39	153.64	149.14	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-741.52	0	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2767.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.67	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.44	Flow Area (sq ft)		2335.00	1637.41
E.G. Slope (ft/ft)	0.004458	Area (sq ft)	446.32	2335.00	1637.41
Q Total (cfs)	31000.00	Flow (cfs)		24756.40	6243.60
Top Width (ft)	1460.10	Top Width (ft)	336.19	404.19	719.72
Vel Total (ft/s)	7.80	Avg. Vel. (ft/s)		10.60	3.81
Max Chl Dpth (ft)	11.67	Hydr. Depth (ft)		5.78	2.28
Conv. Total (cfs)	464316.0	Conv. (cfs)		370799.7	93516.3
Length Wtd. (ft)	152.85	Wetted Per. (ft)		406.74	719.84
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.60	0.63
Alpha	1.52	Stream Power (lb/ft s)		16.94	2.41
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	8.40	38.15	24.63
C & E Loss (ft)	0.02	Cum SA (acres)	5.34	7.10	13.49

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2766.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.02	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2764.98	Flow Area (sq ft)		2074.09	1176.16
E.G. Slope (ft/ft)	0.004660	Area (sq ft)	248.65	2074.09	1176.16
Q Total (cfs)	24490.00	Flow (cfs)		20776.47	3713.53
Top Width (ft)	1389.85	Top Width (ft)	276.26	404.19	709.40
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)		10.02	3.16
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		5.13	1.66
Conv. Total (cfs)	358749.9	Conv. (cfs)		304351.0	54398.9
Length Wtd. (ft)	153.08	Wetted Per. (ft)		406.74	709.50
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.48	0.48
Alpha	1.53	Stream Power (lb/ft s)		14.86	1.52
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	5.72	34.36	17.64
C & E Loss (ft)	0.01	Cum SA (acres)	4.77	7.10	13.21

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2767.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.07	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.81	Flow Area (sq ft)		2497.72	1928.23
E.G. Slope (ft/ft)	0.004493	Area (sq ft)	589.49	2497.72	1928.23
Q Total (cfs)	36000.00	Flow (cfs)		27806.80	8193.20
Top Width (ft)	1508.19	Top Width (ft)	379.26	404.19	724.74
Vel Total (ft/s)	8.13	Avg. Vel. (ft/s)		11.13	4.25
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		6.18	2.66
Conv. Total (cfs)	537097.4	Conv. (cfs)		414859.9	122237.5
Length Wtd. (ft)	152.72	Wetted Per. (ft)		406.74	724.88
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.72	0.75
Alpha	1.51	Stream Power (lb/ft s)		19.17	3.17
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	10.76	40.97	29.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.03	7.10	13.67

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,

water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 115

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2767	4.83	2766	9.61	2765	11.16	2765	13.74	2766
16.32	2767	24.15	2767	124.55	2766	311.87	2765.02	314.97	2765
395.1	2764	477.26	2763	482.56	2762	505.65	2762	555.24	2763
679.5	2764	697.39	2764	706.13	2763	725.14	2762	747.88	2762
765.91	2762	799.67	2761	831.73	2760	835.05	2759	837.03	2758
839.03	2757	841.23	2756	843.42	2755	845.62	2754	847.82	2753
863.85	2753	869.22	2754	874.61	2755	887.51	2756	990.68	2756
1015.46	2756	1026.66	2757	1037.87	2758	1040.87	2759	1043.78	2760
1046.68	2761	1049.37	2762	1074.62	2763	1080.06	2763	1202.38	2763
1254.26	2763	1359.68	2763	1365.58	2763	1696.27	2762.75	1789.59	2762.75
1848.13	2763.75	1874.7	2764.73	1875.36	2764.75	1890.38	2765.75	1895.84	2766.75
1902.22	2767.75	1908.29	2768.75	1913.86	2769.75	1918.72	2770.75	1920.54	2771.75
1922.37	2772.75	1924.2	2773.75	1926.03	2774.75	1927.8	2775.75	1929.57	2776.75
1931.38	2777.75	1933.2	2778.75	1935.07	2779.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	679.5	.03	1074.62	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
679.5	1074.62		257.93	242.39	227.54	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	679.5	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2766.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.65	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.74	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.74	Flow Area (sq ft)		2381.48	1412.74
E.G. Slope (ft/ft)	0.004600	Area (sq ft)	465.63	2381.48	1412.74
Q Total (cfs)	31000.00	Flow (cfs)		26379.82	4620.18
Top Width (ft)	1539.72	Top Width (ft)	344.05	395.12	800.55
Vel Total (ft/s)	8.17	Avg. Vel. (ft/s)		11.08	3.27
Max Chl Dpth (ft)	11.74	Hydr. Depth (ft)		6.03	1.76
Conv. Total (cfs)	457069.9	Conv. (cfs)		388949.0	68120.9
Length Wtd. (ft)	239.83	Wetted Per. (ft)		397.73	800.58
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.72	0.51
Alpha	1.59	Stream Power (lb/ft s)		19.05	1.66
Frctn Loss (ft)	1.17	Cum Volume (acre-ft)	6.74	29.83	19.40
C & E Loss (ft)	0.05	Cum SA (acres)	4.11	5.69	10.89

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2765.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.16	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.16	Flow Area (sq ft)		2151.22	950.85
E.G. Slope (ft/ft)	0.004527	Area (sq ft)	278.74	2151.22	950.85
Q Total (cfs)	24490.00	Flow (cfs)		22088.98	2401.02
Top Width (ft)	1477.14	Top Width (ft)	297.35	395.12	784.67
Vel Total (ft/s)	7.89	Avg. Vel. (ft/s)		10.27	2.53
Max Chl Dpth (ft)	11.16	Hydr. Depth (ft)		5.44	1.21
Conv. Total (cfs)	364000.3	Conv. (cfs)		328313.5	35686.8
Length Wtd. (ft)	240.55	Wetted Per. (ft)		397.73	784.69
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.53	0.34
Alpha	1.54	Stream Power (lb/ft s)		15.69	0.86
Frctn Loss (ft)	1.15	Cum Volume (acre-ft)	4.76	26.91	14.00
C & E Loss (ft)	0.05	Cum SA (acres)	3.72	5.69	10.65

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2766.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.75	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.15	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2765.15	Flow Area (sq ft)		2543.06	1741.41
E.G. Slope (ft/ft)	0.004615	Area (sq ft)	614.55	2543.06	1741.41

* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*29476.35	* 6523.65	*
* Top Width (ft)	* 1597.71	* Top Width (ft)	* 395.79	* 395.12	* 806.80	*
* Vel Total (ft/s)	* 8.40	* Avg. Vel. (ft/s)	*	* 11.59	* 3.75	*
* Max Chl Dpth (ft)	* 12.15	* Hydr. Depth (ft)	*	* 6.44	* 2.16	*
* Conv. Total (cfs)	*529952.8	* Conv. (cfs)	*	*433918.7	* 96034.1	*
Length Wtd. (ft)	* 239.39	* Wetted Per. (ft)	*	* 397.73	* 806.84	*
Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*	* 1.84	* 0.62	*
* Alpha	* 1.59	* Stream Power (lb/ft s)	*	* 21.35	* 2.33	*
* Frctn Loss (ft)	* 1.19	* Cum Volume (acre-ft)	* 8.57	* 32.08	* 23.56	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 5.62	* 5.69	* 11.05	*

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 110

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600.38	2767	-579.98	2766	-400.38	2765	-181.14	2764	-81.76	2763
-57.48	2762	-47.61	2761	0	2761	227.2	2762	237.17	2762
274.46	2761	312.01	2760	358.58	2760	379.63	2760	383.11	2759
386.65	2758	390.19	2757	392.73	2756	392.74	2756	395.22	2755
397.63	2754	410.68	2753	426.46	2753	431.11	2754	435.76	2755
446.04	2756	470.07	2757	481.43	2757	501.92	2756.75	563.14	2756
587.96	2756	594.62	2757	602.49	2758	613.17	2759	626.03	2759.97
626.5	2760	890.32	2761	967.13	2761	1086.65	2761	1302.26	2762
1331.06	2761.75	1340.58	2761.75	1426.39	2761.75	1446.33	2761.75	1459.98	2761.75
1515.86	2762.75	1570.65	2763.75	1587.84	2764.75	1592.77	2765.75	1597.63	2766.75
1602.74	2767.75	1607.53	2768.75	1611.47	2769.75	1613.74	2770.75	1616.01	2771.75
1618.28	2772.75	1620.53	2773.75	1622.77	2774.75	1624.98	2775.75	1627.19	2776.75
1629.4	2777.75	1631.62	2778.75	1633.89	2779.75	1636.29	2780.75	1638.58	2781.75
1640.84	2782.75	1643.09	2783.75	1645.32	2784.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600.38	.045	227.2	.03	626.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
227.2	626.5	308.04	322.72	332.25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-600.38	227.2	2770	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2764.92	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.08	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2762.85	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25 *
* Crit W.S. (ft)	* 2763.33	* Flow Area (sq ft)	*	* 1956.99	* 1473.46 *
* E.G. Slope (ft/ft)	*0.007990	* Area (sq ft)	* 415.36	* 1956.99	* 1473.46 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*24934.30	* 6065.70 *
* Top Width (ft)	* 1599.06	* Top Width (ft)	* 305.20	* 399.30	* 894.56 *
* Vel Total (ft/s)	* 9.04	* Avg. Vel. (ft/s)	*	* 12.74	* 4.12 *
* Max Chl Dpth (ft)	* 9.84	* Hydr. Depth (ft)	*	* 4.90	* 1.65 *
* Conv. Total (cfs)	*346800.4	* Conv. (cfs)	*	*278942.8	* 67857.6 *
* Length Wtd. (ft)	* 324.49	* Wetted Per. (ft)	*	* 400.88	* 894.58 *
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*	* 2.44	* 0.82 *
* Alpha	* 1.64	* Stream Power (lb/ft s)	*	* 31.03	* 3.38 *
* Frctn Loss (ft)	* 1.43	* Cum Volume (acre-ft)	* 4.13	* 17.76	* 11.87 *
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 2.19	* 3.48	* 6.46 *

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2764.24	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.82	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2762.42	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25 *
* Crit W.S. (ft)	* 2762.82	* Flow Area (sq ft)	*	* 1787.46	* 1098.66 *
* E.G. Slope (ft/ft)	*0.007531	* Area (sq ft)	* 287.97	* 1787.46	* 1098.66 *
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*20814.43	* 3675.57 *
* Top Width (ft)	* 1565.13	* Top Width (ft)	* 294.89	* 399.30	* 870.94 *
* Vel Total (ft/s)	* 8.49	* Avg. Vel. (ft/s)	*	* 11.64	* 3.35 *
* Max Chl Dpth (ft)	* 9.42	* Hydr. Depth (ft)	*	* 4.48	* 1.26 *
* Conv. Total (cfs)	*282197.7	* Conv. (cfs)	*	*239844.2	* 42353.5 *
* Length Wtd. (ft)	* 324.13	* Wetted Per. (ft)	*	* 400.88	* 870.95 *
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*	* 2.10	* 0.59 *
* Alpha	* 1.62	* Stream Power (lb/ft s)	*	* 24.41	* 1.98 *
* Frctn Loss (ft)	* 1.38	* Cum Volume (acre-ft)	* 3.08	* 15.95	* 8.65 *
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 1.97	* 3.48	* 6.33 *

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

OSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2765.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2763.14	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2763.67	Flow Area (sq ft)		2074.07	1738.11
E.G. Slope (ft/ft)	0.008280	Area (sq ft)	506.61	2074.07	1738.11
Q Total (cfs)	36000.00	Flow (cfs)		27964.04	8035.96
Top Width (ft)	1632.62	Top Width (ft)	322.69	399.30	910.63
Vel Total (ft/s)	9.44	Avg. Vel. (ft/s)		13.48	4.62
Max Chl Dpth (ft)	10.14	Hydr. Depth (ft)		5.19	1.91
Conv. Total (cfs)	395617.6	Conv. (cfs)		307307.4	88310.2
Length Wtd. (ft)	324.71	Wetted Per. (ft)		400.88	910.65
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		2.67	0.99
Alpha	1.64	Stream Power (lb/ft s)		36.06	4.56
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	5.25	19.23	14.47
C & E Loss (ft)	0.05	Cum SA (acres)	3.49	3.48	6.56

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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 100

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-1079.5	2765	-908.05	2764	-796.29	2763	-637.85	2762	-590.66	2762
-582.71	2762	-429.48	2762	-343.01	2762	-257.47	2761	-240.37	2760
-236.92	2759	-233.51	2758	-230.22	2757	-227.02	2756	-223.93	2755
-185.04	2755	-174.13	2756	-169.65	2757	-165.16	2758	-160.66	2759
-156.1	2760	-123.66	2760	-99.38	2760	0	2760	48.99	2759
69.53	2759	69.54	2759	92.94	2759	92.95	2759	136.19	2758
136.2	2758	181.29	2757	186.69	2757	207.37	2758	220.09	2758
222.63	2757	222.64	2757	225.18	2756	227.72	2755	227.73	2755
230.27	2754	232.22	2753.36	233.31	2753	236.48	2752	271.72	2752
275.17	2753	279.24	2754	328.16	2755	339.63	2756	339.64	2756
380.46	2756	380.47	2756	390.22	2755.86	451.75	2755	486.38	2754
497.38	2754	501.1	2755	504.87	2756	504.88	2756	507.69	2757
539.73	2758	571.48	2759	643.34	2760	716.38	2760	890.83	2759
890.84	2759	1036.2	2759	1036.21	2759	1095.21	2760	1202.49	2760
1202.5	2760	1304.69	2760	1327.57	2761	1346.89	2762	1361.89	2763
1372.87	2764	1372.88	2764	1398.46	2765				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-1079.5	.045	0	.03	539.73	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	539.73	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-1079.5	-156.1	2764	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2762.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.65	Reach Len. (ft)			
Crit W.S. (ft)	2761.20	Flow Area (sq ft)	257.55	2837.18	1638.16
E.G. Slope (ft/ft)	0.003515	Area (sq ft)	753.97	2837.18	1638.16
Q Total (cfs)	31000.00	Flow (cfs)	703.96	25126.95	5169.09
Top Width (ft)	1653.19	Top Width (ft)	313.06	539.73	800.40
Vel Total (ft/s)	6.55	Avg. Vel. (ft/s)	2.73	8.86	3.16
Max Chl Dpth (ft)	9.65	Hydr. Depth (ft)	1.65	5.26	2.05
Conv. Total (cfs)	522910.6	Conv. (cfs)	11874.5	423843.4	87192.6
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	800.47
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.36	1.15	0.45
Alpha	1.52	Stream Power (lb/ft s)	0.99	10.18	1.42
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2762.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.06	Reach Len. (ft)			
Crit W.S. (ft)	2760.72	Flow Area (sq ft)	165.48	2518.82	1169.41
E.G. Slope (ft/ft)	0.003685	Area (sq ft)	584.19	2518.82	1169.41
Q Total (cfs)	24490.00	Flow (cfs)	344.82	21098.36	3046.82
Top Width (ft)	1591.34	Top Width (ft)	262.61	539.73	789.00
Vel Total (ft/s)	6.35	Avg. Vel. (ft/s)	2.08	8.38	2.61
Max Chl Dpth (ft)	9.06	Hydr. Depth (ft)	1.06	4.67	1.48

* Conv. Total (cfs)	*403456.7	* Conv. (cfs)	* 5680.7	*347581.5	* 50194.4	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 789.06	*
* Min Ch El (ft)	* 2752.00	* Shear (lb/sq ft)	* 0.24	* 1.07	* 0.34	*
* Alpha	* 1.52	* Stream Power (lb/ft s)	* 0.51	* 8.96	* 0.89	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*
C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2763.17	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.00	* Wt. n-Val.	* 0.045	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2762.17	* Reach Len. (ft)	*	*	*	*
* Crit W.S. (ft)	* 2761.51	* Flow Area (sq ft)	* 338.72	* 3117.85	* 2056.93	*
* E.G. Slope (ft/ft)	*0.003152	* Area (sq ft)	* 979.48	* 3117.85	* 2056.93	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	* 1052.54	*27848.25	* 7099.21	*
* Top Width (ft)	* 2014.21	* Top Width (ft)	* 664.77	* 539.73	* 809.71	*
* Vel Total (ft/s)	* 6.53	* Avg. Vel. (ft/s)	* 3.11	* 8.93	* 3.45	*
* Max Chl Dpth (ft)	* 10.17	* Hydr. Depth (ft)	* 2.17	* 5.78	* 2.54	*
* Conv. Total (cfs)	*641195.8	* Conv. (cfs)	* 18746.7	*496005.0	*126444.0	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 809.80	*
* Min Ch El (ft)	* 2752.00	* Shear (lb/sq ft)	* 0.43	* 1.13	* 0.50	*
* Alpha	* 1.51	* Stream Power (lb/ft s)	* 1.33	* 10.12	* 1.73	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

SUMMARY OF MANNING'S N VALUES

River:River #1

Reach	River Sta.	n1	n2	n3
Reach #1	225	.045	.03	.045
Reach #1	220	.045	.03	.045
Reach #1	215	.045	.03	.045
Reach #1	210	.045	.03	.045
Reach #1	205	.045	.03	.045
Reach #1	200	.045	.03	.045
Reach #1	195	.045	.03	.045
Reach #1	190	.045	.03	.045
Reach #1	180	.045	.03	.045
Reach #1	170	.045	.03	.045
Reach #1	160	.045	.03	.045
Reach #1	150	.045	.03	.045
Reach #1	139	.045	.03	.045
Reach #1	130	.045	.03	.045
Reach #1	120	.045	.03	.045
Reach #1	115	.045	.03	.045
Reach #1	110	.045	.03	.045
Reach #1	100	.045	.03	.045

SUMMARY OF REACH LENGTHS

River: River #1

Reach	River Sta.	Left	Channel	Right
Reach #1	225	299.75	282.05	262.04
Reach #1	220	277.65	269.4	261.19
Reach #1	215	294.95	268.22	230.48
Reach #1	210	283.6	269.08	254.74
Reach #1	205	280.12	286.64	293.88
Reach #1	200	179.8	195.07	210.23
Reach #1	195	215.83	225.58	311.98
Reach #1	190	77.8	72.37	83.03
Reach #1	180	44.45	181.54	256.85
Reach #1	170	130.15	130.15	130.15
Reach #1	160	203.69	188.86	197
Reach #1	150	262.45	206.64	129.8
Reach #1	139	172.75	171.78	164.65
Reach #1	130	295.76	287.33	274.51
Reach #1	120	158.39	153.64	149.14
Reach #1	115	257.93	242.39	227.54
Reach #1	110	308.04	322.72	332.25
Reach #1	100			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River #1

Reach	River Sta.	Contr.	Expan.
Reach #1	225	.1	.3
Reach #1	220	.1	.3
Reach #1	215	.1	.3
Reach #1	210	.1	.3
Reach #1	205	.1	.3
Reach #1	200	.1	.3

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*Reach #1        *    195     *       .1*       .3*
*Reach #1        *    190     *       .1*       .3*
*Reach #1        *    180     *       .1*       .3*
*Reach #1        *    170     *       .1*       .3*
*Reach #1        *    160     *       .1*       .3*
 Reach #1        *    150     *       .1*       .3*
 Reach #1        *    139     *       .1*       .3*
*Reach #1        *    130     *       .1*       .3*
*Reach #1        *    120     *       .1*       .3*
*Reach #1        *    115     *       .1*       .3*
*Reach #1        *    110     *       .1*       .3*
*Reach #1        *    100     *       .1*       .3*
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Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #1	225	PF 1	31000.00	2768.00	2783.79	2781.42	2786.45	0.003148	13.09	2368.69	849.40	0.71
Reach #1	225	PF 2	24490.00	2768.00	2782.23	2780.05	2784.51	0.003108	12.10	2023.49	754.54	0.70
Reach #1	225	PF 3	36000.00	2768.00	2784.84	2782.42	2787.78	0.003262	13.77	2613.48	1215.25	0.73
Reach #1	220	PF 1	31000.00	2767.00	2780.92	2780.92	2785.06	0.006598	16.33	1897.98	904.77	1.00
Reach #1	220	PF 2	24490.00	2767.00	2780.16	2779.58	2783.28	0.005463	14.17	1728.23	784.47	0.90
Reach #1	220	PF 3	36000.00	2767.00	2781.82	2781.82	2786.37	0.006460	17.10	2104.79	1075.72	1.00
Reach #1	215	PF 1	31000.00	2767.00	2780.49	2779.67	2783.03	0.004711	12.82	2425.80	1271.30	0.83
Reach #1	215	PF 2	24490.00	2767.00	2779.44	2777.92	2781.60	0.004906	11.81	2075.45	903.76	0.83
Reach #1	215	PF 3	36000.00	2767.00	2779.41	2780.35	2784.13	0.010772	17.44	2065.33	892.30	1.22
Reach #1	210	PF 1	31000.00	2766.00	2778.66	2778.66	2781.45	0.007383	13.40	2313.85	1097.58	1.00
Reach #1	210	PF 2	24490.00	2766.00	2776.84	2776.53	2780.03	0.006179	14.33	1708.58	503.53	0.95
Reach #1	210	PF 3	36000.00	2766.00	2779.29	2779.29	2782.30	0.007343	13.93	2585.10	1350.50	1.00
Reach #1	205	PF 1	31000.00	2765.00	2776.22	2777.30	2779.34	0.008080	14.33	2410.89	793.24	1.05
Reach #1	205	PF 2	24490.00	2765.00	2775.69	2775.69	2778.12	0.006333	12.57	2054.88	564.95	0.92
Reach #1	205	PF 3	36000.00	2765.00	2776.61	2777.75	2780.06	0.009177	15.23	2725.49	821.56	1.12
Reach #1	200	PF 1	31000.00	2763.00	2775.79	2774.99	2777.53	0.002710	11.65	4073.47	1061.35	0.66
Reach #1	200	PF 2	24490.00	2763.00	2773.47	2773.95	2776.37	0.005630	14.06	2140.17	639.31	0.91
Reach #1	200	PF 3	36000.00	2763.00	2777.61	2775.91	2778.65	0.001471	9.63	6098.87	1123.03	0.50
Reach #1	195	PF 1	31000.00	2762.00	2776.10	2773.18	2776.91	0.001134	8.08	5620.12	1032.86	0.44
Reach #1	195	PF 2	24490.00	2762.00	2773.94	2771.52	2775.00	0.001844	8.87	3625.64	791.32	0.53
Reach #1	195	PF 3	36000.00	2762.00	2777.65	2773.66	2778.32	0.000834	7.58	7312.49	1150.72	0.38
Reach #1	190	PF 1	31000.00	2760.49	2776.15	2770.00	2776.63	0.000559	5.57	5571.29	561.62	0.30
Reach #1	190	PF 2	24490.00	2760.49	2774.11	2769.25	2774.57	0.000684	5.44	4498.68	516.51	0.33
Reach #1	190	PF 3	36000.00	2760.49	2777.63	2770.53	2778.12	0.000482	5.64	6607.73	849.13	0.29
Reach #1	180	PF 1	31000.00	2759.08	2775.79	2769.77	2776.56	0.000797	7.02	4417.73	380.92	0.36
Reach #1	180	PF 2	24490.00	2759.08	2773.80	2768.85	2774.49	0.000903	6.68	3663.85	374.16	0.38
Reach #1	180	PF 3	36000.00	2759.08	2777.24	2770.43	2778.05	0.000732	7.22	5081.69	539.32	0.35
Reach #1	170	PF 1	31000.00	2758.49	2774.20	2770.56	2776.17	0.003676	11.25	2757.73	242.69	0.59
Reach #1	170	PF 2	24490.00	2758.49	2772.35	2769.31	2774.09	0.003766	10.58	2315.34	235.99	0.60
Reach #1	170	PF 3	36000.00	2758.49	2775.55	2771.45	2777.66	0.003616	11.68	3086.79	247.31	0.58
Reach #1	160	PF 1	31000.00	2757.67	2771.39	2770.34	2775.27	0.008706	15.81	1961.09	187.93	0.86
Reach #1	160	PF 2	24490.00	2757.67	2770.21	2768.88	2773.29	0.007540	14.07	1740.90	184.84	0.81
Reach #1	160	PF 3	36000.00	2757.67	2772.11	2771.39	2776.69	0.009790	17.17	2096.10	189.78	0.91
Reach #1	150	PF 1	31000.00	2757.36	2769.35	2769.35	2773.78	0.006782	16.88	1836.44	207.99	1.00
Reach #1	150	PF 2	24490.00	2757.36	2768.00	2768.00	2771.83	0.007077	15.72	1557.52	204.23	1.00
Reach #1	150	PF 3	36000.00	2757.36	2770.31	2770.31	2775.16	0.006667	17.68	2036.48	211.14	1.00
Reach #1	139	PF 1	31000.00	2756.07	2765.45	2767.29	2771.69	0.013412	20.39	1706.88	405.73	1.38
Reach #1	139	PF 2	24490.00	2756.07	2764.81	2766.35	2769.85	0.011932	18.13	1453.04	392.22	1.28
Reach #1	139	PF 3	36000.00	2756.07	2765.88	2768.62	2772.99	0.014387	21.91	1884.39	413.39	1.44
Reach #1	130	PF 1	31000.00	2755.25	2765.14	2766.38	2769.18	0.008922	16.72	2239.54	595.82	1.12
Reach #1	130	PF 2	24490.00	2755.25	2765.89	2765.37	2767.71	0.003800	11.42	2678.53	718.73	0.74
Reach #1	130	PF 3	36000.00	2755.25	2765.43	2767.00	2770.22	0.010327	18.32	2408.98	645.25	1.22
Reach #1	120	PF 1	31000.00	2754.00	2765.67	2765.44	2767.11	0.004458	10.60	3972.41	1460.10	0.78
Reach #1	120	PF 2	24490.00	2754.00	2765.02	2764.98	2766.37	0.004660	10.02	3250.25	1389.85	0.78
Reach #1	120	PF 3	36000.00	2754.00	2766.07	2765.81	2767.62	0.004493	11.13	4425.95	1508.19	0.79
Reach #1	115	PF 1	31000.00	2753.00	2764.74	2764.74	2766.39	0.004600	11.08	3794.22	1539.72	0.80
Reach #1	115	PF 2	24490.00	2753.00	2764.16	2764.16	2765.65	0.004527	10.27	3102.07	1477.14	0.78
Reach #1	115	PF 3	36000.00	2753.00	2765.15	2765.15	2766.90	0.004615	11.59	4284.47	1597.71	0.81
Reach #1	110	PF 1	31000.00	2753.00	2762.85	2763.33	2764.92	0.007990	12.74	3430.45	1599.06	1.01
Reach #1	110	PF 2	24490.00	2753.00	2762.42	2762.82	2764.24	0.007531	11.64	2886.12	1565.13	0.97
Reach #1	110	PF 3	36000.00	2753.00	2763.14	2763.67	2765.41	0.008280	13.48	3812.18	1632.62	1.04
Reach #1	100	PF 1	31000.00	2752.00	2761.65	2761.20	2762.67	0.003515	8.86	4732.88	1653.19	0.68
Reach #1	100	PF 2	24490.00	2752.00	2761.06	2760.72	2762.01	0.003685	8.38	3853.71	1591.34	0.68
Reach #1	100	PF 3	36000.00	2752.00	2762.17	2761.51	2763.17	0.003152	8.93	5513.50	2014.21	0.65

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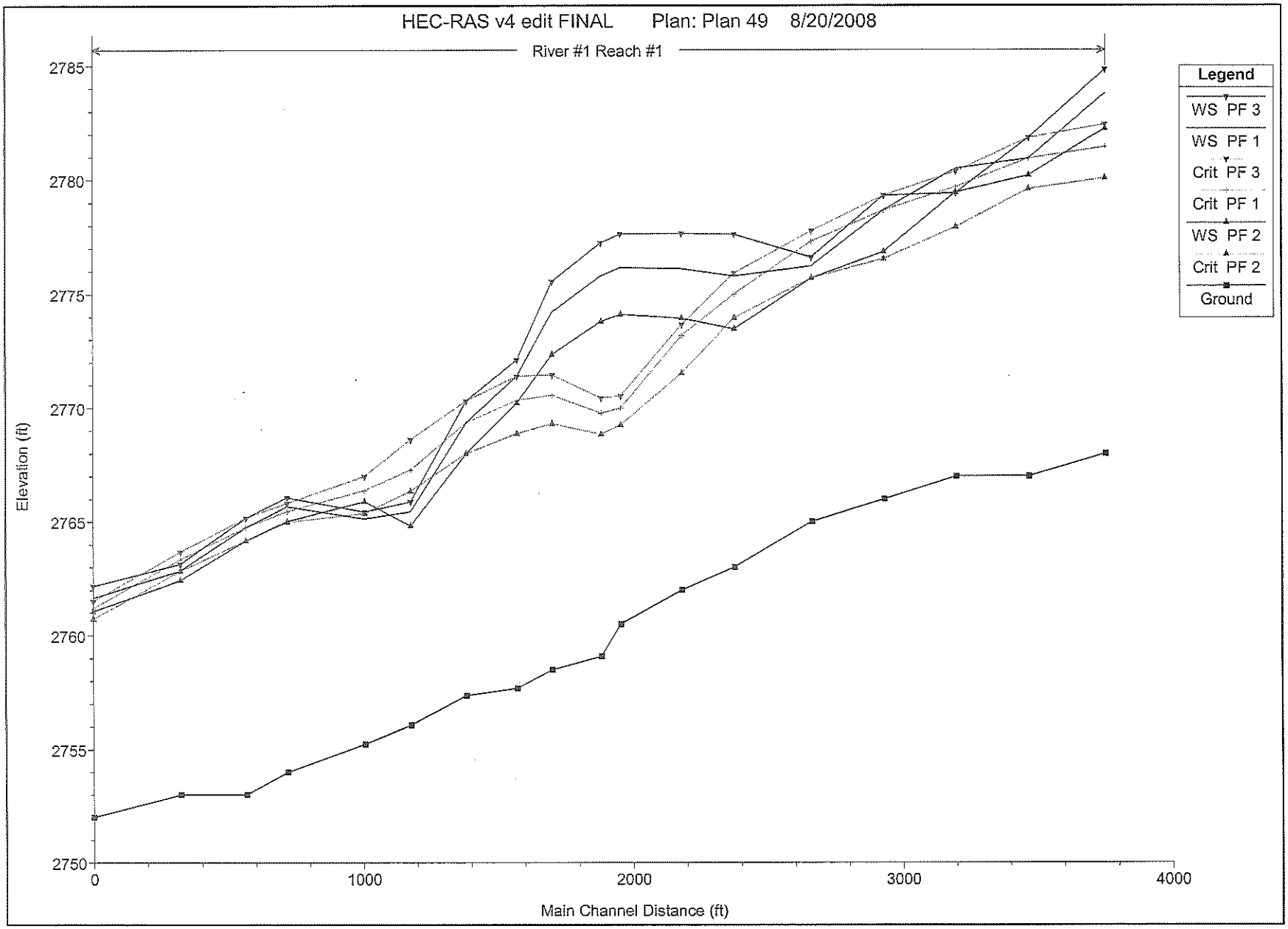
ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : 2a

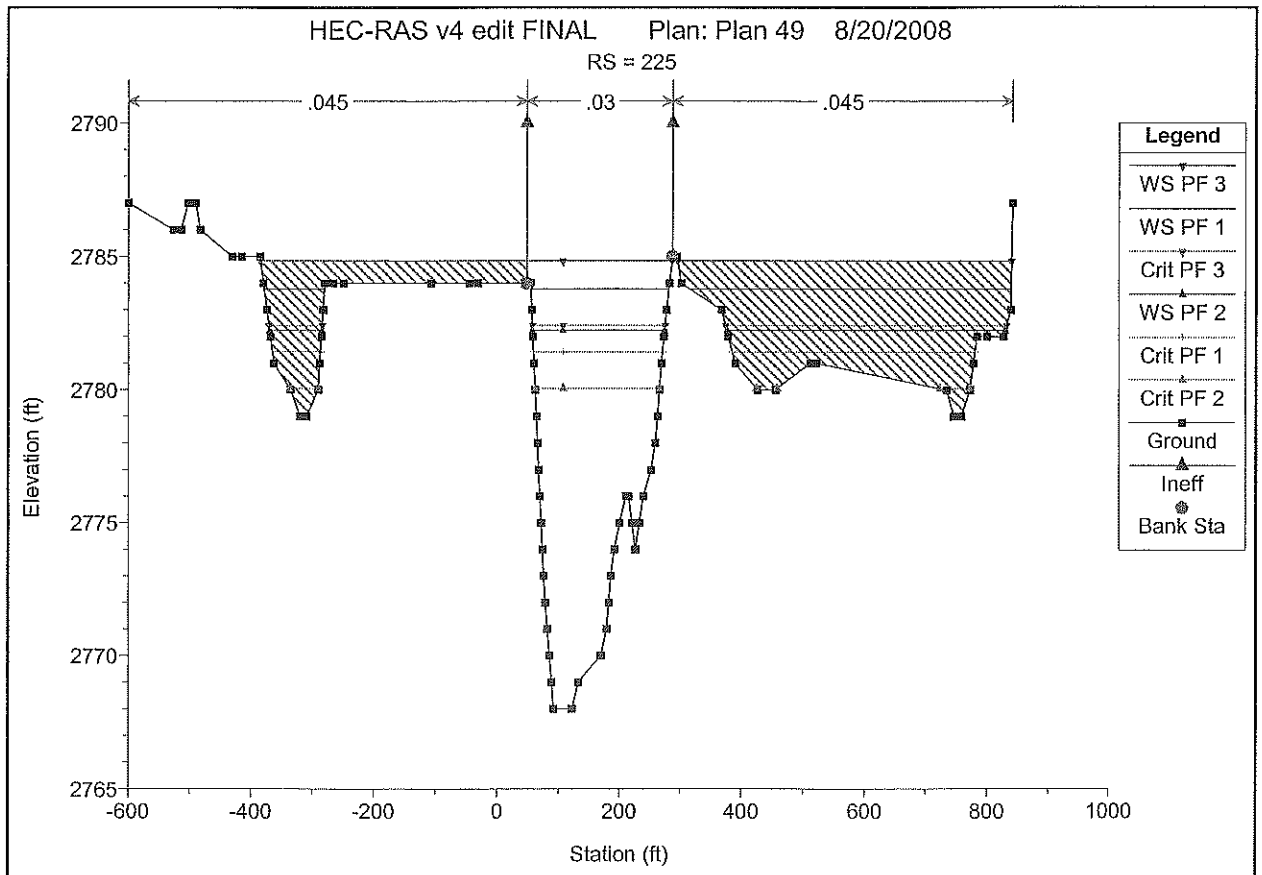
iver: River #1 Reach: Reach #1 RS: 225 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream 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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 1
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:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
iver: River #1 Reach: Reach #1 RS: 220 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

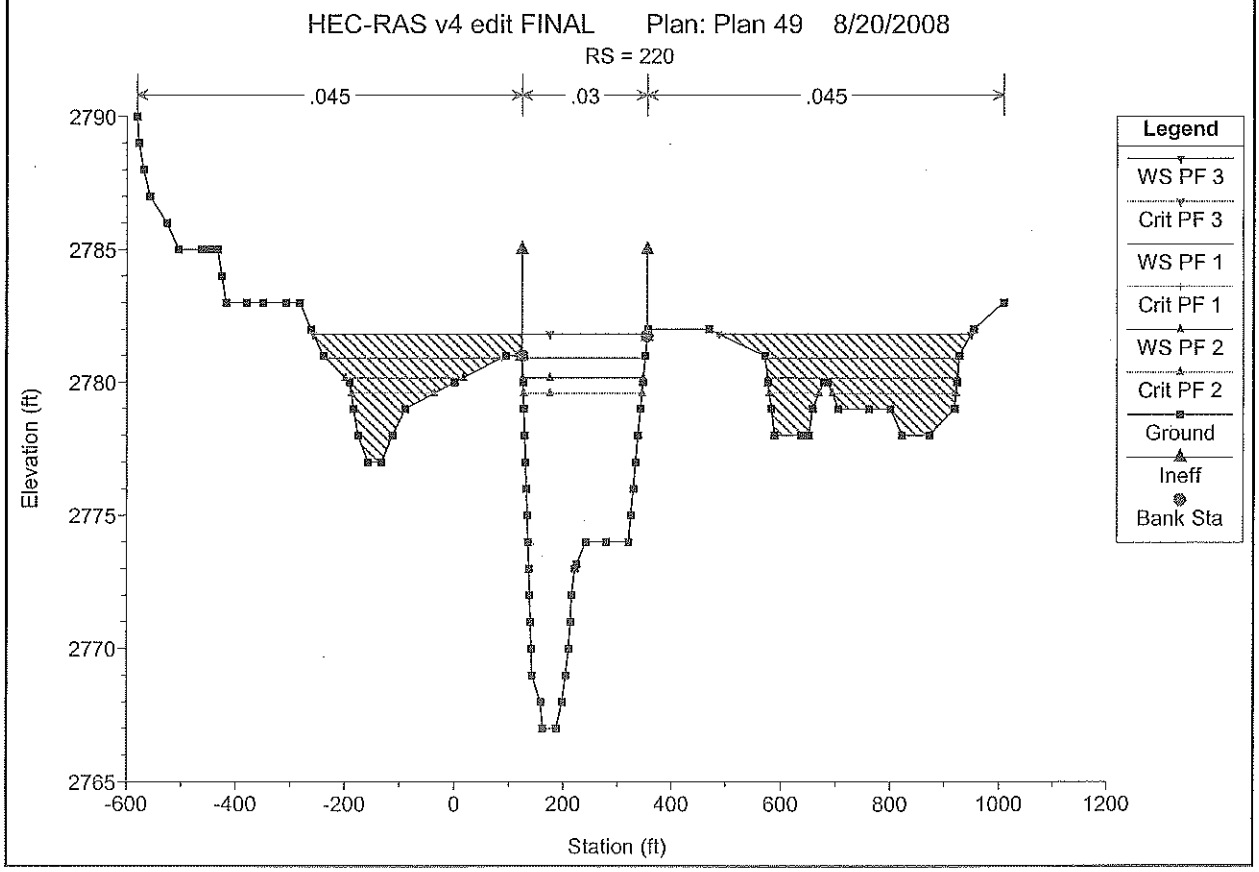
the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
iver: River #1 Reach: Reach #1 RS: 205 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 3
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 1
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 3
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 2
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 2
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 3
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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 3
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.


HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
River #1 Reach #1
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Elevation (ft)
2785
2780
2775
2770
2765
2760
2755
2750
0
1000
2000
3000
4000
Main Channel Distance (ft)


HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 225
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Ineff
Bank Sta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RS = 220
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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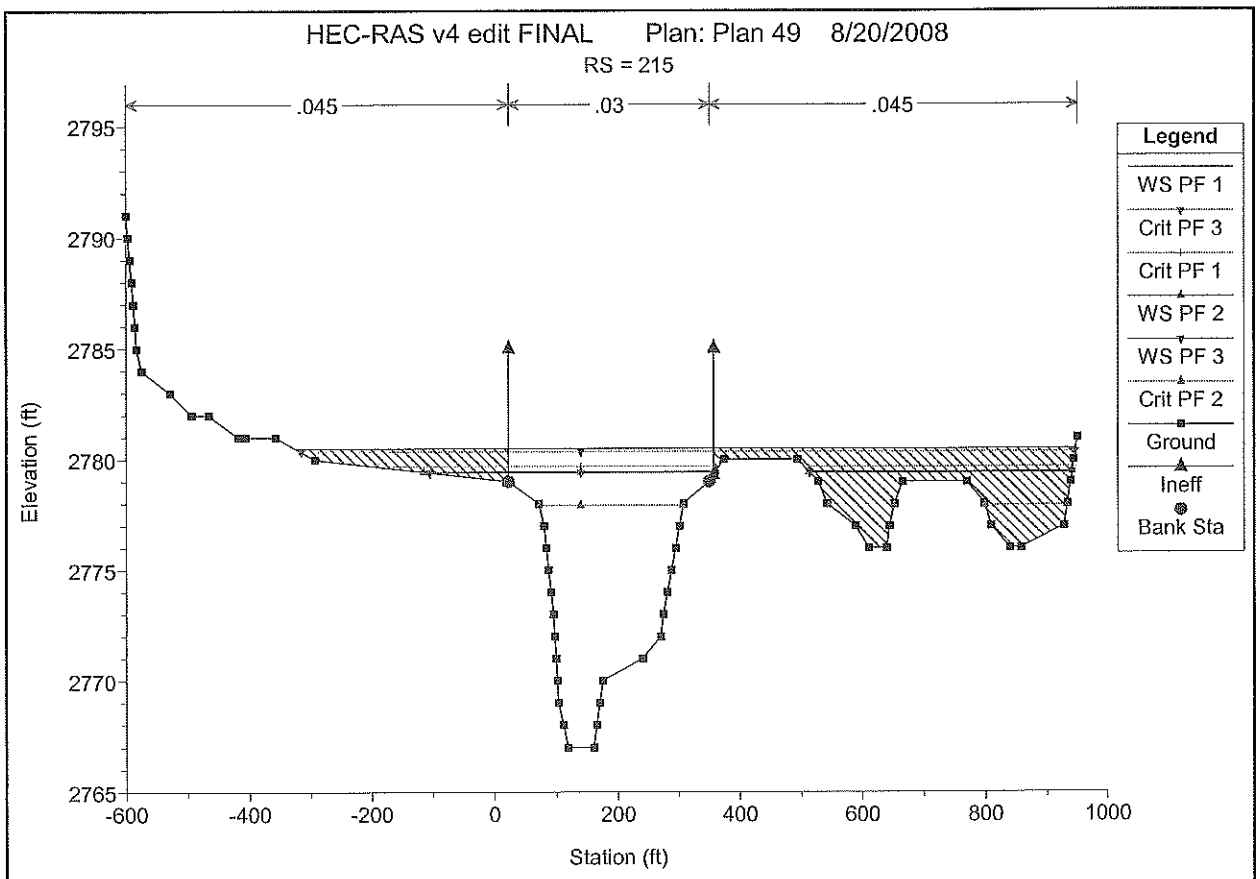
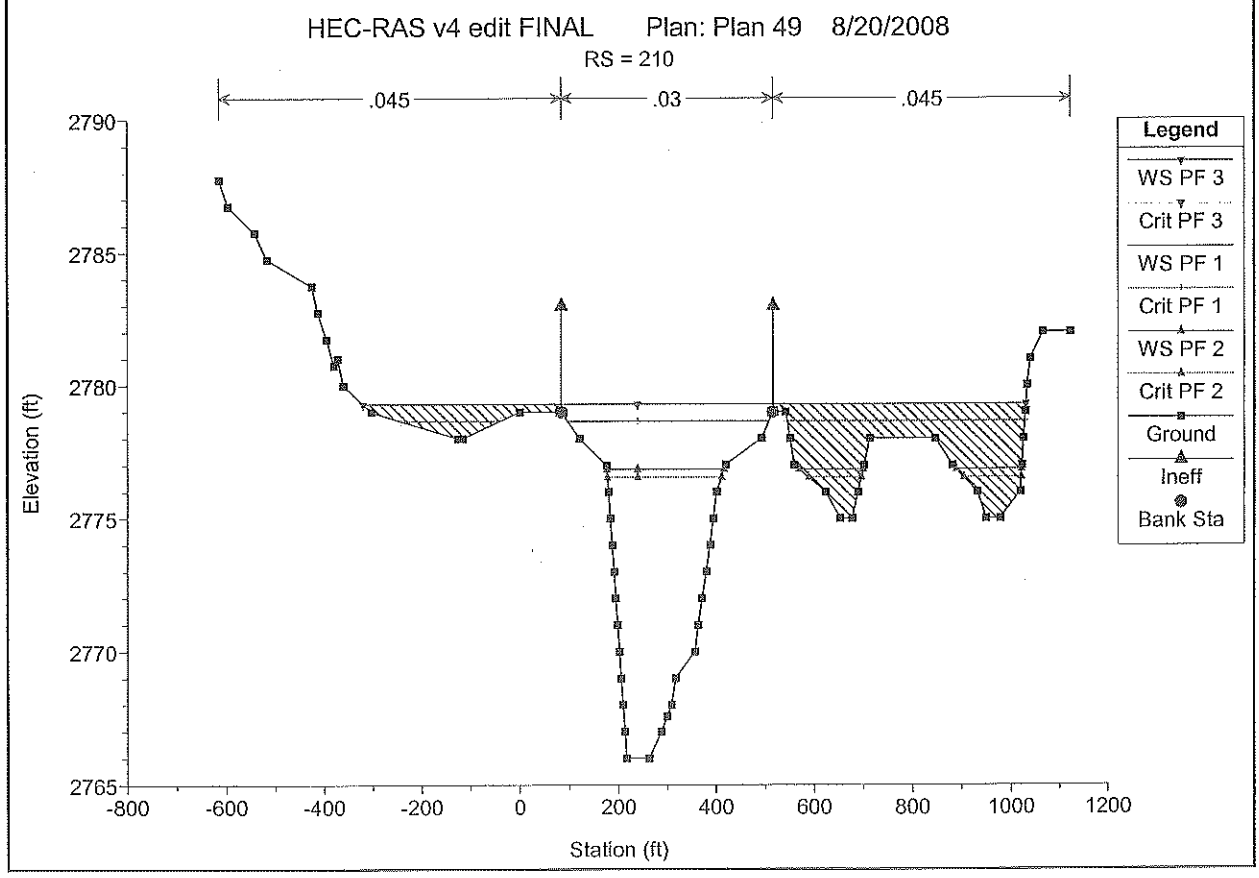
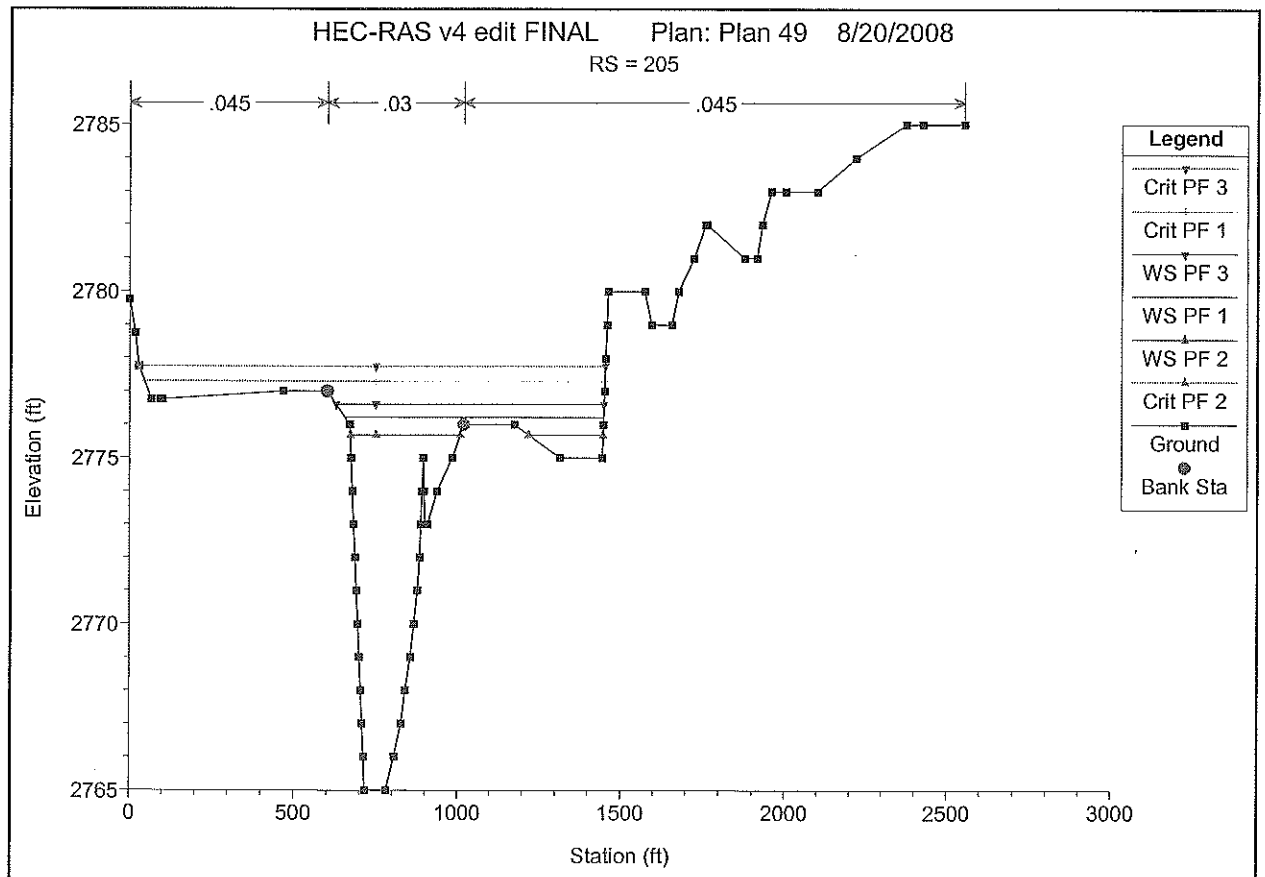
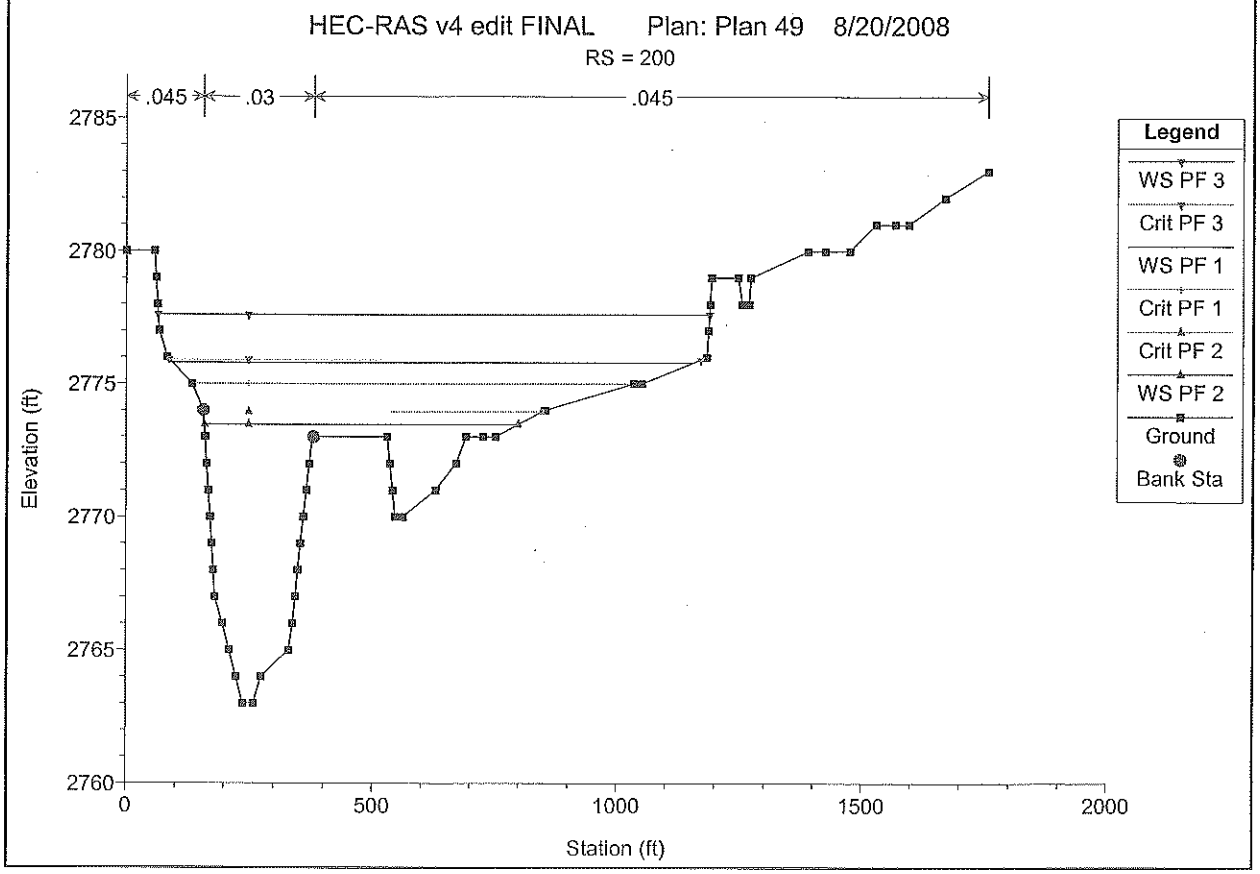
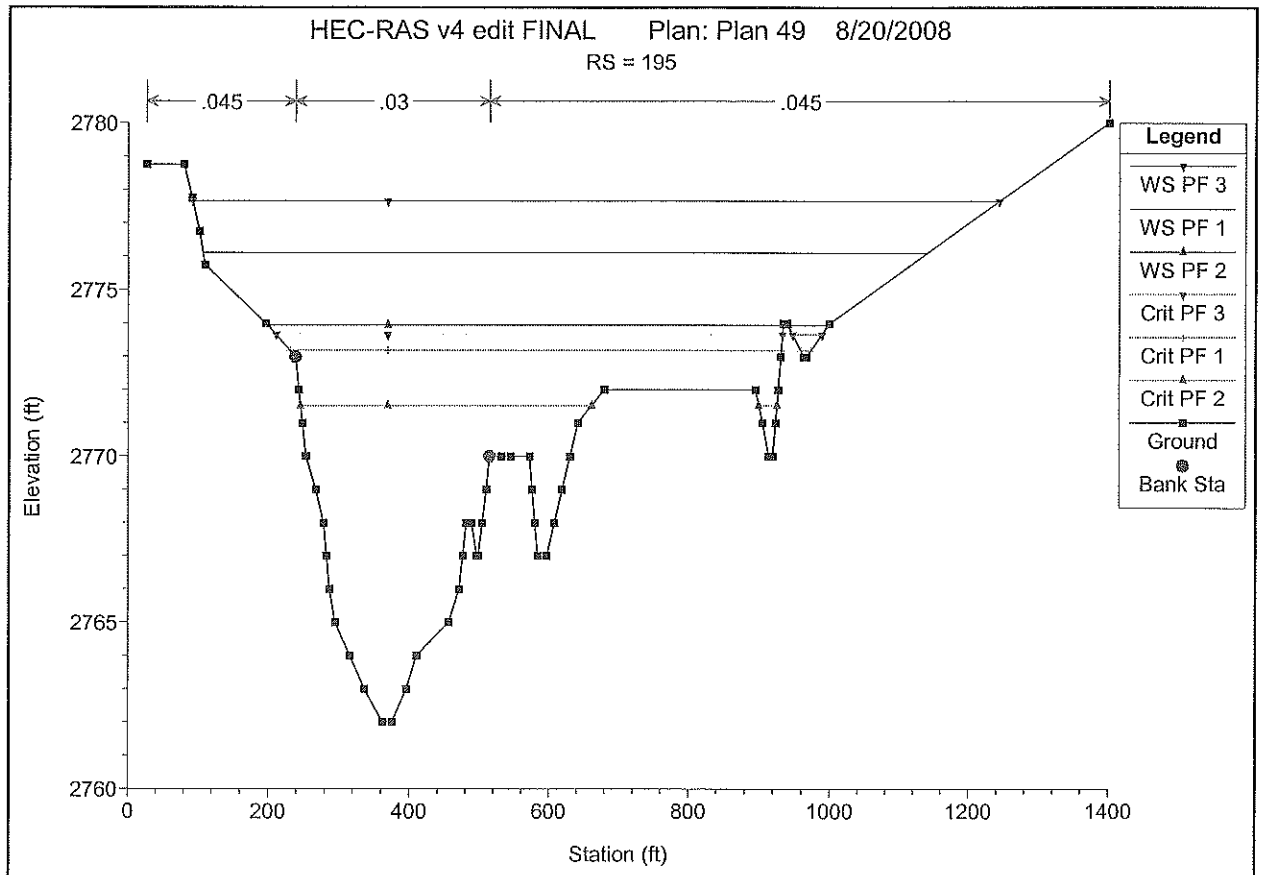
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta

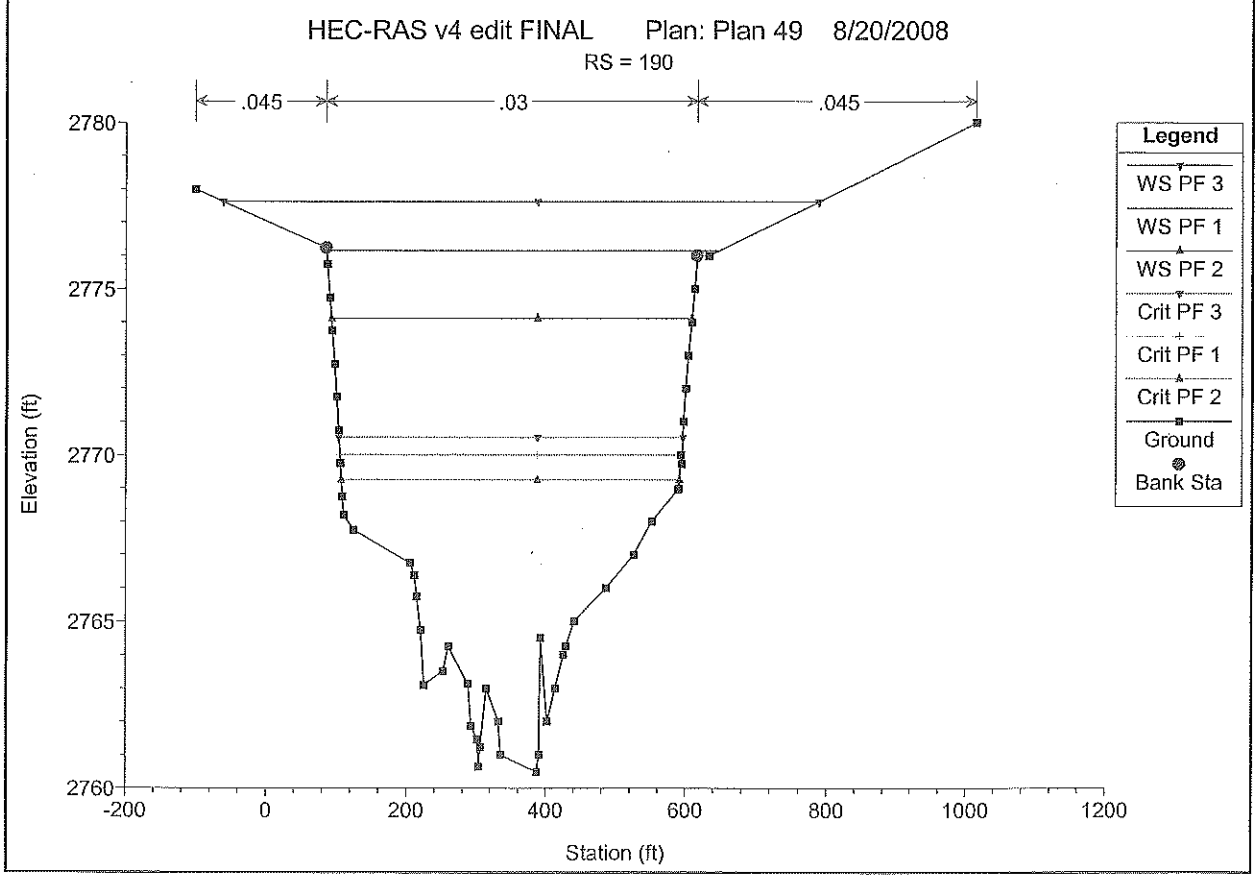

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 215
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
Ground
Ineff
Bank Sta

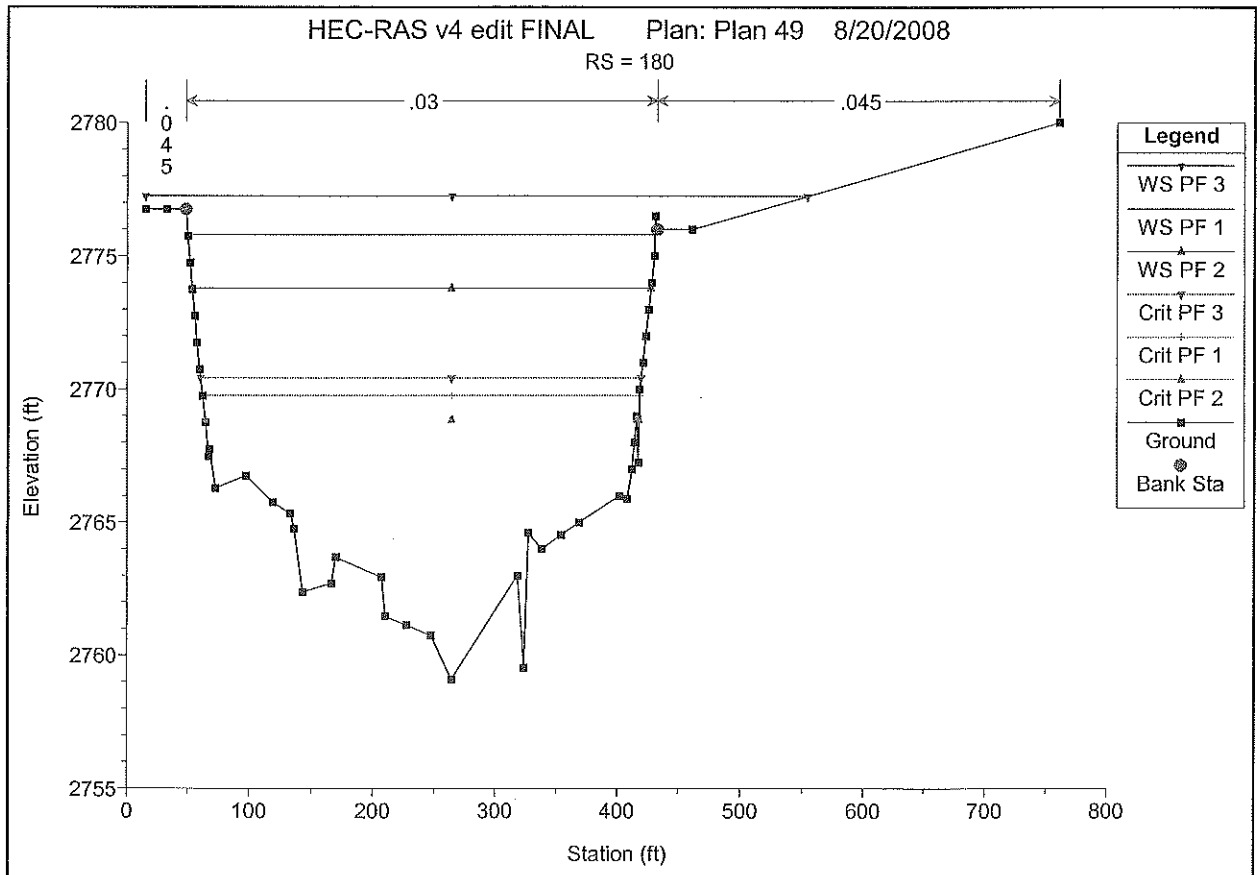

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 210
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta

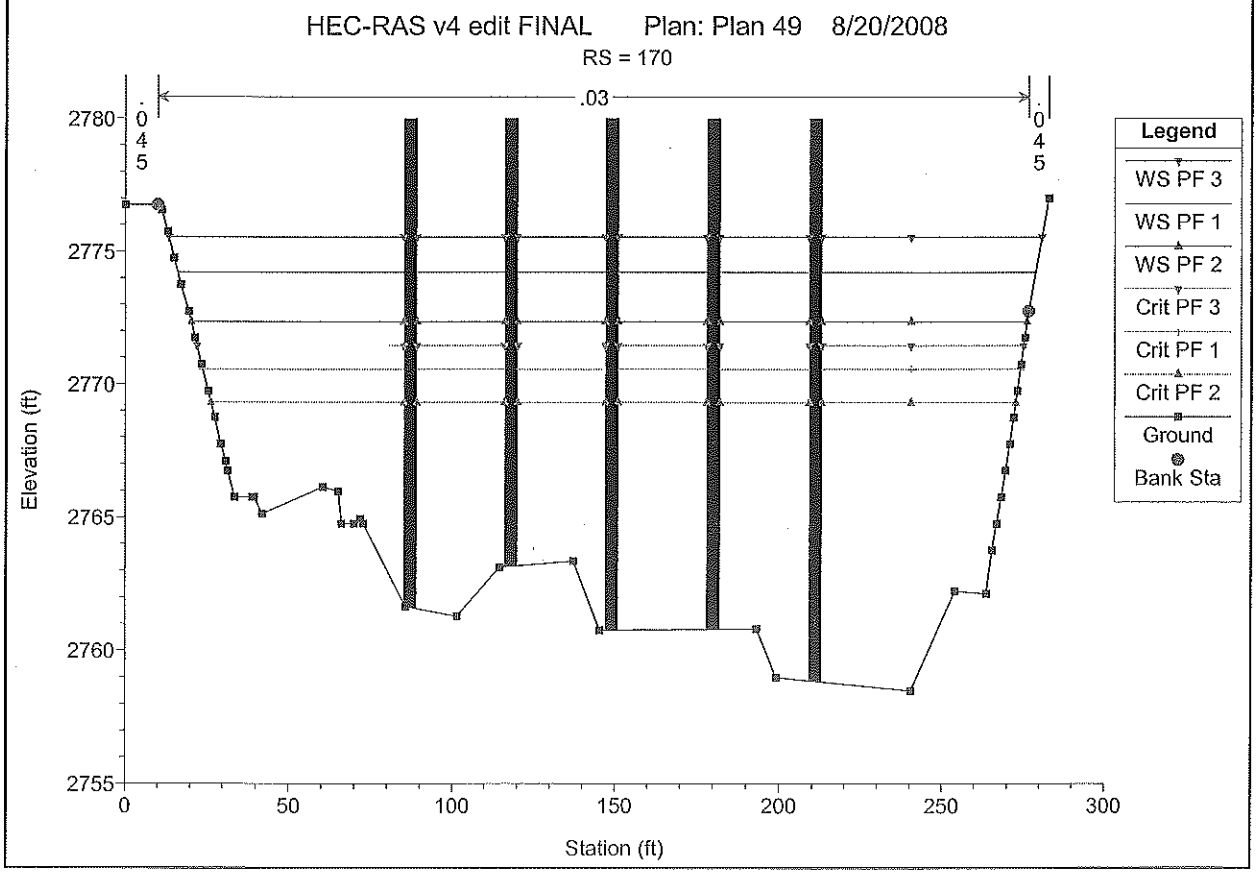

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 205
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta

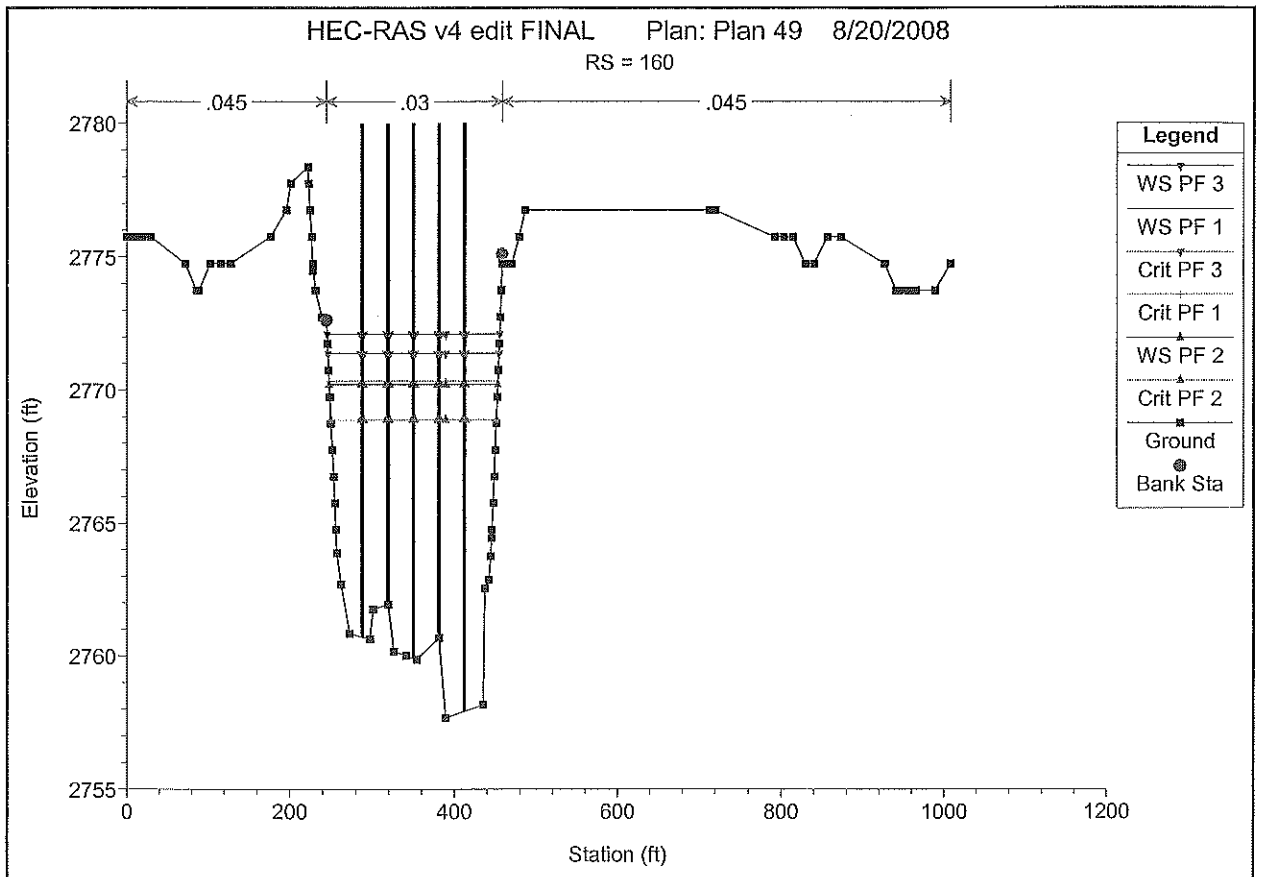

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 200
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
Crit PF 2
WS PF 2
Ground
Bank Sta

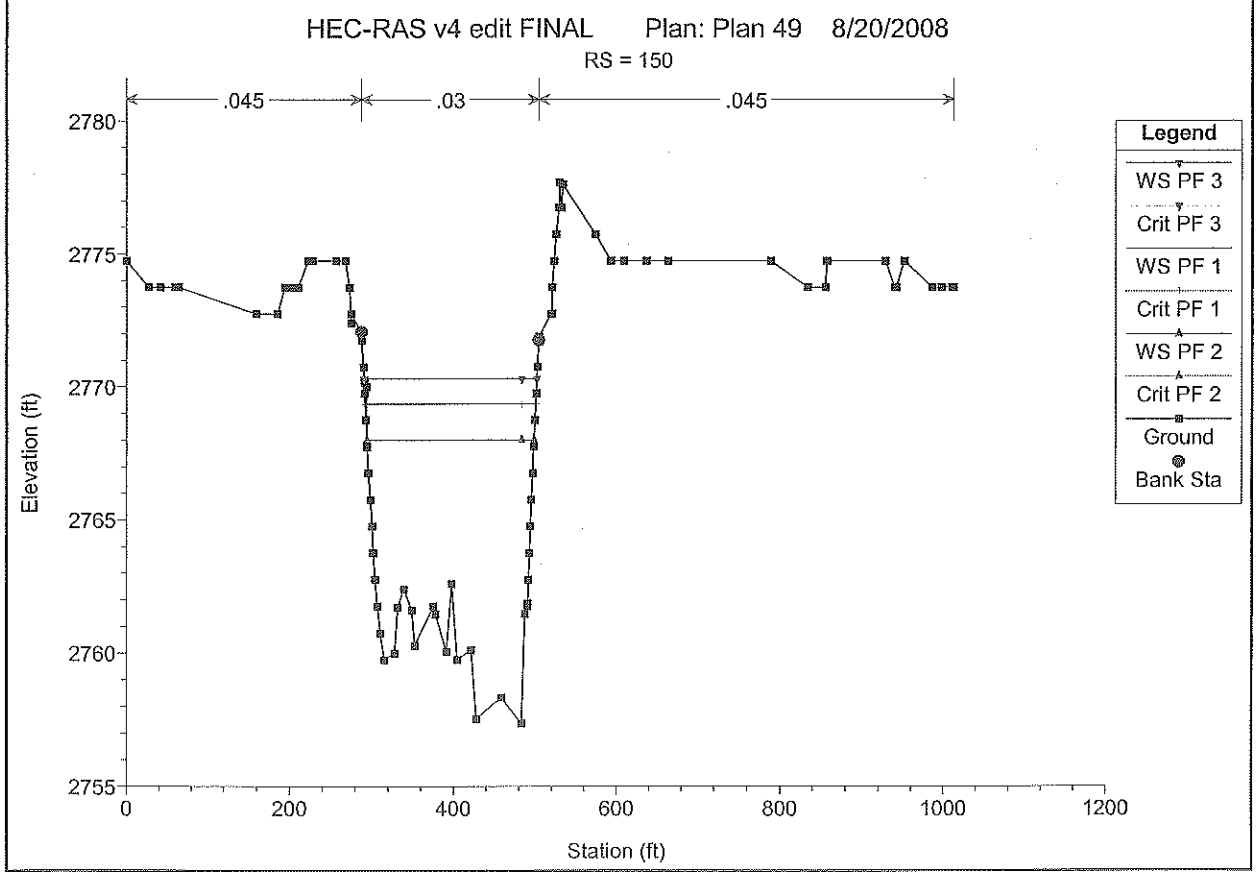

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 195
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta

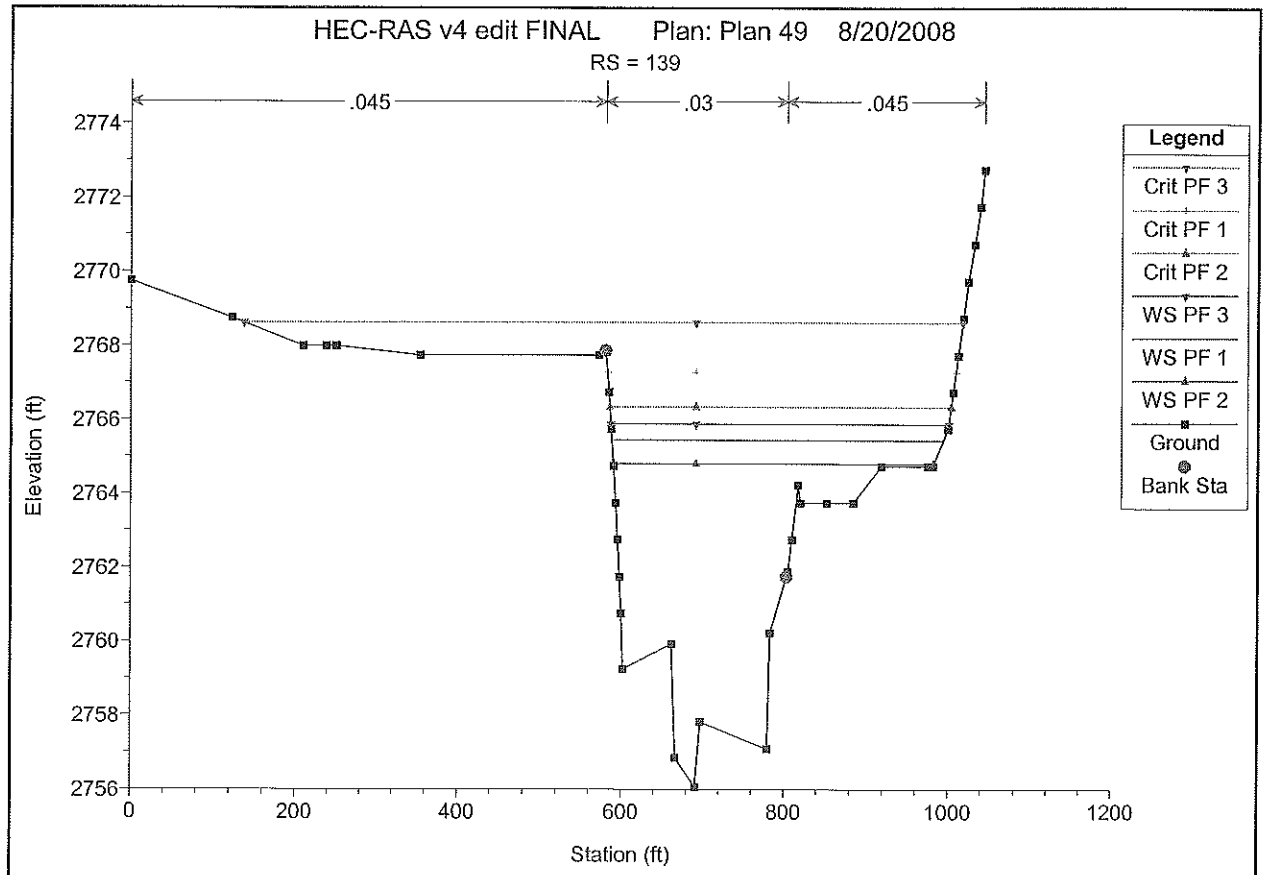

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 190
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta

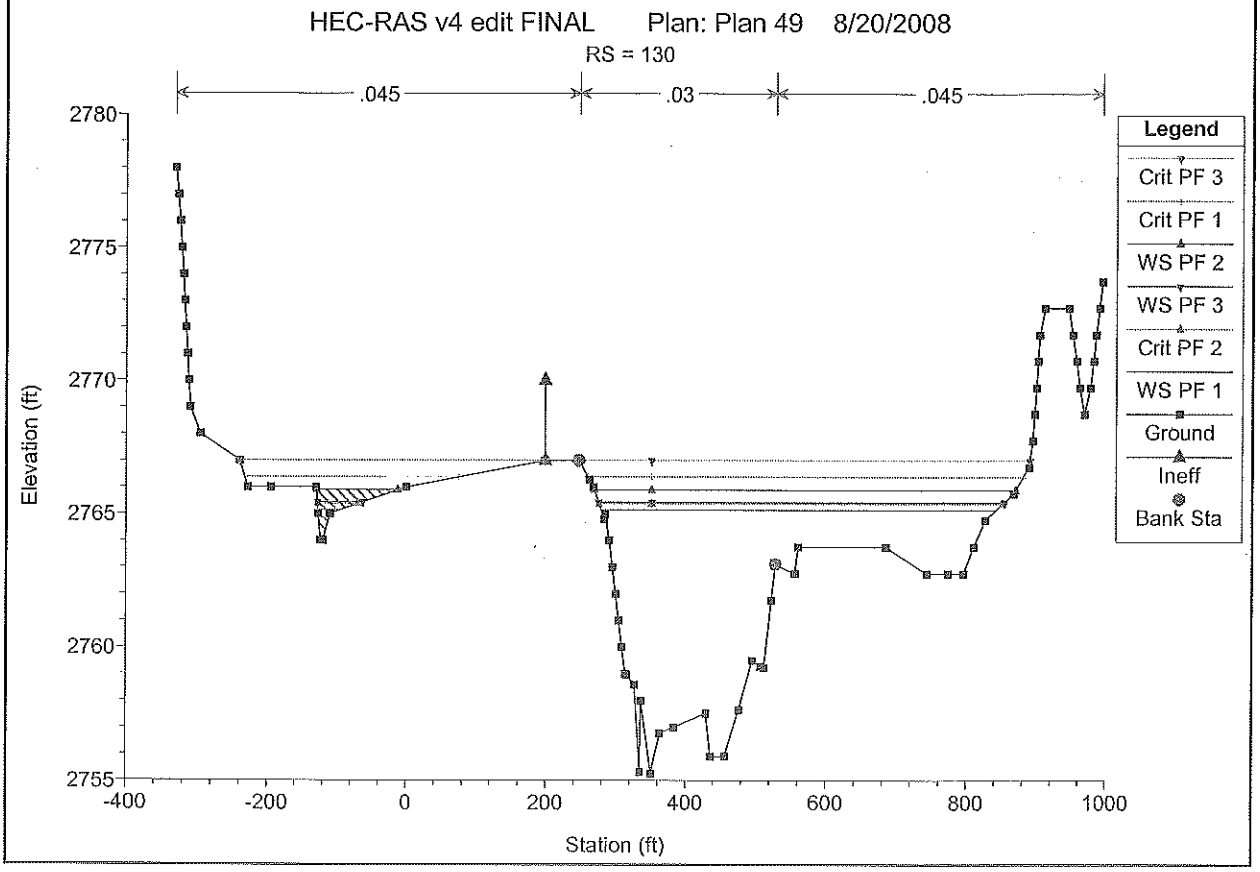

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 180
.045
.03
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
2780
2775
2770
2765
2760
2755
0
100
200
300
400
500
600
700
800
Station (ft)

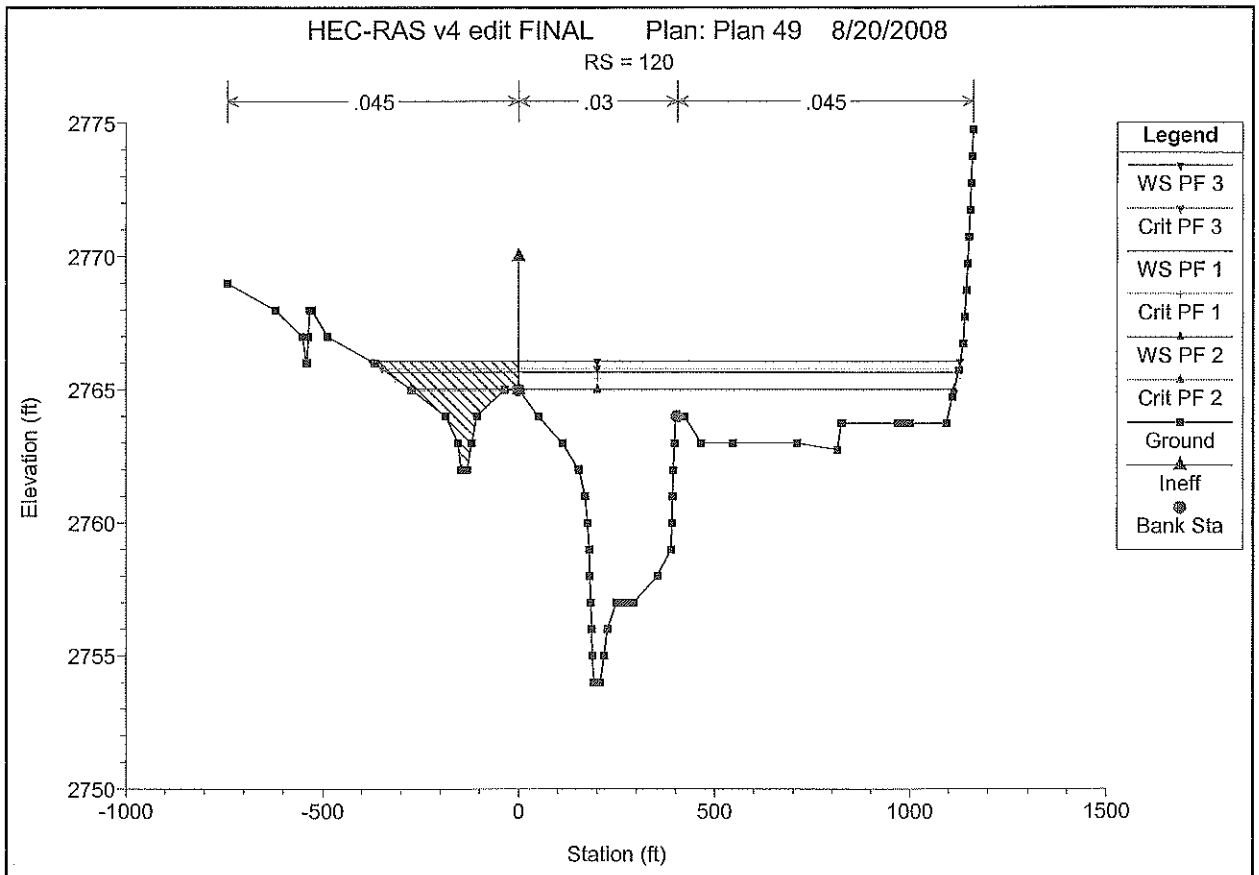

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 170
.045
.03
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
2780
2775
2770
2765
2760
2755
0
50
100
150
200
250
300
Station (ft)

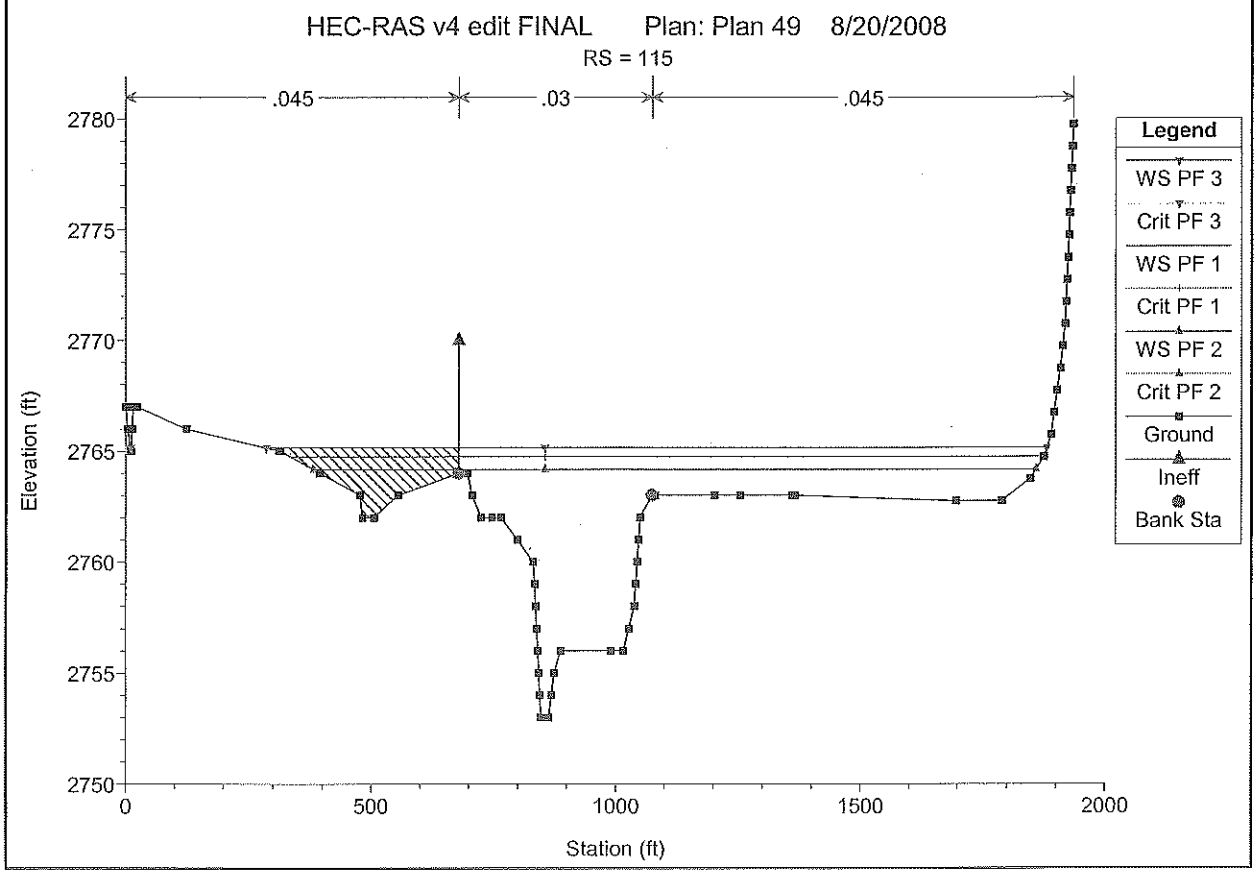

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 160
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta

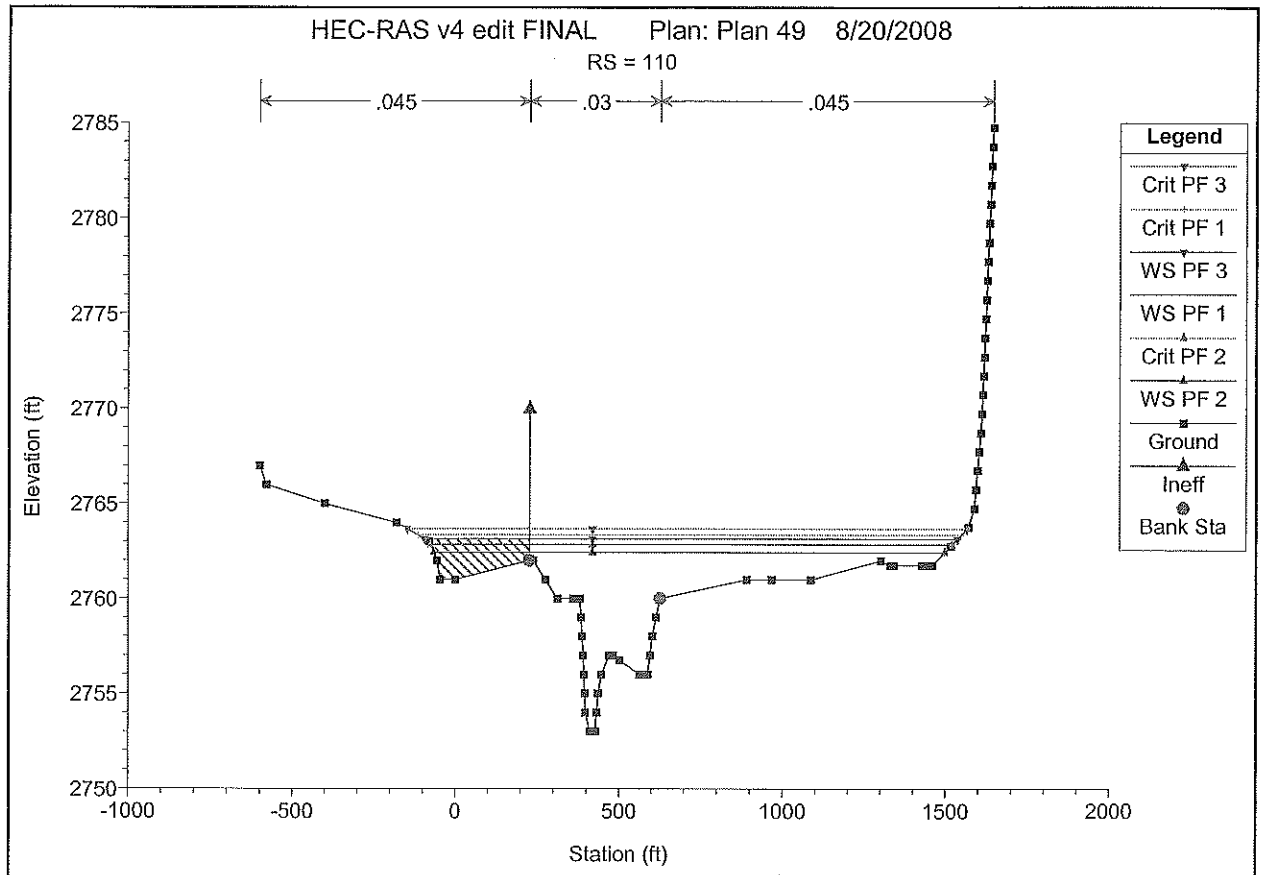

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 150
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta

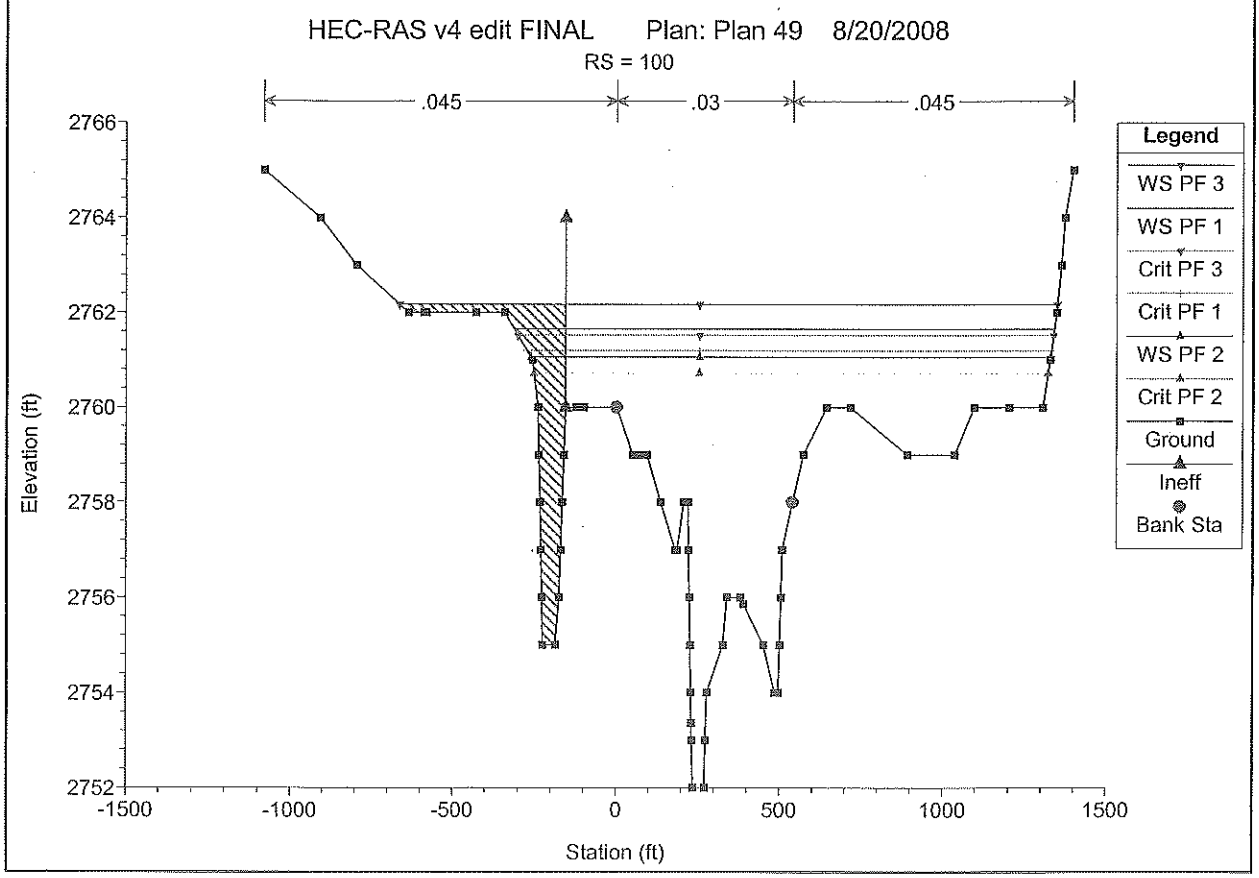

HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 139
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 130
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
WS PF 1
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 120
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 115
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 110
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
Crit PF 2
WS PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 49 8/20/2008
RS = 100
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta

ALTERNATIVE 3

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

*****************************************************************************

PROJECT DATA
Project Title: HEC-RAS v4 edit FINAL
Project File : v4_FINAL.prj
Run Date and Time: 7/28/2008 2:18:12 PM

Project in English units

*****************************************************************************

PLAN DATA

Plan Title: Plan 44
Plan File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.p44

          Geometry Title: Alternative 3
          Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g01

          Flow Title    : Flow Profiles
          Flow File     : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Plan Summary Information:
Number of:  Cross Sections =   18    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

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

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

*****************************************************************************

FLOW DATA

Flow Title: Flow Profiles
Flow File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Flow Data (cfs)
*********************************************************************************************
* River           Reach           RS      *            PF 1            PF 2            PF 3 *
* River #1        Reach #1        225     *           31000           24490           36000 *
*********************************************************************************************

Boundary Conditions
*****************************************************************************************************************
* River           Reach           Profile          *            Upstream                  Downstream    *
*****************************************************************************************************************
* River #1        Reach #1        PF 1             *       Known WS = 2784.88        Known WS = 2761.65 *
* River #1        Reach #1        PF 2             *        Known WS = 2783.7        Known WS = 2761.06 *
* River #1        Reach #1        PF 3             *       Known WS = 2785.58        Known WS = 2762.17 *
*****************************************************************************************************************

*****************************************************************************

GEOMETRY DATA

Geometry Title: Alternative 3
Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g01

CROSS SECTION


RIVER: River #1
REACH: Reach #1           RS: 225

INPUT
Description:
Station Elevation Data    num=      87
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
  ***************************************************************************
    -600    2787  -527.4    2786 -514.33    2786    -503    2787  -490.5    2787
  483.14    2786 -430.62    2785 -415.31    2785 -385.29    2785  -379.5    2784
 -373.64    2783 -367.89    2782 -362.54    2781 -335.28    2780 -319.81    2779
 -309.13    2779  -289.6    2780 -286.98    2781 -284.35    2782 -281.73    2783
  -279.1    2784 -265.97    2784 -248.75    2784 -107.38    2784  -45.25    2784
  -31.61    2784   48.35    2784   54.16    2784   56.16    2783   58.16    2782
   60.16    2781   62.16    2780   64.15    2779   66.14    2778   68.14    2777
```

70.13	2776	72.11	2775	74.12	2774	76.14	2773	78.74	2772
82.21	2771	85.67	2770	89.14	2769	92.61	2768	122.93	2768
133.3	2769	169.83	2770	179.3	2771	182.56	2772	185.85	2773
191.57	2774	200.62	2775	210.54	2776	215.34	2776	220.78	2775
226.28	2774	226.63	2774	232.86	2775	239.08	2776	251.88	2777
259.19	2778	262.5	2779	265.81	2780	269.11	2781	272.46	2782
277.36	2783	282.24	2784	287.11	2785	294.48	2785	301.44	2784
367.61	2783	378.84	2782	390.07	2781	426.4	2780	455.43	2780
512.28	2781	521.82	2781	734.04	2780	745.89	2779	758.18	2779
772.24	2780	777.86	2781	783.57	2782	799.74	2782	826.6	2782
838.75	2783	841.94	2787						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	48.35	.03	287.11	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.35	287.11	299.75	282.05	262.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	48.35	2790	F
287.11	841.94	2790	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2786.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.66	Wt. n-Val.		0.030	
W.S. Elev (ft)	2783.79	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2781.42	Flow Area (sq ft)		2368.69	
E.G. Slope (ft/ft)	0.003148	Area (sq ft)	331.46	2368.69	1497.45
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	849.40	Top Width (ft)	98.63	226.64	524.13
Vel Total (ft/s)	13.09	Avg. Vel. (ft/s)		13.09	
Max Chl Dpth (ft)	15.79	Hydr. Depth (ft)		10.45	
Conv. Total (cfs)	552522.3	Conv. (cfs)		552522.3	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		231.77	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.01	
Alpha	1.00	Stream Power (lb/ft s)		26.29	
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	17.64	203.66	75.58
C & E Loss (ft)	0.15	Cum SA (acres)	13.35	27.77	37.33

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2784.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	2782.23	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2780.05	Flow Area (sq ft)		2023.49	
E.G. Slope (ft/ft)	0.003108	Area (sq ft)	187.89	2023.49	748.39
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	754.54	Top Width (ft)	85.48	215.90	453.17
Vel Total (ft/s)	12.10	Avg. Vel. (ft/s)		12.10	
Max Chl Dpth (ft)	14.23	Hydr. Depth (ft)		9.37	
Conv. Total (cfs)	439315.6	Conv. (cfs)		439315.6	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		220.49	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		1.78	
Alpha	1.00	Stream Power (lb/ft s)		21.55	
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)	9.77	176.48	46.41
C & E Loss (ft)	0.08	Cum SA (acres)	9.02	26.38	31.65

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2787.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.95	Wt. n-Val.		0.030	
W.S. Elev (ft)	2784.84	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2782.42	Flow Area (sq ft)		2613.48	
E.G. Slope (ft/ft)	0.003262	Area (sq ft)	712.12	2613.48	2061.12
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1215.25	Top Width (ft)	432.69	237.96	544.60
Vel Total (ft/s)	13.77	Avg. Vel. (ft/s)		13.77	
Max Chl Dpth (ft)	16.84	Hydr. Depth (ft)		10.98	
Conv. Total (cfs)	630296.7	Conv. (cfs)		630296.7	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		243.24	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.19	
Alpha	1.00	Stream Power (lb/ft s)		30.14	
Frctn Loss (ft)	1.26	Cum Volume (acre-ft)	25.16	221.98	101.75
C & E Loss (ft)	0.16	Cum SA (acres)	17.59	28.21	40.26

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

CROSS SECTION

VER: River #1
ACH: Reach #1 RS: 220

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-581.45	2790	-578.15	2789	-569.74	2788	-557.64	2787	-527.23	2786
-505.43	2785	-463.74	2785	-455.79	2785	-443.54	2785	-433.72	2785
-425.53	2784	-417.97	2783	-380.36	2783	-349.98	2783	-307.83	2783
-282.84	2783	-261.98	2782	-239.35	2781	-190.7	2780	-183.94	2779
-175.54	2778	-157.15	2777	-133.21	2777	-112.75	2778	-89.46	2779
0	2780	93.96	2781	93.97	2781	123.68	2781	123.69	2781
125.31	2780	126.91	2779	128.5	2778	128.51	2778	130.1	2777
131.69	2776	131.7	2775.99	133.28	2775	134.86	2774	134.87	2774
136.44	2773	136.45	2772.99	138.01	2772	138.02	2772	139.58	2771
139.59	2770.99	141.14	2770	141.15	2769.99	142.52	2769	159.27	2768
159.28	2768	162.78	2767	187.06	2767	198.25	2768	198.26	2768
204.67	2769	210.08	2770	213.61	2771	215.17	2772	215.18	2772
221.37	2773	224.62	2773.16	241.47	2774	241.48	2774	279.56	2774
320.64	2774	324.91	2775	324.92	2775	329.19	2776	333.46	2777
333.47	2777	337.74	2778	342.02	2779	346.29	2780	346.3	2780
351.04	2781	354.75	2781.74	356.06	2782	468.74	2782	570.77	2781
570.78	2781	576.15	2780	582.31	2779	588.49	2778	588.5	2778
635.74	2778	648.28	2778	648.29	2778	650.75	2778	650.76	2778
657.91	2779	677.66	2780	677.67	2780	685.61	2780	704.82	2779
761.06	2779	800.38	2779	800.39	2779	821.89	2778	871.9	2778
871.91	2778	918.79	2779	922.82	2780	922.83	2780	927.55	2781
927.56	2781	954.11	2782	954.12	2782	1008.32	2783	1008.33	2783

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-581.45	.045	123.69	.03	354.75	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
123.69	354.75	277.65	269.4	261.19	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-581.45	123.69	2785	F
354.75	1008.33	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2785.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.92	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2780.92	Flow Area (sq ft)		1897.98	
E.G. Slope (ft/ft)	0.006598	Area (sq ft)	500.52	1897.98	790.65
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	904.77	Top Width (ft)	321.96	226.84	355.97
Vel Total (ft/s)	16.33	Avg. Vel. (ft/s)		16.33	
Max Chl Dpth (ft)	13.92	Hydr. Depth (ft)		8.37	
Conv. Total (cfs)	381638.5	Conv. (cfs)		381638.5	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		232.04	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.37	
Alpha	1.00	Stream Power (lb/ft s)		55.03	
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)	14.78	189.85	68.69
C & E Loss (ft)	0.48	Cum SA (acres)	11.90	26.30	34.68

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: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2783.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.12	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.16	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2779.58	Flow Area (sq ft)		1728.23	
E.G. Slope (ft/ft)	0.005463	Area (sq ft)	297.80	1728.23	524.30
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	784.47	Top Width (ft)	214.10	222.03	348.34
Vel Total (ft/s)	14.17	Avg. Vel. (ft/s)		14.17	
Max Chl Dpth (ft)	13.16	Hydr. Depth (ft)		7.78	
Conv. Total (cfs)	331339.7	Conv. (cfs)		331339.7	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		226.94	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.60	
Alpha	1.00	Stream Power (lb/ft s)		36.81	
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	8.10	164.33	42.58
C & E Loss (ft)	0.29	Cum SA (acres)	7.98	24.96	29.24

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

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2786.37	Element	Left OB	Channel	Right OB	
Vel Head (ft)	4.54	Wt. n-Val.		0.030		
W.S. Elev (ft)	2781.82	Reach Len. (ft)	277.65	269.40	261.19	
Crit W.S. (ft)	2781.82	Flow Area (sq ft)		2104.79		
E.G. Slope (ft/ft)	0.006460	Area (sq ft)	832.95	2104.79	1156.10	
Q Total (cfs)	36000.00	Flow (cfs)		36000.00		
Top Width (ft)	1075.72	Top Width (ft)	381.66	231.06	463.00	
Vel Total (ft/s)	17.10	Avg. Vel. (ft/s)		17.10		
Max Chl Dpth (ft)	14.82	Hydr. Depth (ft)		9.11		
Conv. Total (cfs)	447891.0	Conv. (cfs)		447891.0		
Length Wtd. (ft)	269.40	Wetted Per. (ft)		236.36		
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.59		
Alpha	1.00	Stream Power (lb/ft s)		61.43		
Frctn Loss (ft)	1.57	Cum Volume (acre-ft)	19.85	206.70	92.07	
C & E Loss (ft)	0.44	Cum SA (acres)	14.79	26.70	37.23	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 215

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600	2791	-597.36	2790	-594.38	2789	-591.34	2788	-588.34	2787
-585.87	2786	-583.46	2785	-574.84	2784	-529.58	2783	-494.62	2782
-493.31	2782	-466.31	2782	-418.17	2781	-406.34	2781	-357.18	2781
-292.94	2780	22.72	2779	71.36	2778	79.77	2777	83.57	2776
87.37	2775	91.17	2774	94.97	2773	97.27	2772	99.2	2771
101.13	2770	103.06	2769	111.41	2768	118.38	2767	160.1	2767
165.01	2768	169.93	2769	174.87	2770	240.22	2771	270.17	2772
274.15	2773	280.87	2774	287.59	2775	294.31	2776	301.03	2777
307.75	2778	350.35	2779	373.61	2780	494.04	2780	528.29	2779
542.52	2778	588.86	2777	611.04	2776	639.44	2776	644.41	2777
652.37	2778	665.66	2779	769.93	2779	798.66	2778	809.36	2777
839.56	2776	858.07	2776	928.58	2777	933.82	2778	939.05	2779
944.29	2780	950.35	2781						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	22.72	.03	350.35	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
22.72	350.35	294.95	268.22	230.48	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	22.72	2785	F
357.15	950.35	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2783.03	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.55	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2780.49	Reach Len. (ft)	294.95	268.22	230.48	
Crit W.S. (ft)	2779.67	Flow Area (sq ft)		2416.70	9.10	
E.G. Slope (ft/ft)	0.004711	Area (sq ft)	318.35	2416.70	1327.16	
Q Total (cfs)	31000.00	Flow (cfs)		30974.96	25.04	
Top Width (ft)	1271.30	Top Width (ft)	346.79	327.63	596.88	
Vel Total (ft/s)	12.78	Avg. Vel. (ft/s)		12.82	2.75	
Max Chl Dpth (ft)	13.48	Hydr. Depth (ft)		7.38	1.34	
Conv. Total (cfs)	451664.8	Conv. (cfs)		451300.0	364.8	
Length Wtd. (ft)	268.20	Wetted Per. (ft)		330.12	6.81	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.15	0.39	
Alpha	1.01	Stream Power (lb/ft s)		27.59	1.08	
Frctn Loss (ft)	1.56	Cum Volume (acre-ft)	12.17	176.51	62.34	
C & E Loss (ft)	0.02	Cum SA (acres)	9.77	24.59	31.82	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2781.60	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.17	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2779.44	Reach Len. (ft)	294.95	268.22	230.48	
Crit W.S. (ft)	2777.92	Flow Area (sq ft)		2073.47	1.98	
E.G. Slope (ft/ft)	0.004906	Area (sq ft)	30.14	2073.47	781.98	

* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24487.99	*	2.01 *
* Top Width (ft)	* 903.76	* Top Width (ft)	*	137.95	* 327.63	*	438.18 *
* Vel Total (ft/s)	* 11.80	* Avg. Vel. (ft/s)	*		* 11.81	*	1.01 *
* Max Chl Dpth (ft)	* 12.44	* Hydr. Depth (ft)	*		* 6.33	*	0.29 *
* Conv. Total (cfs)	*349644.7	* Conv. (cfs)	*		*349616.0	*	28.7 *
* Length Wtd. (ft)	* 268.22	* Wetted Per. (ft)	*		* 330.12	*	6.81 *
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 1.92	*	0.09 *
Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 22.72	*	0.09 *
Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	*	7.05	* 152.57	*	38.67 *
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	*	6.86	* 23.26	*	26.89 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2784.13	* Element	*	Left OB	* Channel	*	Right OB *
* Vel Head (ft)	* 4.72	* Wt. n-Val.	*		* 0.030	*	0.045 *
* W.S. Elev (ft)	* 2779.41	* Reach Len. (ft)	*	294.95	* 268.22	*	230.48 *
* Crit W.S. (ft)	* 2780.35	* Flow Area (sq ft)	*		* 2063.55	*	1.77 *
* E.G. Slope (ft/ft)	*0.010772	* Area (sq ft)	*	26.11	* 2063.55	*	768.74 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*35997.52	*	2.48 *
* Top Width (ft)	* 892.30	* Top Width (ft)	*	128.39	* 327.63	*	436.28 *
* Vel Total (ft/s)	* 17.43	* Avg. Vel. (ft/s)	*		* 17.44	*	1.40 *
* Max Chl Dpth (ft)	* 12.41	* Hydr. Depth (ft)	*		* 6.30	*	0.26 *
* Conv. Total (cfs)	*346857.0	* Conv. (cfs)	*		*346833.1	*	23.9 *
* Length Wtd. (ft)	* 268.20	* Wetted Per. (ft)	*		* 330.12	*	6.81 *
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 4.20	*	0.18 *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 73.33	*	0.24 *
* Frctn Loss (ft)	* 2.21	* Cum Volume (acre-ft)	*	17.11	* 193.81	*	86.30 *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	13.16	* 24.97	*	34.53 *

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 210

PUT
scription:
tation Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-614.23	2787.75	-596.1	2786.75	-542.4	2785.75	-516.9	2784.75	-424.44	2783.75
-412.49	2782.75	-394.83	2781.75	-379.82	2780.75	-371.56	2781	-360.26	2780
-302.66	2779	-125.77	2778	-116.44	2778	0	2779	83.98	2779
120.42	2778	175.57	2777	179.48	2776	183.19	2775	186.89	2774
190.59	2773	194.29	2772	198	2771	201.7	2770	205.4	2769
209.11	2768	212.81	2767	216.2	2766	262.35	2766	287.31	2767
299.68	2767.58	308.47	2768	316.57	2769	356.57	2770	363.17	2771
371.31	2772	379.21	2773	387.12	2774	393.96	2775	400.77	2776
419.08	2777	420.22	2777.02	492.78	2778	516.88	2779	542.96	2779
542.97	2779	551.39	2778	559.71	2777	623.32	2776	653.95	2775
677.99	2775	689.88	2776	701.76	2777	713.64	2778	846.55	2778
880.52	2777	931.83	2776	949.52	2775	978.42	2775	1020.01	2776
1023.25	2777	1026.61	2778	1029.97	2779	1033.37	2780	1041.03	2781
1066.33	2782	1122.14	2782						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-614.23	.045	83.98	.03	516.88	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
83.98	516.88	283.6	269.08	254.74	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-614.23	83.98	2783	F
516.88	1122.14	2783	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2781.45	* Element	*	Left OB	* Channel	*	Right OB *
* Vel Head (ft)	* 2.79	* Wt. n-Val.	*		* 0.030	*	*
* W.S. Elev (ft)	* 2778.66	* Reach Len. (ft)	*	283.60	* 269.08	*	254.74 *
* Crit W.S. (ft)	* 2778.66	* Flow Area (sq ft)	*		* 2313.85	*	*
* E.G. Slope (ft/ft)	*0.007383	* Area (sq ft)	*	69.68	* 2313.85	*	952.49 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*		*31000.00	*	*
* Top Width (ft)	* 1097.58	* Top Width (ft)	*	202.40	* 412.21	*	482.97 *
* Vel Total (ft/s)	* 13.40	* Avg. Vel. (ft/s)	*		* 13.40	*	*
* Max Chl Dpth (ft)	* 12.66	* Hydr. Depth (ft)	*		* 5.61	*	*
* Conv. Total (cfs)	*360784.2	* Conv. (cfs)	*		*360784.2	*	*
* Length Wtd. (ft)	* 268.92	* Wetted Per. (ft)	*		* 414.26	*	*
Min Ch El (ft)	* 2766.00	* Shear (lb/sq ft)	*		* 2.57	*	*
Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 34.49	*	*
Frctn Loss (ft)	* 1.53	* Cum Volume (acre-ft)	*	10.86	* 161.94	*	56.31 *
* C & E Loss (ft)	* 0.31	* Cum SA (acres)	*	7.91	* 22.31	*	28.97 *

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

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2780.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.19	Wt. n-Val.		0.030	
W.S. Elev (ft)	2776.84	Reach Len. (ft)	283.60	269.08	254.74
Crit W.S. (ft)	2776.53	Flow Area (sq ft)		1708.58	
E.G. Slope (ft/ft)	0.006179	Area (sq ft)		1708.58	279.01
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	503.53	Top Width (ft)		239.90	263.64
Vel Total (ft/s)	14.33	Avg. Vel. (ft/s)		14.33	
Max Chl Dpth (ft)	10.84	Hydr. Depth (ft)		7.12	
Conv. Total (cfs)	311544.8	Conv. (cfs)		311544.8	
Length Wtd. (ft)	269.02	Wetted Per. (ft)		241.89	
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72	
Alpha	1.00	Stream Power (lb/ft s)		39.06	
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	6.95	140.93	35.86
C & E Loss (ft)	0.23	Cum SA (acres)	6.40	21.51	25.03

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2782.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.01	Wt. n-Val.		0.030	
W.S. Elev (ft)	2779.29	Reach Len. (ft)	283.60	269.08	254.74
Crit W.S. (ft)	2779.29	Flow Area (sq ft)		2585.10	
E.G. Slope (ft/ft)	0.007343	Area (sq ft)	271.74	2585.10	1268.72
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1350.50	Top Width (ft)	403.52	432.90	514.09
Vel Total (ft/s)	13.93	Avg. Vel. (ft/s)		13.93	
Max Chl Dpth (ft)	13.29	Hydr. Depth (ft)		5.97	
Conv. Total (cfs)	420112.1	Conv. (cfs)		420112.1	
Length Wtd. (ft)	268.78	Wetted Per. (ft)		434.97	
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72	
Alpha	1.00	Stream Power (lb/ft s)		37.94	
Frctn Loss (ft)	1.51	Cum Volume (acre-ft)	16.10	179.50	80.91
C & E Loss (ft)	0.36	Cum SA (acres)	11.36	22.63	32.02

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 205

INPUT
Description:
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2779.75	17.21	2778.75	28.7	2777.75	66.51	2776.75	94.56	2776.75
100.85	2776.75	468.23	2777	600.71	2777	670.1	2776	673.71	2775
677.6	2774	681.95	2773	686.31	2772	690.66	2771	695.01	2770
699.36	2769	703.71	2768	708.06	2767	712.41	2766	716.76	2765
780.93	2765	805.65	2766	827.39	2767	839.98	2768	855.27	2769
866.08	2770	876.89	2771	884.28	2772	887.51	2773	890.74	2774
893.96	2775	894.82	2775	897.09	2774	899.36	2773	907.15	2773
937.24	2774	983.75	2775	1019.24	2776	1175.04	2776	1314.05	2775
1444.32	2775	1447.57	2776	1450.85	2777	1454.14	2778	1457.58	2779
1460.79	2780	1572.29	2780	1594.22	2779	1655.34	2779	1675.82	2780
1723.5	2781	1758.89	2782	1762.13	2782	1876.53	2781	1913.81	2781
1931.12	2782	1958.13	2783	2003.69	2783	2099.98	2783	2221.07	2784
2374.26	2785	2425.16	2785	2552.13	2785				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	600.71	.03	1019.24	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
600.71 1019.24 280.12 286.64 293.88 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2779.34	Element	Left OB	Channel	Right OB

* Vel Head (ft)	* 3.12	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.22	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.30	* Flow Area (sq ft)	*	* 2116.44	* 294.44	*
* E.G. Slope (ft/ft)	*0.008080	* Area (sq ft)	*	* 2116.44	* 294.44	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30320.23	* 679.77	*
* Top Width (ft)	* 793.24	* Top Width (ft)	*	* 364.20	* 429.04	*
* Vel Total (ft/s)	* 12.86	* Avg. Vel. (ft/s)	*	* 14.33	* 2.31	*
Max Chl Dpth (ft)	* 11.22	* Hydr. Depth (ft)	*	* 5.81	* 0.69	*
Conv. Total (cfs)	*344871.9	* Conv. (cfs)	*	*337309.5	* 7562.4	*
* Length Wtd. (ft)	* 287.14	* Wetted Per. (ft)	*	* 366.68	* 429.23	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.91	* 0.35	*
* Alpha	* 1.21	* Stream Power (lb/ft s)	*	* 41.71	* 0.80	*
* Frctn Loss (ft)	* 2.08	* Cum Volume (acre-ft)	* 10.63	* 148.26	* 52.67	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 7.26	* 19.91	* 26.30	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2778.12	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.43	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2775.69	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2775.69	* Flow Area (sq ft)	*	* 1931.75	* 123.12	*
* E.G. Slope (ft/ft)	*0.006333	* Area (sq ft)	*	* 1931.75	* 123.12	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24275.54	* 214.46	*
* Top Width (ft)	* 564.95	* Top Width (ft)	*	* 336.91	* 228.04	*
* Vel Total (ft/s)	* 11.92	* Avg. Vel. (ft/s)	*	* 12.57	* 1.74	*
* Max Chl Dpth (ft)	* 10.69	* Hydr. Depth (ft)	*	* 5.73	* 0.54	*
* Conv. Total (cfs)	*307743.6	* Conv. (cfs)	*	*305048.6	* 2695.0	*
* Length Wtd. (ft)	* 286.88	* Wetted Per. (ft)	*	* 339.34	* 228.14	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.25	* 0.21	*
* Alpha	* 1.10	* Stream Power (lb/ft s)	*	* 28.28	* 0.37	*
* Frctn Loss (ft)	* 1.49	* Cum Volume (acre-ft)	* 6.95	* 129.69	* 34.68	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 6.40	* 19.73	* 23.59	*

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: 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 #PF 3

E.G. Elev (ft)	* 2780.06	* Element	* Left OB	* Channel	* Right OB	*
Vel Head (ft)	* 3.45	* Wt. n-Val.	*	* 0.030	* 0.045	*
W.S. Elev (ft)	* 2776.61	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.75	* Flow Area (sq ft)	*	* 2263.62	* 461.87	*
* E.G. Slope (ft/ft)	*0.009177	* Area (sq ft)	*	* 2263.62	* 461.87	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*34469.06	* 1530.94	*
* Top Width (ft)	* 821.56	* Top Width (ft)	*	* 391.24	* 430.32	*
* Vel Total (ft/s)	* 13.21	* Avg. Vel. (ft/s)	*	* 15.23	* 3.31	*
* Max Chl Dpth (ft)	* 11.61	* Hydr. Depth (ft)	*	* 5.79	* 1.07	*
* Conv. Total (cfs)	*375805.2	* Conv. (cfs)	*	*359823.7	* 15981.5	*
* Length Wtd. (ft)	* 287.82	* Wetted Per. (ft)	*	* 393.72	* 430.56	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 3.29	* 0.61	*
* Alpha	* 1.28	* Stream Power (lb/ft s)	*	* 50.16	* 2.04	*
* Frctn Loss (ft)	* 2.20	* Cum Volume (acre-ft)	* 15.22	* 164.52	* 75.85	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 10.05	* 20.08	* 29.26	*

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.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 200

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2780	57.36	2780	60.61	2779	63.64	2778	66.72	2777
82.64	2776	133.38	2775	157.32	2774	160.71	2773	164.05	2772
167.4	2771	170.76	2770	174.13	2769	177.5	2768	180.93	2767
196.35	2766	210.46	2765	223.84	2764	238.32	2763	259.65	2763
259.7	2763	274.72	2764	330.68	2765	338.84	2766	343.67	2767
348.5	2768	354.06	2769	359.85	2770	365.64	2771	371.43	2772
377.22	2773	380.61	2773	529.52	2773	534.88	2772	540.16	2771
545.4	2770	561.87	2770	628.9	2771	670.42	2772	691.36	2773
726.72	2773	751.79	2773	852.22	2774	1033.68	2775	1050.22	2775
1183.08	2776	1186.05	2777	1189.02	2778	1191.99	2779	1246.04	2779
1253.82	2778	1267.34	2778	1270.81	2779	1388.57	2780	1424.17	2780
1424.18	2780	1474.73	2780	1528.93	2781	1568.19	2781	1595.98	2781
1670.08	2782	1757.29	2783						

ning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	157.32	.03	380.61	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
157.32	380.61	179.8	195.07	210.23	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2777.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.87	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2774.60	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2774.99	Flow Area (sq ft)	4.36	1897.21	1052.36
E.G. Slope (ft/ft)	0.004947	Area (sq ft)	4.36	1897.21	1052.36
Q Total (cfs)	31000.00	Flow (cfs)	4.55	27365.53	3629.92
Top Width (ft)	818.81	Top Width (ft)	14.44	223.29	581.08
Vel Total (ft/s)	10.49	Avg. Vel. (ft/s)	1.04	14.42	3.45
Max Chl Dpth (ft)	11.60	Hydr. Depth (ft)	0.30	8.50	1.81
Conv. Total (cfs)	440756.3	Conv. (cfs)	64.7	389081.7	51610.0
Length Wtd. (ft)	197.55	Wetted Per. (ft)	14.45	225.19	581.41
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.09	2.60	0.56
Alpha	1.68	Stream Power (lb/ft s)	0.10	37.53	1.93
Frctn Loss (ft)	1.79	Cum Volume (acre-ft)	10.61	135.05	48.12
C & E Loss (ft)	0.07	Cum SA (acres)	7.21	17.98	22.89

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 #PF 2

E.G. Elev (ft)	2776.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2773.47	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2773.95	Flow Area (sq ft)		1643.45	496.72
E.G. Slope (ft/ft)	0.005630	Area (sq ft)		1643.45	496.72
Q Total (cfs)	24490.00	Flow (cfs)		23109.66	1380.34
Top Width (ft)	639.31	Top Width (ft)		221.48	417.84
Vel Total (ft/s)	11.44	Avg. Vel. (ft/s)		14.06	2.78
Max Chl Dpth (ft)	10.46	Hydr. Depth (ft)		7.42	1.19
Conv. Total (cfs)	326395.8	Conv. (cfs)		307999.0	18396.8
Length Wtd. (ft)	196.56	Wetted Per. (ft)		223.29	418.17
Min Ch El (ft)	2763.00	Shear (lb/sq ft)		2.59	0.42
Alpha	1.43	Stream Power (lb/ft s)		36.37	1.16
Frctn Loss (ft)	1.71	Cum Volume (acre-ft)	6.95	117.92	32.59
C & E Loss (ft)	0.05	Cum SA (acres)	6.40	17.89	21.41

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2778.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2776.84	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2775.91	Flow Area (sq ft)	129.70	2396.84	2708.99
E.G. Slope (ft/ft)	0.002126	Area (sq ft)	129.70	2396.84	2708.99
Q Total (cfs)	36000.00	Flow (cfs)	255.50	26485.92	9258.58
Top Width (ft)	1116.32	Top Width (ft)	88.07	223.29	804.97
Vel Total (ft/s)	6.88	Avg. Vel. (ft/s)	1.97	11.05	3.42
Max Chl Dpth (ft)	13.84	Hydr. Depth (ft)	1.47	10.73	3.37
Conv. Total (cfs)	780785.1	Conv. (cfs)	5541.4	574439.2	200804.4
Length Wtd. (ft)	198.68	Wetted Per. (ft)	88.12	225.19	805.44
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.20	1.41	0.45
Alpha	1.96	Stream Power (lb/ft s)	0.38	15.61	1.53
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	14.80	149.19	65.16
C & E Loss (ft)	0.19	Cum SA (acres)	9.76	18.06	25.09

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 195

INPUT
Description:
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
26.87	2778.75	80.18	2778.75	91.81	2777.75	102.18	2776.75	109.95	2775.75
196.7	2774	238.41	2773	243.26	2772	248.12	2771	252.97	2770
267.11	2769	278.26	2768	282.3	2767	286.64	2766	294.54	2765
315.54	2764	336.81	2763	362.46	2762	375.59	2762	395.84	2763
410.49	2764	456.09	2765	471.11	2766	476.14	2767	481.17	2768
488.94	2768	495.94	2767	498.12	2767	504.07	2768	509.82	2769
514.48	2770	532.03	2770	544.86	2770	571.92	2770	575.9	2769
579.84	2768	583.78	2767	597.25	2767	608.28	2768	619.31	2769
630.34	2770	641.37	2771	679.44	2772	894.51	2772	904.56	2771
913.16	2770	918.98	2770	922.78	2771	926.49	2772	930.19	2773
933.9	2774	939.14	2774	962.74	2773	967.03	2773	999.74	2774
1400	2780								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
26.87	.045	238.41	.03	514.48	.045

ık Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
238.41 514.48 215.83 225.58 311.98 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2776.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.00	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2775.47	Reach Len. (ft)	215.83	225.58	311.98

* Crit W.S. (ft)	* 2773.18	* Flow Area (sq ft)	* 135.84	* 2785.41	* 2062.05 *
* E.G. Slope (ft/ft)	*0.001484	* Area (sq ft)	* 135.84	* 2785.41	* 2062.05 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	* 193.44	*24729.52	* 6077.04 *
* Top Width (ft)	* 974.08	* Top Width (ft)	* 114.63	* 276.07	* 583.39 *
* Vel Total (ft/s)	* 6.22	* Avg. Vel. (ft/s)	* 1.42	* 8.88	* 2.95 *
* Max Chl Dpth (ft)	* 13.47	* Hydr. Depth (ft)	* 1.19	* 10.09	* 3.53 *
* Conv. Total (cfs)	*804808.9	* Conv. (cfs)	* 5022.1	*642017.4	*157769.4 *
Length Wtd. (ft)	* 234.02	* Wetted Per. (ft)	* 114.65	* 277.47	* 584.64 *
Min Ch El (ft)	* 2762.00	* Shear (lb/sq ft)	* 0.11	* 0.93	* 0.33 *
* Alpha	* 1.67	* Stream Power (lb/ft s)	* 0.16	* 8.26	* 0.96 *
* Frctn Loss (ft)	* 0.22	* Cum Volume (acre-ft)	* 10.32	* 124.57	* 40.61 *
* C & E Loss (ft)	* 0.14	* Cum SA (acres)	* 6.94	* 16.86	* 20.08 *

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.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2774.68	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.37	* Wt. n-Val.	* 0.045	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2773.31	* Reach Len. (ft)	* 215.83	* 225.58	* 311.98 *
* Crit W.S. (ft)	* 2771.52	* Flow Area (sq ft)	* 2.04	* 2189.66	* 960.47 *
* E.G. Slope (ft/ft)	*0.002552	* Area (sq ft)	* 2.04	* 2189.66	* 960.47 *
* Q Total (cfs)	*24490.00	* Flow (cfs)	* 0.99	*21716.72	* 2772.29 *
* Top Width (ft)	* 727.91	* Top Width (ft)	* 13.05	* 276.07	* 438.79 *
* Vel Total (ft/s)	* 7.77	* Avg. Vel. (ft/s)	* 0.48	* 9.92	* 2.89 *
* Max Chl Dpth (ft)	* 11.31	* Hydr. Depth (ft)	* 0.16	* 7.93	* 2.19 *
* Conv. Total (cfs)	*484791.1	* Conv. (cfs)	* 19.6	*429892.8	* 54878.7 *
* Length Wtd. (ft)	* 230.47	* Wetted Per. (ft)	* 13.06	* 277.47	* 439.91 *
* Min Ch El (ft)	* 2762.00	* Shear (lb/sq ft)	* 0.02	* 1.26	* 0.35 *
* Alpha	* 1.46	* Stream Power (lb/ft s)	* 0.01	* 12.47	* 1.00 *
* Frctn Loss (ft)	* 0.31	* Cum Volume (acre-ft)	* 6.94	* 109.34	* 29.08 *
* C & E Loss (ft)	* 0.25	* Cum SA (acres)	* 6.37	* 16.78	* 19.35 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2777.80	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.82	* Wt. n-Val.	* 0.045	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2776.98	* Reach Len. (ft)	* 215.83	* 225.58	* 311.98 *
* Crit W.S. (ft)	* 2773.66	* Flow Area (sq ft)	* 333.97	* 3202.55	* 3019.69 *
* E.G. Slope (ft/ft)	*0.001075	* Area (sq ft)	* 333.97	* 3202.55	* 3019.69 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	* 649.49	*26564.15	* 8786.36 *
* Top Width (ft)	* 1098.89	* Top Width (ft)	* 138.64	* 276.07	* 684.18 *
* Vel Total (ft/s)	* 5.49	* Avg. Vel. (ft/s)	* 1.94	* 8.29	* 2.91 *
* Max Chl Dpth (ft)	* 14.98	* Hydr. Depth (ft)	* 2.41	* 11.60	* 4.41 *
* Conv. Total (cfs)	*1097904.0	* Conv. (cfs)	* 19807.8	*810135.8	*267960.5 *
* Length Wtd. (ft)	* 236.08	* Wetted Per. (ft)	* 138.74	* 277.47	* 685.45 *
* Min Ch El (ft)	* 2762.00	* Shear (lb/sq ft)	* 0.16	* 0.77	* 0.30 *
* Alpha	* 1.75	* Stream Power (lb/ft s)	* 0.31	* 6.43	* 0.86 *
* Frctn Loss (ft)	* 0.18	* Cum Volume (acre-ft)	* 13.84	* 136.65	* 51.33 *
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 9.30	* 16.94	* 21.50 *

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 190

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-99.71	2778	85.29	2776.24	86.48	2775.75	90.2	2774.75	93.57	2773.75
96.92	2772.75	100.08	2771.75	102.72	2770.75	105.24	2769.76	105.24	2769.75
107.77	2768.75	110.47	2768.2	124.39	2767.75	204.15	2766.75	210.65	2766.39
214.06	2765.75	219.98	2764.75	224.93	2763.09	252.41	2763.52	259.56	2764.25
288.16	2763.13	292.48	2761.87	301.29	2761.46	303.05	2760.65	305.84	2761.23
314.29	2763	332	2762	335.19	2761	387.24	2760.49	390.36	2761
390.36	2761.01	392.23	2764.51	402.23	2762	413.83	2763	425.43	2764
429.38	2764.26	440.47	2765	486.39	2766	526.25	2767	551.56	2768
588.96	2768.96	589.86	2769	593.28	2770	594.72	2769.73	596.66	2771
600.08	2772	603.53	2773	608.4	2774	612.53	2775	616.08	2776
632.62	2776	1014.62	2780						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-99.71	.045	85.29	.03	616.08	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
85.29	616.08	77.8	72.37	83.03	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2776.11	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.54	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2775.57	* Reach Len. (ft)	* 77.80	* 72.37	* 83.03 *
* Crit W.S. (ft)	* 2770.00	* Flow Area (sq ft)	*	* 5260.27	* *
* E.G. Slope (ft/ft)	*0.000670	* Area (sq ft)	*	* 5260.27	* *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*31000.00	* *
* Top Width (ft)	* 527.41	* Top Width (ft)	*	* 527.41	* *
* Vel Total (ft/s)	* 5.89	* Avg. Vel. (ft/s)	*	* 5.89	* *
* Max Chl Dpth (ft)	* 15.08	* Hydr. Depth (ft)	*	* 9.97	* *

* Conv. Total (cfs)	*1197790.0	* Conv. (cfs)	*	*1197790.0	*		*
* Length Wtd. (ft)	* 72.37	* Wetted Per. (ft)	*	* 533.65	*		*
* Min Ch El (ft)	* 2760.49	* Shear (lb/sq ft)	*	* 0.41	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.43	*		*
* Frctn Loss (ft)	* 0.06	* Cum Volume (acre-ft)	*	9.99	*	103.74	* 33.22 *
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	*	6.66	*	14.78	* 17.99 *

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2774.12	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.52	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2773.60	* Reach Len. (ft)	* 77.80	* 72.37	* 83.03	*
* Crit W.S. (ft)	* 2769.25	* Flow Area (sq ft)	*	* 4232.78	*	*
* E.G. Slope (ft/ft)	*0.000829	* Area (sq ft)	*	* 4232.78	*	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24490.00	*	*
* Top Width (ft)	* 512.34	* Top Width (ft)	*	* 512.34	*	*
* Vel Total (ft/s)	* 5.79	* Avg. Vel. (ft/s)	*	* 5.79	*	*
* Max Chl Dpth (ft)	* 13.11	* Hydr. Depth (ft)	*	* 8.26	*	*
* Conv. Total (cfs)	*850471.6	* Conv. (cfs)	*	*850471.6	*	*
* Length Wtd. (ft)	* 72.37	* Wetted Per. (ft)	*	* 518.07	*	*
* Min Ch El (ft)	* 2760.49	* Shear (lb/sq ft)	*	* 0.42	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.45	*	*
* Frctn Loss (ft)	* 0.07	* Cum Volume (acre-ft)	* 6.94	* 92.71	* 25.64	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 6.34	* 14.74	* 17.77	*

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2777.54	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.55	* Wt. n-Val.	* 0.045	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.99	* Reach Len. (ft)	* 77.80	* 72.37	* 83.03	*
* Crit W.S. (ft)	* 2770.53	* Flow Area (sq ft)	* 29.24	* 6010.34	* 62.71	*
* E.G. Slope (ft/ft)	*0.000583	* Area (sq ft)	* 29.24	* 6010.34	* 62.71	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	* 12.08	*35953.69	* 34.23	*
* Top Width (ft)	* 719.88	* Top Width (ft)	* 78.40	* 530.79	* 110.69	*
* Vel Total (ft/s)	* 5.90	* Avg. Vel. (ft/s)	* 0.41	* 5.98	* 0.55	*
* Max Chl Dpth (ft)	* 16.50	* Hydr. Depth (ft)	* 0.37	* 11.32	* 0.57	*
* Conv. Total (cfs)	*1491078.0	* Conv. (cfs)	* 500.2	*1489160.0	* 1417.9	*
* Length Wtd. (ft)	* 72.38	* Wetted Per. (ft)	* 78.40	* 537.21	* 110.69	*
* Min Ch El (ft)	* 2760.49	* Shear (lb/sq ft)	* 0.01	* 0.41	* 0.02	*
* Alpha	* 1.03	* Stream Power (lb/ft s)	* 0.01	* 2.44	* 0.01	*
* Frctn Loss (ft)	* 0.05	* Cum Volume (acre-ft)	* 12.94	* 112.80	* 40.30	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 8.76	* 14.85	* 18.65	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 180

PUT
scription:
cation Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
15.05	2776.75	32.58	2776.75	48.65	2776.75	49.95	2775.75	51.72	2774.75
53.59	2773.75	55.5	2772.75	57.44	2771.75	59.59	2770.75	62.1	2769.75
64.56	2768.76	64.56	2768.75	67.13	2767.47	67.71	2767.75	72.88	2766.28
97.35	2766.75	119.19	2765.75	133.29	2765.33	136.67	2764.75	143.41	2762.38
166.6	2762.71	170.36	2763.69	207.2	2762.94	207.2	2762.93	210.09	2761.47
227.57	2761.13	247.23	2760.75	264.13	2759.08	318.52	2763	323.83	2759.53
323.83	2759.52	327.41	2764.6	338.72	2764	354.33	2764.52	369.01	2765
401.74	2766	408.05	2765.89	412.18	2767	414.21	2768	416.27	2769
417.18	2767.25	417.18	2767.26	418.65	2770	421.02	2771	423.39	2772
425.77	2773	428.14	2774	430.51	2775	431.09	2776.49	433.02	2776
461.43	2776	761.43	2780						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
15.05	.045	48.65	.03	433.02	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.65	433.02	44.45	181.54	256.85	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2776.02	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.85	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2775.17	* Reach Len. (ft)	* 44.45	* 181.54	* 256.85	*
* Crit W.S. (ft)	* 2769.77	* Flow Area (sq ft)	*	* 4180.06	*	*
* E.G. Slope (ft/ft)	*0.000952	* Area (sq ft)	*	* 4180.06	*	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*31000.00	*	*
* Top Width (ft)	* 379.59	* Top Width (ft)	*	* 379.59	*	*
* Vel Total (ft/s)	* 7.42	* Avg. Vel. (ft/s)	*	* 7.42	*	*
* Max Chl Dpth (ft)	* 16.09	* Hydr. Depth (ft)	*	* 11.01	*	*
* Conv. Total (cfs)	*1004737.0	* Conv. (cfs)	*	*1004737.0	*	*
* Length Wtd. (ft)	* 181.54	* Wetted Per. (ft)	*	* 391.01	*	*
* Min Ch El (ft)	* 2759.08	* Shear (lb/sq ft)	*	* 0.64	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 4.71	*	*
* Frctn Loss (ft)	* 0.29	* Cum Volume (acre-ft)	* 9.99	* 95.89	* 33.22	*
* C & E Loss (ft)	* 0.12	* Cum SA (acres)	* 6.66	* 14.02	* 17.99	*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
ning: The conveyance ratio (upstream 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 #PF 2

* E.G. Elev (ft)	* 2774.02	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.78	* Wt. n-Val.	*	* 0.030	*

```
* W.S. Elev (ft)          * 2773.24  * Reach Len. (ft)         *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)          * 2768.85  * Flow Area (sq ft)       *          * 3455.69  *          *
* E.G. Slope (ft/ft)      *0.001087  * Area (sq ft)            *          * 3455.69  *          *
* Q Total (cfs)           *24490.00  * Flow (cfs)              *          *24490.00  *          *
* Top Width (ft)          *  371.77  * Top Width (ft)          *          *  371.77  *          *
* Vel Total (ft/s)        *    7.09  * Avg. Vel. (ft/s)        *          *    7.09  *          *
* Max Chl Dpth (ft)       *   14.16  * Hydr. Depth (ft)        *          *    9.30  *          *
  Conv. Total (cfs)       *742810.8  * Conv. (cfs)             *          *742810.8  *          *
  Length Wtd. (ft)        *  181.54  * Wetted Per. (ft)        *          *  382.24  *          *
* Min Ch El (ft)          * 2759.08  * Shear (lb/sq ft)        *          *    0.61  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *          *    4.35  *          *
* Frctn Loss (ft)         *    0.33  * Cum Volume (acre-ft)    *    6.94  *   86.32  *   25.64  *
* C & E Loss (ft)         *    0.11  * Cum SA (acres)          *    6.34  *   14.00  *   17.77  *
*****************************************************************************************************

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 conveyance ratio (upstream 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 #PF 3
*****************************************************************************************************
* E.G. Elev (ft)          * 2777.45  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.91  * Wt. n-Val.             *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2776.55  * Reach Len. (ft)        *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)          * 2770.43  * Flow Area (sq ft)      *          * 4706.06  *   26.70  *
* E.G. Slope (ft/ft)      *0.000882  * Area (sq ft)           *          * 4706.06  *   26.70  *
* Q Total (cfs)           *36000.00  * Flow (cfs)             *          *35986.15  *   13.85  *
* Top Width (ft)          *  453.48  * Top Width (ft)         *          *  384.11  *   69.37  *
* Vel Total (ft/s)        *    7.61  * Avg. Vel. (ft/s)       *          *    7.65  *    0.52  *
* Max Chl Dpth (ft)       *   17.47  * Hydr. Depth (ft)       *          *   12.25  *    0.38  *
* Conv. Total (cfs)       *1212478.0  * Conv. (cfs)            *          *1212011.0  *   466.5  *
* Length Wtd. (ft)        *  181.56  * Wetted Per. (ft)       *          *  396.91  *   69.37  *
* Min Ch El (ft)          * 2759.08  * Shear (lb/sq ft)       *          *    0.65  *    0.02  *
* Alpha                   *    1.01  * Stream Power (lb/ft s)  *          *    4.99  *    0.01  *
* Frctn Loss (ft)         *    0.28  * Cum Volume (acre-ft)    *   12.92  *  103.90  *   40.21  *
* C & E Loss (ft)         *    0.13  * Cum SA (acres)          *    8.69  *   14.09  *   18.48  *
*****************************************************************************************************

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: River #1
REACH: Reach #1            RS: 170

INPUT
Description:
  ation Elevation Data     num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
 ***********************************************************************************
       0 2776.75  10.041 2776.75  11.208 2776.56  13.039 2775.75  14.984 2774.75
  17.041 2773.75  19.445 2772.75  21.468 2771.75  23.419 2770.75  25.484 2769.75
  27.471 2768.75  29.409 2767.75  30.901 2767.12  31.424 2766.75  33.545 2765.75
  38.947 2765.75  39.428 2765.75  41.868 2765.12  60.352 2766.13  65.082 2765.97
  66.072 2764.75   69.89 2764.75  71.743 2764.93  72.768 2764.75  85.567 2761.65
 101.392 2761.27 114.672 2763.12 137.165 2763.34 145.296 2760.76  193.16  2760.8
 199.171 2758.99 240.331 2758.49 254.092 2762.23 263.715 2762.13 265.413 2763.75
 266.813 2764.75 268.199 2765.75 269.584 2766.75 270.801 2767.75 271.974 2768.75
 273.155 2769.75 274.336 2770.75 275.524 2771.75 276.705 2772.75 282.843    2777

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
 ***********************************************
       0    .045  10.041     .03 276.705    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        10.041 276.705            130.15  130.15  130.15          .1        .3
Blocked Obstructions      num=       3
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
 ***********************************************************************
      85      89    2780     147     151    2780     209     213    2780
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************************
* E.G. Elev (ft)          * 2775.61  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    2.06  * Wt. n-Val.             *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2773.55  * Reach Len. (ft)        *  130.15  *  130.15  *  130.15  *
* Crit W.S. (ft)          * 2770.35  * Flow Area (sq ft)      *          * 2690.82  *    0.46  *
* E.G. Slope (ft/ft)      *0.003348  * Area (sq ft)           *          * 2690.82  *    0.46  *
* Q Total (cfs)           *31000.00  * Flow (cfs)             *          *30999.59  *    0.41  *
* Top Width (ft)          *  248.32  * Top Width (ft)         *          *  247.17  *    1.15  *
* Vel Total (ft/s)        *   11.52  * Avg. Vel. (ft/s)       *          *   11.52  *    0.91  *
* Max Chl Dpth (ft)       *   15.05  * Hydr. Depth (ft)       *          *   10.89  *    0.40  *
* Conv. Total (cfs)       *535776.1  * Conv. (cfs)            *          *535769.0  *     7.1  *
* Length Wtd. (ft)        *  130.15  * Wetted Per. (ft)       *          *  333.85  *    1.40  *
* Min Ch El (ft)          * 2758.49  * Shear (lb/sq ft)       *          *    1.68  *    0.07  *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *          *   19.41  *    0.06  *
* Frctn Loss (ft)         *    0.52  * Cum Volume (acre-ft)    *    9.99  *   81.58  *   33.22  *
* C & E Loss (ft)         *    0.11  * Cum SA (acres)          *    6.66  *   12.72  *   17.99  *
*****************************************************************************************************

  rning: Divided flow computed for this cross-section.
  rning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************************
* E.G. Elev (ft)          * 2773.59  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.84  * Wt. n-Val.             *          *   0.030  *          *
```

W.S. Elev (ft)	2771.75	Reach Len. (ft)	130.15	130.15	130.15	
Crit W.S. (ft)	2769.11	Flow Area (sq ft)		2251.21		
E.G. Slope (ft/ft)	0.003537	Area (sq ft)		2251.21		
Q Total (cfs)	24490.00	Flow (cfs)		24490.00		
Top Width (ft)	242.05	Top Width (ft)		242.05		
Vel Total (ft/s)	10.88	Avg. Vel. (ft/s)		10.88		
Max Chl Dpth (ft)	13.26	Hydr. Depth (ft)		9.30		
Conv. Total (cfs)	411790.7	Conv. (cfs)		411790.7		
Length Wtd. (ft)	130.15	Wetted Per. (ft)		317.20		
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.57		
Alpha	1.00	Stream Power (lb/ft s)		17.05		
Frctn Loss (ft)	0.51	Cum Volume (acre-ft)	6.94	74.43	25.64	
C & E Loss (ft)	0.07	Cum SA (acres)	6.34	12.72	17.77	

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.

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	2777.05	Element			
Vel Head (ft)	2.22	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2774.82	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2771.24	Flow Area (sq ft)		3008.37	3.10
E.G. Slope (ft/ft)	0.003245	Area (sq ft)		3008.37	3.10
Q Total (cfs)	36000.00	Flow (cfs)		35994.76	5.24
Top Width (ft)	252.85	Top Width (ft)		249.86	2.99
Vel Total (ft/s)	11.95	Avg. Vel. (ft/s)		11.96	1.69
Max Chl Dpth (ft)	16.33	Hydr. Depth (ft)		12.04	1.04
Conv. Total (cfs)	631968.9	Conv. (cfs)		631876.9	92.0
Length Wtd. (ft)	130.15	Wetted Per. (ft)		344.50	3.64
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.77	0.17
Alpha	1.00	Stream Power (lb/ft s)		21.17	0.29
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	12.92	87.82	40.12
C & E Loss (ft)	0.14	Cum SA (acres)	8.69	12.77	18.26

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.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 160

INPUT
Description:
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2775.75	5.607	2775.75	12.07	2775.75	19.049	2775.75	29.317	2775.75
71.828	2774.75	85.786	2773.75	89.067	2773.75	103.188	2774.75	115.831	2774.75
128.085	2774.75	176.975	2775.75	196.024	2776.75	201.271	2777.75	222.357	2778.36
223.106	2777.75	224.726	2776.75	226.578	2775.75	228.113	2774.48	228.466	2774.75
231.408	2773.75	239.405	2772.75	244.73	2772.63	245.868	2771.75	247.233	2770.75
248.605	2769.75	250.054	2768.75	251.681	2767.76	251.681	2767.75	253.342	2766.75
254.813	2765.75	256.164	2764.75	257.132	2763.88	262.209	2762.7	273.085	2760.84
297.19	2760.63	301.164	2761.77	319.273	2761.94	326.146	2760.17	341.547	2760.01
354.324	2759.87	381.194	2760.68	389.17	2757.67	435.231	2758.17	436.985	2762.55
442.317	2762.86	444.608	2763.75	445.477	2764.44	445.88	2764.75	447.146	2765.75
448.419	2766.75	449.692	2767.75	450.979	2768.75	452.237	2769.75	453.482	2770.75
453.482	2770.76	454.74	2771.75	455.985	2772.75	457.201	2773.75	457.201	2773.76
458.12	2775.1	458.403	2774.75	466.584	2774.75	469.887	2774.75	478.704	2775.75
485.853	2776.75	713.195	2776.75	716.745	2776.75	720.132	2776.75	792.165	2775.75
803.98	2775.75	814.743	2775.75	830.143	2774.75	840.806	2774.75	857.466	2775.75
873.256	2775.75	926.755	2774.75	940.777	2773.75	941.237	2773.75	945.579	2773.75
955.669	2773.75	965.18	2773.75	989.002	2773.75	1007.684	2774.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	244.73	.03	458.12	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
244.73	458.12	203.69	188.86	197	.1	.3

Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
250	254	2780	312	316	2780	374	378	2780

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2774.98	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.17	Wt. n-Val.		0.030		
W.S. Elev (ft)	2771.80	Reach Len. (ft)	203.69	188.86	197.00	
Crit W.S. (ft)	2769.83	Flow Area (sq ft)		2168.83		
E.G. Slope (ft/ft)	0.004844	Area (sq ft)		2168.83		
Q Total (cfs)	31000.00	Flow (cfs)		31000.00		
Top Width (ft)	197.01	Top Width (ft)		197.01		
Vel Total (ft/s)	14.29	Avg. Vel. (ft/s)		14.29		
Max Chl Dpth (ft)	14.13	Hydr. Depth (ft)		11.01		
Conv. Total (cfs)	445397.6	Conv. (cfs)		445397.6		
Length Wtd. (ft)	188.86	Wetted Per. (ft)		256.89		
Min Ch El (ft)	2757.67	Shear (lb/sq ft)		2.55		
Alpha	1.00	Stream Power (lb/ft s)		36.49		
Frctn Loss (ft)	1.07	Cum Volume (acre-ft)	9.99	74.32	33.22	
C & E Loss (ft)	0.13	Cum SA (acres)	6.66	12.05	17.99	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2773.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.59	Wt. n-Val.		0.030	
W.S. Elev (ft)	2770.41	Reach Len. (ft)	203.69	188.86	197.00
Crit W.S. (ft)	2768.41	Flow Area (sq ft)		1897.59	
E.G. Slope (ft/ft)	0.004406	Area (sq ft)		1897.59	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	193.37	Top Width (ft)		193.37	
Vel Total (ft/s)	12.91	Avg. Vel. (ft/s)		12.91	
Max Chl Dpth (ft)	12.74	Hydr. Depth (ft)		9.81	
Conv. Total (cfs)	368965.5	Conv. (cfs)		368965.5	
Length Wtd. (ft)	188.86	Wetted Per. (ft)		243.97	
Min Ch El (ft)	2757.67	Shear (lb/sq ft)		2.14	
Alpha	1.00	Stream Power (lb/ft s)		27.61	
Frctn Loss (ft)	1.04	Cum Volume (acre-ft)	6.94	68.23	25.64
C & E Loss (ft)	0.13	Cum SA (acres)	6.34	12.07	17.77

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2776.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.61	Wt. n-Val.	0.045	0.030	
W.S. Elev (ft)	2772.77	Reach Len. (ft)	203.69	188.86	197.00
Crit W.S. (ft)	2770.85	Flow Area (sq ft)	0.44	2361.00	
E.G. Slope (ft/ft)	0.005147	Area (sq ft)	0.44	2361.00	
Q Total (cfs)	36000.00	Flow (cfs)	0.19	35999.81	
Top Width (ft)	204.78	Top Width (ft)	5.50	199.28	
Vel Total (ft/s)	15.24	Avg. Vel. (ft/s)	0.44	15.25	
Max Chl Dpth (ft)	15.10	Hydr. Depth (ft)	0.08	11.85	
Conv. Total (cfs)	501812.0	Conv. (cfs)	2.7	501809.3	
Length Wtd. (ft)	188.86	Wetted Per. (ft)	5.51	265.61	
Min Ch El (ft)	2757.67	Shear (lb/sq ft)	0.03	2.86	
Alpha	1.00	Stream Power (lb/ft s)	0.01	43.55	
Frctn Loss (ft)	1.10	Cum Volume (acre-ft)	12.92	79.80	40.12
C & E Loss (ft)	0.12	Cum SA (acres)	8.68	12.10	18.26

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 150

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.75	27.415	2773.75	42.03	2773.75	59.892	2773.75	62.416	2773.75
64.078	2773.75	160.259	2772.75	185.715	2772.75	194.744	2773.75	204.594	2773.75
210.718	2773.75	222.774	2774.75	228.183	2774.75	257.019	2774.75	267.81	2774.75
273.007	2773.75	274.803	2772.4	275.015	2772.75	287.29	2772.06	287.545	2771.75
289.737	2770.75	290.925	2770.17	291.165	2769.75	292.615	2768.75	292.615	2768.76
293.301	2770.01	294.086	2767.76	294.086	2767.75	295.641	2766.75	298.583	2765.75
300.223	2764.76	300.223	2764.75	301.687	2763.75	304.049	2762.75	306.828	2761.76
307.153	2761.75	310.201	2760.75	315.32	2759.75	327.928	2759.98	331.711	2761.72
339.341	2762.38	348.858	2761.61	352.302	2760.28	375.078	2761.75	377.814	2761.46
391.136	2760.05	397.352	2762.59	404.677	2759.75	421.315	2760.11	427.849	2757.53
458.495	2758.34	483.223	2757.36	487.119	2761.47	490.188	2761.75	490.492	2761.76
490.492	2761.77	490.584	2761.86	491.482	2762.75	491.482	2762.76	492.726	2763.75
492.726	2763.76	493.964	2764.75	495.201	2765.75	496.467	2766.75	497.853	2767.75
499.401	2768.75	500.936	2769.75	500.936	2769.76	502.477	2770.75	504.047	2771.75
504.294	2771.9	518.734	2772.75	520.388	2772.75	520.388	2772.76	520.685	2773.75
522.75	2774.75	525.055	2775.75	528.562	2776.75	529.291	2777.69	531.794	2776.75
533.505	2777.63	573.768	2775.75	592.796	2774.75	608.727	2774.75	636.672	2774.75
663.471	2774.75	788.445	2774.75	833.707	2773.75	855.161	2773.75	857.438	2774.75
928.516	2774.75	939.879	2773.75	942.008	2773.75	951.829	2774.75	952.204	2774.75
986.569	2773.75	998.018	2773.75	1010.809	2773.75	1012.796	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	287.29	.03	504.047	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
287.29	504.047	262.45	206.64	129.8	.1	.3

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.42	Wt. n-Val.		0.030	
W.S. Elev (ft)	2769.35	Reach Len. (ft)	262.45	206.64	129.80
Crit W.S. (ft)	2769.35	Flow Area (sq ft)		1836.44	
E.G. Slope (ft/ft)	0.006782	Area (sq ft)		1836.44	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	207.99	Top Width (ft)		207.99	
Vel Total (ft/s)	16.88	Avg. Vel. (ft/s)		16.88	

* Max Chl Dpth (ft)	* 11.99	* Hydr. Depth (ft)	*		* 8.83	*		*
* Conv. Total (cfs)	*376419.2	* Conv. (cfs)	*		*376419.2	*		*
* Length Wtd. (ft)	* 205.33	* Wetted Per. (ft)	*		* 218.15	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.56	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 60.17	*		*
* Frctn Loss (ft)	* 1.23	* Cum Volume (acre-ft)	*	9.99	* 65.63	*	33.22	*
* C & E Loss (ft)	* 0.37	* Cum SA (acres)	*	6.66	* 11.18	*	17.99	*

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

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2771.83	* Element	*	Left OB	* Channel	*	Right OB	*
* Vel Head (ft)	* 3.84	* Wt. n-Val.	*		* 0.030	*		*
* W.S. Elev (ft)	* 2768.00	* Reach Len. (ft)	*	262.45	* 206.64	*	129.80	*
* Crit W.S. (ft)	* 2768.00	* Flow Area (sq ft)	*		* 1557.52	*		*
* E.G. Slope (ft/ft)	*0.007077	* Area (sq ft)	*		* 1557.52	*		*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24490.00	*		*
* Top Width (ft)	* 204.23	* Top Width (ft)	*		* 204.23	*		*
* Vel Total (ft/s)	* 15.72	* Avg. Vel. (ft/s)	*		* 15.72	*		*
* Max Chl Dpth (ft)	* 10.64	* Hydr. Depth (ft)	*		* 7.63	*		*
* Conv. Total (cfs)	*291109.0	* Conv. (cfs)	*		*291109.0	*		*
* Length Wtd. (ft)	* 206.12	* Wetted Per. (ft)	*		* 212.48	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.24	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 50.93	*		*
* Frctn Loss (ft)	* 1.24	* Cum Volume (acre-ft)	*	6.94	* 60.74	*	25.64	*
* C & E Loss (ft)	* 0.32	* Cum SA (acres)	*	6.34	* 11.21	*	17.77	*

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

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2775.16	* Element	*	Left OB	* Channel	*	Right OB	*
Vel Head (ft)	* 4.85	* Wt. n-Val.	*		* 0.030	*		*
W.S. Elev (ft)	* 2770.31	* Reach Len. (ft)	*	262.45	* 206.64	*	129.80	*
Crit W.S. (ft)	* 2770.31	* Flow Area (sq ft)	*		* 2036.48	*		*
* E.G. Slope (ft/ft)	*0.006667	* Area (sq ft)	*		* 2036.48	*		*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*36000.00	*		*
* Top Width (ft)	* 211.14	* Top Width (ft)	*		* 211.14	*		*
* Vel Total (ft/s)	* 17.68	* Avg. Vel. (ft/s)	*		* 17.68	*		*
* Max Chl Dpth (ft)	* 12.94	* Hydr. Depth (ft)	*		* 9.65	*		*
* Conv. Total (cfs)	*440907.8	* Conv. (cfs)	*		*440907.8	*		*
* Length Wtd. (ft)	* 204.75	* Wetted Per. (ft)	*		* 222.84	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.80	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 67.24	*		*
* Frctn Loss (ft)	* 1.03	* Cum Volume (acre-ft)	*	12.91	* 70.27	*	40.12	*
* C & E Loss (ft)	* 0.64	* Cum SA (acres)	*	8.67	* 11.21	*	18.26	*

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 139

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2769.75	122.83	2768.75	210.08	2768	238.55	2768	250.4	2768
250.9	2768	353.99	2767.75	571.8	2767.75	580.55	2767.87	584.21	2766.75
587.25	2765.75	590.19	2764.75	592.82	2763.75	595.21	2762.75	597.5	2761.75
599.8	2760.75	601.9	2759.24	661.57	2759.92	666.41	2756.85	691.06	2756.07
697.71	2757.82	779.92	2757.09	782.85	2760.21	803.38	2761.75	805.38	2761.89
809.83	2762.75	817.41	2764.24	820.11	2763.75	852.39	2763.75	884.33	2763.75
918.74	2764.75	974.69	2764.75	981.1	2764.75	999.39	2765.75	1005.92	2766.75
1011.93	2767.75	1018.14	2768.75	1024.29	2769.75	1031.8	2770.75	1039.15	2771.75
1043.88	2772.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	580.55	.03	803.38	.045

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

580.55 803.38 172.75 171.78 164.65 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2771.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	6.25	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.45	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2767.29	Flow Area (sq ft)		1468.72	238.15
E.G. Slope (ft/ft)	0.013412	Area (sq ft)		1468.72	238.15
Q Total (cfs)	31000.00	Flow (cfs)		29944.19	1055.81
Top Width (ft)	405.73	Top Width (ft)		215.24	190.49
Vel Total (ft/s)	18.16	Avg. Vel. (ft/s)		20.39	4.43
Max Chl Dpth (ft)	9.38	Hydr. Depth (ft)		6.82	1.25
Conv. Total (cfs)	267675.2	Conv. (cfs)		258558.6	9116.6
Length Wtd. (ft)	171.40	Wetted Per. (ft)		219.19	190.80
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		5.61	1.05
Alpha	1.22	Stream Power (lb/ft s)		114.39	4.63
Frctn Loss (ft)	1.90	Cum Volume (acre-ft)	9.99	57.80	32.87
C & E Loss (ft)	0.18	Cum SA (acres)	6.66	10.17	17.70

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2769.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.81	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2766.35	Flow Area (sq ft)		1332.37	120.66
E.G. Slope (ft/ft)	0.011932	Area (sq ft)		1332.37	120.66
Q Total (cfs)	24490.00	Flow (cfs)		24155.58	334.42
Top Width (ft)	392.22	Top Width (ft)		213.37	178.85
Vel Total (ft/s)	16.85	Avg. Vel. (ft/s)		18.13	2.77
Max Chl Dpth (ft)	8.74	Hydr. Depth (ft)		6.24	0.67
Conv. Total (cfs)	224196.8	Conv. (cfs)		221135.2	3061.5
Length Wtd. (ft)	171.15	Wetted Per. (ft)		217.21	179.14
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		4.57	0.50
Alpha	1.14	Stream Power (lb/ft s)		82.84	1.39
Frctn Loss (ft)	1.87	Cum Volume (acre-ft)	6.94	53.89	25.46
C & E Loss (ft)	0.12	Cum SA (acres)	6.34	10.22	17.51

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2772.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	7.11	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.88	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2768.62	Flow Area (sq ft)		1562.17	322.22
E.G. Slope (ft/ft)	0.014387	Area (sq ft)		1562.17	322.22
Q Total (cfs)	36000.00	Flow (cfs)		34229.51	1770.49
Top Width (ft)	413.39	Top Width (ft)		216.53	196.86
Vel Total (ft/s)	19.10	Avg. Vel. (ft/s)		21.91	5.49
Max Chl Dpth (ft)	9.81	Hydr. Depth (ft)		7.21	1.64
Conv. Total (cfs)	300138.3	Conv. (cfs)		285377.4	14760.9
Length Wtd. (ft)	171.29	Wetted Per. (ft)		220.55	197.19
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		6.36	1.47
Alpha	1.25	Stream Power (lb/ft s)		139.40	8.06
Frctn Loss (ft)	1.93	Cum Volume (acre-ft)	12.91	61.73	39.64
C & E Loss (ft)	0.23	Cum SA (acres)	8.67	10.20	17.97

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: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 130

INPUT
Description:
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-329.97	2778	-326.97	2777	-324.12	2776	-321.7	2775	-319.71	2774
-317.71	2773	-315.72	2772	-313.73	2771	-311.73	2770	-309.74	2769
-295.4	2768	-239.67	2767	-228.16	2766	-194.92	2766	-129.95	2766
-127.06	2765	-123.98	2764	-120.22	2764	-110.54	2765	-110.53	2765
-.01	2766	0	2766	197.95	2767	197.96	2767	246.6	2767
261.24	2766.28	267.04	2766	267.05	2766	282.58	2764.8	282.59	2764.8
284.05	2765	284.06	2765	289.71	2764	289.72	2764	294.36	2763
294.37	2763	299.03	2762	299.04	2762	303.71	2761	303.72	2761
308.4	2760	308.41	2760	313.09	2759	313.1	2759	314.9	2758.96
314.91	2758.96	326.53	2758.59	326.54	2758.59	334.76	2755.3	334.76	2755.31
335.91	2758	335.92	2758	350.25	2755.25	350.26	2755.25	362.85	2756.77
362.86	2756.77	383.3	2757	429.42	2757.52	429.43	2757.51	436.01	2755.89
436.02	2755.89	456.36	2755.9	456.37	2755.9	476.41	2757.65	476.42	2757.65

495.5	2759.49	495.51	2759.49	507.59	2759.28	512.02	2759.21	512.03	2759.21
522.41	2761.75	522.42	2761.76	528.15	2763.11	528.16	2763.11	555.77	2762.75
555.78	2762.76	560.43	2763.75	560.44	2763.75	684.75	2763.75	684.76	2763.75
743.07	2762.75	743.08	2762.75	773.59	2762.75	773.6	2762.75	795.48	2762.75
795.94	2762.75	809.75	2763.75	809.76	2763.75	826.38	2764.75	866.79	2765.75
889.01	2766.75	894.02	2767.75	896.67	2768.75	896.67	2768.76	899.25	2769.75
901.38	2770.75	903.52	2771.75	911.41	2772.75	945.7	2772.75	951.33	2771.75
957.1	2770.75	961.49	2769.75	968.66	2768.75	968.68	2768.75	977.22	2769.75
981.89	2770.75	985.39	2771.75	990.06	2772.75	994.39	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-329.97	.045	246.6	.03	528.16	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
246.6	528.16	295.76	287.33	274.51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-329.97	197.95	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2769.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.14	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2766.38	Flow Area (sq ft)		1717.40	522.14
E.G. Slope (ft/ft)	0.008922	Area (sq ft)	13.46	1717.40	522.14
Q Total (cfs)	31000.00	Flow (cfs)		28714.42	2285.58
Top Width (ft)	595.82	Top Width (ft)	32.04	249.94	313.85
Vel Total (ft/s)	13.84	Avg. Vel. (ft/s)		16.72	4.38
Max Chl Dpth (ft)	9.89	Hydr. Depth (ft)		6.87	1.66
Conv. Total (cfs)	328199.1	Conv. (cfs)		304001.5	24197.6
Length Wtd. (ft)	285.18	Wetted Per. (ft)		254.20	314.04
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		3.76	0.93
Alpha	1.36	Stream Power (lb/ft s)		62.92	4.05
Frctn Loss (ft)	1.86	Cum Volume (acre-ft)	9.96	51.51	31.43
C & E Loss (ft)	0.66	Cum SA (acres)	6.60	9.26	16.75

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2767.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.82	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.89	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2765.37	Flow Area (sq ft)		1909.06	769.47
E.G. Slope (ft/ft)	0.003800	Area (sq ft)	69.64	1909.06	769.47
Q Total (cfs)	24490.00	Flow (cfs)		21800.10	2689.90
Top Width (ft)	718.73	Top Width (ft)	117.34	259.67	341.72
Vel Total (ft/s)	9.14	Avg. Vel. (ft/s)		11.42	3.50
Max Chl Dpth (ft)	10.64	Hydr. Depth (ft)		7.35	2.25
Conv. Total (cfs)	397259.9	Conv. (cfs)		353626.2	43633.7
Length Wtd. (ft)	285.65	Wetted Per. (ft)		263.96	341.92
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		1.72	0.53
Alpha	1.40	Stream Power (lb/ft s)		19.59	1.87
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	6.80	47.50	23.77
C & E Loss (ft)	0.14	Cum SA (acres)	6.10	9.29	16.52

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2770.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.79	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.43	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2767.00	Flow Area (sq ft)		1792.04	616.93
E.G. Slope (ft/ft)	0.010327	Area (sq ft)	27.94	1792.04	616.93
Q Total (cfs)	36000.00	Flow (cfs)		32832.83	3167.17
Top Width (ft)	645.25	Top Width (ft)	65.65	253.77	325.82
Vel Total (ft/s)	14.94	Avg. Vel. (ft/s)		18.32	5.13
Max Chl Dpth (ft)	10.18	Hydr. Depth (ft)		7.06	1.89
Conv. Total (cfs)	354255.9	Conv. (cfs)		323089.5	31166.4
Length Wtd. (ft)	284.82	Wetted Per. (ft)		258.05	326.02
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		4.48	1.22
Alpha	1.38	Stream Power (lb/ft s)		82.03	6.26
Frctn Loss (ft)	2.07	Cum Volume (acre-ft)	12.86	55.12	37.86
C & E Loss (ft)	0.70	Cum SA (acres)	8.54	9.27	16.98

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 120

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-741.52	2769	-620.87	2768	-551.88	2767	-543.14	2766	-540.36	2766
-537.06	2767	-533.83	2768	-527.7	2768	-488.6	2767	-366.95	2766
-274.11	2765	-186.15	2764	-155.02	2763	-147.68	2762	-131.64	2762
-119.22	2763	-106.8	2764	-35.92	2765	0	2765	50.02	2764
110.9	2763	152.46	2762.03	153.73	2762	168.97	2761	175.86	2760
175.87	2760	179.66	2759	179.67	2759	181.81	2758	183.96	2757
186.11	2756	188.37	2755	192.2	2754	208.49	2754	208.5	2754
217.9	2755	217.91	2755	226.38	2756	226.39	2756	249.43	2757
265.63	2757	283.93	2757	293.22	2757	353.9	2758	388.76	2759
390.5	2760	392.24	2761	392.25	2761	393.98	2762	393.99	2762
396.77	2763	400.02	2764	404.19	2764	422.66	2764	464.57	2763
544.99	2763	709.9	2763	814.02	2762.75	823.72	2763.75	825.7	2763.75
826.66	2763.75	968	2763.75	980.94	2763.75	999.92	2763.75	1093.44	2763.75
1109.22	2764.75	1125.21	2765.75	1136.78	2766.75	1141.28	2767.75	1145.01	2768.75
1148.2	2769.75	1151.41	2770.75	1154.48	2771.75	1157.68	2772.75	1160.12	2773.75
1162.38	2774.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-741.52	.045	0	.03	404.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	404.19	158.39	153.64	149.14	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-741.52	0	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2767.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.67	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.44	Flow Area (sq ft)		2335.00	1637.41
E.G. Slope (ft/ft)	0.004458	Area (sq ft)	446.32	2335.00	1637.41
Q Total (cfs)	31000.00	Flow (cfs)		24756.40	6243.60
Top Width (ft)	1460.10	Top Width (ft)	336.19	404.19	719.72
Vel Total (ft/s)	7.80	Avg. Vel. (ft/s)		10.60	3.81
Max Chl Dpth (ft)	11.67	Hydr. Depth (ft)		5.78	2.28
Conv. Total (cfs)	464316.0	Conv. (cfs)		370799.7	93516.3
Length Wtd. (ft)	152.85	Wetted Per. (ft)		406.74	719.84
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.60	0.63
Alpha	1.52	Stream Power (lb/ft s)		16.94	2.41
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	8.40	38.15	24.63
C & E Loss (ft)	0.02	Cum SA (acres)	5.34	7.10	13.49

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2766.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.02	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2764.98	Flow Area (sq ft)		2074.09	1176.16
E.G. Slope (ft/ft)	0.004660	Area (sq ft)	248.65	2074.09	1176.16
Q Total (cfs)	24490.00	Flow (cfs)		20776.47	3713.53
Top Width (ft)	1389.85	Top Width (ft)	276.26	404.19	709.40
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)		10.02	3.16
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		5.13	1.66
Conv. Total (cfs)	358749.9	Conv. (cfs)		304351.0	54398.9
Length Wtd. (ft)	153.08	Wetted Per. (ft)		406.74	709.50
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.48	0.48
Alpha	1.53	Stream Power (lb/ft s)		14.86	1.52
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	5.72	34.36	17.64
C & E Loss (ft)	0.01	Cum SA (acres)	4.77	7.10	13.21

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2767.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.07	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.81	Flow Area (sq ft)		2497.72	1928.23
E.G. Slope (ft/ft)	0.004493	Area (sq ft)	589.49	2497.72	1928.23
Q Total (cfs)	36000.00	Flow (cfs)		27806.80	8193.20
Top Width (ft)	1508.19	Top Width (ft)	379.26	404.19	724.74
Vel Total (ft/s)	8.13	Avg. Vel. (ft/s)		11.13	4.25
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		6.18	2.66
Conv. Total (cfs)	537097.4	Conv. (cfs)		414859.9	122237.5
Length Wtd. (ft)	152.72	Wetted Per. (ft)		406.74	724.88
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.72	0.75
Alpha	1.51	Stream Power (lb/ft s)		19.17	3.17
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	10.76	40.97	29.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.03	7.10	13.67

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 115

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2767	4.83	2766	9.61	2765	11.16	2765	13.74	2766
16.32	2767	24.15	2767	124.55	2766	311.87	2765.02	314.97	2765
395.1	2764	477.26	2763	482.56	2762	505.65	2762	555.24	2763
679.5	2764	697.39	2764	706.13	2763	725.14	2762	747.88	2762
765.91	2762	799.67	2761	831.73	2760	835.05	2759	837.03	2758
839.03	2757	841.23	2756	843.42	2755	845.62	2754	847.82	2753
863.85	2753	869.22	2754	874.61	2755	887.51	2756	990.68	2756
1015.46	2756	1026.66	2757	1037.87	2758	1040.87	2759	1043.78	2760
1046.68	2761	1049.37	2762	1074.62	2763	1080.06	2763	1202.38	2763
1254.26	2763	1359.68	2763	1365.58	2763	1696.27	2762.75	1789.59	2762.75
1848.13	2763.75	1874.7	2764.73	1875.36	2764.75	1890.38	2765.75	1895.84	2766.75
1902.22	2767.75	1908.29	2768.75	1913.86	2769.75	1918.72	2770.75	1920.54	2771.75
1922.37	2772.75	1924.2	2773.75	1926.03	2774.75	1927.8	2775.75	1929.57	2776.75
1931.38	2777.75	1933.2	2778.75	1935.07	2779.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	679.5	.03	1074.62	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
679.5	1074.62	257.93	242.39	227.54	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	679.5	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2766.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.65	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.74	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.74	Flow Area (sq ft)		2381.48	1412.74
E.G. Slope (ft/ft)	0.004600	Area (sq ft)	465.63	2381.48	1412.74
Q Total (cfs)	31000.00	Flow (cfs)		26379.82	4620.18
Top Width (ft)	1539.72	Top Width (ft)	344.05	395.12	800.55
Vel Total (ft/s)	8.17	Avg. Vel. (ft/s)		11.08	3.27
Max Chl Dpth (ft)	11.74	Hydr. Depth (ft)		6.03	1.76
Conv. Total (cfs)	457069.9	Conv. (cfs)		388949.0	68120.9
Length Wtd. (ft)	239.83	Wetted Per. (ft)		397.73	800.58
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.72	0.51
Alpha	1.59	Stream Power (lb/ft s)		19.05	1.66
Frctn Loss (ft)	1.17	Cum Volume (acre-ft)	6.74	29.83	19.40
C & E Loss (ft)	0.05	Cum SA (acres)	4.11	5.69	10.89

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2765.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.16	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.16	Flow Area (sq ft)		2151.22	950.85
E.G. Slope (ft/ft)	0.004527	Area (sq ft)	278.74	2151.22	950.85
Q Total (cfs)	24490.00	Flow (cfs)		22088.98	2401.02
Top Width (ft)	1477.14	Top Width (ft)	297.35	395.12	784.67
Vel Total (ft/s)	7.89	Avg. Vel. (ft/s)		10.27	2.53
Max Chl Dpth (ft)	11.16	Hydr. Depth (ft)		5.44	1.21
Conv. Total (cfs)	364000.3	Conv. (cfs)		328313.5	35686.8
Length Wtd. (ft)	240.55	Wetted Per. (ft)		397.73	784.69
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.53	0.34
Alpha	1.54	Stream Power (lb/ft s)		15.69	0.86
Frctn Loss (ft)	1.15	Cum Volume (acre-ft)	4.76	26.91	14.00
C & E Loss (ft)	0.05	Cum SA (acres)	3.72	5.69	10.65

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2766.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.75	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.15	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2765.15	Flow Area (sq ft)		2543.06	1741.41
E.G. Slope (ft/ft)	0.004615	Area (sq ft)	614.55	2543.06	1741.41
Q Total (cfs)	36000.00	Flow (cfs)		29476.35	6523.65
Top Width (ft)	1597.71	Top Width (ft)	395.79	395.12	806.80
Vel Total (ft/s)	8.40	Avg. Vel. (ft/s)		11.59	3.75
Max Chl Dpth (ft)	12.15	Hydr. Depth (ft)		6.44	2.16

```
* Conv. Total (cfs)      *529952.8  * Conv. (cfs)            *          *433918.7  * 96034.1  *
* Length Wtd. (ft)       *  239.39  * Wetted Per. (ft)       *          *  397.73  *  806.84  *
* Min Ch El (ft)         * 2753.00  * Shear (lb/sq ft)       *          *    1.84  *    0.62  *
* Alpha                  *    1.59  * Stream Power (lb/ft s) *          *   21.35  *    2.33  *
* Frctn Loss (ft)        *    1.19  * Cum Volume (acre-ft)   *    8.57  *   32.08  *   23.56  *
* C & E Loss (ft)        *    0.04  * Cum SA (acres)         *    5.62  *    5.69  *   11.05  *
*****************************************************************************************

 rning: The energy equation could not be balanced within the specified number of iterations.  The
        program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
        section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
        depth, the calculated water surface came back below critical depth.  This indicates that there
        is not a valid subcritical answer.  The program defaulted to critical depth.
Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
        water surface was used.

CROSS SECTION


RIVER: River #1
REACH: Reach #1          RS: 110

INPUT
Description:
Station Elevation Data    num=      68
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 -600.38    2767 -579.98    2766 -400.38    2765 -181.14    2764  -81.76    2763
  -57.48    2762  -47.61    2761       0    2761   227.2    2762  237.17    2762
  274.46    2761  312.01    2760  358.58    2760  379.63    2760  383.11    2759
  386.65    2758  390.19    2757  392.73    2756  392.74    2756  395.22    2755
  397.63    2754  410.68    2753  426.46    2753  431.11    2754  435.76    2755
  446.04    2756  470.07    2757  481.43    2757  501.92 2756.75  563.14    2756
  587.96    2756  594.62    2757  602.49    2758  613.17    2759  626.03 2759.97
   626.5    2760  890.32    2761  967.13    2761 1086.65    2761 1302.26    2762
 1331.06 2761.75 1340.58 2761.75 1426.39 2761.75 1446.33 2761.75 1459.98 2761.75
 1515.86 2762.75 1570.65 2763.75 1587.84 2764.75 1592.77 2765.75 1597.63 2766.75
 1602.74 2767.75 1607.53 2768.75 1611.47 2769.75 1613.74 2770.75 1616.01 2771.75
 1618.28 2772.75 1620.53 2773.75 1622.77 2774.75 1624.98 2775.75 1627.19 2776.75
  1629.4 2777.75 1631.62 2778.75 1633.89 2779.75 1636.29 2780.75 1638.58 2781.75
 1640.84 2782.75 1643.09 2783.75 1645.32 2784.75

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
 -600.38    .045   227.2     .03   626.5    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         227.2   626.5            308.04  322.72  332.25            .1        .3
 effective Flow     num=       1
  Sta L   Sta R    Elev  Permanent
 -600.38   227.2    2770        F

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 2764.92  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    2.08  * Wt. n-Val.             *         *   0.030 *   0.045 *
* W.S. Elev (ft)         * 2762.85  * Reach Len. (ft)        * 308.04  *  322.72 *  332.25 *
* Crit W.S. (ft)         * 2763.33  * Flow Area (sq ft)      *         * 1956.99 * 1473.46 *
* E.G. Slope (ft/ft)     *0.007990  * Area (sq ft)           * 415.36  * 1956.99 * 1473.46 *
* Q Total (cfs)          *31000.00  * Flow (cfs)             *         *24934.30 * 6065.70 *
* Top Width (ft)         * 1599.06  * Top Width (ft)         * 305.20  *  399.30 *  894.56 *
* Vel Total (ft/s)       *    9.04  * Avg. Vel. (ft/s)       *         *   12.74 *    4.12 *
* Max Chl Dpth (ft)      *    9.84  * Hydr. Depth (ft)       *         *    4.90 *    1.65 *
* Conv. Total (cfs)      *346800.4  * Conv. (cfs)            *         *278942.8 * 67857.6 *
* Length Wtd. (ft)       *  324.49  * Wetted Per. (ft)       *         *  400.88 *  894.58 *
* Min Ch El (ft)         * 2753.00  * Shear (lb/sq ft)       *         *    2.44 *    0.82 *
* Alpha                  *    1.64  * Stream Power (lb/ft s) *         *   31.03 *    3.38 *
* Frctn Loss (ft)        *    1.43  * Cum Volume (acre-ft)   *    4.13 *   17.76 *   11.87 *
* C & E Loss (ft)        *    0.04  * Cum SA (acres)         *    2.19 *    3.48 *    6.46 *
*****************************************************************************************

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.
Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
        water surface was used.
Note:   Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 2764.24  * Element                * Left OB * Channel * Right OB *
* Vel Head (ft)          *    1.82  * Wt. n-Val.             *         *   0.030 *   0.045 *
* W.S. Elev (ft)         * 2762.42  * Reach Len. (ft)        * 308.04  *  322.72 *  332.25 *
* Crit W.S. (ft)         * 2762.82  * Flow Area (sq ft)      *         * 1787.46 * 1098.66 *
* E.G. Slope (ft/ft)     *0.007531  * Area (sq ft)           * 287.97  * 1787.46 * 1098.66 *
* Q Total (cfs)          *24490.00  * Flow (cfs)             *         *20814.43 * 3675.57 *
* Top Width (ft)         * 1565.13  * Top Width (ft)         * 294.89  *  399.30 *  870.94 *
* Vel Total (ft/s)       *    8.49  * Avg. Vel. (ft/s)       *         *   11.64 *    3.35 *
* Max Chl Dpth (ft)      *    9.42  * Hydr. Depth (ft)       *         *    4.48 *    1.26 *
* Conv. Total (cfs)      *282197.7  * Conv. (cfs)            *         *239844.2 * 42353.5 *
* Length Wtd. (ft)       *  324.13  * Wetted Per. (ft)       *         *  400.88 *  870.95 *
* Min Ch El (ft)         * 2753.00  * Shear (lb/sq ft)       *         *    2.10 *    0.59 *
* Alpha                  *    1.62  * Stream Power (lb/ft s) *         *   24.41 *    1.98 *
* Frctn Loss (ft)        *    1.38  * Cum Volume (acre-ft)   *    3.08 *   15.95 *    8.65 *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)         *    1.97 *    3.48 *    6.33 *
*****************************************************************************************

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.
Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
        water surface was used.
Note:   Program found supercritical flow starting at this cross section.
```

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2765.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2763.14	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2763.67	Flow Area (sq ft)		2074.07	1738.11
E.G. Slope (ft/ft)	0.008280	Area (sq ft)	506.61	2074.07	1738.11
Q Total (cfs)	36000.00	Flow (cfs)		27964.04	8035.96
Top Width (ft)	1632.62	Top Width (ft)	322.69	399.30	910.63
Vel Total (ft/s)	9.44	Avg. Vel. (ft/s)		13.48	4.62
Max Chl Dpth (ft)	10.14	Hydr. Depth (ft)		5.19	1.91
Conv. Total (cfs)	395617.6	Conv. (cfs)		307307.4	88310.2
Length Wtd. (ft)	324.71	Wetted Per. (ft)		400.88	910.65
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		2.67	0.99
Alpha	1.64	Stream Power (lb/ft s)		36.06	4.56
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	5.25	19.23	14.47
C & E Loss (ft)	0.05	Cum SA (acres)	3.49	3.48	6.56

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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 100

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-1079.5	2765	-908.05	2764	-796.29	2763	-637.85	2762	-590.66	2762
-582.71	2762	-429.48	2762	-343.01	2762	-257.47	2761	-240.37	2760
-236.92	2759	-233.51	2758	-230.22	2757	-227.02	2756	-223.93	2755
-185.04	2755	-174.13	2756	-169.65	2757	-165.16	2758	-160.66	2759
-156.1	2760	-123.66	2760	-99.38	2760	0	2760	48.99	2759
69.53	2759	69.54	2759	92.94	2759	92.95	2759	136.19	2758
136.2	2758	181.29	2757	186.69	2757	207.37	2758	220.09	2758
222.63	2757	222.64	2757	225.18	2756	227.72	2755	227.73	2755
230.27	2754	232.22	2753.36	233.31	2753	236.48	2752	271.72	2752
275.17	2753	279.24	2754	328.16	2755	339.63	2756	339.64	2756
380.46	2756	380.47	2756	390.22	2755.86	451.75	2755	486.38	2754
497.38	2754	501.1	2755	504.87	2756	504.88	2756	507.69	2757
539.73	2758	571.48	2759	643.34	2760	716.38	2760	890.83	2759
890.84	2759	1036.2	2759	1036.21	2759	1095.21	2760	1202.49	2760
1202.5	2760	1304.69	2760	1327.57	2761	1346.89	2762	1361.89	2763
1372.87	2764	1372.88	2764	1398.46	2765				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-1079.5	.045	0	.03	539.73	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	539.73	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-1079.5	-156.1	2764	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2762.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.65	Reach Len. (ft)			
Crit W.S. (ft)	2761.20	Flow Area (sq ft)	257.55	2837.18	1638.16
E.G. Slope (ft/ft)	0.003515	Area (sq ft)	753.97	2837.18	1638.16
Q Total (cfs)	31000.00	Flow (cfs)	703.96	25126.95	5169.09
Top Width (ft)	1653.19	Top Width (ft)	313.06	539.73	800.40
Vel Total (ft/s)	6.55	Avg. Vel. (ft/s)	2.73	8.86	3.16
Max Chl Dpth (ft)	9.65	Hydr. Depth (ft)	1.65	5.26	2.05
Conv. Total (cfs)	522910.6	Conv. (cfs)	11874.5	423843.4	87192.6
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	800.47
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.36	1.15	0.45
Alpha	1.52	Stream Power (lb/ft s)	0.99	10.18	1.42
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2762.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.06	Reach Len. (ft)			
Crit W.S. (ft)	2760.72	Flow Area (sq ft)	165.48	2518.82	1169.41
E.G. Slope (ft/ft)	0.003685	Area (sq ft)	584.19	2518.82	1169.41
Total (cfs)	24490.00	Flow (cfs)	344.82	21098.36	3046.82
op Width (ft)	1591.34	Top Width (ft)	262.61	539.73	789.00
Vel Total (ft/s)	6.35	Avg. Vel. (ft/s)	2.08	8.38	2.61
Max Chl Dpth (ft)	9.06	Hydr. Depth (ft)	1.06	4.67	1.48
Conv. Total (cfs)	403456.7	Conv. (cfs)	5680.7	347581.5	50194.4
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	789.06
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.24	1.07	0.34
Alpha	1.52	Stream Power (lb/ft s)	0.51	8.96	0.89

* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2763.17	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.00	* Wt. n-Val.	* 0.045	* 0.030	* 0.045
* W.S. Elev (ft)	* 2762.17	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 2761.51	* Flow Area (sq ft)	* 338.72	* 3117.85	* 2056.93
* E.G. Slope (ft/ft)	*0.003152	* Area (sq ft)	* 979.48	* 3117.85	* 2056.93
* Q Total (cfs)	*36000.00	* Flow (cfs)	* 1052.54	*27848.25	* 7099.21
* Top Width (ft)	* 2014.21	* Top Width (ft)	* 664.77	* 539.73	* 809.71
* Vel Total (ft/s)	* 6.53	* Avg. Vel. (ft/s)	* 3.11	* 8.93	* 3.45
* Max Chl Dpth (ft)	* 10.17	* Hydr. Depth (ft)	* 2.17	* 5.78	* 2.54
* Conv. Total (cfs)	*641195.8	* Conv. (cfs)	* 18746.7	*496005.0	*126444.0
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 809.80
* Min Ch El (ft)	* 2752.00	* Shear (lb/sq ft)	* 0.43	* 1.13	* 0.50
* Alpha	* 1.51	* Stream Power (lb/ft s)	* 1.33	* 10.12	* 1.73
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

SUMMARY OF MANNING'S N VALUES

River:River #1

Reach	River Sta.	n1	n2	n3
Reach #1	225	.045	.03	.045
Reach #1	220	.045	.03	.045
Reach #1	215	.045	.03	.045
Reach #1	210	.045	.03	.045
Reach #1	205	.045	.03	.045
Reach #1	200	.045	.03	.045
Reach #1	195	.045	.03	.045
Reach #1	190	.045	.03	.045
Reach #1	180	.045	.03	.045
Reach #1	170	.045	.03	.045
Reach #1	160	.045	.03	.045
Reach #1	150	.045	.03	.045
Reach #1	139	.045	.03	.045
Reach #1	130	.045	.03	.045
Reach #1	120	.045	.03	.045
Reach #1	115	.045	.03	.045
Reach #1	110	.045	.03	.045
Reach #1	100	.045	.03	.045

SUMMARY OF REACH LENGTHS

River: River #1

Reach	River Sta.	Left	Channel	Right
Reach #1	225	299.75	282.05	262.04
Reach #1	220	277.65	269.4	261.19
Reach #1	215	294.95	268.22	230.48
Reach #1	210	283.6	269.08	254.74
Reach #1	205	280.12	286.64	293.88
Reach #1	200	179.8	195.07	210.23
Reach #1	195	215.83	225.58	311.98
Reach #1	190	77.8	72.37	83.03
Reach #1	180	44.45	181.54	256.85
Reach #1	170	130.15	130.15	130.15
Reach #1	160	203.69	188.86	197
Reach #1	150	262.45	206.64	129.8
Reach #1	139	172.75	171.78	164.65
Reach #1	130	295.76	287.33	274.51
Reach #1	120	158.39	153.64	149.14
Reach #1	115	257.93	242.39	227.54
Reach #1	110	308.04	322.72	332.25
Reach #1	100			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River #1

Reach	River Sta.	Contr.	Expan.
Reach #1	225	.1	.3
Reach #1	220	.1	.3
Reach #1	215	.1	.3
Reach #1	210	.1	.3
Reach #1	205	.1	.3
Reach #1	200	.1	.3
Reach #1	195	.1	.3
Reach #1	190	.1	.3
Reach #1	180	.1	.3
Reach #1	170	.1	.3

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*Reach #1        *    160     *       .1*       .3*
*Reach #1        *    150     *       .1*       .3*
*Reach #1        *    139     *       .1*       .3*
*Reach #1        *    130     *       .1*       .3*
*Reach #1        *    120     *       .1*       .3*
*Reach #1        *    115     *       .1*       .3*
*Reach #1        *    110     *       .1*       .3*
 Reach #1        *    100     *       .1*       .3*
/*****************************************************
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Profile Outp. ole - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #1	225	PF 1	31000.00	2768.00	2783.79	2781.42	2786.45	0.003148	13.09	2368.69	849.40	0.71
Reach #1	225	PF 2	24490.00	2768.00	2782.23	2780.05	2784.51	0.003108	12.10	2023.49	754.54	0.70
Reach #1	225	PF 3	36000.00	2768.00	2784.84	2782.42	2787.78	0.003262	13.77	2613.48	1215.25	0.73
Reach #1	220	PF 1	31000.00	2767.00	2780.92	2780.92	2785.06	0.006598	16.33	1897.98	904.77	1.00
Reach #1	220	PF 2	24490.00	2767.00	2780.16	2779.58	2783.28	0.005463	14.17	1728.23	784.47	0.90
Reach #1	220	PF 3	36000.00	2767.00	2781.82	2781.82	2786.37	0.006460	17.10	2104.79	1075.72	1.00
Reach #1	215	PF 1	31000.00	2767.00	2780.49	2779.67	2783.03	0.004711	12.82	2425.80	1271.30	0.83
Reach #1	215	PF 2	24490.00	2767.00	2779.44	2777.92	2781.60	0.004906	11.81	2075.45	903.76	0.83
Reach #1	215	PF 3	36000.00	2767.00	2779.41	2780.35	2784.13	0.010772	17.44	2065.33	892.30	1.22
Reach #1	210	PF 1	31000.00	2766.00	2778.66	2778.66	2781.45	0.007383	13.40	2313.85	1097.58	1.00
Reach #1	210	PF 2	24490.00	2766.00	2776.84	2776.53	2780.03	0.006179	14.33	1708.58	503.53	0.95
Reach #1	210	PF 3	36000.00	2766.00	2779.29	2779.29	2782.30	0.007343	13.93	2585.10	1350.50	1.00
Reach #1	205	PF 1	31000.00	2765.00	2776.22	2777.30	2779.34	0.008080	14.33	2410.89	793.24	1.05
Reach #1	205	PF 2	24490.00	2765.00	2775.69	2775.69	2778.12	0.006333	12.57	2054.88	564.95	0.92
Reach #1	205	PF 3	36000.00	2765.00	2776.61	2777.75	2780.06	0.009177	15.23	2725.49	821.56	1.12
Reach #1	200	PF 1	31000.00	2763.00	2774.60	2774.99	2777.48	0.004947	14.42	2953.93	818.81	0.87
Reach #1	200	PF 2	24490.00	2763.00	2773.47	2773.95	2776.37	0.005630	14.06	2140.17	639.31	0.91
Reach #1	200	PF 3	36000.00	2763.00	2776.84	2775.91	2778.28	0.002126	11.05	5235.53	1116.32	0.59
Reach #1	195	PF 1	31000.00	2762.00	2775.47	2773.18	2776.47	0.001484	8.88	4983.29	974.08	0.49
Reach #1	195	PF 2	24490.00	2762.00	2773.31	2771.52	2774.68	0.002552	9.92	3152.17	727.91	0.62
Reach #1	195	PF 3	36000.00	2762.00	2776.98	2773.66	2777.80	0.001075	8.29	6556.21	1098.89	0.43
Reach #1	190	PF 1	31000.00	2760.49	2775.57	2770.00	2776.11	0.000670	5.89	5260.27	527.41	0.33
Reach #1	190	PF 2	24490.00	2760.49	2773.60	2769.25	2774.12	0.000829	5.79	4232.78	512.34	0.35
Reach #1	190	PF 3	36000.00	2760.49	2776.99	2770.53	2777.54	0.000583	5.98	6102.29	719.88	0.31
Reach #1	180	PF 1	31000.00	2759.08	2775.17	2769.77	2776.02	0.000952	7.42	4180.06	379.59	0.39
Reach #1	180	PF 2	24490.00	2759.08	2773.24	2768.85	2774.02	0.001087	7.09	3455.69	371.77	0.41
Reach #1	180	PF 3	36000.00	2759.08	2776.55	2770.43	2777.45	0.000882	7.65	4732.77	453.48	0.38
Reach #1	170	PF 1	31000.00	2758.49	2773.55	2770.35	2775.61	0.003348	11.52	2691.28	248.32	0.62
Reach #1	170	PF 2	24490.00	2758.49	2771.75	2769.11	2773.59	0.003537	10.88	2251.21	242.05	0.63
Reach #1	170	PF 3	36000.00	2758.49	2774.82	2771.24	2777.05	0.003245	11.96	3011.47	252.85	0.61
Reach #1	160	PF 1	31000.00	2757.67	2771.80	2769.83	2774.98	0.004844	14.29	2168.83	197.01	0.76
Reach #1	160	PF 2	24490.00	2757.67	2770.41	2768.41	2773.00	0.004406	12.91	1897.59	193.37	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.77	2770.85	2776.38	0.005147	15.25	2361.44	204.78	0.78
Reach #1	150	PF 1	31000.00	2757.36	2769.35	2769.35	2773.78	0.006782	16.88	1836.44	207.99	1.00
Reach #1	150	PF 2	24490.00	2757.36	2768.00	2768.00	2771.83	0.007077	15.72	1557.52	204.23	1.00
Reach #1	150	PF 3	36000.00	2757.36	2770.31	2770.31	2775.16	0.006667	17.68	2036.48	211.14	1.00
Reach #1	139	PF 1	31000.00	2756.07	2765.45	2767.29	2771.69	0.013412	20.39	1706.88	405.73	1.38
Reach #1	139	PF 2	24490.00	2756.07	2764.81	2766.35	2769.85	0.011932	18.13	1453.04	392.22	1.28
Reach #1	139	PF 3	36000.00	2756.07	2765.88	2768.62	2772.99	0.014387	21.91	1884.39	413.39	1.44
Reach #1	130	PF 1	31000.00	2755.25	2765.14	2766.38	2769.18	0.008922	16.72	2239.54	595.82	1.12
Reach #1	130	PF 2	24490.00	2755.25	2765.89	2765.37	2767.71	0.003800	11.42	2678.53	718.73	0.74
Reach #1	130	PF 3	36000.00	2755.25	2765.43	2767.00	2770.22	0.010327	18.32	2408.98	645.25	1.22
Reach #1	120	PF 1	31000.00	2754.00	2765.67	2765.44	2767.11	0.004458	10.60	3972.41	1460.10	0.78
Reach #1	120	PF 2	24490.00	2754.00	2765.02	2764.98	2766.37	0.004660	10.02	3250.25	1389.85	0.78
Reach #1	120	PF 3	36000.00	2754.00	2766.07	2765.81	2767.62	0.004493	11.13	4425.95	1508.19	0.79
Reach #1	115	PF 1	31000.00	2753.00	2764.74	2764.74	2766.39	0.004600	11.08	3794.22	1539.72	0.80
Reach #1	115	PF 2	24490.00	2753.00	2764.16	2764.16	2765.65	0.004527	10.27	3102.07	1477.14	0.78
Reach #1	115	PF 3	36000.00	2753.00	2765.15	2765.15	2766.90	0.004615	11.59	4284.47	1597.71	0.81
Reach #1	110	PF 1	31000.00	2753.00	2762.85	2763.33	2764.92	0.007990	12.74	3430.45	1599.06	1.01
Reach #1	110	PF 2	24490.00	2753.00	2762.42	2762.82	2764.24	0.007531	11.64	2886.12	1565.13	0.97
Reach #1	110	PF 3	36000.00	2753.00	2763.14	2763.67	2765.41	0.008280	13.48	3812.18	1632.62	1.04
Reach #1	100	PF 1	31000.00	2752.00	2761.65	2761.20	2762.67	0.003515	8.86	4732.88	1653.19	0.68
Reach #1	100	PF 2	24490.00	2752.00	2761.06	2760.72	2762.01	0.003685	8.38	3853.71	1591.34	0.68
Reach #1	100	PF 3	36000.00	2752.00	2762.17	2761.51	2763.17	0.003152	8.93	5513.50	2014.21	0.65

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Alt 3

River: River #1 Reach: Reach #1 RS: 225 Profile: PF 1
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 1
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:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 3
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 1
Warning:The conveyance ratio (upstream 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: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

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

River: River #1 Reach: Reach #1 RS: 139 Profile: PF 1

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: Program found supercritical flow starting at this cross section.

River: River #1 Reach: Reach #1 RS: 139 Profile: PF 2

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: Program found supercritical flow starting at this cross section.

River: River #1 Reach: Reach #1 RS: 139 Profile: PF 3

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: Program found supercritical flow starting at this cross section.

River: River #1 Reach: Reach #1 RS: 130 Profile: PF 1

Warning:Divided flow computed for this cross-section.

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

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

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

River: River #1 Reach: Reach #1 RS: 130 Profile: PF 2

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.

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

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

River: River #1 Reach: Reach #1 RS: 130 Profile: PF 3

Warning:Divided flow computed for this cross-section.

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

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

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

River: River #1 Reach: Reach #1 RS: 120 Profile: PF 1

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

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

River: River #1 Reach: Reach #1 RS: 120 Profile: PF 2

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

River: River #1 Reach: Reach #1 RS: 120 Profile: PF 3

Warning:Divided flow computed for this cross-section.

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

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

River: River #1 Reach: Reach #1 RS: 115 Profile: PF 1

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

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

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

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

River: River #1 Reach: Reach #1 RS: 115 Profile: PF 2

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

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

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

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

River: River #1 Reach: Reach #1 RS: 115 Profile: PF 3

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

Warning:Divided flow computed for this cross-section.

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

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

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

River: River #1 Reach: Reach #1 RS: 110 Profile: PF 1

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

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

Note: Program found supercritical flow starting at this cross section.

River: River #1 Reach: Reach #1 RS: 110 Profile: PF 2

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

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

Note: Program found supercritical flow starting at this cross section.

er: River #1 Reach: Reach #1 RS: 110 Profile: PF 3

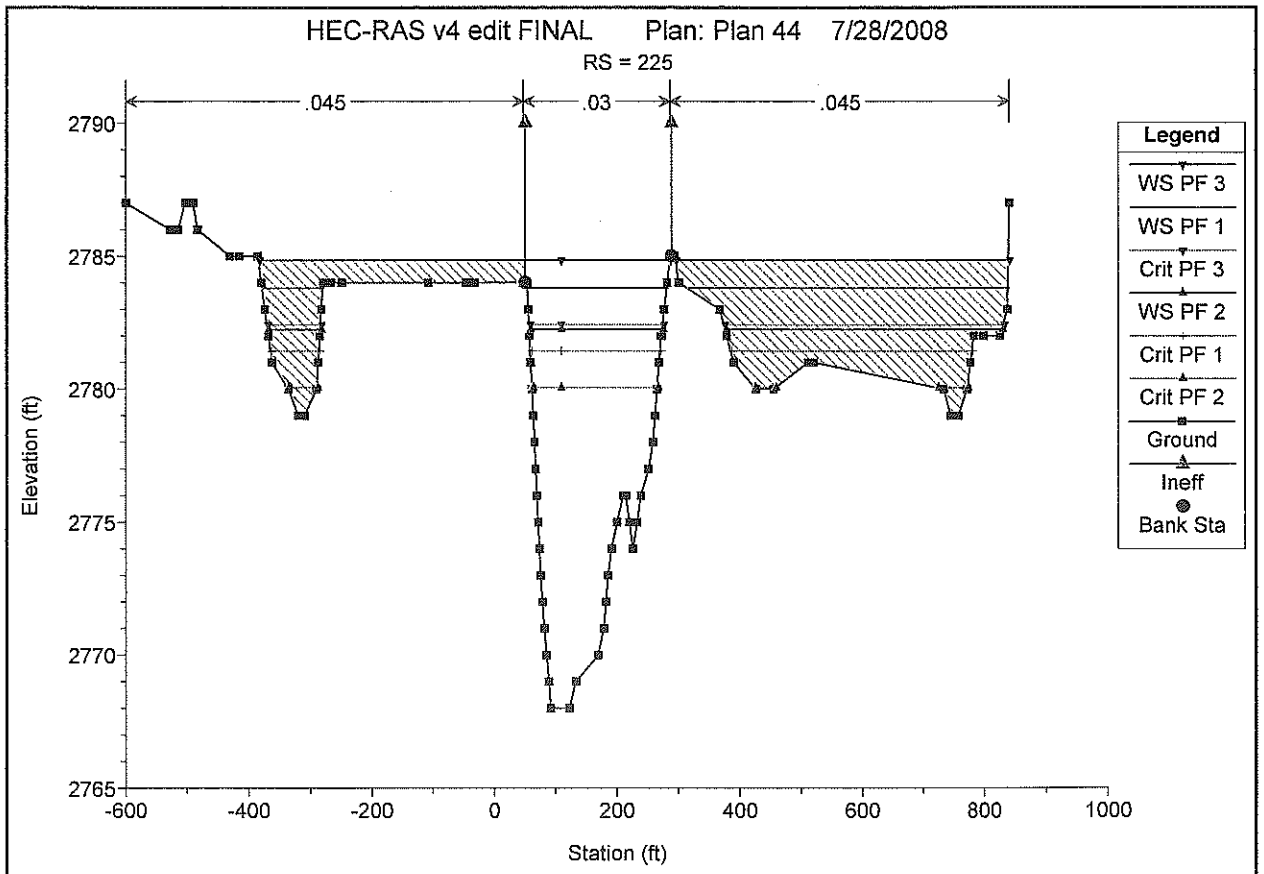
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

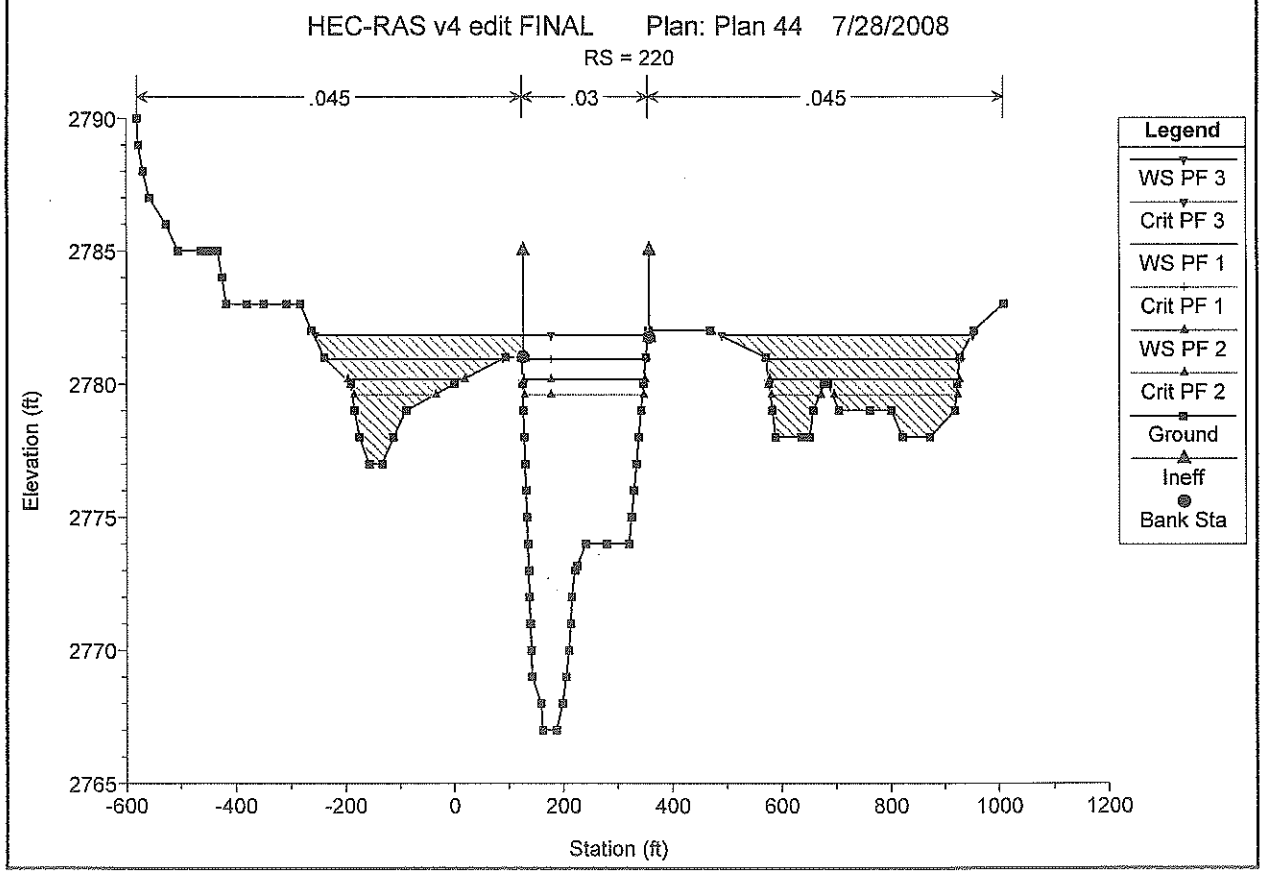
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

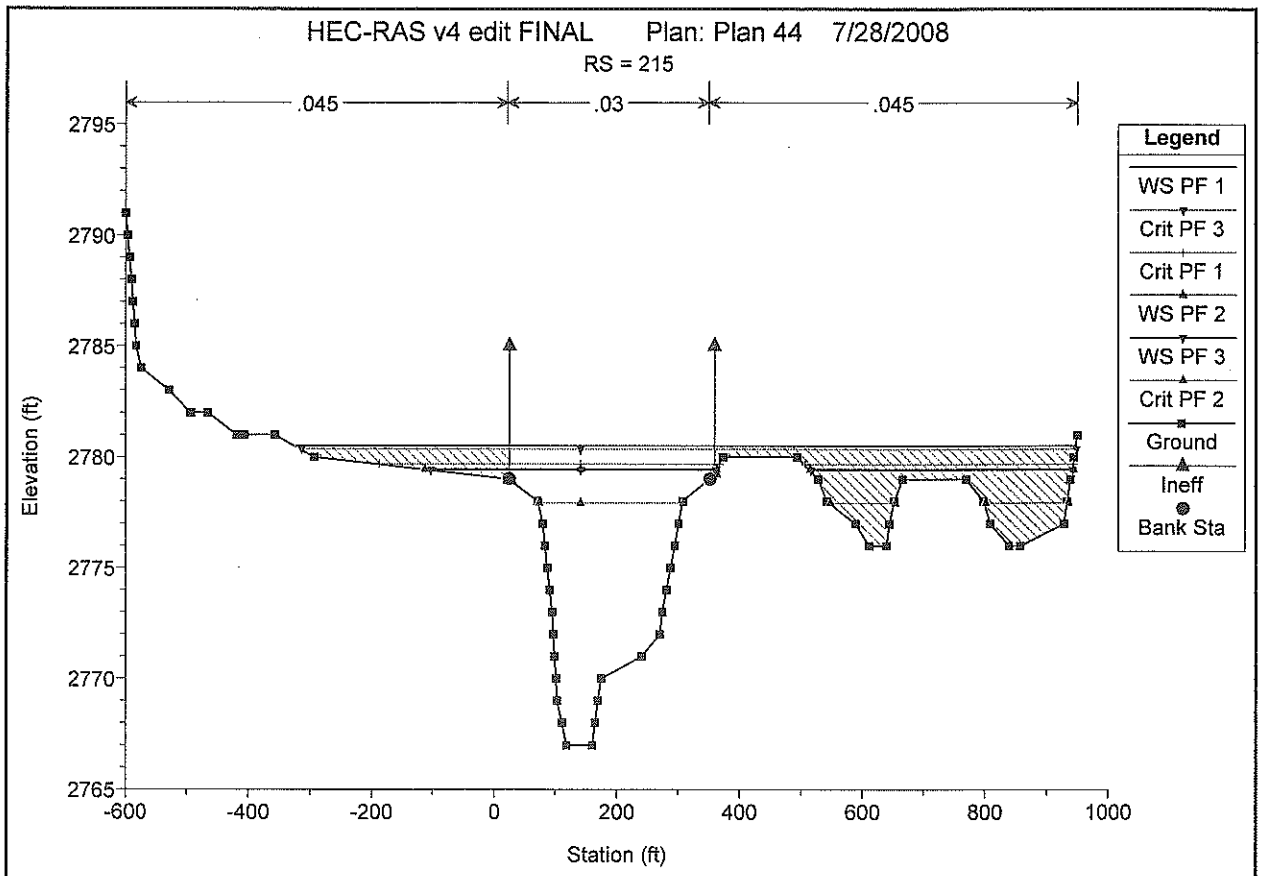
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

Note: Program found supercritical flow starting at this cross section.

River: River #1 Reach: Reach #1 RS: 100 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 3
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
RS = 225
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
RS = 220
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
RS = 215
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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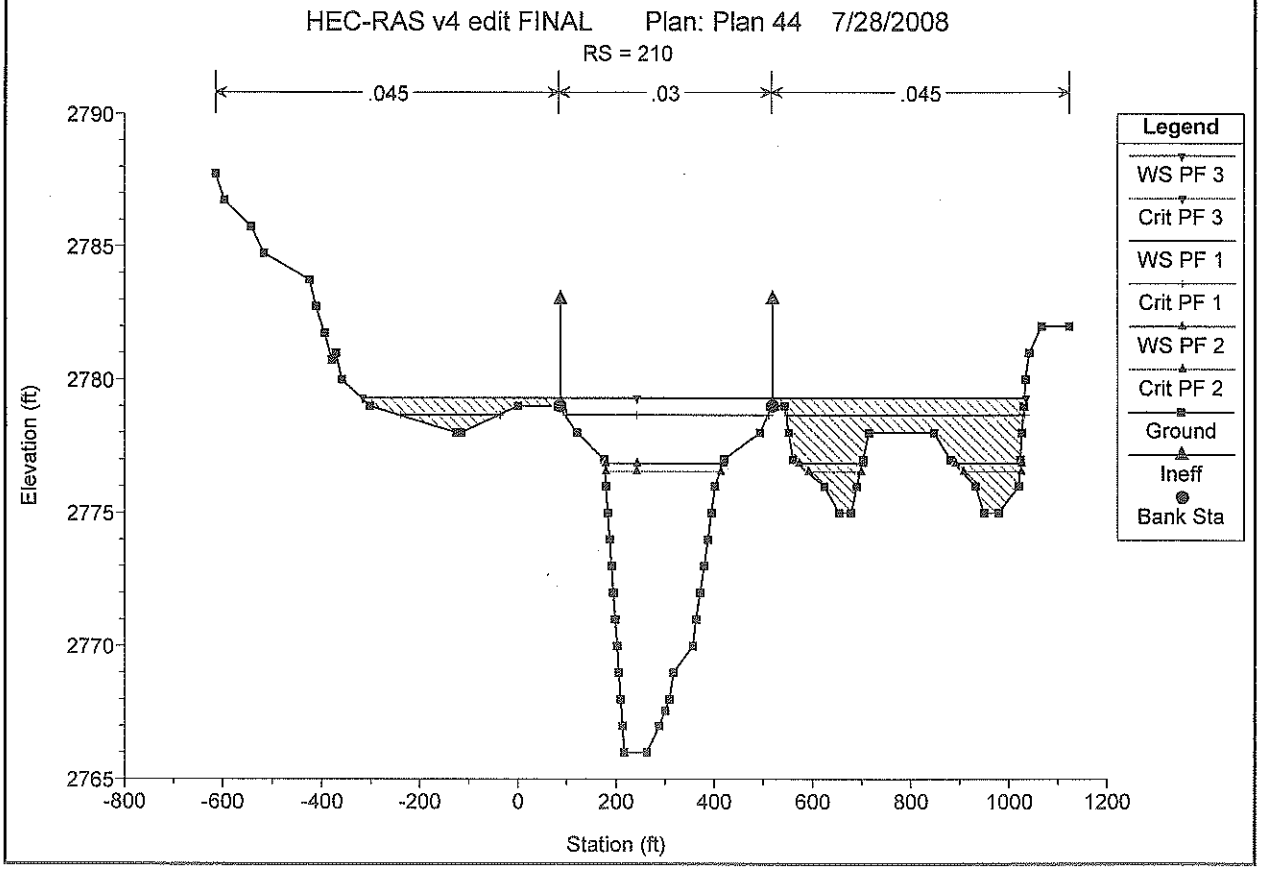
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
RS = 210
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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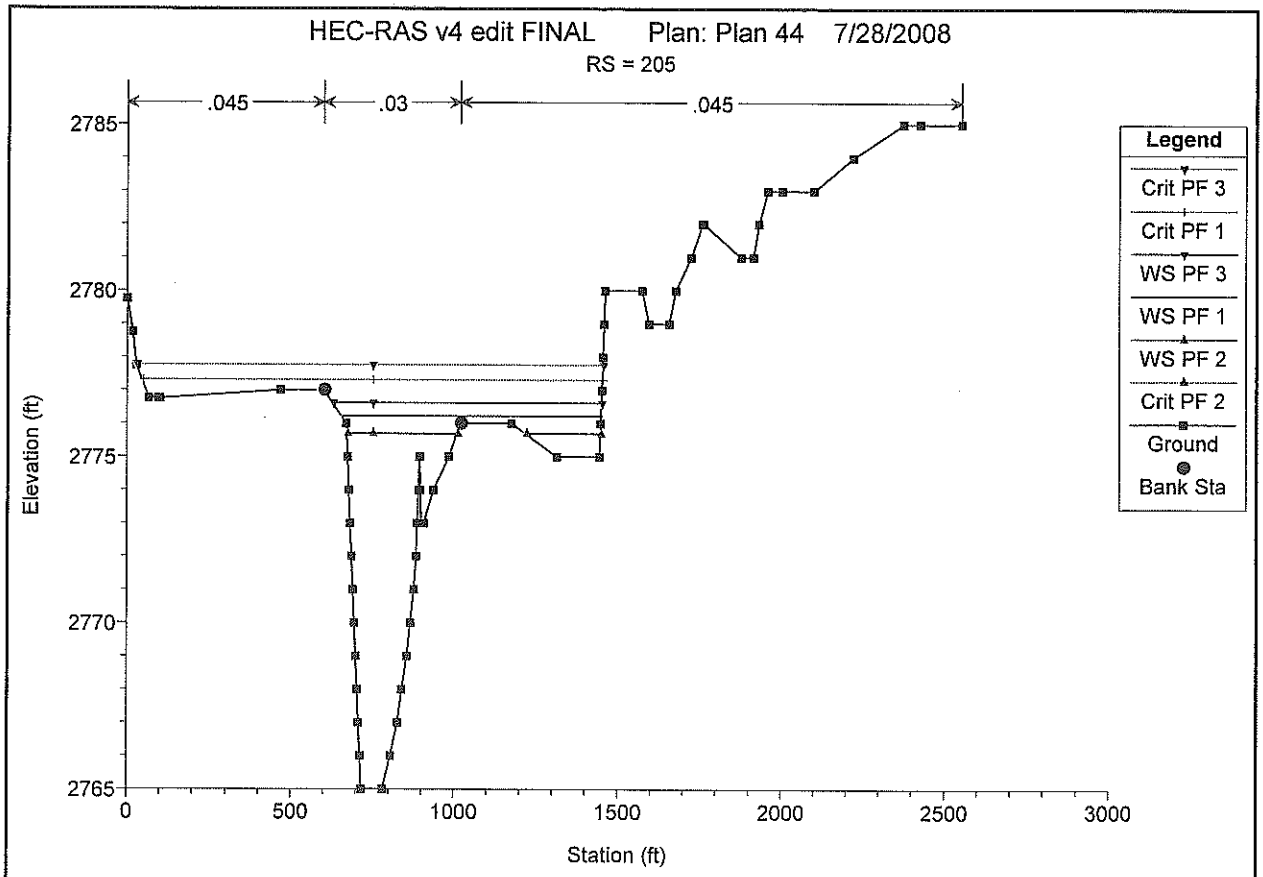
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta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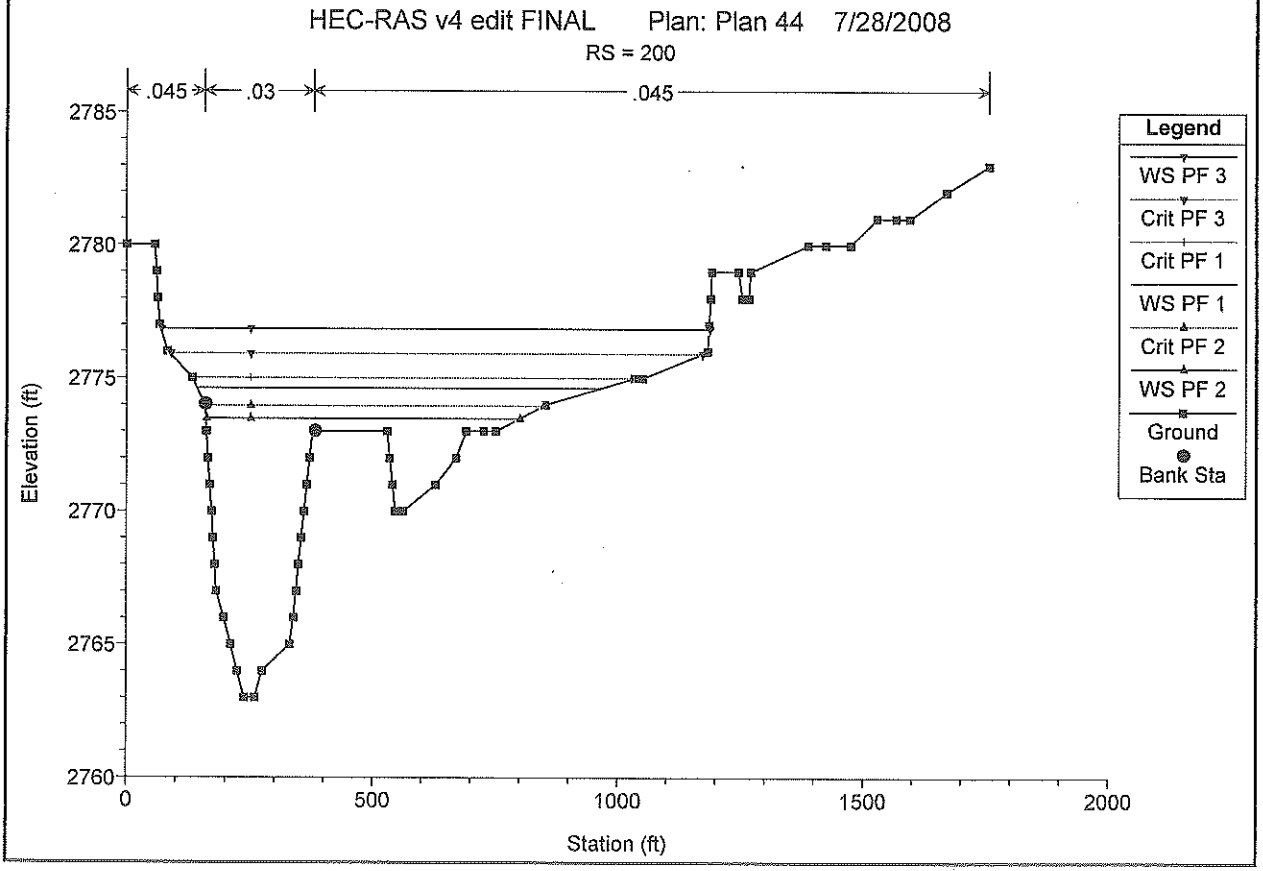
RS = 205
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
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.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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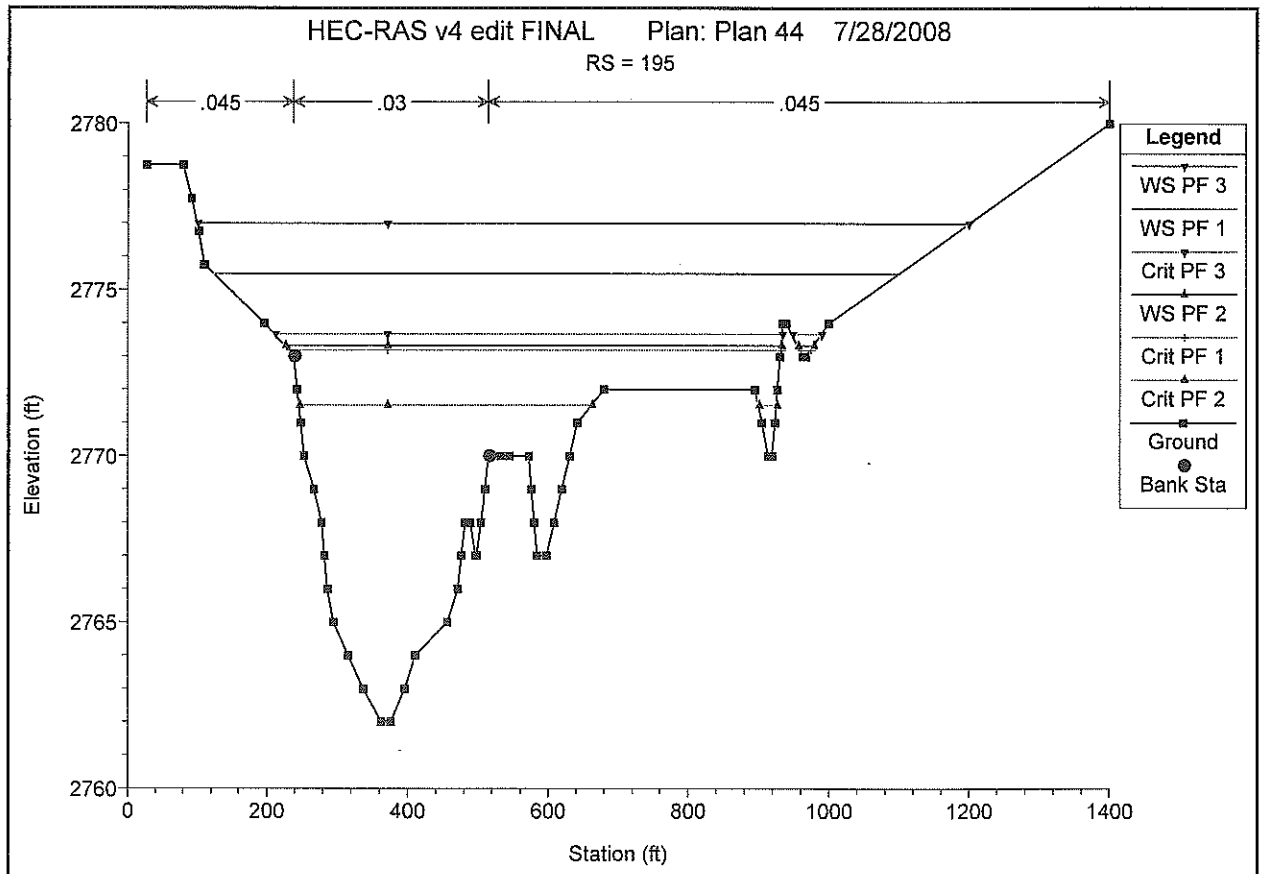
Crit PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
Ground
Bank Sta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.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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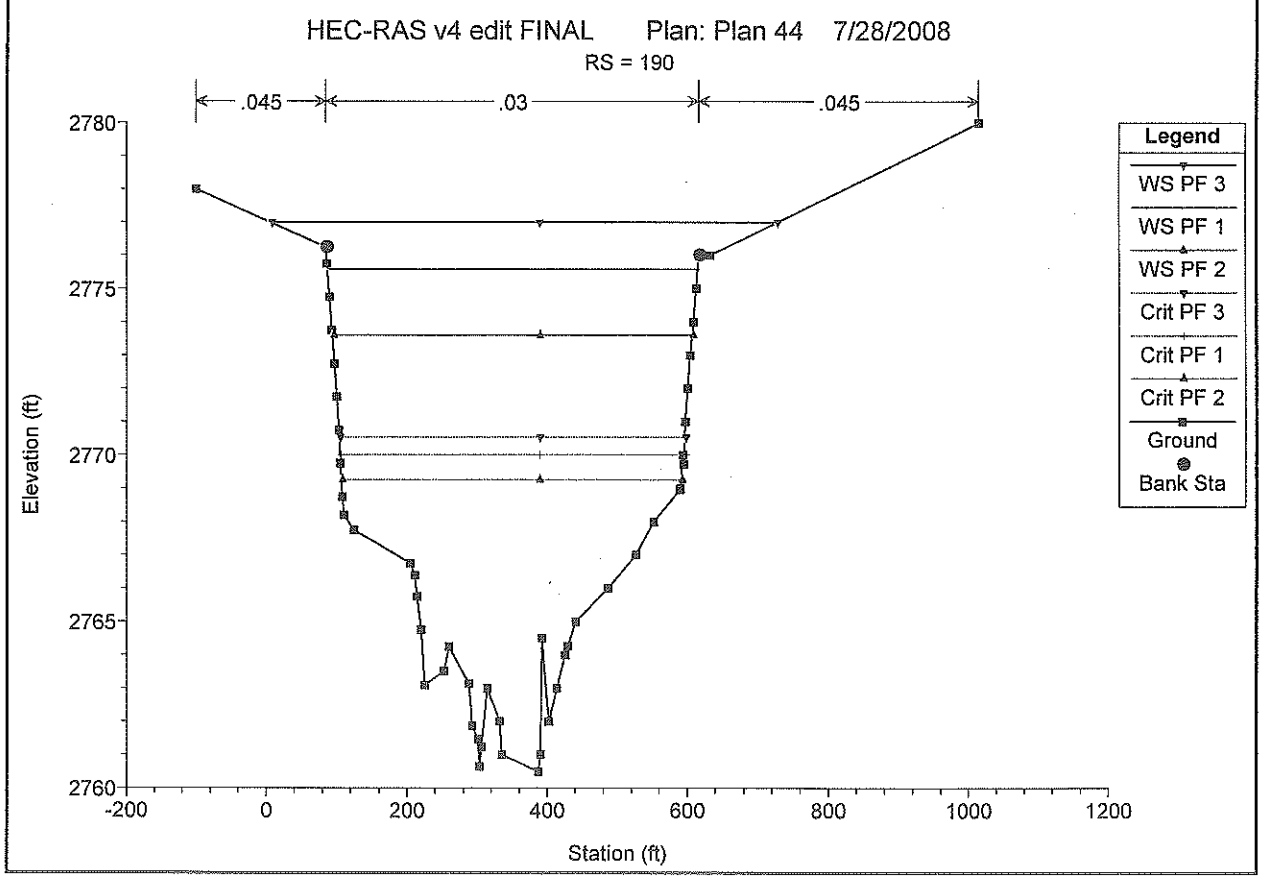
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta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RS = 190
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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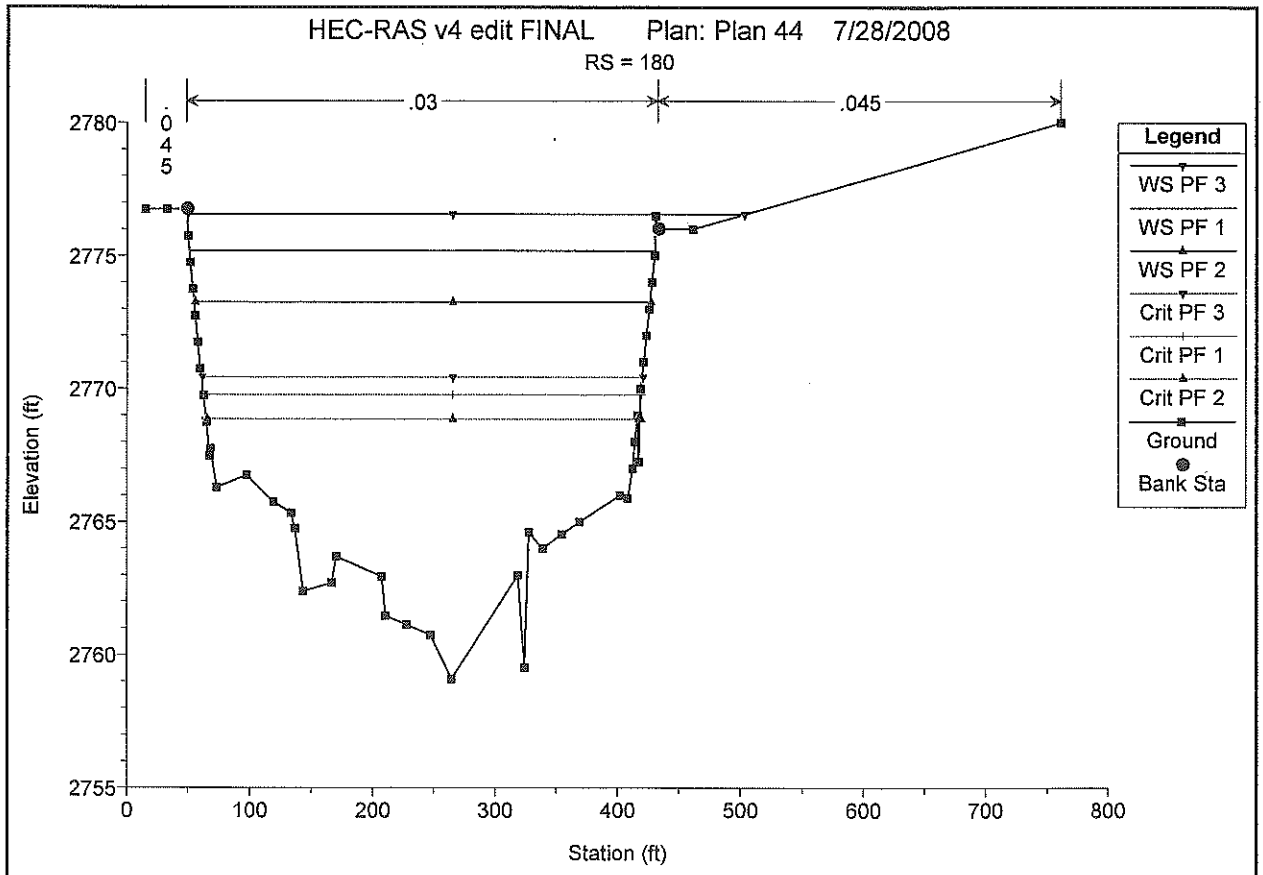
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta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.03
.045
.045
Legend
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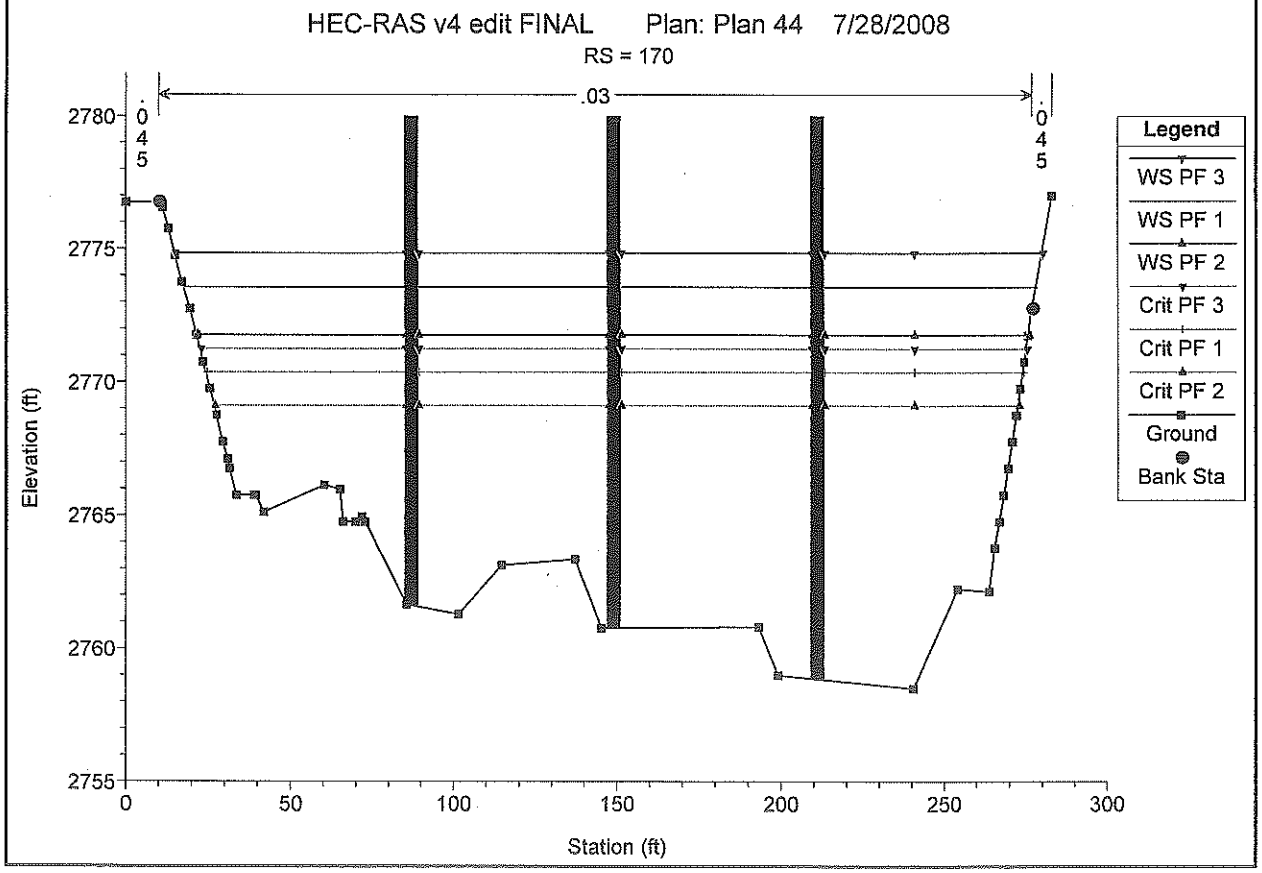
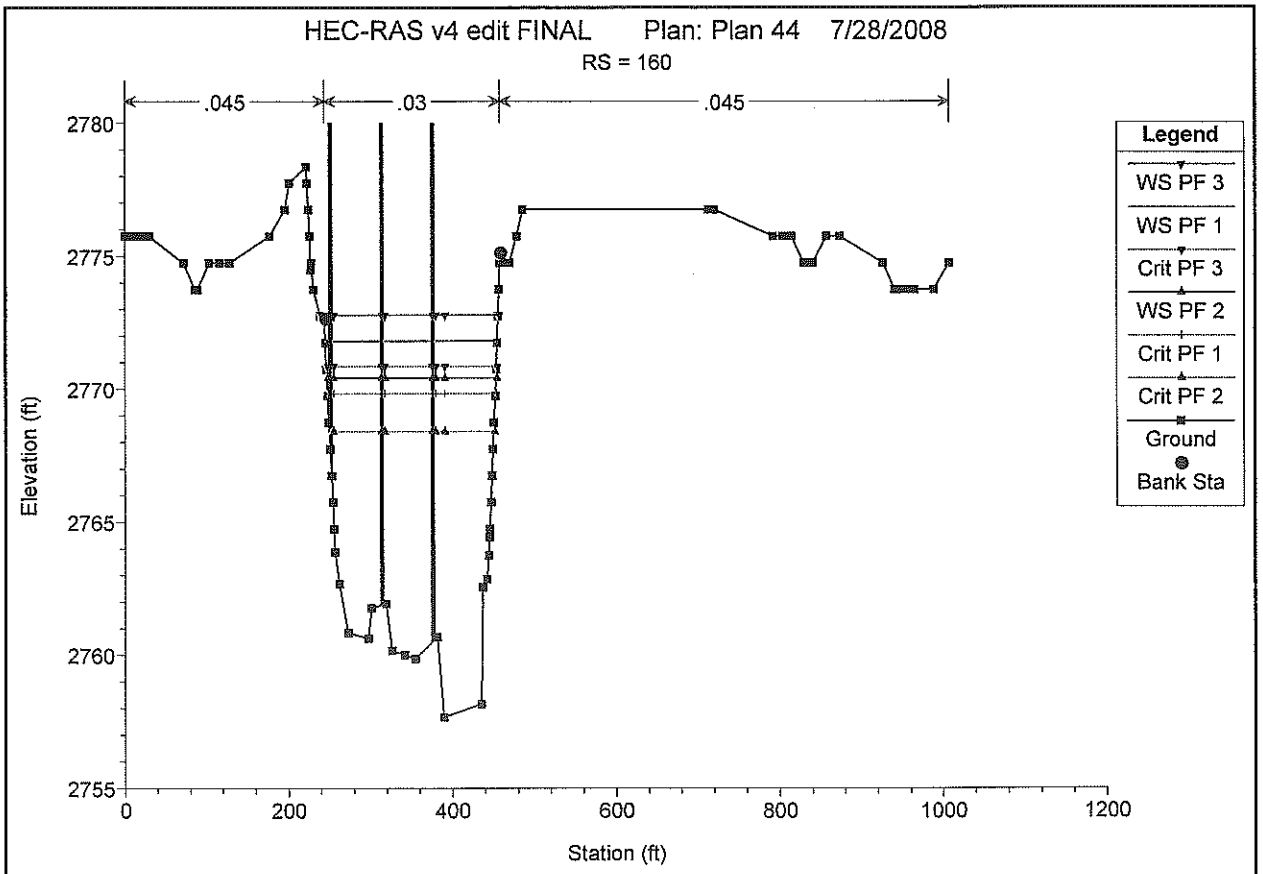
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2755
2760
2765
2770
2775
2780
0
100
200
300
400
500
600
700
800


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
RS = 170
.03
.045
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2755
2760
2765
2770
2775
2780
0
50
100
150
200
250
300


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
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.03
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Elevation (ft)
Station (ft)
Legend
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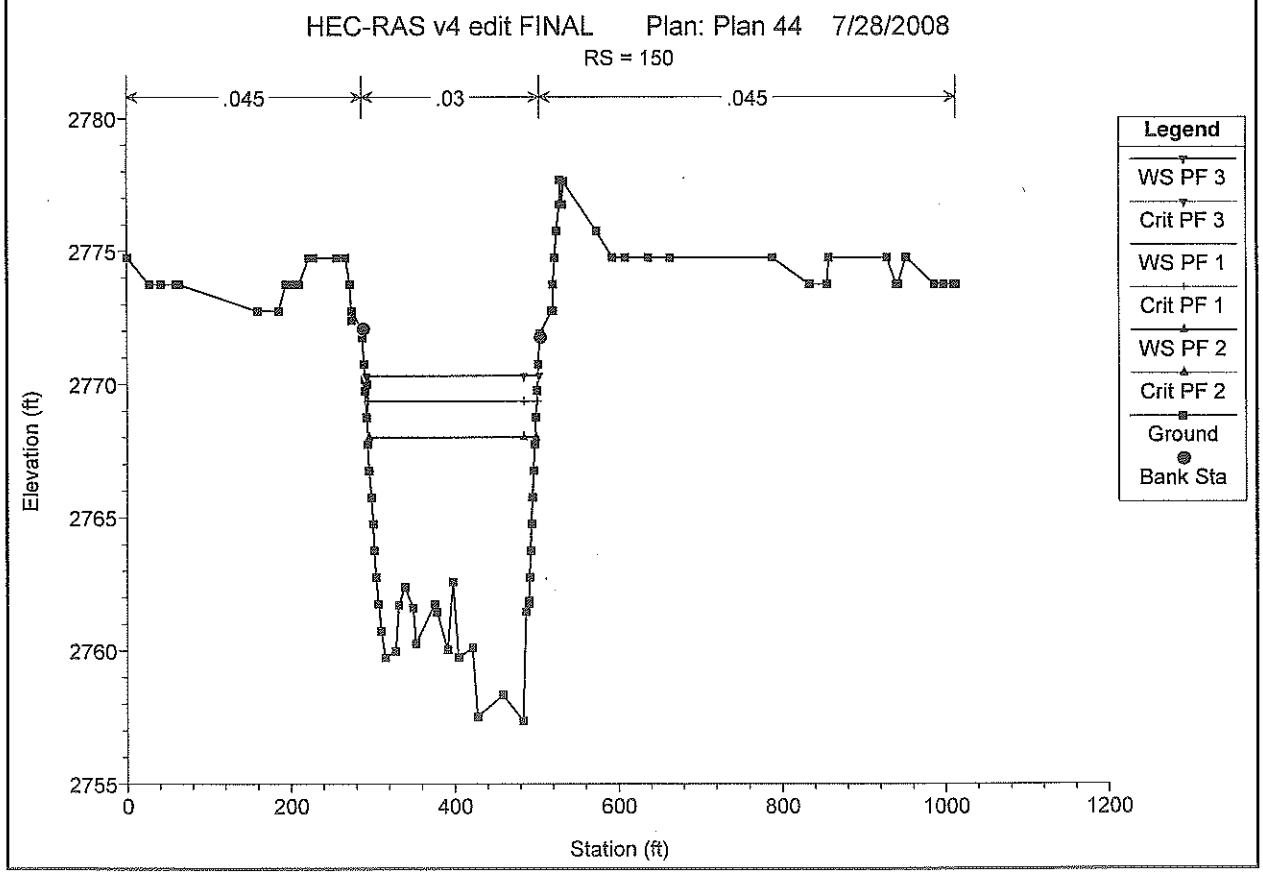
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta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Elevation (ft)
Station (ft)
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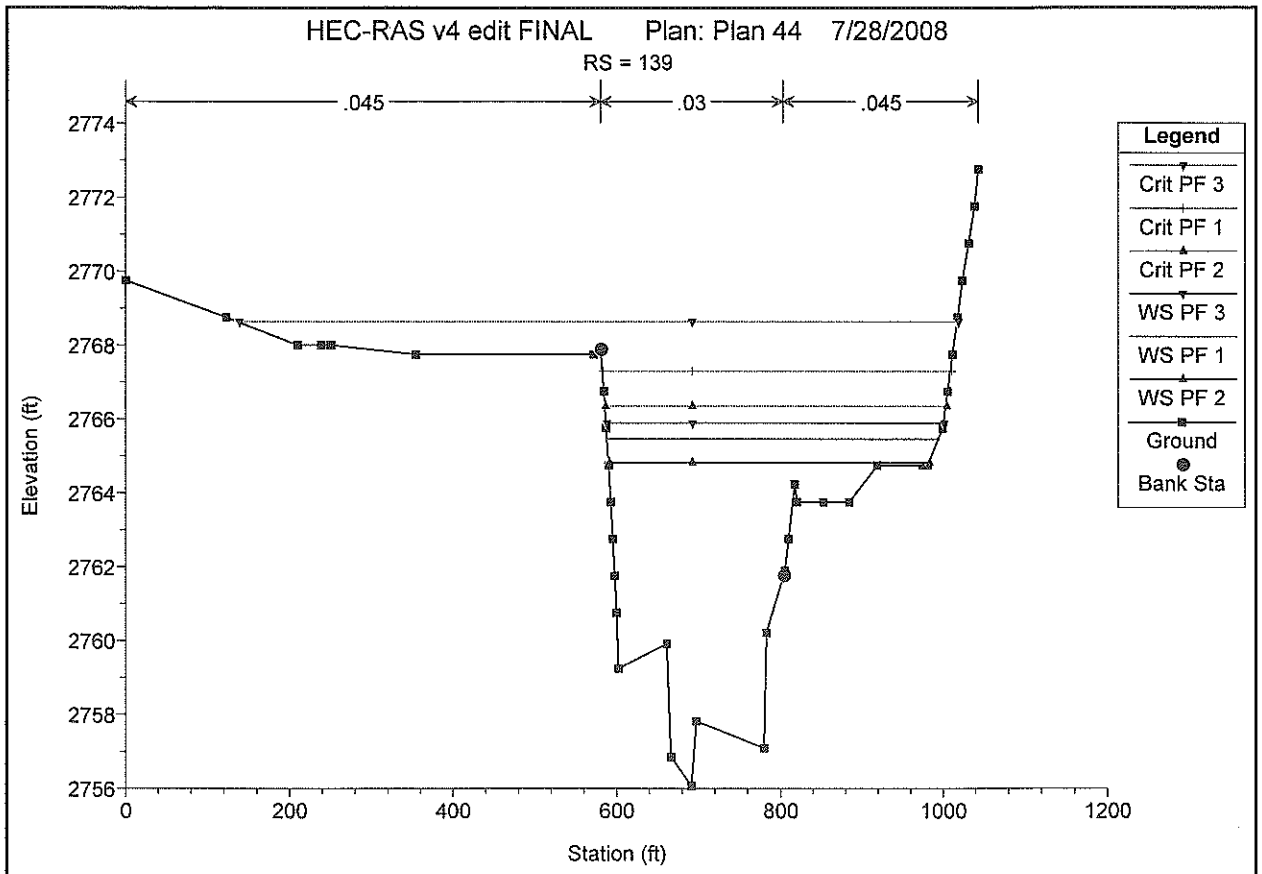
WS PF 2
Crit PF 2
Ground
Bank Sta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.03
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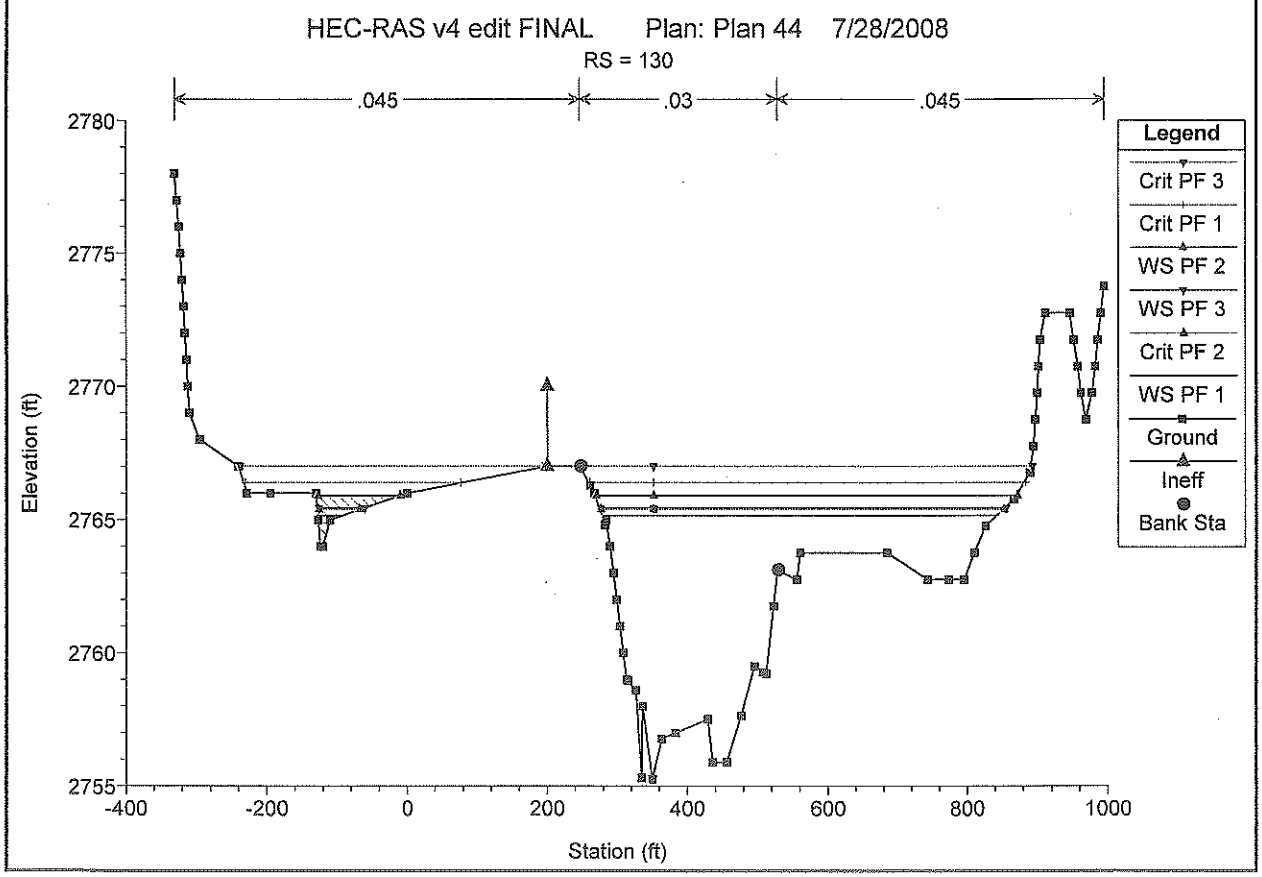
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
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.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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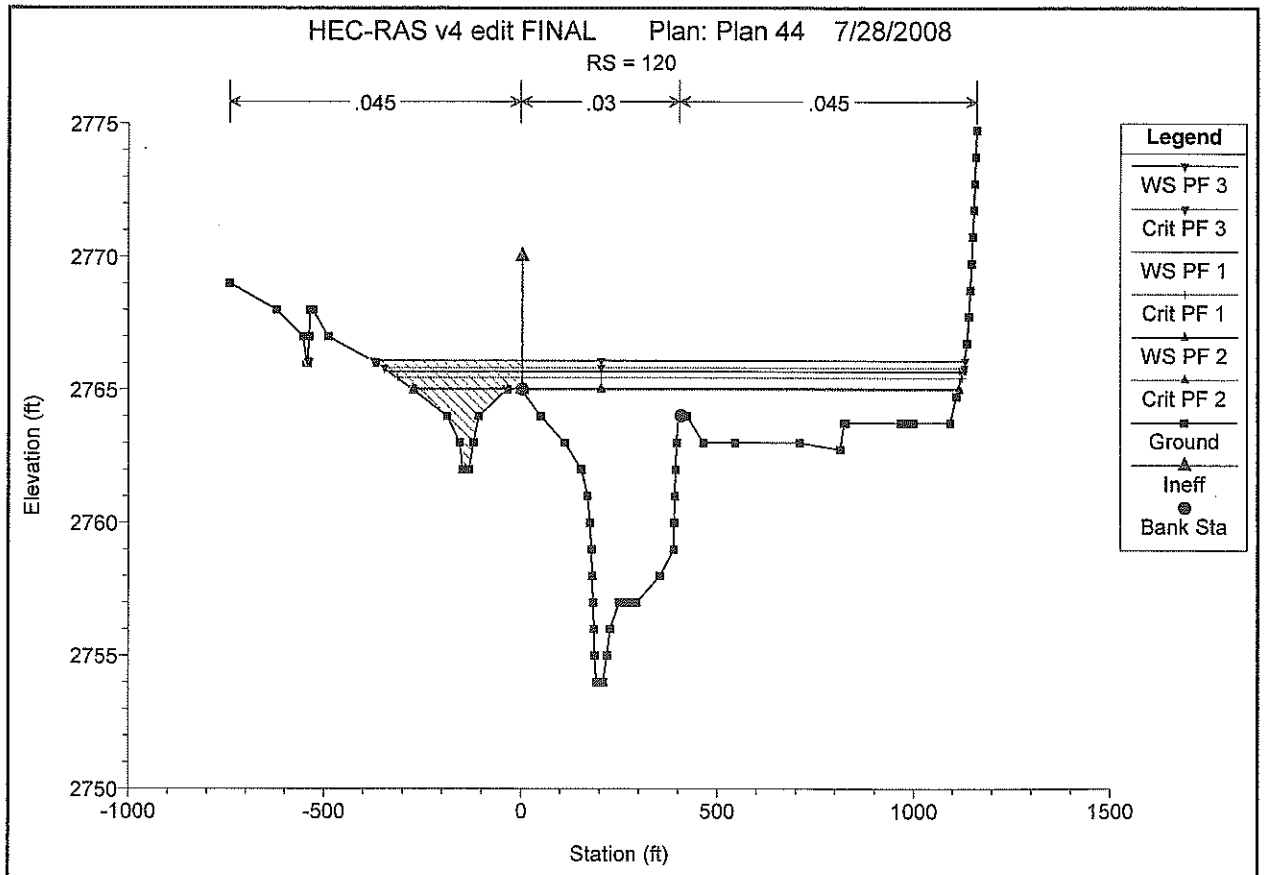
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
WS PF 1
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
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.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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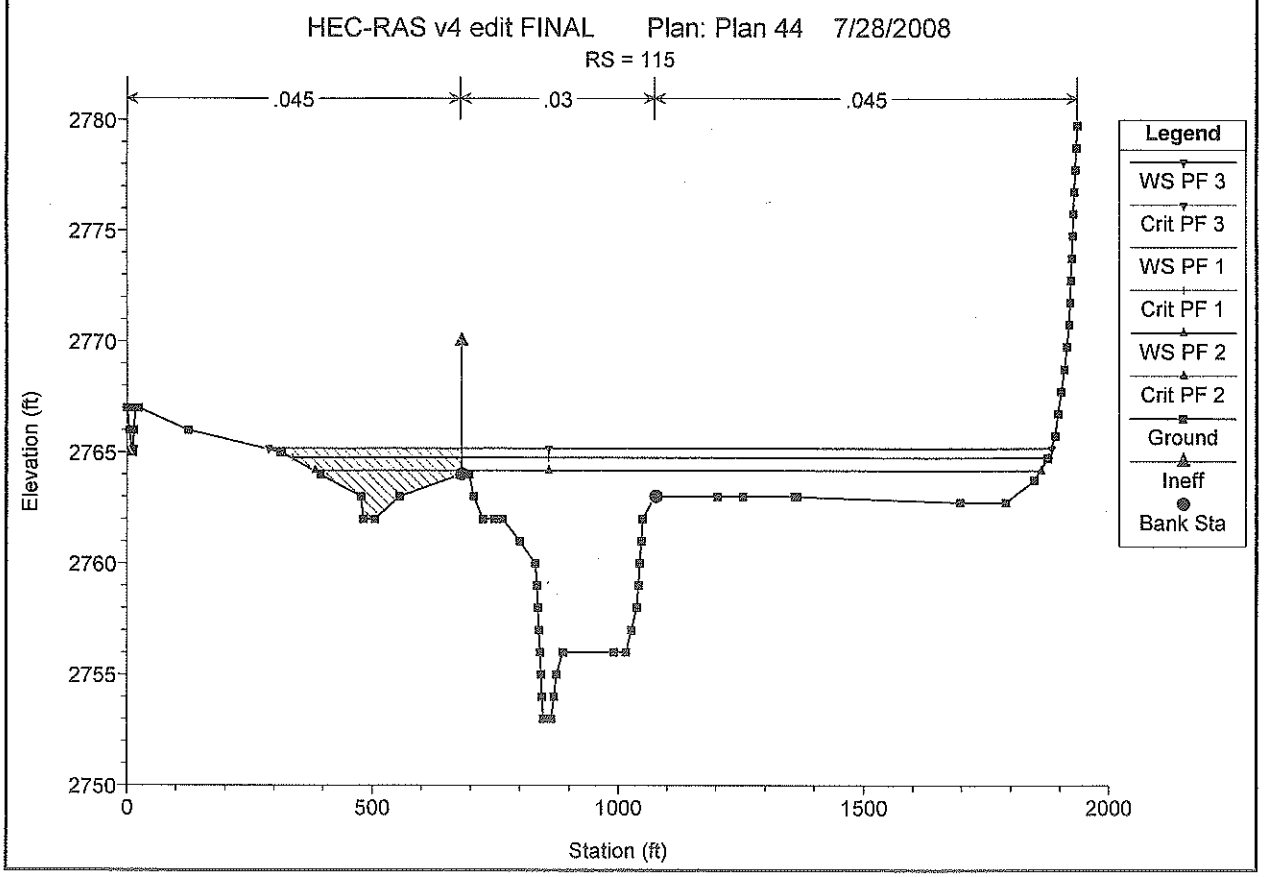
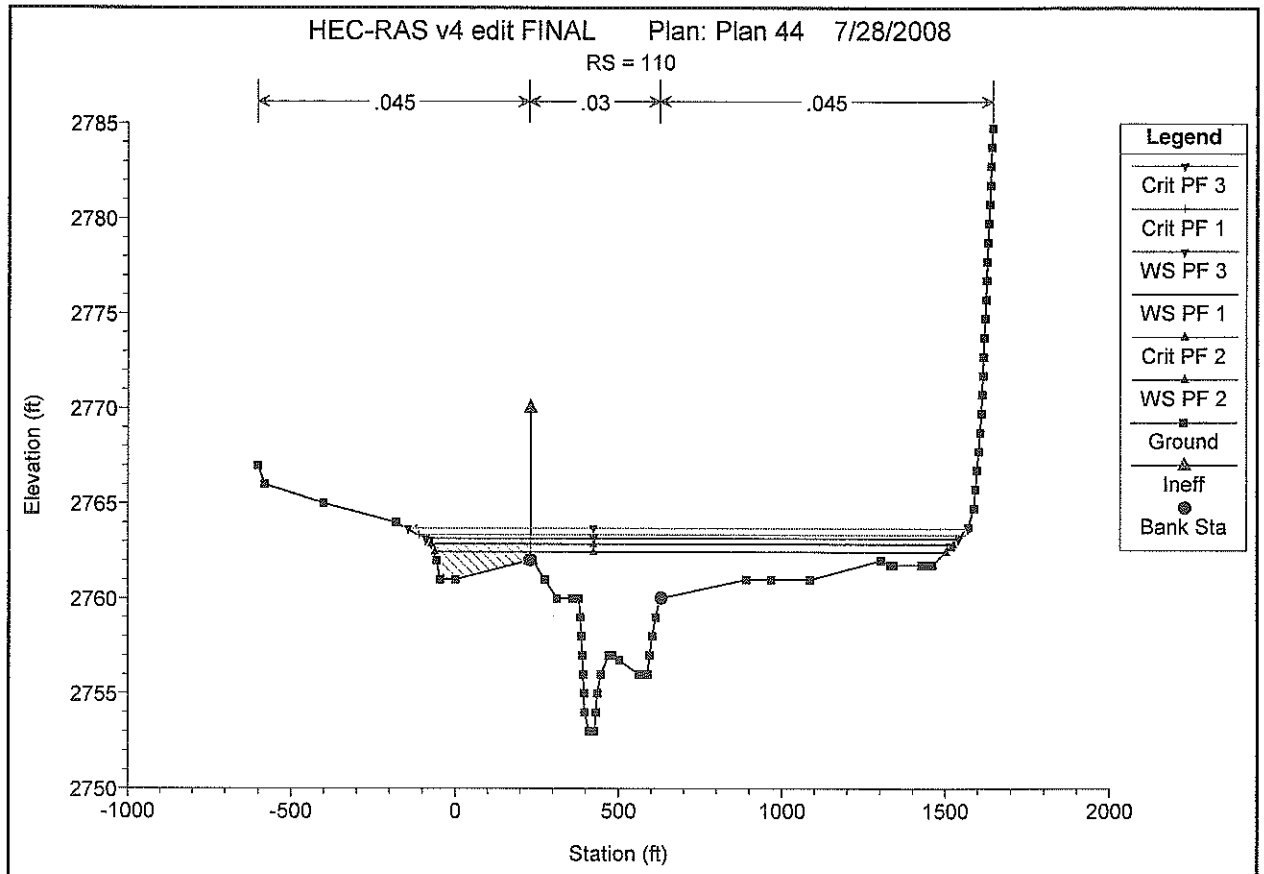
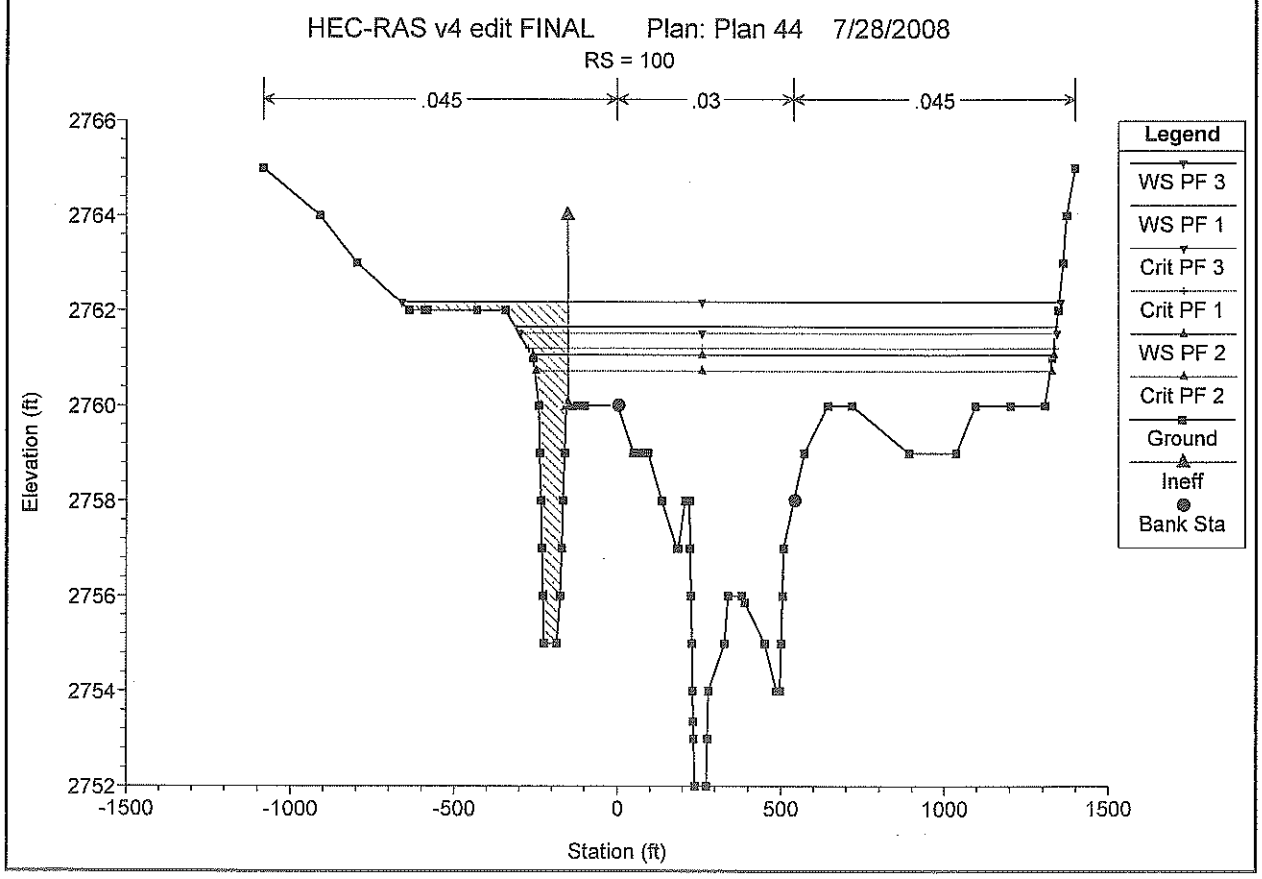
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
RS = 115
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
RS = 110
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
Crit PF 2
WS PF 2
Ground
Ineff
Bank Sta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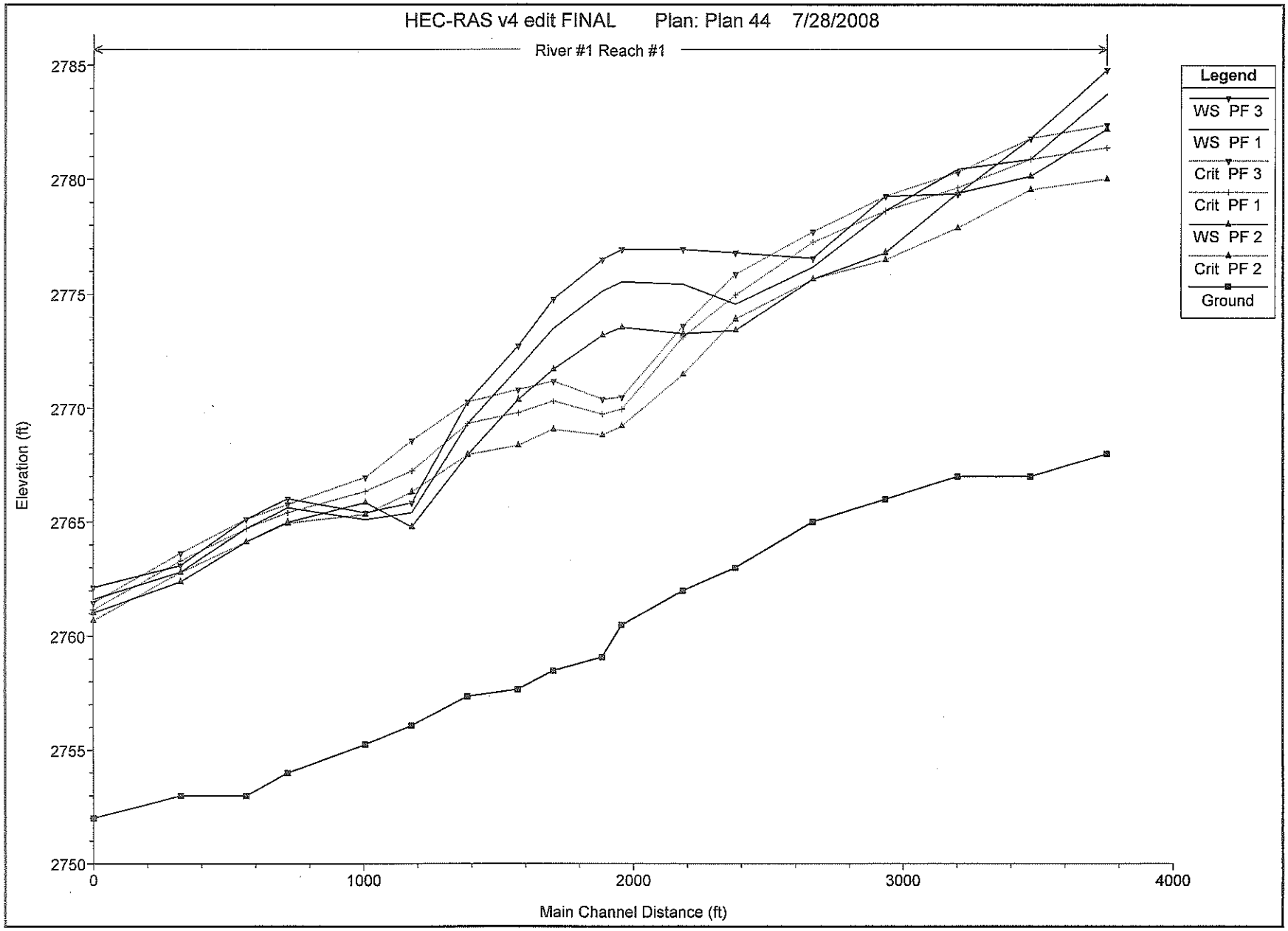
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 44 7/28/2008
River #1 Reach #1
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Elevation (ft)
2785
2780
2775
2770
2765
2760
2755
2750
0
1000
2000
3000
4000
Main Channel Distance (ft)

ALTERNATIVE 3A

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

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PROJECT DATA
Project Title: HEC-RAS v4 edit FINAL
Project File : v4_FINAL.prj
Run Date and Time: 8/20/2008 3:52:35 PM

Project in English units

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PLAN DATA

Plan Title: Plan 50
Plan File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.p50

          Geometry Title: Alternative 3a
          Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g05

          Flow Title    : Flow Profiles
          Flow File     : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Plan Summary Information:
Number of:  Cross Sections =   18    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

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

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


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FLOW DATA

Flow Title: Flow Profiles
Flow File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Flow Data (cfs)
*********************************************************************************************
* River           Reach           RS      *           PF 1            PF 2            PF 3 *
* River #1        Reach #1        225     *          31000           24490           36000 *
*********************************************************************************************

Boundary Conditions
*****************************************************************************************************
* River           Reach           Profile         *           Upstream                Downstream    *
*****************************************************************************************************
* River #1        Reach #1        PF 1            *       Known WS = 2784.88      Known WS = 2761.65 *
* River #1        Reach #1        PF 2            *        Known WS = 2783.7      Known WS = 2761.06 *
* River #1        Reach #1        PF 3            *       Known WS = 2785.58      Known WS = 2762.17 *
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GEOMETRY DATA

Geometry Title: Alternative 3a
Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g05

CROSS SECTION


RIVER: River #1
REACH: Reach #1           RS: 225

INPUT
Description:
`tation Elevation Data    num=      87
      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*******************************************************************************************
     -600     2787   -527.4     2786  -514.33     2786     -503     2787   -490.5     2787
   -483.14    2786   -430.62    2785  -415.31     2785  -385.29     2785   -379.5     2784
   -373.64    2783   -367.89    2782  -362.54     2781  -335.28     2780  -319.81     2779
   -309.13    2779    -289.6    2780  -286.98     2781  -284.35     2782  -281.73     2783
    -279.1    2784   -265.97    2784  -248.75     2784  -107.38     2784   -45.25     2784
    -31.61    2784    48.35     2784   54.16      2784   56.16      2783   58.16      2782
     60.16    2781    62.16     2780   64.15      2779   66.14      2778   68.14      2777
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70.13	2776	72.11	2775	74.12	2774	76.14	2773	78.74	2772
82.21	2771	85.67	2770	89.14	2769	92.61	2768	122.93	2768
133.3	2769	169.83	2770	179.3	2771	182.56	2772	185.85	2773
191.57	2774	200.62	2775	210.54	2776	215.34	2776	220.78	2775
226.28	2774	226.63	2774	232.86	2775	239.08	2776	251.88	2777
259.19	2778	262.5	2779	265.81	2780	269.11	2781	272.46	2782
277.36	2783	282.24	2784	287.11	2785	294.48	2785	301.44	2784
367.61	2783	378.84	2782	390.07	2781	426.4	2780	455.43	2780
512.28	2781	521.82	2781	734.04	2780	745.89	2779	758.18	2779
772.24	2780	777.86	2781	783.57	2782	799.74	2782	826.6	2782
838.75	2783	841.94	2787						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	48.35	.03	287.11	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.35	287.11	299.75	282.05	262.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	48.35	2790	F
287.11	841.94	2790	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2786.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.66	Wt. n-Val.		0.030	
W.S. Elev (ft)	2783.79	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2781.42	Flow Area (sq ft)		2368.69	
E.G. Slope (ft/ft)	0.003148	Area (sq ft)	331.46	2368.69	1497.45
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	849.40	Top Width (ft)	98.63	226.64	524.13
Vel Total (ft/s)	13.09	Avg. Vel. (ft/s)		13.09	
Max Chl Dpth (ft)	15.79	Hydr. Depth (ft)		10.45	
Conv. Total (cfs)	552522.3	Conv. (cfs)		552522.3	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		231.77	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.01	
Alpha	1.00	Stream Power (lb/ft s)		26.29	
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	18.23	207.18	82.59
C & E Loss (ft)	0.15	Cum SA (acres)	13.69	27.73	38.84

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2784.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	2782.23	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2780.05	Flow Area (sq ft)		2023.49	
E.G. Slope (ft/ft)	0.003108	Area (sq ft)	187.89	2023.49	748.39
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	754.54	Top Width (ft)	85.48	215.90	453.17
Vel Total (ft/s)	12.10	Avg. Vel. (ft/s)		12.10	
Max Chl Dpth (ft)	14.23	Hydr. Depth (ft)		9.37	
Conv. Total (cfs)	439315.6	Conv. (cfs)		439315.6	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		220.49	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		1.78	
Alpha	1.00	Stream Power (lb/ft s)		21.55	
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)	9.84	178.48	48.12
C & E Loss (ft)	0.08	Cum SA (acres)	9.13	26.34	31.88

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2787.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.95	Wt. n-Val.		0.030	
W.S. Elev (ft)	2784.84	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2782.42	Flow Area (sq ft)		2613.48	
E.G. Slope (ft/ft)	0.003262	Area (sq ft)	712.12	2613.48	2061.12
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1215.25	Top Width (ft)	432.69	237.96	544.60
Vel Total (ft/s)	13.77	Avg. Vel. (ft/s)		13.77	
Max Chl Dpth (ft)	16.84	Hydr. Depth (ft)		10.98	
Conv. Total (cfs)	630296.7	Conv. (cfs)		630296.7	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		243.24	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.19	
Alpha	1.00	Stream Power (lb/ft s)		30.14	
Frctn Loss (ft)	1.26	Cum Volume (acre-ft)	26.23	225.06	108.88
C & E Loss (ft)	0.16	Cum SA (acres)	17.90	28.16	41.03

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 220

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-581.45	2790	-578.15	2789	-569.74	2788	-557.64	2787	-527.23	2786
-505.43	2785	-463.74	2785	-455.79	2785	-443.54	2785	-433.72	2785
-425.53	2784	-417.97	2783	-380.36	2783	-349.98	2783	-307.83	2783
-282.84	2783	-261.98	2782	-239.35	2781	-190.7	2780	-183.94	2779
-175.54	2778	-157.15	2777	-133.21	2777	-112.75	2778	-89.46	2779
0	2780	93.96	2781	93.97	2781	123.68	2781	123.69	2781
125.31	2780	126.91	2779	128.5	2778	128.51	2778	130.1	2777
131.69	2776	131.7	2775.99	133.28	2775	134.86	2774	134.87	2774
136.44	2773	136.45	2772.99	138.01	2772	138.02	2772	139.58	2771
139.59	2770.99	141.14	2770	141.15	2769.99	142.52	2769	159.27	2768
159.28	2768	162.78	2767	187.06	2767	198.25	2768	198.26	2768
204.67	2769	210.08	2770	213.61	2771	215.17	2772	215.18	2772
221.37	2773	224.62	2773.16	241.47	2774	241.48	2774	279.56	2774
320.64	2774	324.91	2775	324.92	2775	329.19	2776	333.46	2777
333.47	2777	337.74	2778	342.02	2779	346.29	2780	346.3	2780
351.04	2781	354.75	2781.74	356.06	2782	468.74	2782	570.77	2781
570.78	2781	576.15	2780	582.31	2779	588.49	2778	588.5	2778
635.74	2778	648.28	2778	648.29	2778	650.75	2778	650.76	2778
657.91	2779	677.66	2780	677.67	2780	685.61	2780	704.82	2779
761.06	2779	800.38	2779	800.39	2779	821.89	2778	871.9	2778
871.91	2778	918.79	2779	922.82	2780	922.83	2780	927.55	2781
927.56	2781	954.11	2782	954.12	2782	1008.32	2783	1008.33	2783

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-581.45	.045	123.69	.03	354.75	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
123.69	354.75	277.65	269.4	261.19	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-581.45	123.69	2785	F
354.75	1008.33	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2785.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.92	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2780.92	Flow Area (sq ft)		1897.98	
E.G. Slope (ft/ft)	0.006598	Area (sq ft)	500.52	1897.98	790.65
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	904.77	Top Width (ft)	321.96	226.84	355.97
Vel Total (ft/s)	16.33	Avg. Vel. (ft/s)		16.33	
Max Chl Dpth (ft)	13.92	Hydr. Depth (ft)		8.37	
Conv. Total (cfs)	381638.5	Conv. (cfs)		381638.5	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		232.04	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.37	
Alpha	1.00	Stream Power (lb/ft s)		55.03	
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)	15.36	193.37	75.71
C & E Loss (ft)	0.48	Cum SA (acres)	12.24	26.26	36.19

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: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2783.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.12	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.16	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2779.58	Flow Area (sq ft)		1728.23	
E.G. Slope (ft/ft)	0.005463	Area (sq ft)	297.80	1728.23	524.30
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	784.47	Top Width (ft)	214.10	222.03	348.34
Vel Total (ft/s)	14.17	Avg. Vel. (ft/s)		14.17	
Max Chl Dpth (ft)	13.16	Hydr. Depth (ft)		7.78	
Conv. Total (cfs)	331339.7	Conv. (cfs)		331339.7	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		226.94	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.60	
Alpha	1.00	Stream Power (lb/ft s)		36.81	
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	8.17	166.33	44.29
C & E Loss (ft)	0.29	Cum SA (acres)	8.10	24.93	29.47

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

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2786.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.54	Wt. n-Val.		0.030	
W.S. Elev (ft)	2781.82	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2781.82	Flow Area (sq ft)		2104.79	
E.G. Slope (ft/ft)	0.006460	Area (sq ft)	832.95	2104.79	1156.10
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1075.72	Top Width (ft)	381.66	231.06	463.00
Vel Total (ft/s)	17.10	Avg. Vel. (ft/s)		17.10	
Max Chl Dpth (ft)	14.82	Hydr. Depth (ft)		9.11	
Conv. Total (cfs)	447891.0	Conv. (cfs)		447891.0	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		236.36	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.59	
Alpha	1.00	Stream Power (lb/ft s)		61.43	
Prctn Loss (ft)	1.57	Cum Volume (acre-ft)	20.92	209.78	99.20
C & E Loss (ft)	0.44	Cum SA (acres)	15.10	26.64	38.00

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: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 215

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600	2791	-597.36	2790	-594.38	2789	-591.34	2788	-588.34	2787
-585.87	2786	-583.46	2785	-574.84	2784	-529.58	2783	-494.62	2782
-493.31	2782	-466.31	2782	-418.17	2781	-406.34	2781	-357.18	2781
-292.94	2780	22.72	2779	71.36	2778	79.77	2777	83.57	2776
87.37	2775	91.17	2774	94.97	2773	97.27	2772	99.2	2771
101.13	2770	103.06	2769	111.41	2768	118.38	2767	160.1	2767
165.01	2768	169.93	2769	174.87	2770	240.22	2771	270.17	2772
274.15	2773	280.87	2774	287.59	2775	294.31	2776	301.03	2777
307.75	2778	350.35	2779	373.61	2780	494.04	2780	528.29	2779
542.52	2778	588.86	2777	611.04	2776	639.44	2776	644.41	2777
652.37	2778	665.66	2779	769.93	2779	798.66	2778	809.36	2777
839.56	2776	858.07	2776	928.58	2777	933.82	2778	939.05	2779
944.29	2780	950.35	2781						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	22.72	.03	350.35	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
22.72	350.35	294.95	268.22	230.48	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	22.72	2785	F
357.15	950.35	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2783.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2780.49	Reach Len. (ft)	294.95	268.22	230.48
Crit W.S. (ft)	2779.67	Flow Area (sq ft)		2416.70	9.10
E.G. Slope (ft/ft)	0.004711	Area (sq ft)	318.35	2416.70	1327.16
Q Total (cfs)	31000.00	Flow (cfs)		30974.96	25.04
Top Width (ft)	1271.30	Top Width (ft)	346.79	327.63	596.88
Vel Total (ft/s)	12.78	Avg. Vel. (ft/s)		12.82	2.75
Max Chl Dpth (ft)	13.48	Hydr. Depth (ft)		7.38	1.34
Conv. Total (cfs)	451664.8	Conv. (cfs)		451300.0	364.8
Length Wtd. (ft)	268.20	Wetted Per. (ft)		330.12	6.81
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.15	0.39
Alpha	1.01	Stream Power (lb/ft s)		27.59	1.08
Prctn Loss (ft)	1.56	Cum Volume (acre-ft)	12.75	180.03	69.36
C & E Loss (ft)	0.02	Cum SA (acres)	10.11	24.54	33.34

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2781.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.17	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2779.44	Reach Len. (ft)	294.95	268.22	230.48
Crit W.S. (ft)	2777.92	Flow Area (sq ft)		2073.47	1.98
E.G. Slope (ft/ft)	0.004906	Area (sq ft)	30.14	2073.47	781.98

* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24487.99	*	2.01 *
* Top Width (ft)	* 903.76	* Top Width (ft)	*	137.95	* 327.63	*	438.18 *
* Vel Total (ft/s)	* 11.80	* Avg. Vel. (ft/s)	*		* 11.81	*	1.01 *
* Max Chl Dpth (ft)	* 12.44	* Hydr. Depth (ft)	*		* 6.33	*	0.29 *
* Conv. Total (cfs)	*349644.7	* Conv. (cfs)	*		*349616.0	*	28.7 *
* Length Wtd. (ft)	* 268.22	* Wetted Per. (ft)	*		* 330.12	*	6.81 *
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 1.92	*	0.09 *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 22.72	*	0.09 *
* Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	*	7.12	* 154.58	*	40.38 *
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	*	6.98	* 23.23	*	27.11 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2784.13	* Element	*	Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.72	* Wt. n-Val.	*		* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2779.41	* Reach Len. (ft)	*	294.95	* 268.22	* 230.48	*
* Crit W.S. (ft)	* 2780.35	* Flow Area (sq ft)	*		* 2063.55	* 1.77	*
* E.G. Slope (ft/ft)	*0.010772	* Area (sq ft)	*	26.11	* 2063.55	* 768.74	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*35997.52	* 2.48	*
* Top Width (ft)	* 892.30	* Top Width (ft)	*	128.39	* 327.63	* 436.28	*
* Vel Total (ft/s)	* 17.43	* Avg. Vel. (ft/s)	*		* 17.44	* 1.40	*
* Max Chl Dpth (ft)	* 12.41	* Hydr. Depth (ft)	*		* 6.30	* 0.26	*
* Conv. Total (cfs)	*346857.0	* Conv. (cfs)	*		*346833.1	* 23.9	*
* Length Wtd. (ft)	* 268.20	* Wetted Per. (ft)	*		* 330.12	* 6.81	*
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 4.20	* 0.18	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 73.33	* 0.24	*
* Frctn Loss (ft)	* 2.21	* Cum Volume (acre-ft)	*	18.18	* 196.90	* 93.43	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	13.47	* 24.91	* 35.30	*

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 210

INPUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-614.23	2787.75	-596.1	2786.75	-542.4	2785.75	-516.9	2784.75	-424.44	2783.75
-412.49	2782.75	-394.83	2781.75	-379.82	2780.75	-371.56	2781	-360.26	2780
-302.66	2779	-125.77	2778	-116.44	2778	0	2779	83.98	2779
120.42	2778	175.57	2777	179.48	2776	183.19	2775	186.89	2774
190.59	2773	194.29	2772	198	2771	201.7	2770	205.4	2769
209.11	2768	212.81	2767	216.2	2766	262.35	2766	287.31	2767
299.68	2767.58	308.47	2768	316.57	2769	356.57	2770	363.17	2771
371.31	2772	379.21	2773	387.12	2774	393.96	2775	400.77	2776
419.08	2777	420.22	2777.02	492.78	2778	516.88	2779	542.96	2779
542.97	2779	551.39	2778	559.71	2777	623.32	2776	653.95	2775
677.99	2775	689.88	2776	701.76	2777	713.64	2778	846.55	2778
880.52	2777	931.83	2776	949.52	2775	978.42	2775	1020.01	2776
1023.25	2777	1026.61	2778	1029.97	2779	1033.37	2780	1041.03	2781
1066.33	2782	1122.14	2782						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-614.23	.045	83.98	.03	516.88	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
83.98	516.88	283.6	269.08	254.74	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-614.23	83.98	2783	F
516.88	1122.14	2783	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2781.45	* Element	*	Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.79	* Wt. n-Val.	*		* 0.030	*	*
* W.S. Elev (ft)	* 2778.66	* Reach Len. (ft)	*	283.60	* 269.08	* 254.74	*
* Crit W.S. (ft)	* 2778.66	* Flow Area (sq ft)	*		* 2313.85	*	*
* E.G. Slope (ft/ft)	*0.007383	* Area (sq ft)	*	69.68	* 2313.85	* 952.49	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*		*31000.00	*	*
* Top Width (ft)	* 1097.58	* Top Width (ft)	*	202.40	* 412.21	* 482.97	*
* Vel Total (ft/s)	* 13.40	* Avg. Vel. (ft/s)	*		* 13.40	*	*
* Max Chl Dpth (ft)	* 12.66	* Hydr. Depth (ft)	*		* 5.61	*	*
* Conv. Total (cfs)	*360784.2	* Conv. (cfs)	*		*360784.2	*	*
* Length Wtd. (ft)	* 268.92	* Wetted Per. (ft)	*		* 414.26	*	*
* Min Ch El (ft)	* 2766.00	* Shear (lb/sq ft)	*		* 2.57	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 34.49	*	*
* Frctn Loss (ft)	* 1.53	* Cum Volume (acre-ft)	*	11.44	* 165.47	* 63.33	*
* C & E Loss (ft)	* 0.31	* Cum SA (acres)	*	8.25	* 22.27	* 30.48	*

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

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2780.03	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.19	Wt. n-Val.		0.030	
W.S. Elev (ft)	2776.84	Reach Len. (ft)	283.60	269.08	254.74
Crit W.S. (ft)	2776.53	Flow Area (sq ft)		1708.58	
E.G. Slope (ft/ft)	0.006179	Area (sq ft)		1708.58	279.01
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	503.53	Top Width (ft)		239.90	263.64
Vel Total (ft/s)	14.33	Avg. Vel. (ft/s)		14.33	
Max Chl Dpth (ft)	10.84	Hydr. Depth (ft)		7.12	
Conv. Total (cfs)	311544.8	Conv. (cfs)		311544.8	
Length Wtd. (ft)	269.02	Wetted Per. (ft)		241.89	
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72	
Alpha	1.00	Stream Power (lb/ft s)		39.06	
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	7.02	142.93	37.57
C & E Loss (ft)	0.23	Cum SA (acres)	6.51	21.48	25.25

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2782.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.01	Wt. n-Val.		0.030	
W.S. Elev (ft)	2779.29	Reach Len. (ft)	283.60	269.08	254.74
Crit W.S. (ft)	2779.29	Flow Area (sq ft)		2585.10	
E.G. Slope (ft/ft)	0.007343	Area (sq ft)	271.74	2585.10	1268.72
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1350.50	Top Width (ft)	403.52	432.90	514.09
Vel Total (ft/s)	13.93	Avg. Vel. (ft/s)		13.93	
Max Chl Dpth (ft)	13.29	Hydr. Depth (ft)		5.97	
Conv. Total (cfs)	420112.1	Conv. (cfs)		420112.1	
Length Wtd. (ft)	268.78	Wetted Per. (ft)		434.97	
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72	
Alpha	1.00	Stream Power (lb/ft s)		37.94	
Frctn Loss (ft)	1.51	Cum Volume (acre-ft)	17.17	182.58	88.04
C & E Loss (ft)	0.36	Cum SA (acres)	11.67	22.57	32.79

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 energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 205

INPUT
Description:
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2779.75	17.21	2778.75	28.7	2777.75	66.51	2776.75	94.56	2776.75
100.85	2776.75	468.23	2777	600.71	2777	670.1	2776	673.71	2775
677.6	2774	681.95	2773	686.31	2772	690.66	2771	695.01	2770
699.36	2769	703.71	2768	708.06	2767	712.41	2766	716.76	2765
780.93	2765	805.65	2766	827.39	2767	839.98	2768	855.27	2769
866.08	2770	876.89	2771	884.28	2772	887.51	2773	890.74	2774
893.96	2775	894.82	2775	897.09	2774	899.36	2773	907.15	2773
937.24	2774	983.75	2775	1019.24	2776	1175.04	2776	1314.05	2775
1444.32	2775	1447.57	2776	1450.85	2777	1454.14	2778	1457.58	2779
1460.79	2780	1572.29	2780	1594.22	2779	1655.34	2779	1675.82	2780
1723.5	2781	1758.89	2782	1762.13	2782	1876.53	2781	1913.81	2781
1931.12	2782	1958.13	2783	2003.69	2783	2099.98	2783	2221.07	2784
2374.26	2785	2425.16	2785	2552.13	2785				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	600.71	.03	1019.24	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
600.71	1019.24	280.12	286.64	293.88	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2779.34	Element	Left OB	Channel	Right OB

* Vel Head (ft)	* 3.12	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.22	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.30	* Flow Area (sq ft)	*	* 2116.44	* 294.44	*
* E.G. Slope (ft/ft)	*0.008080	* Area (sq ft)	*	* 2116.44	* 294.44	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30320.23	* 679.77	*
* Top Width (ft)	* 793.24	* Top Width (ft)	*	* 364.20	* 429.04	*
* Vel Total (ft/s)	* 12.86	* Avg. Vel. (ft/s)	*	* 14.33	* 2.31	*
* Max Chl Dpth (ft)	* 11.22	* Hydr. Depth (ft)	*	* 5.81	* 0.69	*
* Conv. Total (cfs)	*344871.9	* Conv. (cfs)	*	*337309.5	* 7562.4	*
* Length Wtd. (ft)	* 287.57	* Wetted Per. (ft)	*	* 366.68	* 429.23	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.91	* 0.35	*
* Alpha	* 1.21	* Stream Power (lb/ft s)	*	* 41.71	* 0.80	*
* Frctn Loss (ft)	* 2.08	* Cum Volume (acre-ft)	* 11.21	* 151.78	* 59.69	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 7.59	* 19.87	* 27.81	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2778.12	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.43	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2775.69	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2775.69	* Flow Area (sq ft)	*	* 1931.75	* 123.12	*
* E.G. Slope (ft/ft)	*0.006333	* Area (sq ft)	*	* 1931.75	* 123.12	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24275.54	* 214.46	*
* Top Width (ft)	* 564.95	* Top Width (ft)	*	* 336.91	* 228.04	*
* Vel Total (ft/s)	* 11.92	* Avg. Vel. (ft/s)	*	* 12.57	* 1.74	*
* Max Chl Dpth (ft)	* 10.69	* Hydr. Depth (ft)	*	* 5.73	* 0.54	*
* Conv. Total (cfs)	*307743.6	* Conv. (cfs)	*	*305048.6	* 2695.0	*
* Length Wtd. (ft)	* 286.88	* Wetted Per. (ft)	*	* 339.34	* 228.14	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.25	* 0.21	*
* Alpha	* 1.10	* Stream Power (lb/ft s)	*	* 28.28	* 0.37	*
* Frctn Loss (ft)	* 1.49	* Cum Volume (acre-ft)	* 7.02	* 131.69	* 36.39	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 6.51	* 19.70	* 23.82	*

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: 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 #PF 3

* E.G. Elev (ft)	* 2780.06	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 3.45	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.61	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.75	* Flow Area (sq ft)	*	* 2263.62	* 461.87	*
* E.G. Slope (ft/ft)	*0.009177	* Area (sq ft)	*	* 2263.62	* 461.87	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*34469.06	* 1530.94	*
* Top Width (ft)	* 821.56	* Top Width (ft)	*	* 391.24	* 430.32	*
* Vel Total (ft/s)	* 13.21	* Avg. Vel. (ft/s)	*	* 15.23	* 3.31	*
* Max Chl Dpth (ft)	* 11.61	* Hydr. Depth (ft)	*	* 5.79	* 1.07	*
* Conv. Total (cfs)	*375805.2	* Conv. (cfs)	*	*359823.7	* 15981.5	*
* Length Wtd. (ft)	* 287.97	* Wetted Per. (ft)	*	* 393.72	* 430.56	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 3.29	* 0.61	*
* Alpha	* 1.28	* Stream Power (lb/ft s)	*	* 50.16	* 2.04	*
* Frctn Loss (ft)	* 2.20	* Cum Volume (acre-ft)	* 16.29	* 167.61	* 82.98	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 10.36	* 20.02	* 30.02	*

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

RIVER: River #1
REACH: Reach #1 RS: 200

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2780	57.36	2780	60.61	2779	63.64	2778	66.72	2777
82.64	2776	133.38	2775	157.32	2774	160.71	2773	164.05	2772
167.4	2771	170.76	2770	174.13	2769	177.5	2768	180.93	2767
196.35	2766	210.46	2765	223.84	2764	238.32	2763	259.65	2763
259.7	2763	274.72	2764	330.68	2765	338.84	2766	343.67	2767
348.5	2768	354.06	2769	359.85	2770	365.64	2771	371.43	2772
377.22	2773	380.61	2773	529.52	2773	534.88	2772	540.16	2771
545.4	2770	561.87	2770	628.9	2771	670.42	2772	691.36	2773
726.72	2773	751.79	2773	852.22	2774	1033.68	2775	1050.22	2775
1183.08	2776	1186.05	2777	1189.02	2778	1191.99	2779	1246.04	2779
1253.82	2778	1267.34	2778	1270.81	2779	1388.57	2780	1424.17	2780
1424.18	2780	1474.73	2780	1528.93	2781	1568.19	2781	1595.98	2781
1670.08	2782	1757.29	2783						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	157.32	.03	380.61	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
157.32	380.61	179.8	195.07	210.23	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2777.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.74	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2775.79	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2774.99	Flow Area (sq ft)	46.53	2161.55	1865.38
E.G. Slope (ft/ft)	0.002710	Area (sq ft)	46.53	2161.55	1865.38
Q Total (cfs)	31000.00	Flow (cfs)	64.74	25173.80	5761.46
Top Width (ft)	1061.35	Top Width (ft)	63.88	223.29	774.19
Vel Total (ft/s)	7.61	Avg. Vel. (ft/s)	1.39	11.65	3.09
Max Chl Dpth (ft)	12.79	Hydr. Depth (ft)	0.73	9.68	2.41
Conv. Total (cfs)	595483.4	Conv. (cfs)	1243.5	483567.1	110672.7
Length Wtd. (ft)	198.03	Wetted Per. (ft)	63.91	225.19	774.52
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.12	1.62	0.41
Alpha	1.93	Stream Power (lb/ft s)	0.17	18.91	1.26
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	11.06	137.71	52.40
C & E Loss (ft)	0.28	Cum SA (acres)	7.39	17.93	23.76

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2776.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2773.47	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2773.95	Flow Area (sq ft)		1643.45	496.72
E.G. Slope (ft/ft)	0.005630	Area (sq ft)		1643.45	496.72
Q Total (cfs)	24490.00	Flow (cfs)		23109.66	1380.34
Top Width (ft)	639.31	Top Width (ft)		221.48	417.84
Vel Total (ft/s)	11.44	Avg. Vel. (ft/s)		14.06	2.78
Max Chl Dpth (ft)	10.46	Hydr. Depth (ft)		7.42	1.19
Conv. Total (cfs)	326395.8	Conv. (cfs)		307999.0	18396.8
Length Wtd. (ft)	196.79	Wetted Per. (ft)		223.29	418.17
Min Ch El (ft)	2763.00	Shear (lb/sq ft)		2.59	0.42
Alpha	1.43	Stream Power (lb/ft s)		36.37	1.16
Frctn Loss (ft)	1.71	Cum Volume (acre-ft)	7.02	119.93	34.30
C & E Loss (ft)	0.05	Cum SA (acres)	6.51	17.86	21.64

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2778.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.04	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2777.61	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2775.91	Flow Area (sq ft)	199.88	2568.88	3330.11
E.G. Slope (ft/ft)	0.001471	Area (sq ft)	199.88	2568.88	3330.11
Q Total (cfs)	36000.00	Flow (cfs)	422.73	24733.35	10843.92
Top Width (ft)	1123.03	Top Width (ft)	92.48	223.29	807.26
Vel Total (ft/s)	5.90	Avg. Vel. (ft/s)	2.11	9.63	3.26
Max Chl Dpth (ft)	14.61	Hydr. Depth (ft)	2.16	11.50	4.13
Conv. Total (cfs)	938512.9	Conv. (cfs)	11020.5	644793.6	282698.8
Length Wtd. (ft)	199.08	Wetted Per. (ft)	92.64	225.19	807.86
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.20	1.05	0.38
Alpha	1.92	Stream Power (lb/ft s)	0.42	10.09	1.23
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	15.64	151.71	70.19
C & E Loss (ft)	0.11	Cum SA (acres)	10.06	18.00	25.85

Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 195

INPUT
Description:
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
26.87	2778.75	80.18	2778.75	91.81	2777.75	102.18	2776.75	109.95	2775.75
196.7	2774	238.41	2773	243.26	2772	248.12	2771	252.97	2770
267.11	2769	278.26	2768	282.3	2767	286.64	2766	294.54	2765
315.54	2764	336.81	2763	362.46	2762	375.59	2762	395.84	2763
410.49	2764	456.09	2765	471.11	2766	476.14	2767	481.17	2768
488.94	2768	495.94	2767	498.12	2767	504.07	2768	509.82	2769
514.48	2770	532.03	2770	544.86	2770	571.92	2770	575.9	2769
579.84	2768	583.78	2767	597.25	2767	608.28	2768	619.31	2769
630.34	2770	641.37	2771	679.44	2772	894.51	2772	904.56	2771
913.16	2770	918.98	2770	922.78	2771	926.49	2772	930.19	2773
933.9	2774	939.14	2774	962.74	2773	967.03	2773	999.74	2774
1400	2780								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
26.87	.045	238.41	.03	514.48	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
238.41	514.48	215.83	225.58	311.98	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2776.91	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.81	Wt. n-Val.	0.045	0.030	0.045

W.S. Elev (ft)	2776.10	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2773.18	Flow Area (sq ft)	215.65	2960.04	2444.43
E.G. Slope (ft/ft)	0.001134	Area (sq ft)	215.65	2960.04	2444.43
Q Total (cfs)	31000.00	Flow (cfs)	333.95	23930.63	6735.43
Top Width (ft)	1032.86	Top Width (ft)	131.21	276.07	625.59
Vel Total (ft/s)	5.52	Avg. Vel. (ft/s)	1.55	8.08	2.76
Max Chl Dpth (ft)	14.10	Hydr. Depth (ft)	1.64	10.72	3.91
Conv. Total (cfs)	920384.8	Conv. (cfs)	9914.8	710496.2	199973.7
Length Wtd. (ft)	234.91	Wetted Per. (ft)	131.26	277.47	626.84
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.12	0.76	0.28
Alpha	1.71	Stream Power (lb/ft s)	0.18	6.11	0.76
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	10.52	126.24	42.00
C & E Loss (ft)	0.10	Cum SA (acres)	6.98	16.82	20.38

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2775.00	Element			
Vel Head (ft)	1.06	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2773.94	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2771.52	Flow Area (sq ft)	18.28	2361.73	1245.62
E.G. Slope (ft/ft)	0.001844	Area (sq ft)	18.28	2361.73	1245.62
Q Total (cfs)	24490.00	Flow (cfs)	15.63	20943.34	3531.03
Top Width (ft)	791.32	Top Width (ft)	39.05	276.07	476.20
Vel Total (ft/s)	6.75	Avg. Vel. (ft/s)	0.85	8.87	2.83
Max Chl Dpth (ft)	11.94	Hydr. Depth (ft)	0.47	8.55	2.62
Conv. Total (cfs)	570242.3	Conv. (cfs)	363.9	487659.5	82218.9
Length Wtd. (ft)	231.81	Wetted Per. (ft)	39.06	277.47	477.42
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.05	0.98	0.30
Alpha	1.50	Stream Power (lb/ft s)	0.05	8.69	0.85
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	6.98	110.96	30.10
C & E Loss (ft)	0.18	Cum SA (acres)	6.43	16.75	19.48

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	2778.32	Element			
Vel Head (ft)	0.67	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2777.65	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2773.66	Flow Area (sq ft)	429.53	3388.17	3494.79
E.G. Slope (ft/ft)	0.000834	Area (sq ft)	429.53	3388.17	3494.79
Q Total (cfs)	36000.00	Flow (cfs)	841.85	25695.72	9462.43
Top Width (ft)	1150.72	Top Width (ft)	145.61	276.07	729.04
Vel Total (ft/s)	4.92	Avg. Vel. (ft/s)	1.96	7.58	2.71
Max Chl Dpth (ft)	15.65	Hydr. Depth (ft)	2.95	12.27	4.79
Conv. Total (cfs)	1246756.0	Conv. (cfs)	29154.9	889897.1	327703.8
Length Wtd. (ft)	236.94	Wetted Per. (ft)	145.74	277.47	730.30
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.15	0.64	0.25
Alpha	1.78	Stream Power (lb/ft s)	0.30	4.82	0.67
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	14.34	138.37	53.72
C & E Loss (ft)	0.05	Cum SA (acres)	9.57	16.88	22.14

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 190

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-99.71	2778	85.29	2776.24	86.48	2775.75	90.2	2774.75	93.57	2773.75
96.92	2772.75	100.08	2771.75	102.72	2770.75	105.24	2769.76	105.24	2769.75
107.77	2768.75	110.47	2768.2	124.39	2767.75	204.15	2766.75	210.65	2766.39
214.06	2765.75	219.98	2764.75	224.93	2763.09	252.41	2763.52	259.56	2764.25
288.16	2763.13	292.48	2761.87	301.29	2761.46	303.05	2760.65	305.84	2761.23
314.29	2763	332	2762	335.19	2761	387.24	2760.49	390.36	2761
390.36	2761.01	392.23	2764.51	402.23	2762	413.83	2763	425.43	2764
429.38	2764.26	440.47	2765	486.39	2766	526.25	2767	551.56	2768
588.96	2768.96	589.86	2769	593.28	2770	594.72	2769.73	596.66	2771
600.08	2772	603.53	2773	608.4	2774	612.53	2775	616.08	2776
632.62	2776	1014.62	2780						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-99.71	.045	85.29	.03	616.08	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
85.29	616.08	77.8	72.37	83.03	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2776.63	Element			
Vel Head (ft)	0.48	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2776.15	Reach Len. (ft)	77.80	72.37	83.03
Crit W.S. (ft)	2770.00	Flow Area (sq ft)		5567.68	3.61
E.G. Slope (ft/ft)	0.000559	Area (sq ft)		5567.68	3.61
Q Total (cfs)	31000.00	Flow (cfs)		30999.33	0.67
Top Width (ft)	561.62	Top Width (ft)		530.58	31.04
Vel Total (ft/s)	5.56	Avg. Vel. (ft/s)		5.57	0.19
Max Chl Dpth (ft)	15.66	Hydr. Depth (ft)		10.49	0.12
Conv. Total (cfs)	1311296.0	Conv. (cfs)		1311268.0	28.4
Length Wtd. (ft)	72.37	Wetted Per. (ft)		536.98	31.04
Min Ch El (ft)	2760.49	Shear (lb/sq ft)		0.36	0.00

* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	2.01	*	0.00	*
* Frctn Loss (ft)	*	0.05	* Cum Volume (acre-ft)	*	9.99	*	104.16	*	33.23	*
* C & E Loss (ft)	*	0.03	* Cum SA (acres)	*	6.66	*	14.73	*	18.03	*

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	*	2774.57	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.46	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2774.11	* Reach Len. (ft)	*	77.80	*	72.37	*	83.03	*
* Crit W.S. (ft)	*	2769.25	* Flow Area (sq ft)	*		*	4498.68	*		*
* E.G. Slope (ft/ft)	*	0.000684	* Area (sq ft)	*		*	4498.68	*		*
* Q Total (cfs)	*	24490.00	* Flow (cfs)	*		*	24490.00	*		*
* Top Width (ft)	*	516.51	* Top Width (ft)	*		*	516.51	*		*
* Vel Total (ft/s)	*	5.44	* Avg. Vel. (ft/s)	*		*	5.44	*		*
* Max Chl Dpth (ft)	*	13.62	* Hydr. Depth (ft)	*		*	8.71	*		*
* Conv. Total (cfs)	*	936189.0	* Conv. (cfs)	*		*	936189.0	*		*
* Length Wtd. (ft)	*	72.37	* Wetted Per. (ft)	*		*	522.37	*		*
* Min Ch El (ft)	*	2760.49	* Shear (lb/sq ft)	*		*	0.37	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	2.00	*		*
* Frctn Loss (ft)	*	0.06	* Cum Volume (acre-ft)	*	6.94	*	93.19	*	25.64	*
* C & E Loss (ft)	*	0.02	* Cum SA (acres)	*	6.34	*	14.69	*	17.77	*

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	*	2778.12	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.49	* Wt. n-Val.	*	0.045	*	0.030	*	0.045	*
* W.S. Elev (ft)	*	2777.63	* Reach Len. (ft)	*	77.80	*	72.37	*	83.03	*
* Crit W.S. (ft)	*	2770.53	* Flow Area (sq ft)	*	101.56	*	6352.32	*	153.85	*
* E.G. Slope (ft/ft)	*	0.000482	* Area (sq ft)	*	101.56	*	6352.32	*	153.85	*
* Q Total (cfs)	*	36000.00	* Flow (cfs)	*	57.75	*	35838.84	*	103.41	*
* Top Width (ft)	*	849.13	* Top Width (ft)	*	146.12	*	530.79	*	172.22	*
* Vel Total (ft/s)	*	5.45	* Avg. Vel. (ft/s)	*	0.57	*	5.64	*	0.67	*
* Max Chl Dpth (ft)	*	17.14	* Hydr. Depth (ft)	*	0.70	*	11.97	*	0.89	*
* Conv. Total (cfs)	*	1640384.0	* Conv. (cfs)	*	2631.5	*	1633041.0	*	4712.0	*
* Length Wtd. (ft)	*	72.40	* Wetted Per. (ft)	*	146.13	*	537.21	*	172.23	*
* Min Ch El (ft)	*	2760.49	* Shear (lb/sq ft)	*	0.02	*	0.36	*	0.03	*
* Alpha	*	1.07	* Stream Power (lb/ft s)	*	0.01	*	2.01	*	0.02	*
* Frctn Loss (ft)	*	0.04	* Cum Volume (acre-ft)	*	13.03	*	113.15	*	40.65	*
* C & E Loss (ft)	*	0.03	* Cum SA (acres)	*	8.85	*	14.79	*	18.92	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 180

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
15.05	2776.75	32.58	2776.75	48.65	2776.75	49.95	2775.75	51.72	2774.75
53.59	2773.75	55.5	2772.75	57.44	2771.75	59.59	2770.75	62.1	2769.75
64.56	2768.76	64.56	2768.75	67.13	2767.47	67.71	2767.75	72.88	2766.28
97.35	2766.75	119.19	2765.75	133.29	2765.33	136.67	2764.75	143.41	2762.38
166.6	2762.71	170.36	2763.69	207.2	2762.94	207.2	2762.93	210.09	2761.47
227.57	2761.13	247.23	2760.75	264.13	2759.08	318.52	2763	323.83	2759.53
323.83	2759.52	327.41	2764.6	338.72	2764	354.33	2764.52	369.01	2765
401.74	2766	408.05	2765.89	412.18	2767	414.21	2768	416.27	2769
417.18	2767.25	417.18	2767.26	418.65	2770	421.02	2771	423.39	2772
425.77	2773	428.14	2774	430.51	2775	431.09	2776.49	433.02	2776
461.43	2776	761.43	2780						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
15.05	.045	48.65	.03	433.02	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.65	433.02	44.45	181.54	256.85	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	*	2776.56	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.76	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2775.79	* Reach Len. (ft)	*	44.45	*	181.54	*	256.85	*
* Crit W.S. (ft)	*	2769.77	* Flow Area (sq ft)	*		*	4417.73	*		*
* E.G. Slope (ft/ft)	*	0.000797	* Area (sq ft)	*		*	4417.73	*		*
* Q Total (cfs)	*	31000.00	* Flow (cfs)	*		*	31000.00	*		*
* Top Width (ft)	*	380.92	* Top Width (ft)	*		*	380.92	*		*
* Vel Total (ft/s)	*	7.02	* Avg. Vel. (ft/s)	*		*	7.02	*		*
* Max Chl Dpth (ft)	*	16.71	* Hydr. Depth (ft)	*		*	11.60	*		*
* Conv. Total (cfs)	*	1098141.0	* Conv. (cfs)	*		*	1098141.0	*		*
* Length Wtd. (ft)	*	181.54	* Wetted Per. (ft)	*		*	392.94	*		*
* Min Ch El (ft)	*	2759.08	* Shear (lb/sq ft)	*		*	0.56	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	3.93	*		*
* Frctn Loss (ft)	*	0.27	* Cum Volume (acre-ft)	*	9.99	*	95.86	*	33.23	*
* C & E Loss (ft)	*	0.12	* Cum SA (acres)	*	6.66	*	13.97	*	18.00	*

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 #PF 2

* E.G. Elev (ft)	*	2774.49	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.69	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2773.80	* Reach Len. (ft)	*	44.45	*	181.54	*	256.85	*
* Crit W.S. (ft)	*	2768.85	* Flow Area (sq ft)	*		*	3663.85	*		*
* E.G. Slope (ft/ft)	*	0.000903	* Area (sq ft)	*		*	3663.85	*		*

```
* Q Total (cfs)          *24490.00  * Flow (cfs)              *          *24490.00  *          *
* Top Width (ft)         *  374.16  * Top Width (ft)          *          *  374.16  *          *
* Vel Total (ft/s)       *    6.68  * Avg. Vel. (ft/s)        *          *    6.68  *          *
* Max Chl Dpth (ft)      *   14.72  * Hydr. Depth (ft)        *          *    9.79  *          *
* Conv. Total (cfs)      *815126.1  * Conv. (cfs)             *          *815126.1  *          *
  Length Wtd. (ft)       *  181.54  * Wetted Per. (ft)        *          *  384.87  *          *
  Min Ch El (ft)         * 2759.08  * Shear (lb/sq ft)        *          *    0.54  *          *
  Alpha                  *    1.00  * Stream Power (lb/ft s) *          *    3.59  *          *
* Frctn Loss (ft)        *    0.30  * Cum Volume (acre-ft)   *    6.94  *   86.41  *   25.64  *
* C & E Loss (ft)        *    0.10  * Cum SA (acres)         *    6.34  *   13.95  *   17.77  *
*****************************************************************************************

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 conveyance ratio (upstream 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 #PF 3
*****************************************************************************************
* E.G. Elev (ft)         * 2778.05  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.81  * Wt. n-Val.             *   0.045  *   0.030  *   0.045  *
* W.S. Elev (ft)         * 2777.24  * Reach Len. (ft)        *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)         * 2770.43  * Flow Area (sq ft)      *   16.44  * 4972.45  *   92.80  *
* E.G. Slope (ft/ft)     *0.000732  * Area (sq ft)           *   16.44  * 4972.45  *   92.80  *
* Q Total (cfs)          *36000.00  * Flow (cfs)             *    9.03  *35921.65  *   69.32  *
* Top Width (ft)         *  539.32  * Top Width (ft)          *   33.60  *  384.37  *  121.35  *
* Vel Total (ft/s)       *    7.08  * Avg. Vel. (ft/s)        *    0.55  *    7.22  *    0.75  *
* Max Chl Dpth (ft)      *   18.16  * Hydr. Depth (ft)        *    0.49  *   12.94  *    0.76  *
* Conv. Total (cfs)      *1330649.0  * Conv. (cfs)            *   333.8  *1327753.0  *  2562.3  *
* Length Wtd. (ft)       *  181.61  * Wetted Per. (ft)        *   34.09  *  397.25  *  121.36  *
* Min Ch El (ft)         * 2759.08  * Shear (lb/sq ft)        *    0.02  *    0.57  *    0.03  *
* Alpha                  *    1.04  * Stream Power (lb/ft s) *    0.01  *    4.13  *    0.03  *
* Frctn Loss (ft)        *    0.25  * Cum Volume (acre-ft)   *   12.92  *  103.74  *   40.42  *
* C & E Loss (ft)        *    0.13  * Cum SA (acres)         *    8.69  *   14.03  *   18.64  *
*****************************************************************************************

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: River #1
REACH: Reach #1            RS: 170

INPUT
Description:
Station Elevation Data     num=      45
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*******************************************************************************
      0 2776.75  10.041 2776.75  11.208 2776.56  13.039 2775.75  14.984 2774.75
 17.041 2773.75  19.445 2772.75  21.468 2771.75  23.419 2770.75  25.484 2769.75
 27.471 2768.75  29.409 2767.75  30.901 2767.12  31.424 2766.75  33.545 2765.75
 38.947 2765.75  39.428 2765.75  41.868 2765.12  60.352 2766.13  65.082 2765.97
 66.072 2764.75   69.89 2764.75  71.743 2764.93  72.768 2764.75  85.567 2761.65
101.392 2761.27 114.672 2763.12 137.165 2763.34 145.296 2760.76  193.16  2760.8
199.171 2758.99 240.331 2758.49 254.092 2762.23 263.715 2762.13 265.413 2763.75
266.813 2764.75 268.199 2765.75 269.584 2766.75 270.801 2767.75 271.974 2768.75
273.155 2769.75 274.336 2770.75 275.524 2771.75 276.705 2772.75 282.843    2777

Manning's n Values         num=       3
    Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
      0    .045  10.041     .03 276.705    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
       10.041 276.705            130.15  130.15  130.15              .1       .3
Blocked Obstructions      num=       5
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*****************************************************************************
      85      89    2780     116     120    2780     147     151    2780
     178     182    2780     209     213    2780
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 2776.17  * Element                *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.96  * Wt. n-Val.             *          *   0.030  *   0.045  *
* W.S. Elev (ft)         * 2774.20  * Reach Len. (ft)        *  130.15  *  130.15  *  130.15  *
* Crit W.S. (ft)         * 2770.56  * Flow Area (sq ft)      *          * 2756.20  *    1.52  *
* E.G. Slope (ft/ft)     *0.003676  * Area (sq ft)           *          * 2756.20  *    1.52  *
* Q Total (cfs)          *31000.00  * Flow (cfs)             *          *30997.83  *    2.17  *
* Top Width (ft)         *  242.69  * Top Width (ft)          *          *  240.60  *    2.10  *
* Vel Total (ft/s)       *   11.24  * Avg. Vel. (ft/s)        *          *   11.25  *    1.42  *
* Max Chl Dpth (ft)      *   15.71  * Hydr. Depth (ft)        *          *   11.46  *    0.73  *
* Conv. Total (cfs)      *511290.2  * Conv. (cfs)             *          *511254.5  *    35.7  *
* Length Wtd. (ft)       *  130.15  * Wetted Per. (ft)        *          *  380.31  *    2.55  *
* Min Ch El (ft)         * 2758.49  * Shear (lb/sq ft)        *          *    1.66  *    0.14  *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   18.71  *    0.19  *
* Frctn Loss (ft)        *    0.70  * Cum Volume (acre-ft)   *    9.99  *   80.91  *   33.23  *
* C & E Loss (ft)        *    0.19  * Cum SA (acres)         *    6.66  *   12.68  *   17.99  *
*****************************************************************************************

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

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 2774.09  * Element                *  Left OB *  Channel * Right OB *
```

* Vel Head (ft)	* 1.74	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2772.35	* Reach Len. (ft)	* 130.15	* 130.15	* 130.15	*
* Crit W.S. (ft)	* 2769.31	* Flow Area (sq ft)	*	* 2315.34	*	*
* E.G. Slope (ft/ft)	*0.003766	* Area (sq ft)	*	* 2315.34	*	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24490.00	*	*
* Top Width (ft)	* 235.99	* Top Width (ft)	*	* 235.99	*	*
Vel Total (ft/s)	* 10.58	* Avg. Vel. (ft/s)	*	* 10.58	*	*
* Max Chl Dpth (ft)	* 13.86	* Hydr. Depth (ft)	*	* 9.81	*	*
* Conv. Total (cfs)	*399072.1	* Conv. (cfs)	*	*399072.1	*	*
* Length Wtd. (ft)	* 130.15	* Wetted Per. (ft)	*	* 356.67	*	*
* Min Ch El (ft)	* 2758.49	* Shear (lb/sq ft)	*	* 1.53	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 16.14	*	*
* Frctn Loss (ft)	* 0.67	* Cum Volume (acre-ft)	* 6.94	* 73.95	* 25.64	*
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 6.34	* 12.68	* 17.77	*

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

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2777.66	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.12	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2775.55	* Reach Len. (ft)	* 130.15	* 130.15	* 130.15 *
* Crit W.S. (ft)	* 2771.45	* Flow Area (sq ft)	*	* 3081.15	* 5.65 *
* E.G. Slope (ft/ft)	*0.003616	* Area (sq ft)	*	* 3081.15	* 5.65 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*35987.70	* 12.30 *
* Top Width (ft)	* 247.31	* Top Width (ft)	*	* 243.27	* 4.04 *
* Vel Total (ft/s)	* 11.66	* Avg. Vel. (ft/s)	*	* 11.68	* 2.18 *
* Max Chl Dpth (ft)	* 17.06	* Hydr. Depth (ft)	*	* 12.67	* 1.40 *
* Conv. Total (cfs)	*598707.1	* Conv. (cfs)	*	*598502.6	* 204.6 *
* Length Wtd. (ft)	* 130.15	* Wetted Per. (ft)	*	* 396.73	* 4.91 *
* Min Ch El (ft)	* 2758.49	* Shear (lb/sq ft)	*	* 1.75	* 0.26 *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 20.48	* 0.57 *
* Frctn Loss (ft)	* 0.73	* Cum Volume (acre-ft)	* 12.91	* 86.96	* 40.13 *
* C & E Loss (ft)	* 0.25	* Cum SA (acres)	* 8.67	* 12.73	* 18.27 *

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 160

INPUT
Description:
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2775.75	5.607	2775.75	12.07	2775.75	19.049	2775.75	29.317	2775.75
71.828	2774.75	85.786	2773.75	89.067	2773.75	103.188	2774.75	115.831	2774.75
128.085	2774.75	176.975	2775.75	196.024	2776.75	201.271	2777.75	222.357	2778.36
223.106	2777.75	224.726	2776.75	226.578	2775.75	228.113	2774.48	228.466	2774.75
231.408	2773.75	239.405	2772.75	244.73	2772.63	245.868	2771.75	247.233	2770.75
248.605	2769.75	250.054	2768.75	251.681	2767.76	251.681	2767.75	253.342	2766.75
254.813	2765.75	256.164	2764.75	257.132	2763.88	262.209	2762.7	273.085	2760.84
297.19	2760.63	301.164	2761.77	319.273	2761.94	326.146	2760.17	341.547	2760.01
354.324	2759.87	381.194	2760.68	389.17	2757.67	435.231	2758.17	436.985	2762.55
442.317	2762.86	444.608	2763.75	445.477	2764.44	445.88	2764.75	447.146	2765.75
448.419	2766.75	449.692	2767.75	450.979	2768.75	452.237	2769.75	453.482	2770.75
453.482	2770.76	454.74	2771.75	455.985	2772.75	457.201	2773.75	457.201	2773.76
458.12	2775.1	458.403	2774.75	466.584	2774.75	469.887	2774.75	478.704	2775.75
485.853	2776.75	713.195	2776.75	716.745	2776.75	720.132	2776.75	792.165	2775.75
803.98	2775.75	814.743	2775.75	830.143	2774.75	840.806	2774.75	857.466	2775.75
873.256	2775.75	926.755	2774.75	940.777	2773.75	941.237	2773.75	945.579	2773.75
955.669	2773.75	965.18	2773.75	989.002	2773.75	1007.684	2774.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	244.73	.03	458.12	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
244.73	458.12	203.69	188.86	197	.1	.3

Blocked Obstructions num= 5

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
286	290	2780	317	321	2780	348	352	2780
379	383	2780	410	414	2780			

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2775.27	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 3.88	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2771.39	* Reach Len. (ft)	* 203.69	* 188.86	* 197.00 *
* Crit W.S. (ft)	* 2770.34	* Flow Area (sq ft)	*	* 1961.09	* *
* E.G. Slope (ft/ft)	*0.008706	* Area (sq ft)	*	* 1961.09	* *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*31000.00	* *
* Top Width (ft)	* 187.93	* Top Width (ft)	*	* 187.93	* *
* Vel Total (ft/s)	* 15.81	* Avg. Vel. (ft/s)	*	* 15.81	* *
* Max Chl Dpth (ft)	* 13.72	* Hydr. Depth (ft)	*	* 10.43	* *
* Conv. Total (cfs)	*332243.2	* Conv. (cfs)	*	*332243.2	* *
* Length Wtd. (ft)	* 188.86	* Wetted Per. (ft)	*	* 310.01	* *
* Min Ch El (ft)	* 2757.67	* Shear (lb/sq ft)	*	* 3.44	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 54.35	* *

```
* Frctn Loss (ft)        *    1.45  * Cum Volume (acre-ft)   *    9.99  *   73.87  *   33.22  *
* C & E Loss (ft)        *    0.05  * Cum SA (acres)         *    6.66  *   12.04  *   17.99  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 2773.29  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.07  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)         * 2770.21  * Reach Len. (ft)         *  203.69  *  188.86  *  197.00  *
* Crit W.S. (ft)         * 2768.88  * Flow Area (sq ft)       *          * 1740.90  *          *
* E.G. Slope (ft/ft)     *0.007540  * Area (sq ft)            *          * 1740.90  *          *
* Q Total (cfs)          *24490.00  * Flow (cfs)              *          *24490.00  *          *
* Top Width (ft)         *  184.84  * Top Width (ft)          *          *  184.84  *          *
* Vel Total (ft/s)       *   14.07  * Avg. Vel. (ft/s)        *          *   14.07  *          *
* Max Chl Dpth (ft)      *   12.54  * Hydr. Depth (ft)        *          *    9.42  *          *
* Conv. Total (cfs)      *282035.8  * Conv. (cfs)             *          *282035.8  *          *
* Length Wtd. (ft)       *  188.86  * Wetted Per. (ft)        *          *  294.30  *          *
* Min Ch El (ft)         * 2757.67  * Shear (lb/sq ft)        *          *    2.78  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)  *          *   39.17  *          *
* Frctn Loss (ft)        *    1.38  * Cum Volume (acre-ft)    *    6.94  *   67.89  *   25.64  *
* C & E Loss (ft)        *    0.08  * Cum SA (acres)          *    6.34  *   12.05  *   17.77  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)         * 2776.69  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    4.58  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)         * 2772.11  * Reach Len. (ft)         *  203.69  *  188.86  *  197.00  *
* Crit W.S. (ft)         * 2771.39  * Flow Area (sq ft)       *          * 2096.10  *          *
* E.G. Slope (ft/ft)     *0.009790  * Area (sq ft)            *          * 2096.10  *          *
* Q Total (cfs)          *36000.00  * Flow (cfs)              *          *36000.00  *          *
* Top Width (ft)         *  189.78  * Top Width (ft)          *          *  189.78  *          *
* Vel Total (ft/s)       *   17.17  * Avg. Vel. (ft/s)        *          *   17.17  *          *
* Max Chl Dpth (ft)      *   14.44  * Hydr. Depth (ft)        *          *   11.04  *          *
* Conv. Total (cfs)      *363848.4  * Conv. (cfs)             *          *363848.4  *          *
* Length Wtd. (ft)       *  188.86  * Wetted Per. (ft)        *          *  319.49  *          *
* Min Ch El (ft)         * 2757.67  * Shear (lb/sq ft)        *          *    4.01  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)  *          *   68.87  *          *
* Frctn Loss (ft)        *    1.51  * Cum Volume (acre-ft)    *   12.91  *   79.22  *   40.12  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)          *    8.67  *   12.08  *   18.26  *
*****************************************************************************************

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

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 150

INPUT
Description:
Station Elevation Data     num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 2774.75  27.415 2773.75   42.03 2773.75  59.892 2773.75  62.416 2773.75
  64.078 2773.75 160.259 2772.75 185.715 2772.75 194.744 2773.75 204.594 2773.75
 210.718 2773.75 222.774 2774.75 228.183 2774.75 257.019 2774.75  267.81 2774.75
 273.007 2773.75 274.803  2772.4 275.015 2772.75  287.29 2772.06 287.545 2771.75
 289.737 2770.75 290.925 2770.17 291.165 2769.75 292.615 2768.75 292.615 2768.76
 293.301 2770.01 294.086 2767.76 294.086 2767.75 295.641 2766.75 298.583 2765.75
 300.223 2764.76 300.223 2764.75 301.687 2763.75 304.049 2762.75 306.828 2761.76
 307.153 2761.75 310.201 2760.75  315.32 2759.75 327.928 2759.98 331.711 2761.72
 339.341 2762.38 348.858 2761.61 352.302 2760.28 375.078 2761.75 377.814 2761.46
 391.136 2760.05 397.352 2762.59 404.677 2759.75 421.315 2760.11 427.849 2757.53
 458.495 2758.34 483.223 2757.36 487.119 2761.47 490.188 2761.75 490.492 2761.76
 490.492 2761.77 490.584 2761.86 491.482 2762.75 491.482 2762.76 492.726 2763.75
 492.726 2763.76 493.964 2764.75 495.201 2765.75 496.467 2766.75 497.853 2767.75
 499.401 2768.75 500.936 2769.75 500.936 2769.76 502.477 2770.75 504.047 2771.75
 504.294  2771.9 518.734 2772.75 520.388 2772.75 520.388 2772.76 520.685 2773.75
  522.75 2774.75 525.055 2775.75 528.562 2776.75 529.291 2777.69 531.794 2776.75
 533.505 2777.63 573.768 2775.75 592.796 2774.75 608.727 2774.75 636.672 2774.75
 663.471 2774.75 788.445 2774.75 833.707 2773.75 855.161 2773.75 857.438 2774.75
 928.516 2774.75 939.879 2773.75 942.008 2773.75 951.829 2774.75 952.204 2774.75
 986.569 2773.75 998.018 2773.751010.809 2773.751012.796 2773.75

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .045  287.29     .03 504.047    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        287.29 504.047            262.45  206.64   129.8          .1          .3
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 2773.78  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    4.42  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)         * 2769.35  * Reach Len. (ft)         *  262.45  *  206.64  *  129.80  *
* Crit W.S. (ft)         * 2769.35  * Flow Area (sq ft)       *          * 1836.44  *          *
```

* E.G. Slope (ft/ft)	*0.006782	* Area (sq ft)	*		* 1836.44	*		*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*		*31000.00	*		*
* Top Width (ft)	* 207.99	* Top Width (ft)	*		* 207.99	*		*
* Vel Total (ft/s)	* 16.88	* Avg. Vel. (ft/s)	*		* 16.88	*		*
* Max Chl Dpth (ft)	* 11.99	* Hydr. Depth (ft)	*		* 8.83	*		*
* Conv. Total (cfs)	*376419.2	* Conv. (cfs)	*		*376419.2	*		*
* Length Wtd. (ft)	* 205.33	* Wetted Per. (ft)	*		* 218.15	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.56	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 60.17	*		*
* Frctn Loss (ft)	* 1.23	* Cum Volume (acre-ft)	*	9.99	* 65.63	*	33.22	*
* C & E Loss (ft)	* 0.37	* Cum SA (acres)	*	6.66	* 11.18	*	17.99	*

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

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2771.83	* Element	*	Left OB	* Channel	*	Right OB	*
* Vel Head (ft)	* 3.84	* Wt. n-Val.	*		* 0.030	*		*
* W.S. Elev (ft)	* 2768.00	* Reach Len. (ft)	*	262.45	* 206.64	*	129.80	*
* Crit W.S. (ft)	* 2768.00	* Flow Area (sq ft)	*		* 1557.52	*		*
* E.G. Slope (ft/ft)	*0.007077	* Area (sq ft)	*		* 1557.52	*		*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24490.00	*		*
* Top Width (ft)	* 204.23	* Top Width (ft)	*		* 204.23	*		*
* Vel Total (ft/s)	* 15.72	* Avg. Vel. (ft/s)	*		* 15.72	*		*
* Max Chl Dpth (ft)	* 10.64	* Hydr. Depth (ft)	*		* 7.63	*		*
* Conv. Total (cfs)	*291109.0	* Conv. (cfs)	*		*291109.0	*		*
* Length Wtd. (ft)	* 206.12	* Wetted Per. (ft)	*		* 212.48	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.24	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 50.93	*		*
* Frctn Loss (ft)	* 1.24	* Cum Volume (acre-ft)	*	6.94	* 60.74	*	25.64	*
* C & E Loss (ft)	* 0.32	* Cum SA (acres)	*	6.34	* 11.21	*	17.77	*

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

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2775.16	* Element	*	Left OB	* Channel	*	Right OB	*
* Vel Head (ft)	* 4.85	* Wt. n-Val.	*		* 0.030	*		*
* W.S. Elev (ft)	* 2770.31	* Reach Len. (ft)	*	262.45	* 206.64	*	129.80	*
* Crit W.S. (ft)	* 2770.31	* Flow Area (sq ft)	*		* 2036.48	*		*
* E.G. Slope (ft/ft)	*0.006667	* Area (sq ft)	*		* 2036.48	*		*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*36000.00	*		*
* Top Width (ft)	* 211.14	* Top Width (ft)	*		* 211.14	*		*
* Vel Total (ft/s)	* 17.68	* Avg. Vel. (ft/s)	*		* 17.68	*		*
* Max Chl Dpth (ft)	* 12.94	* Hydr. Depth (ft)	*		* 9.65	*		*
* Conv. Total (cfs)	*440907.8	* Conv. (cfs)	*		*440907.8	*		*
* Length Wtd. (ft)	* 204.75	* Wetted Per. (ft)	*		* 222.84	*		*
* Min Ch El (ft)	* 2757.36	* Shear (lb/sq ft)	*		* 3.80	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 67.24	*		*
* Frctn Loss (ft)	* 1.03	* Cum Volume (acre-ft)	*	12.91	* 70.27	*	40.12	*
* C & E Loss (ft)	* 0.64	* Cum SA (acres)	*	8.67	* 11.21	*	18.26	*

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 139

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2769.75	122.83	2768.75	210.08	2768	238.55	2768	250.4	2768
250.9	2768	353.99	2767.75	571.8	2767.75	580.55	2767.87	584.21	2766.75
587.25	2765.75	590.19	2764.75	592.82	2763.75	595.21	2762.75	597.5	2761.75
599.8	2760.75	601.9	2759.24	661.57	2759.92	666.41	2756.85	691.06	2756.07
697.71	2757.82	779.92	2757.09	782.85	2760.21	803.38	2761.75	805.38	2761.89
809.83	2762.75	817.41	2764.24	820.11	2763.75	852.39	2763.75	884.33	2763.75
918.74	2764.75	974.69	2764.75	981.1	2764.75	999.39	2765.75	1005.92	2766.75
1011.93	2767.75	1018.14	2768.75	1024.29	2769.75	1031.8	2770.75	1039.15	2771.75
1043.88	2772.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
**********************************************
       0    .045  580.55     .03  803.38    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        580.55  803.38            172.75  171.78  164.65              .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 2771.69  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    6.25  * Wt. n-Val.              *          *    0.030 *    0.045 *
* W.S. Elev (ft)         * 2765.45  * Reach Len. (ft)         *  172.75  *   171.78 *   164.65 *
* Crit W.S. (ft)         * 2767.29  * Flow Area (sq ft)       *          * 1468.72  *   238.15 *
* E.G. Slope (ft/ft)     *0.013412  * Area (sq ft)            *          * 1468.72  *   238.15 *
* Q Total (cfs)          *31000.00  * Flow (cfs)              *          *29944.19  *  1055.81 *
* Top Width (ft)         *  405.73  * Top Width (ft)           *          *   215.24 *   190.49 *
* Vel Total (ft/s)       *   18.16  * Avg. Vel. (ft/s)         *          *    20.39 *     4.43 *
* Max Chl Dpth (ft)      *    9.38  * Hydr. Depth (ft)         *          *     6.82 *     1.25 *
* Conv. Total (cfs)      *267675.2  * Conv. (cfs)              *          *258558.6  *  9116.6 *
* Length Wtd. (ft)       *  171.40  * Wetted Per. (ft)         *          *   219.19 *   190.80 *
* Min Ch El (ft)         * 2756.07  * Shear (lb/sq ft)         *          *     5.61 *     1.05 *
* Alpha                  *    1.22  * Stream Power (lb/ft s)   *          *   114.39 *     4.63 *
* Frctn Loss (ft)        *    1.90  * Cum Volume (acre-ft)     *    9.99  *    57.80 *    32.87 *
* C & E Loss (ft)        *    0.18  * Cum SA (acres)           *    6.66  *    10.17 *    17.70 *
*****************************************************************************************

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:    Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 2769.85  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    5.04  * Wt. n-Val.              *          *    0.030 *    0.045 *
* W.S. Elev (ft)         * 2764.81  * Reach Len. (ft)         *  172.75  *   171.78 *   164.65 *
* Crit W.S. (ft)         * 2766.35  * Flow Area (sq ft)       *          * 1332.37  *   120.66 *
* E.G. Slope (ft/ft)     *0.011932  * Area (sq ft)            *          * 1332.37  *   120.66 *
* Q Total (cfs)          *24490.00  * Flow (cfs)              *          *24155.58  *   334.42 *
* Top Width (ft)         *  392.22  * Top Width (ft)           *          *   213.37 *   178.85 *
* Vel Total (ft/s)       *   16.85  * Avg. Vel. (ft/s)         *          *    18.13 *     2.77 *
* Max Chl Dpth (ft)      *    8.74  * Hydr. Depth (ft)         *          *     6.24 *     0.67 *
* Conv. Total (cfs)      *224196.8  * Conv. (cfs)              *          *221135.2  *  3061.5 *
* Length Wtd. (ft)       *  171.15  * Wetted Per. (ft)         *          *   217.21 *   179.14 *
* Min Ch El (ft)         * 2756.07  * Shear (lb/sq ft)         *          *     4.57 *     0.50 *
* Alpha                  *    1.14  * Stream Power (lb/ft s)   *          *    82.84 *     1.39 *
* Frctn Loss (ft)        *    1.87  * Cum Volume (acre-ft)     *    6.94  *    53.89 *    25.46 *
* C & E Loss (ft)        *    0.12  * Cum SA (acres)           *    6.34  *    10.22 *    17.51 *
*****************************************************************************************

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:    Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)         * 2772.99  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    7.11  * Wt. n-Val.              *          *    0.030 *    0.045 *
* W.S. Elev (ft)         * 2765.88  * Reach Len. (ft)         *  172.75  *   171.78 *   164.65 *
* Crit W.S. (ft)         * 2768.62  * Flow Area (sq ft)       *          * 1562.17  *   322.22 *
* E.G. Slope (ft/ft)     *0.014387  * Area (sq ft)            *          * 1562.17  *   322.22 *
* Q Total (cfs)          *36000.00  * Flow (cfs)              *          *34229.51  *  1770.49 *
* Top Width (ft)         *  413.39  * Top Width (ft)           *          *   216.53 *   196.86 *
* Vel Total (ft/s)       *   19.10  * Avg. Vel. (ft/s)         *          *    21.91 *     5.49 *
* Max Chl Dpth (ft)      *    9.81  * Hydr. Depth (ft)         *          *     7.21 *     1.64 *
* Conv. Total (cfs)      *300138.3  * Conv. (cfs)              *          *285377.4  * 14760.9 *
* Length Wtd. (ft)       *  171.29  * Wetted Per. (ft)         *          *   220.55 *   197.19 *
* Min Ch El (ft)         * 2756.07  * Shear (lb/sq ft)         *          *     6.36 *     1.47 *
* Alpha                  *    1.25  * Stream Power (lb/ft s)   *          *   139.40 *     8.06 *
* Frctn Loss (ft)        *    1.93  * Cum Volume (acre-ft)     *   12.91  *    61.73 *    39.64 *
* C & E Loss (ft)        *    0.23  * Cum SA (acres)           *    8.67  *    10.20 *    17.97 *
*****************************************************************************************

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:    Program found supercritical flow starting at this cross section.

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 130

INPUT
Description:
Station Elevation Data     num=      109
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************************
 -329.97     2778  -326.97     2777  -324.12     2776    -321.7     2775  -319.71     2774
 -317.71     2773  -315.72     2772  -313.73     2771  -311.73     2770  -309.74     2769
  -295.4     2768  -239.67     2767  -228.16     2766  -194.92     2766  -129.95     2766
 -127.06     2765  -123.98     2764  -120.22     2764  -110.54     2765  -110.53     2765
    -.01     2766        0     2766   197.95     2767   197.96     2767    246.6     2767
  261.24  2766.28   267.04     2766   267.05     2766   282.58  2764.8   282.59  2764.8
  284.05     2765   284.06     2765   289.71     2764   289.72     2764   294.36     2763
  294.37     2763   299.03     2762   299.04     2762   303.71     2761   303.72     2761
   308.4     2760   308.41     2760   313.09     2759    313.1     2759    314.9  2758.96
```

314.91	2758.96	326.53	2758.59	326.54	2758.59	334.76	2755.3	334.76	2755.31
335.91	2758	335.92	2758	350.25	2755.25	350.26	2755.25	362.85	2756.77
362.86	2756.77	383.3	2757	429.42	2757.52	429.43	2757.51	436.01	2755.89
436.02	2755.89	456.36	2755.9	456.37	2755.9	476.41	2757.65	476.42	2757.65
495.5	2759.49	495.51	2759.49	507.59	2759.28	512.02	2759.21	512.03	2759.21
522.41	2761.75	522.42	2761.76	528.15	2763.11	528.16	2763.11	555.77	2762.75
555.78	2762.76	560.43	2763.75	560.44	2763.75	684.75	2763.75	684.76	2763.75
743.07	2762.75	743.08	2762.75	773.59	2762.75	773.6	2762.75	795.48	2762.75
795.94	2762.75	809.75	2763.75	809.76	2763.75	826.38	2764.75	866.79	2765.75
889.01	2766.75	894.02	2767.75	896.67	2768.75	896.67	2768.76	899.25	2769.75
901.38	2770.75	903.52	2771.75	911.41	2772.75	945.7	2772.75	951.33	2771.75
957.1	2770.75	961.49	2769.75	968.66	2768.75	968.68	2768.75	977.22	2769.75
981.89	2770.75	985.39	2771.75	990.06	2772.75	994.39	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-329.97	.045	246.6	.03	528.16	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
246.6	528.16	295.76	287.33	274.51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-329.97	197.95	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2769.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.14	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2766.38	Flow Area (sq ft)		1717.40	522.14
E.G. Slope (ft/ft)	0.008922	Area (sq ft)	13.46	1717.40	522.14
Q Total (cfs)	31000.00	Flow (cfs)		28714.42	2285.58
Top Width (ft)	595.82	Top Width (ft)	32.04	249.94	313.85
Vel Total (ft/s)	13.84	Avg. Vel. (ft/s)		16.72	4.38
Max Chl Dpth (ft)	9.89	Hydr. Depth (ft)		6.87	1.66
Conv. Total (cfs)	328199.1	Conv. (cfs)		304001.5	24197.6
Length Wtd. (ft)	285.18	Wetted Per. (ft)		254.20	314.04
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		3.76	0.93
Alpha	1.36	Stream Power (lb/ft s)		62.92	4.05
Frctn Loss (ft)	1.86	Cum Volume (acre-ft)	9.96	51.51	31.43
C & E Loss (ft)	0.66	Cum SA (acres)	6.60	9.26	16.75

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2767.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.82	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.89	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2765.37	Flow Area (sq ft)		1909.06	769.47
E.G. Slope (ft/ft)	0.003800	Area (sq ft)	69.64	1909.06	769.47
Q Total (cfs)	24490.00	Flow (cfs)		21800.10	2689.90
Top Width (ft)	718.73	Top Width (ft)	117.34	259.67	341.72
Vel Total (ft/s)	9.14	Avg. Vel. (ft/s)		11.42	3.50
Max Chl Dpth (ft)	10.64	Hydr. Depth (ft)		7.35	2.25
Conv. Total (cfs)	397259.9	Conv. (cfs)		353626.2	43633.7
Length Wtd. (ft)	285.65	Wetted Per. (ft)		263.96	341.92
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		1.72	0.53
Alpha	1.40	Stream Power (lb/ft s)		19.59	1.87
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	6.80	47.50	23.77
C & E Loss (ft)	0.14	Cum SA (acres)	6.10	9.29	16.52

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2770.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.79	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.43	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2767.00	Flow Area (sq ft)		1792.04	616.93
E.G. Slope (ft/ft)	0.010327	Area (sq ft)	27.94	1792.04	616.93
Q Total (cfs)	36000.00	Flow (cfs)		32832.83	3167.17
Top Width (ft)	645.25	Top Width (ft)	65.65	253.77	325.82
Vel Total (ft/s)	14.94	Avg. Vel. (ft/s)		18.32	5.13
Max Chl Dpth (ft)	10.18	Hydr. Depth (ft)		7.06	1.89
Conv. Total (cfs)	354255.9	Conv. (cfs)		323089.5	31166.4
Length Wtd. (ft)	284.82	Wetted Per. (ft)		258.05	326.02
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		4.48	1.22
Alpha	1.38	Stream Power (lb/ft s)		82.03	6.26
Frctn Loss (ft)	2.07	Cum Volume (acre-ft)	12.86	55.12	37.86
C & E Loss (ft)	0.70	Cum SA (acres)	8.54	9.27	16.98

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 120

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-741.52	2769	-620.87	2768	-551.88	2767	-543.14	2766	-540.36	2766
-537.06	2767	-533.83	2768	-527.7	2768	-488.6	2767	-366.95	2766
-274.11	2765	-186.15	2764	-155.02	2763	-147.68	2762	-131.64	2762
-119.22	2763	-106.8	2764	-35.92	2765	0	2765	50.02	2764
110.9	2763	152.46	2762.03	153.73	2762	168.97	2761	175.86	2760
175.87	2760	179.66	2759	179.67	2759	181.81	2758	183.96	2757
186.11	2756	188.37	2755	192.2	2754	208.49	2754	208.5	2754
217.9	2755	217.91	2755	226.38	2756	226.39	2756	249.43	2757
265.63	2757	283.93	2757	293.22	2757	353.9	2758	388.76	2759
390.5	2760	392.24	2761	392.25	2761	393.98	2762	393.99	2762
396.77	2763	400.02	2764	404.19	2764	422.66	2764	464.57	2763
544.99	2763	709.9	2763	814.02	2762.75	823.72	2763.75	825.7	2763.75
826.66	2763.75	968	2763.75	980.94	2763.75	999.92	2763.75	1093.44	2763.75
1109.22	2764.75	1125.21	2765.75	1136.78	2766.75	1141.28	2767.75	1145.01	2768.75
1148.2	2769.75	1151.41	2770.75	1154.48	2771.75	1157.68	2772.75	1160.12	2773.75
1162.38	2774.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-741.52	.045	0	.03	404.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	404.19	158.39	153.64	149.14	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-741.52	0	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2767.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.67	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.44	Flow Area (sq ft)		2335.00	1637.41
E.G. Slope (ft/ft)	0.004458	Area (sq ft)	446.32	2335.00	1637.41
Q Total (cfs)	31000.00	Flow (cfs)		24756.40	6243.60
Top Width (ft)	1460.10	Top Width (ft)	336.19	404.19	719.72
Vel Total (ft/s)	7.80	Avg. Vel. (ft/s)		10.60	3.81
Max Chl Dpth (ft)	11.67	Hydr. Depth (ft)		5.78	2.28
Conv. Total (cfs)	464316.0	Conv. (cfs)		370799.7	93516.3
Length Wtd. (ft)	152.85	Wetted Per. (ft)		406.74	719.84
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.60	0.63
Alpha	1.52	Stream Power (lb/ft s)		16.94	2.41
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	8.40	38.15	24.63
C & E Loss (ft)	0.02	Cum SA (acres)	5.34	7.10	13.49

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2766.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.02	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2764.98	Flow Area (sq ft)		2074.09	1176.16
E.G. Slope (ft/ft)	0.004660	Area (sq ft)	248.65	2074.09	1176.16
Q Total (cfs)	24490.00	Flow (cfs)		20776.47	3713.53
Top Width (ft)	1389.85	Top Width (ft)	276.26	404.19	709.40
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)		10.02	3.16
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		5.13	1.66
Conv. Total (cfs)	358749.9	Conv. (cfs)		304351.0	54398.9
Length Wtd. (ft)	153.08	Wetted Per. (ft)		406.74	709.50
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.48	0.48
Alpha	1.53	Stream Power (lb/ft s)		14.86	1.52
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	5.72	34.36	17.64
C & E Loss (ft)	0.01	Cum SA (acres)	4.77	7.10	13.21

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2767.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.07	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.81	Flow Area (sq ft)		2497.72	1928.23
E.G. Slope (ft/ft)	0.004493	Area (sq ft)	589.49	2497.72	1928.23
Q Total (cfs)	36000.00	Flow (cfs)		27806.80	8193.20
Top Width (ft)	1508.19	Top Width (ft)	379.26	404.19	724.74
Vel Total (ft/s)	8.13	Avg. Vel. (ft/s)		11.13	4.25
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		6.18	2.66
Conv. Total (cfs)	537097.4	Conv. (cfs)		414859.9	122237.5
Length Wtd. (ft)	152.72	Wetted Per. (ft)		406.74	724.88
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.72	0.75
Alpha	1.51	Stream Power (lb/ft s)		19.17	3.17
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	10.76	40.97	29.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.03	7.10	13.67

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid,

water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

.VER: River #1
REACH: Reach #1 RS: 115

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2767	4.83	2766	9.61	2765	11.16	2765	13.74	2766
16.32	2767	24.15	2767	124.55	2766	311.87	2765.02	314.97	2765
395.1	2764	477.26	2763	482.56	2762	505.65	2762	555.24	2763
679.5	2764	697.39	2764	706.13	2763	725.14	2762	747.88	2762
765.91	2762	799.67	2761	831.73	2760	835.05	2759	837.03	2758
839.03	2757	841.23	2756	843.42	2755	845.62	2754	847.82	2753
863.85	2753	869.22	2754	874.61	2755	887.51	2756	990.68	2756
1015.46	2756	1026.66	2757	1037.87	2758	1040.87	2759	1043.78	2760
1046.68	2761	1049.37	2762	1074.62	2763	1080.06	2763	1202.38	2763
1254.26	2763	1359.68	2763	1365.58	2763	1696.27	2762.75	1789.59	2762.75
1848.13	2763.75	1874.7	2764.73	1875.36	2764.75	1890.38	2765.75	1895.84	2766.75
1902.22	2767.75	1908.29	2768.75	1913.86	2769.75	1918.72	2770.75	1920.54	2771.75
1922.37	2772.75	1924.2	2773.75	1926.03	2774.75	1927.8	2775.75	1929.57	2776.75
1931.38	2777.75	1933.2	2778.75	1935.07	2779.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	679.5	.03	1074.62	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
679.5	1074.62	257.93	242.39	227.54	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	679.5	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2766.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.65	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.74	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.74	Flow Area (sq ft)		2381.48	1412.74
E.G. Slope (ft/ft)	0.004600	Area (sq ft)	465.63	2381.48	1412.74
Q Total (cfs)	31000.00	Flow (cfs)		26379.82	4620.18
Top Width (ft)	1539.72	Top Width (ft)	344.05	395.12	800.55
Vel Total (ft/s)	8.17	Avg. Vel. (ft/s)		11.08	3.27
Max Chl Dpth (ft)	11.74	Hydr. Depth (ft)		6.03	1.76
Conv. Total (cfs)	457069.9	Conv. (cfs)		388949.0	68120.9
Length Wtd. (ft)	239.83	Wetted Per. (ft)		397.73	800.58
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.72	0.51
Alpha	1.59	Stream Power (lb/ft s)		19.05	1.66
Frctn Loss (ft)	1.17	Cum Volume (acre-ft)	6.74	29.83	19.40
C & E Loss (ft)	0.05	Cum SA (acres)	4.11	5.69	10.89

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2765.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.16	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.16	Flow Area (sq ft)		2151.22	950.85
E.G. Slope (ft/ft)	0.004527	Area (sq ft)	278.74	2151.22	950.85
Q Total (cfs)	24490.00	Flow (cfs)		22088.98	2401.02
Top Width (ft)	1477.14	Top Width (ft)	297.35	395.12	784.67
Vel Total (ft/s)	7.89	Avg. Vel. (ft/s)		10.27	2.53
Max Chl Dpth (ft)	11.16	Hydr. Depth (ft)		5.44	1.21
Conv. Total (cfs)	364000.3	Conv. (cfs)		328313.5	35686.8
Length Wtd. (ft)	240.55	Wetted Per. (ft)		397.73	784.69
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.53	0.34
Alpha	1.54	Stream Power (lb/ft s)		15.69	0.86
Frctn Loss (ft)	1.15	Cum Volume (acre-ft)	4.76	26.91	14.00
C & E Loss (ft)	0.05	Cum SA (acres)	3.72	5.69	10.65

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2766.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.75	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.15	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2765.15	Flow Area (sq ft)		2543.06	1741.41
E.G. Slope (ft/ft)	0.004615	Area (sq ft)	614.55	2543.06	1741.41

```
* Q Total (cfs)          *36000.00  * Flow (cfs)              *          *29476.35  * 6523.65  *
* Top Width (ft)         * 1597.71  * Top Width (ft)          *  395.79  *  395.12  *  806.80  *
* Vel Total (ft/s)       *    8.40  * Avg. Vel. (ft/s)        *          *   11.59  *    3.75  *
* Max Chl Dpth (ft)      *   12.15  * Hydr. Depth (ft)        *          *    6.44  *    2.16  *
* Conv. Total (cfs)      *529952.8  * Conv. (cfs)             *          *433918.7  * 96034.1  *
* Length Wtd. (ft)       *  239.39  * Wetted Per. (ft)        *          *  397.73  *  806.84  *
* Min Ch El (ft)         * 2753.00  * Shear (lb/sq ft)        *          *    1.84  *    0.62  *
* Alpha                  *    1.59  * Stream Power (lb/ft s)  *          *   21.35  *    2.33  *
* Frctn Loss (ft)        *    1.19  * Cum Volume (acre-ft)    *    8.57  *   32.08  *   23.56  *
* C & E Loss (ft)        *    0.04  * Cum SA (acres)          *    5.62  *    5.69  *   11.05  *
*****************************************************************************************

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

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 110

INPUT
Description:
Station Elevation Data     num=      68
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
*****************************************************************************
 -600.38     2767 -579.98     2766 -400.38     2765 -181.14     2764  -81.76     2763
  -57.48     2762  -47.61     2761        0     2761   227.2     2762  237.17     2762
  274.46     2761  312.01     2760  358.58     2760  379.63     2760  383.11     2759
  386.65     2758  390.19     2757  392.73     2756  392.74     2756  395.22     2755
  397.63     2754  410.68     2753  426.46     2753  431.11     2754  435.76     2755
  446.04     2756  470.07     2757  481.43     2757  501.92  2756.75  563.14     2756
  587.96     2756  594.62     2757  602.49     2758  613.17     2759  626.03  2759.97
   626.5     2760  890.32     2761  967.13     2761 1086.65     2761 1302.26     2762
 1331.06  2761.75 1340.58  2761.75 1426.39  2761.75 1446.33  2761.75 1459.98  2761.75
 1515.86  2762.75 1570.65  2763.75 1587.84  2764.75 1592.77  2765.75 1597.63  2766.75
 1602.74  2767.75 1607.53  2768.75 1611.47  2769.75 1613.74  2770.75 1616.01  2771.75
 1618.28  2772.75 1620.53  2773.75 1622.77  2774.75 1624.98  2775.75 1627.19  2776.75
  1629.4  2777.75 1631.62  2778.75 1633.89  2779.75 1636.29  2780.75 1638.58  2781.75
 1640.84  2782.75 1643.09  2783.75 1645.32  2784.75

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 -600.38    .045   227.2     .03   626.5    .045

Bank Sta: Left    Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          227.2   626.5            308.04  322.72  332.25          .1          .3
Ineffective Flow      num=       1
   Sta L    Sta R    Elev  Permanent
 -600.38   227.2    2770        F

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 2764.92  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    2.08  * Wt. n-Val.              *          *    0.030  *   0.045  *
* W.S. Elev (ft)         * 2762.85  * Reach Len. (ft)         *  308.04  *  322.72  *  332.25  *
* Crit W.S. (ft)         * 2763.33  * Flow Area (sq ft)       *          * 1956.99  * 1473.46  *
* E.G. Slope (ft/ft)     *0.007990  * Area (sq ft)            *  415.36  * 1956.99  * 1473.46  *
* Q Total (cfs)          *31000.00  * Flow (cfs)              *          *24934.30  * 6065.70  *
* Top Width (ft)         * 1599.06  * Top Width (ft)          *  305.20  *  399.30  *  894.56  *
* Vel Total (ft/s)       *    9.04  * Avg. Vel. (ft/s)        *          *   12.74  *    4.12  *
* Max Chl Dpth (ft)      *    9.84  * Hydr. Depth (ft)        *          *    4.90  *    1.65  *
* Conv. Total (cfs)      *346800.4  * Conv. (cfs)             *          *278942.8  * 67857.6  *
* Length Wtd. (ft)       *  324.49  * Wetted Per. (ft)        *          *  400.88  *  894.58  *
* Min Ch El (ft)         * 2753.00  * Shear (lb/sq ft)        *          *    2.44  *    0.82  *
* Alpha                  *    1.64  * Stream Power (lb/ft s)  *          *   31.03  *    3.38  *
* Frctn Loss (ft)        *    1.43  * Cum Volume (acre-ft)    *    4.13  *   17.76  *   11.87  *
* C & E Loss (ft)        *    0.04  * Cum SA (acres)          *    2.19  *    3.48  *    6.46  *
*****************************************************************************************

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.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.
Note:    Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 2764.24  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    1.82  * Wt. n-Val.              *          *    0.030  *   0.045  *
* W.S. Elev (ft)         * 2762.42  * Reach Len. (ft)         *  308.04  *  322.72  *  332.25  *
* Crit W.S. (ft)         * 2762.82  * Flow Area (sq ft)       *          * 1787.46  * 1098.66  *
* E.G. Slope (ft/ft)     *0.007531  * Area (sq ft)            *  287.97  * 1787.46  * 1098.66  *
* Q Total (cfs)          *24490.00  * Flow (cfs)              *          *20814.43  * 3675.57  *
* Top Width (ft)         * 1565.13  * Top Width (ft)          *  294.89  *  399.30  *  870.94  *
* Vel Total (ft/s)       *    8.49  * Avg. Vel. (ft/s)        *          *   11.64  *    3.35  *
* Max Chl Dpth (ft)      *    9.42  * Hydr. Depth (ft)        *          *    4.48  *    1.26  *
* Conv. Total (cfs)      *282197.7  * Conv. (cfs)             *          *239844.2  * 42353.5  *
* Length Wtd. (ft)       *  324.13  * Wetted Per. (ft)        *          *  400.88  *  870.95  *
* Min Ch El (ft)         * 2753.00  * Shear (lb/sq ft)        *          *    2.10  *    0.59  *
* Alpha                  *    1.62  * Stream Power (lb/ft s)  *          *   24.41  *    1.98  *
* Frctn Loss (ft)        *    1.38  * Cum Volume (acre-ft)    *    3.08  *   15.95  *    8.65  *
* C & E Loss (ft)        *    0.03  * Cum SA (acres)          *    1.97  *    3.48  *    6.33  *
*****************************************************************************************

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2765.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2763.14	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2763.67	Flow Area (sq ft)		2074.07	1738.11
E.G. Slope (ft/ft)	0.008280	Area (sq ft)	506.61	2074.07	1738.11
Q Total (cfs)	36000.00	Flow (cfs)		27964.04	8035.96
Top Width (ft)	1632.62	Top Width (ft)	322.69	399.30	910.63
Vel Total (ft/s)	9.44	Avg. Vel. (ft/s)		13.48	4.62
Max Chl Dpth (ft)	10.14	Hydr. Depth (ft)		5.19	1.91
Conv. Total (cfs)	395617.6	Conv. (cfs)		307307.4	88310.2
Length Wtd. (ft)	324.71	Wetted Per. (ft)		400.88	910.65
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		2.67	0.99
Alpha	1.64	Stream Power (lb/ft s)		36.06	4.56
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	5.25	19.23	14.47
C & E Loss (ft)	0.05	Cum SA (acres)	3.49	3.48	6.56

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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 100

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-1079.5	2765	-908.05	2764	-796.29	2763	-637.85	2762	-590.66	2762
-582.71	2762	-429.48	2762	-343.01	2762	-257.47	2761	-240.37	2760
-236.92	2759	-233.51	2758	-230.22	2757	-227.02	2756	-223.93	2755
-185.04	2755	-174.13	2756	-169.65	2757	-165.16	2758	-160.66	2759
-156.1	2760	-123.66	2760	-99.38	2760	0	2760	48.99	2759
69.53	2759	69.54	2759	92.94	2759	92.95	2759	136.19	2758
136.2	2758	181.29	2757	186.69	2757	207.37	2758	220.09	2758
222.63	2757	222.64	2757	225.18	2756	227.72	2755	227.73	2755
230.27	2754	232.22	2753.36	233.31	2753	236.48	2752	271.72	2752
275.17	2753	279.24	2754	328.16	2755	339.63	2756	339.64	2756
380.46	2756	380.47	2756	390.22	2755.86	451.75	2755	486.38	2754
497.38	2754	501.1	2755	504.87	2756	504.88	2756	507.69	2757
539.73	2758	571.48	2759	643.34	2760	716.38	2760	890.83	2759
890.84	2759	1036.2	2759	1036.21	2759	1095.21	2760	1202.49	2760
1202.5	2760	1304.69	2760	1327.57	2761	1346.89	2762	1361.89	2763
1372.87	2764	1372.88	2764	1398.46	2765				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-1079.5	.045	0	.03	539.73	.045

Bank Sta: Left Right Coeff Contr. Expan.
0 539.73 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-1079.5	-156.1	2764	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2762.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.65	Reach Len. (ft)			
Crit W.S. (ft)	2761.20	Flow Area (sq ft)	257.55	2837.18	1638.16
E.G. Slope (ft/ft)	0.003515	Area (sq ft)	753.97	2837.18	1638.16
Q Total (cfs)	31000.00	Flow (cfs)	703.96	25126.95	5169.09
Top Width (ft)	1653.19	Top Width (ft)	313.06	539.73	800.40
Vel Total (ft/s)	6.55	Avg. Vel. (ft/s)	2.73	8.86	3.16
Max Chl Dpth (ft)	9.65	Hydr. Depth (ft)	1.65	5.26	2.05
Conv. Total (cfs)	522910.6	Conv. (cfs)	11874.5	423843.4	87192.6
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	800.47
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.36	1.15	0.45
Alpha	1.52	Stream Power (lb/ft s)	0.99	10.18	1.42
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2762.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.06	Reach Len. (ft)			
Crit W.S. (ft)	2760.72	Flow Area (sq ft)	165.48	2518.82	1169.41
E.G. Slope (ft/ft)	0.003685	Area (sq ft)	584.19	2518.82	1169.41
Q Total (cfs)	24490.00	Flow (cfs)	344.82	21098.36	3046.82
Top Width (ft)	1591.34	Top Width (ft)	262.61	539.73	789.00
Vel Total (ft/s)	6.35	Avg. Vel. (ft/s)	2.08	8.38	2.61
Max Chl Dpth (ft)	9.06	Hydr. Depth (ft)	1.06	4.67	1.48

* Conv. Total (cfs)	*403456.7	* Conv. (cfs)	* 5680.7	*347581.5	* 50194.4	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 789.06	*
* Min Ch El (ft)	* 2752.00	* Shear (lb/sq ft)	* 0.24	* 1.07	* 0.34	*
* Alpha	* 1.52	* Stream Power (lb/ft s)	* 0.51	* 8.96	* 0.89	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2763.17	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.00	* Wt. n-Val.	* 0.045	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2762.17	* Reach Len. (ft)	*	*	*	*
* Crit W.S. (ft)	* 2761.51	* Flow Area (sq ft)	* 338.72	* 3117.85	* 2056.93	*
* E.G. Slope (ft/ft)	*0.003152	* Area (sq ft)	* 979.48	* 3117.85	* 2056.93	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	* 1052.54	*27848.25	* 7099.21	*
* Top Width (ft)	* 2014.21	* Top Width (ft)	* 664.77	* 539.73	* 809.71	*
* Vel Total (ft/s)	* 6.53	* Avg. Vel. (ft/s)	* 3.11	* 8.93	* 3.45	*
* Max Chl Dpth (ft)	* 10.17	* Hydr. Depth (ft)	* 2.17	* 5.78	* 2.54	*
* Conv. Total (cfs)	*641195.8	* Conv. (cfs)	* 18746.7	*496005.0	*126444.0	*
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 809.80	*
* Min Ch El (ft)	* 2752.00	* Shear (lb/sq ft)	* 0.43	* 1.13	* 0.50	*
* Alpha	* 1.51	* Stream Power (lb/ft s)	* 1.33	* 10.12	* 1.73	*
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

SUMMARY OF MANNING'S N VALUES

River:River #1

Reach	River Sta.	n1	n2	n3
Reach #1	225	.045	.03	.045
Reach #1	220	.045	.03	.045
Reach #1	215	.045	.03	.045
Reach #1	210	.045	.03	.045
Reach #1	205	.045	.03	.045
Reach #1	200	.045	.03	.045
Reach #1	195	.045	.03	.045
Reach #1	190	.045	.03	.045
Reach #1	180	.045	.03	.045
Reach #1	170	.045	.03	.045
Reach #1	160	.045	.03	.045
Reach #1	150	.045	.03	.045
Reach #1	139	.045	.03	.045
Reach #1	130	.045	.03	.045
Reach #1	120	.045	.03	.045
Reach #1	115	.045	.03	.045
Reach #1	110	.045	.03	.045
Reach #1	100	.045	.03	.045

SUMMARY OF REACH LENGTHS

River: River #1

Reach	River Sta.	Left	Channel	Right
Reach #1	225	299.75	282.05	262.04
Reach #1	220	277.65	269.4	261.19
Reach #1	215	294.95	268.22	230.48
Reach #1	210	283.6	269.08	254.74
Reach #1	205	280.12	286.64	293.88
Reach #1	200	179.8	195.07	210.23
Reach #1	195	215.83	225.58	311.98
Reach #1	190	77.8	72.37	83.03
Reach #1	180	44.45	181.54	256.85
Reach #1	170	130.15	130.15	130.15
Reach #1	160	203.69	188.86	197
Reach #1	150	262.45	206.64	129.8
Reach #1	139	172.75	171.78	164.65
Reach #1	130	295.76	287.33	274.51
Reach #1	120	158.39	153.64	149.14
Reach #1	115	257.93	242.39	227.54
Reach #1	110	308.04	322.72	332.25
Reach #1	100			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River #1

Reach	River Sta.	Contr.	Expan.
Reach #1	225	.1	.3
Reach #1	220	.1	.3
Reach #1	215	.1	.3
Reach #1	210	.1	.3
Reach #1	205	.1	.3
Reach #1	200	.1	.3

```
*Reach #1        *    195     *       .1*       .3*
*Reach #1        *    190     *       .1*       .3*
*Reach #1        *    180     *       .1*       .3*
*Reach #1        *    170     *       .1*       .3*
*Reach #1        *    160     *       .1*       .3*
*Reach #1        *    150     *       .1*       .3*
*Reach #1        *    139     *       .1*       .3*
*Reach #1        *    130     *       .1*       .3*
*Reach #1        *    120     *       .1*       .3*
*Reach #1        *    115     *       .1*       .3*
*Reach #1        *    110     *       .1*       .3*
*Reach #1        *    100     *       .1*       .3*
*****************************************************
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Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #1	225	PF 1	31000.00	2768.00	2783.79	2781.42	2786.45	0.003148	13.09	2368.69	849.40	0.71
Reach #1	225	PF 2	24490.00	2768.00	2782.23	2780.05	2784.51	0.003108	12.10	2023.49	754.54	0.70
Reach #1	225	PF 3	36000.00	2768.00	2784.84	2782.42	2787.78	0.003262	13.77	2613.48	1215.25	0.73
Reach #1	220	PF 1	31000.00	2767.00	2780.92	2780.92	2785.06	0.006598	16.33	1897.98	904.77	1.00
Reach #1	220	PF 2	24490.00	2767.00	2780.16	2779.58	2783.28	0.005463	14.17	1728.23	784.47	0.90
Reach #1	220	PF 3	36000.00	2767.00	2781.82	2781.82	2786.37	0.006460	17.10	2104.79	1075.72	1.00
Reach #1	215	PF 1	31000.00	2767.00	2780.49	2779.67	2783.03	0.004711	12.82	2425.80	1271.30	0.83
Reach #1	215	PF 2	24490.00	2767.00	2779.44	2777.92	2781.60	0.004906	11.81	2075.45	903.76	0.83
Reach #1	215	PF 3	36000.00	2767.00	2779.41	2780.35	2784.13	0.010772	17.44	2065.33	892.30	1.22
Reach #1	210	PF 1	31000.00	2766.00	2778.66	2778.66	2781.45	0.007383	13.40	2313.85	1097.58	1.00
Reach #1	210	PF 2	24490.00	2766.00	2776.84	2776.53	2780.03	0.006179	14.33	1708.58	503.53	0.95
Reach #1	210	PF 3	36000.00	2766.00	2779.29	2779.29	2782.30	0.007343	13.93	2585.10	1350.50	1.00
Reach #1	205	PF 1	31000.00	2765.00	2776.22	2777.30	2779.34	0.008080	14.33	2410.89	793.24	1.05
Reach #1	205	PF 2	24490.00	2765.00	2775.69	2775.69	2778.12	0.006333	12.57	2054.88	564.95	0.92
Reach #1	205	PF 3	36000.00	2765.00	2776.61	2777.75	2780.06	0.009177	15.23	2725.49	821.56	1.12
Reach #1	200	PF 1	31000.00	2763.00	2775.79	2774.99	2777.53	0.002710	11.65	4073.47	1061.35	0.66
Reach #1	200	PF 2	24490.00	2763.00	2773.47	2773.95	2776.37	0.005630	14.06	2140.17	639.31	0.91
Reach #1	200	PF 3	36000.00	2763.00	2777.61	2775.91	2778.65	0.001471	9.63	6098.87	1123.03	0.50
Reach #1	195	PF 1	31000.00	2762.00	2776.10	2773.18	2776.91	0.001134	8.08	5620.12	1032.86	0.44
Reach #1	195	PF 2	24490.00	2762.00	2773.94	2771.52	2775.00	0.001844	8.87	3625.64	791.32	0.53
Reach #1	195	PF 3	36000.00	2762.00	2777.65	2773.66	2778.32	0.000834	7.58	7312.49	1150.72	0.38
Reach #1	190	PF 1	31000.00	2760.49	2776.15	2770.00	2776.63	0.000559	5.57	5571.29	561.62	0.30
Reach #1	190	PF 2	24490.00	2760.49	2774.11	2769.25	2774.57	0.000684	5.44	4498.68	516.51	0.33
Reach #1	190	PF 3	36000.00	2760.49	2777.63	2770.53	2778.12	0.000482	5.64	6607.73	849.13	0.29
Reach #1	180	PF 1	31000.00	2759.08	2775.79	2769.77	2776.56	0.000797	7.02	4417.73	380.92	0.36
Reach #1	180	PF 2	24490.00	2759.08	2773.80	2768.85	2774.49	0.000903	6.68	3663.85	374.16	0.38
Reach #1	180	PF 3	36000.00	2759.08	2777.24	2770.43	2778.05	0.000732	7.22	5081.69	539.32	0.35
Reach #1	170	PF 1	31000.00	2758.49	2774.20	2770.56	2776.17	0.003676	11.25	2757.73	242.69	0.59
Reach #1	170	PF 2	24490.00	2758.49	2772.35	2769.31	2774.09	0.003766	10.58	2315.34	235.99	0.60
Reach #1	170	PF 3	36000.00	2758.49	2775.55	2771.45	2777.66	0.003616	11.68	3086.79	247.31	0.58
Reach #1	160	PF 1	31000.00	2757.67	2771.39	2770.34	2775.27	0.008706	15.81	1961.09	187.93	0.86
Reach #1	160	PF 2	24490.00	2757.67	2770.21	2768.88	2773.29	0.007540	14.07	1740.90	184.84	0.81
Reach #1	160	PF 3	36000.00	2757.67	2772.11	2771.39	2776.69	0.009790	17.17	2096.10	189.78	0.91
Reach #1	150	PF 1	31000.00	2757.36	2769.35	2769.35	2773.78	0.006782	16.88	1836.44	207.99	1.00
Reach #1	150	PF 2	24490.00	2757.36	2768.00	2768.00	2771.83	0.007077	15.72	1557.52	204.23	1.00
Reach #1	150	PF 3	36000.00	2757.36	2770.31	2770.31	2775.16	0.006667	17.68	2036.48	211.14	1.00
Reach #1	139	PF 1	31000.00	2756.07	2765.45	2767.29	2771.69	0.013412	20.39	1706.88	405.73	1.38
Reach #1	139	PF 2	24490.00	2756.07	2764.81	2766.35	2769.85	0.011932	18.13	1453.04	392.22	1.28
Reach #1	139	PF 3	36000.00	2756.07	2765.88	2768.62	2772.99	0.014387	21.91	1884.39	413.39	1.44
Reach #1	130	PF 1	31000.00	2755.25	2765.14	2766.38	2769.18	0.008922	16.72	2239.54	595.82	1.12
Reach #1	130	PF 2	24490.00	2755.25	2765.89	2765.37	2767.71	0.003800	11.42	2678.53	718.73	0.74
Reach #1	130	PF 3	36000.00	2755.25	2765.43	2767.00	2770.22	0.010327	18.32	2408.98	645.25	1.22
Reach #1	120	PF 1	31000.00	2754.00	2765.67	2765.44	2767.11	0.004458	10.60	3972.41	1460.10	0.78
Reach #1	120	PF 2	24490.00	2754.00	2765.02	2764.98	2766.37	0.004660	10.02	3250.25	1389.85	0.78
Reach #1	120	PF 3	36000.00	2754.00	2766.07	2765.81	2767.62	0.004493	11.13	4425.95	1508.19	0.79
Reach #1	115	PF 1	31000.00	2753.00	2764.74	2764.74	2766.39	0.004600	11.08	3794.22	1539.72	0.80
Reach #1	115	PF 2	24490.00	2753.00	2764.16	2764.16	2765.65	0.004527	10.27	3102.07	1477.14	0.78
Reach #1	115	PF 3	36000.00	2753.00	2765.15	2765.15	2766.90	0.004615	11.59	4284.47	1597.71	0.81
Reach #1	110	PF 1	31000.00	2753.00	2762.85	2763.33	2764.92	0.007990	12.74	3430.45	1599.06	1.01
Reach #1	110	PF 2	24490.00	2753.00	2762.42	2762.82	2764.24	0.007531	11.64	2886.12	1565.13	0.97
Reach #1	110	PF 3	36000.00	2753.00	2763.14	2763.67	2765.41	0.008280	13.48	3812.18	1632.62	1.04
Reach #1	100	PF 1	31000.00	2752.00	2761.65	2761.20	2762.67	0.003515	8.86	4732.88	1653.19	0.68
Reach #1	100	PF 2	24490.00	2752.00	2761.06	2760.72	2762.01	0.003685	8.38	3853.71	1591.34	0.68
Reach #1	100	PF 3	36000.00	2752.00	2762.17	2761.51	2763.17	0.003152	8.93	5513.50	2014.21	0.65

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Alt. 3a

ver: River #1 Reach: Reach #1 RS: 225 Profile: PF 1
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 1
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:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
iver: River #1 Reach: Reach #1 RS: 220 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
ver: River #1 Reach: Reach #1 RS: 205 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 1
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 3
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.

Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 1
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 3
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 2
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 2
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 3
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:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 1
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 2
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 3
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
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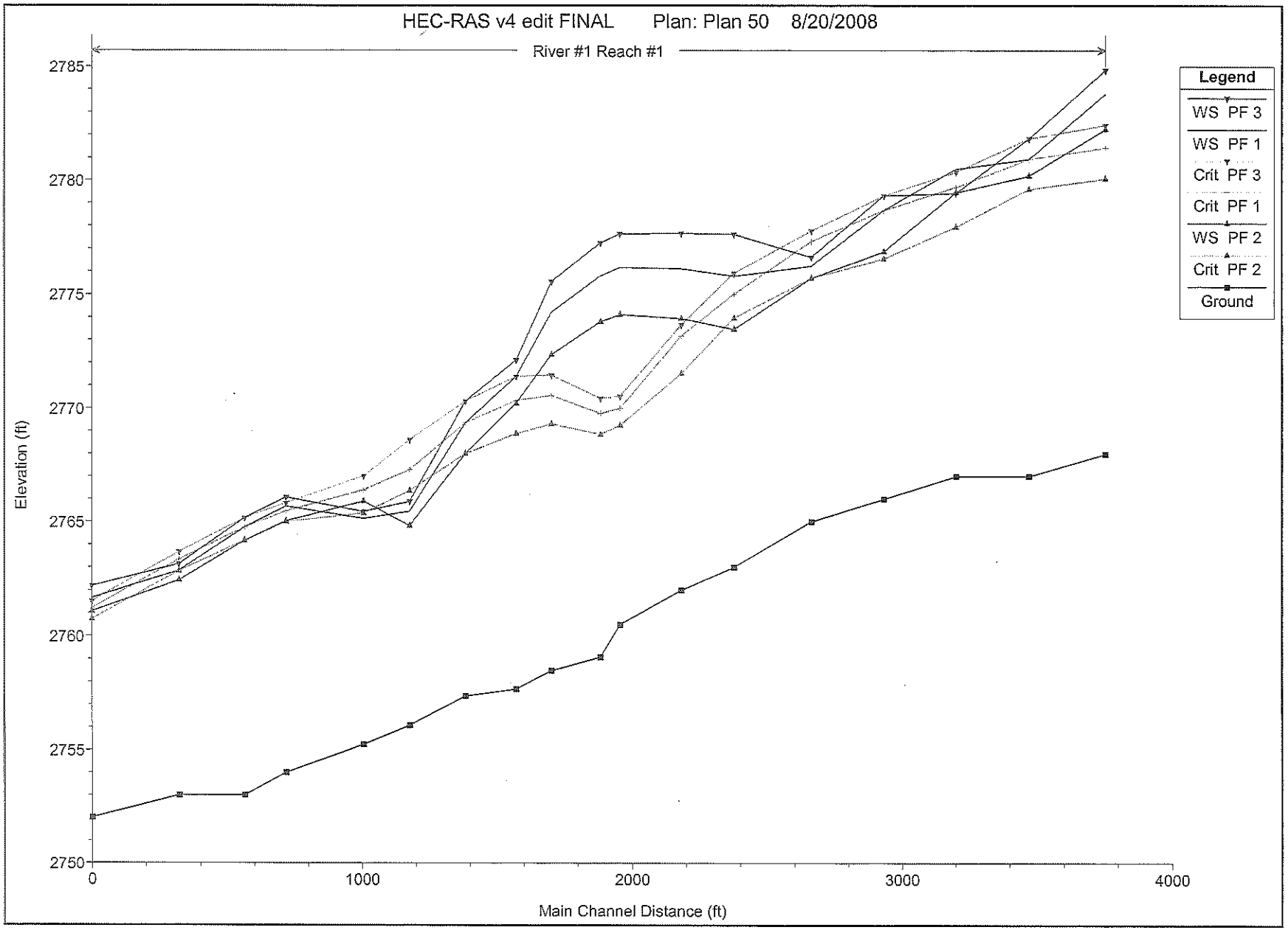
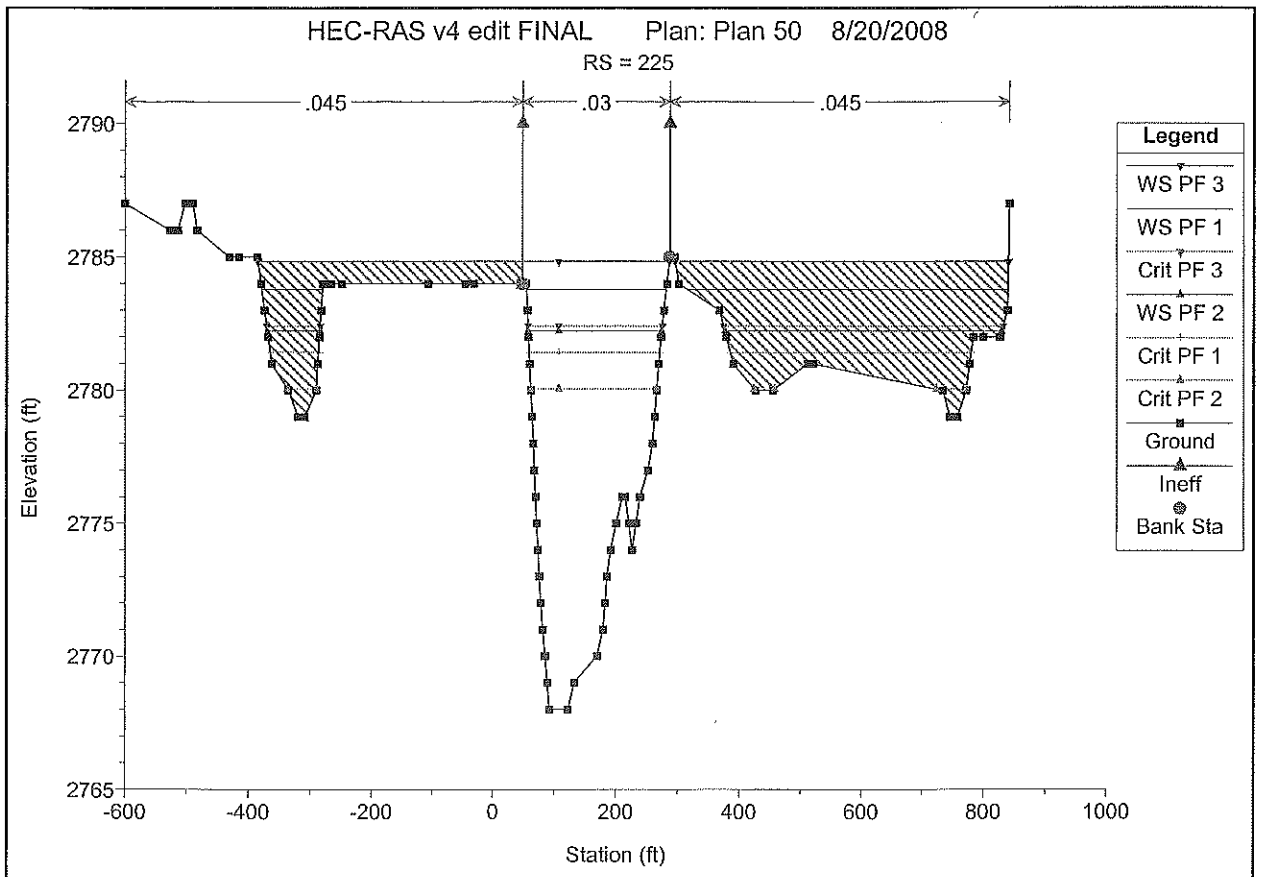

HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
River #1 Reach #1
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Elevation (ft)
2785
2780
2775
2770
2765
2760
2755
2750
0
1000
2000
3000
4000
Main Channel Distance (ft)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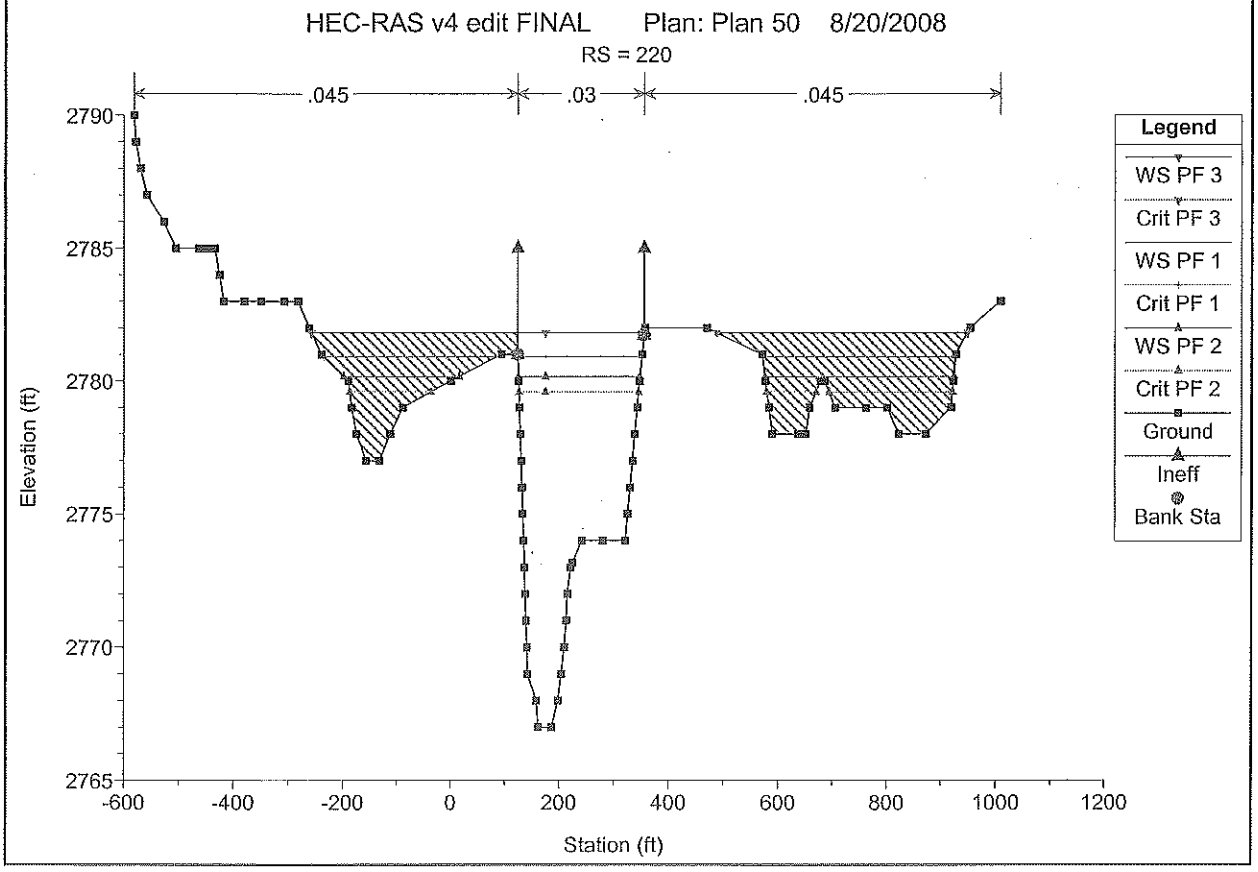
RS = 225
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Ineff
Bank Sta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RS = 220
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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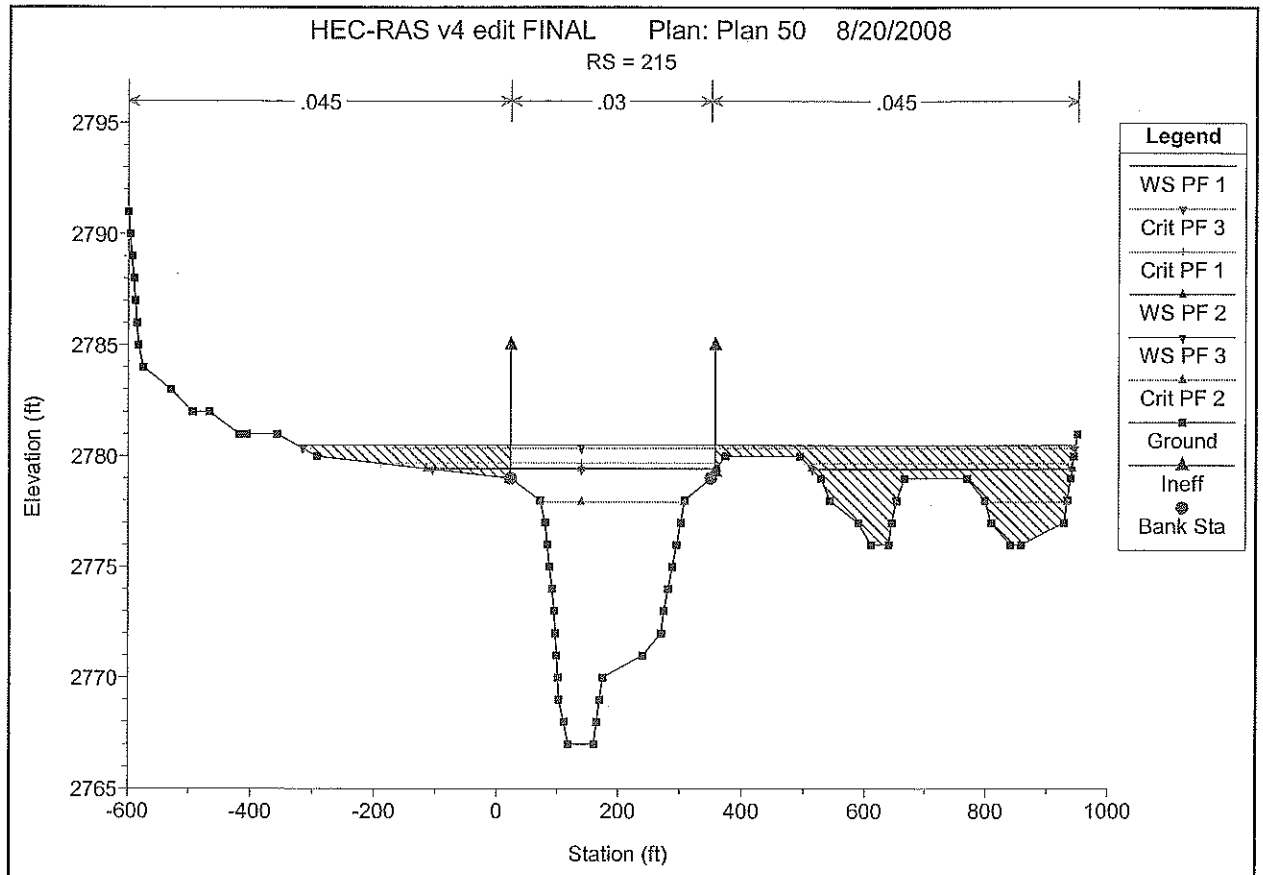
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta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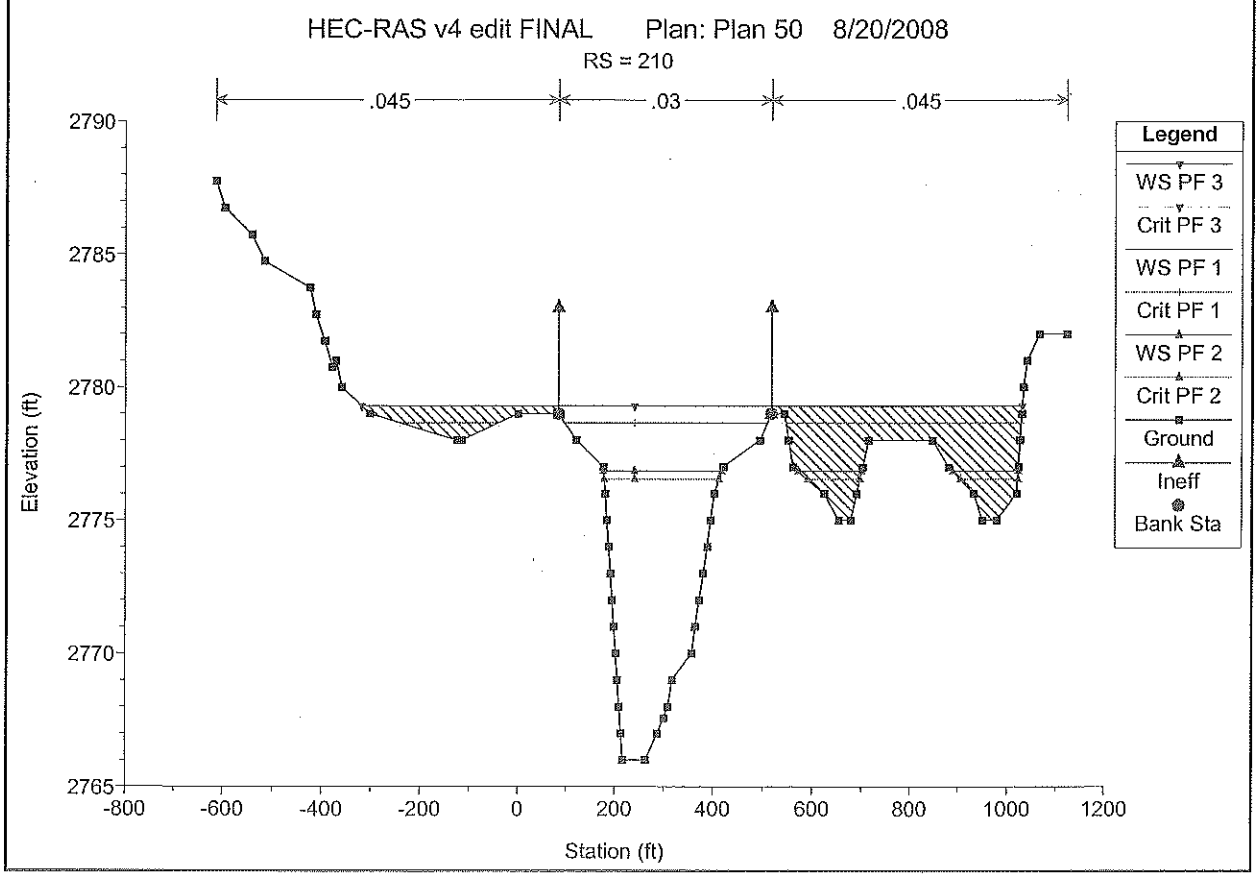
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
Ground
Ineff
Bank Sta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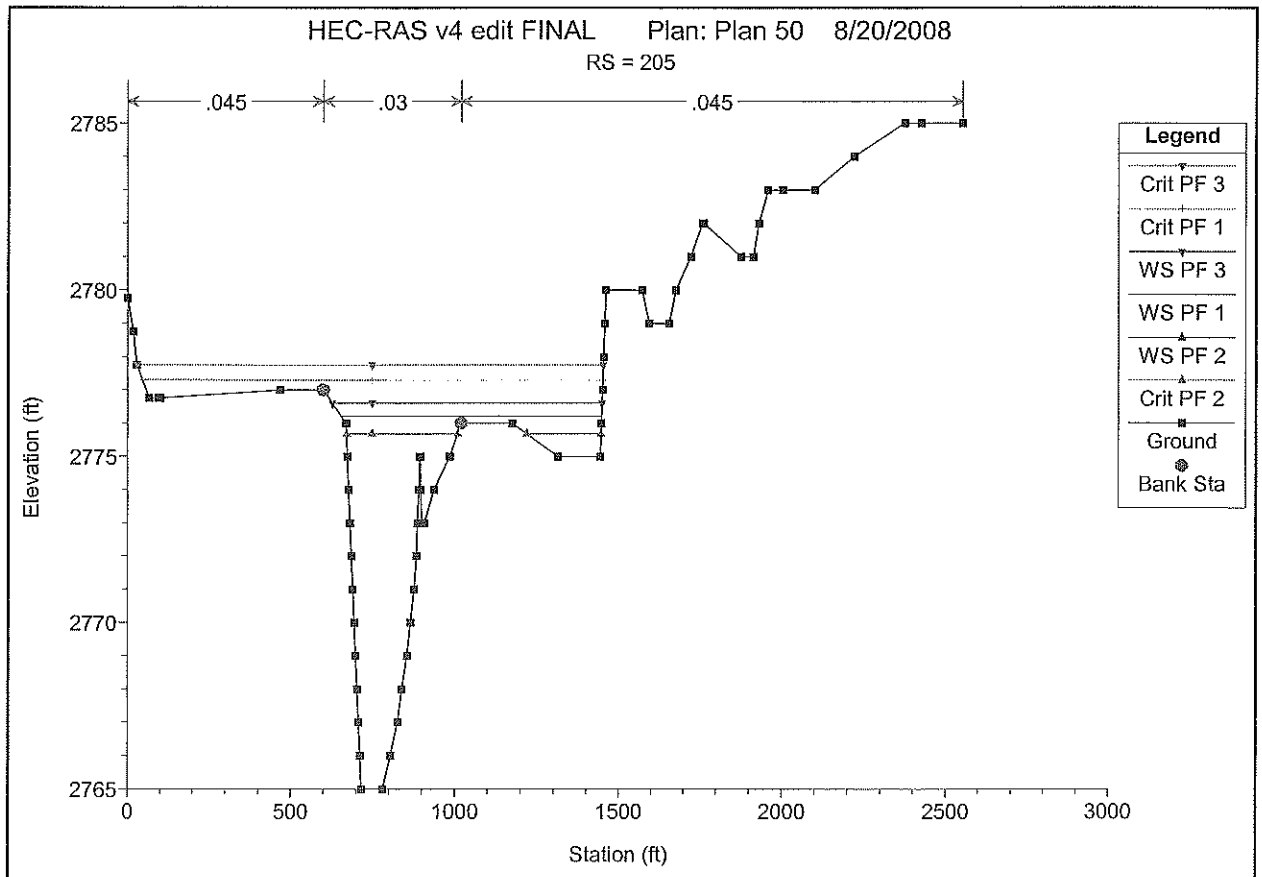
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta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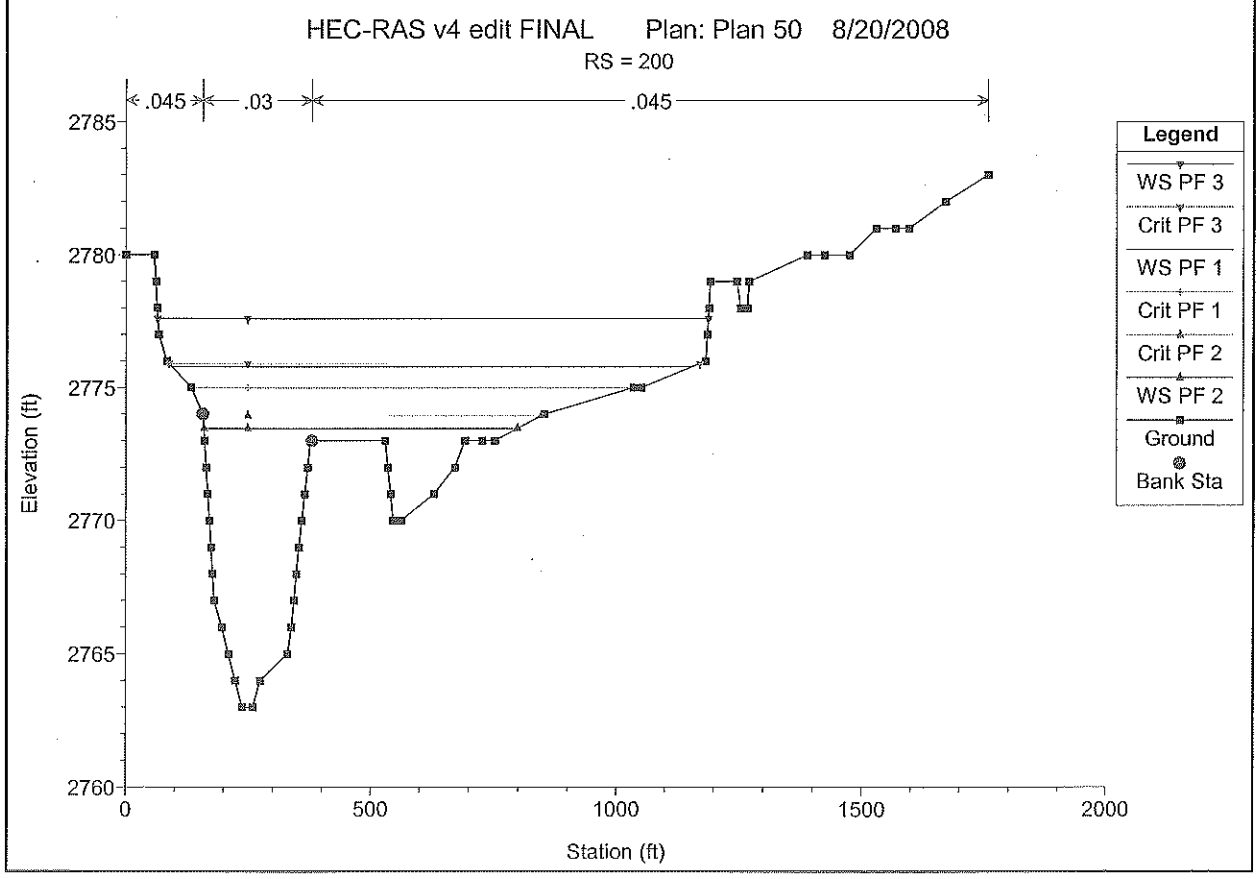
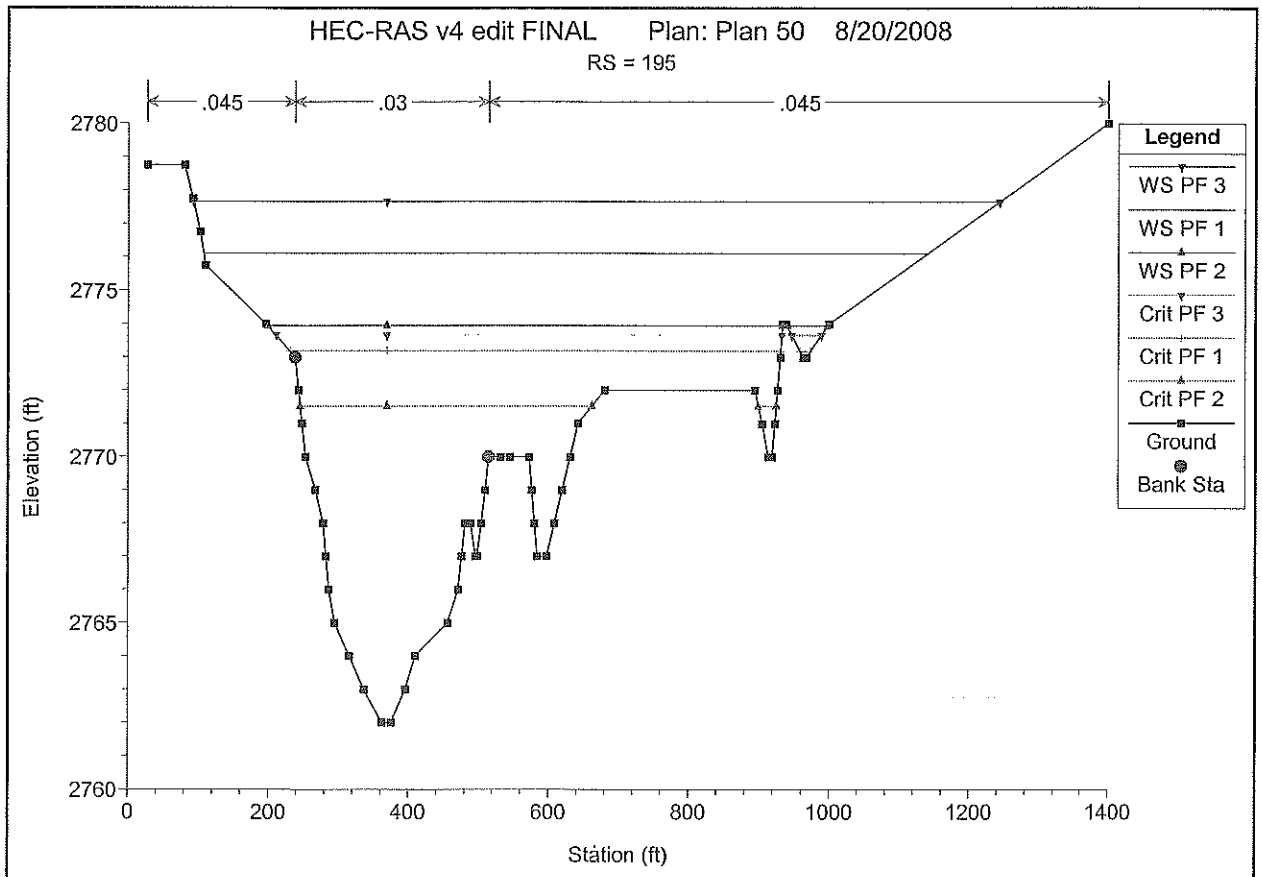
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 200
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
Crit PF 2
WS PF 2
Ground
Bank Sta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RS = 195
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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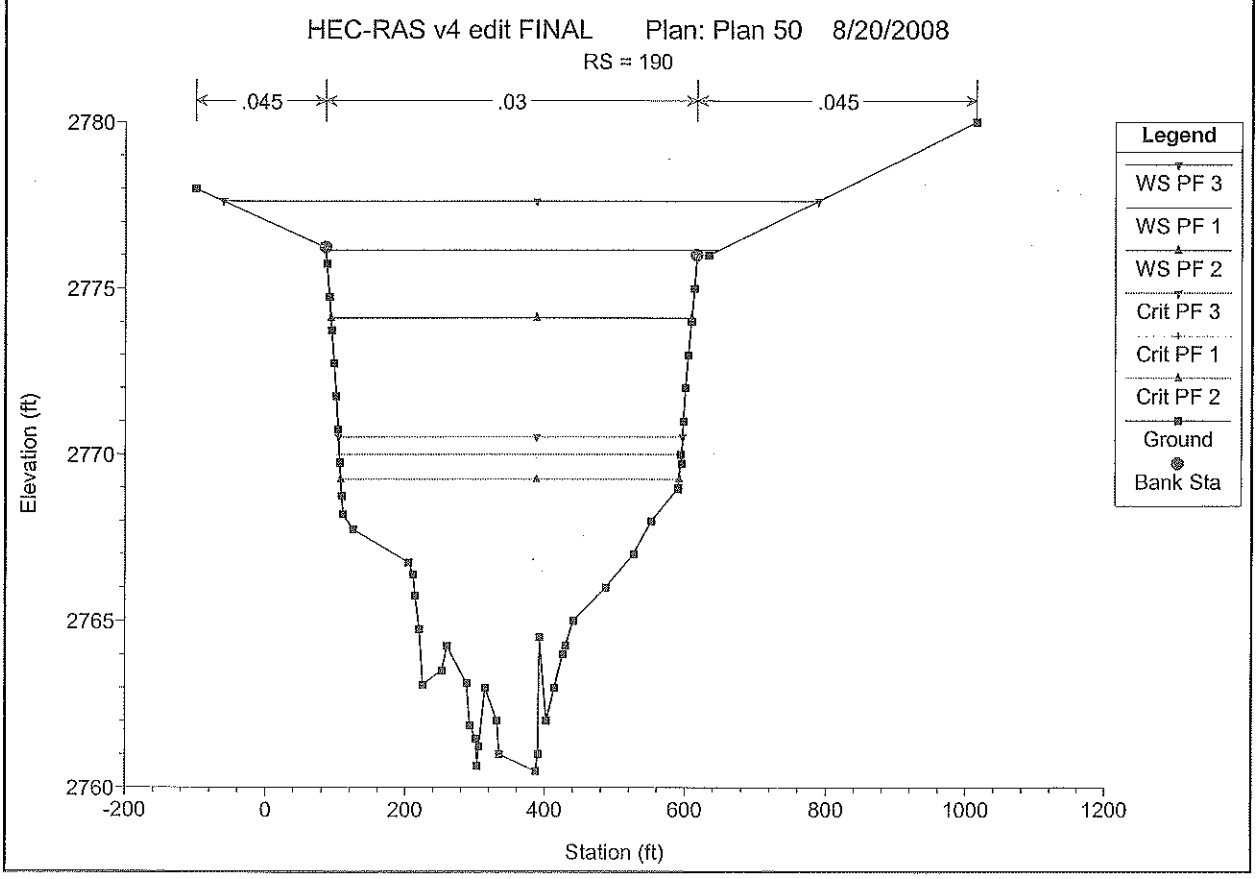
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 190
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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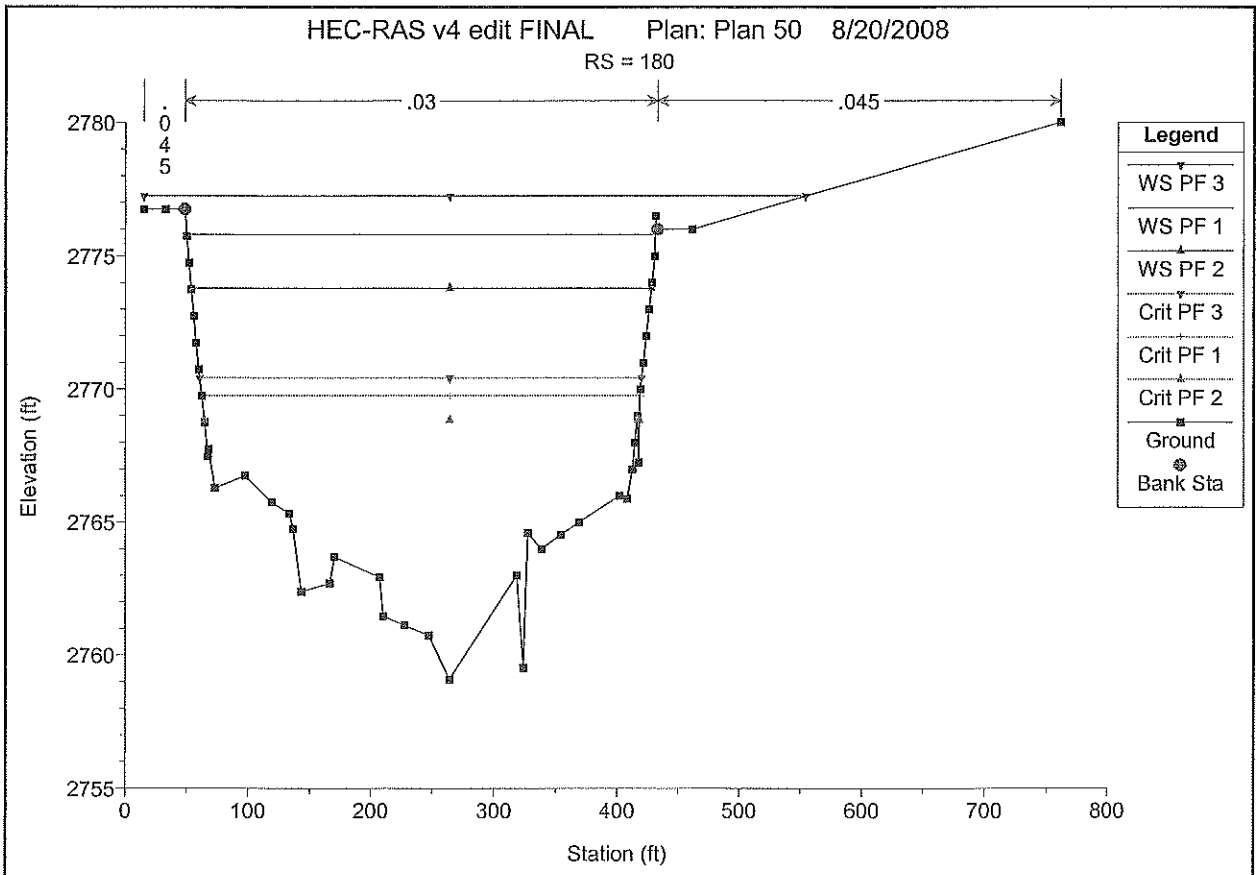
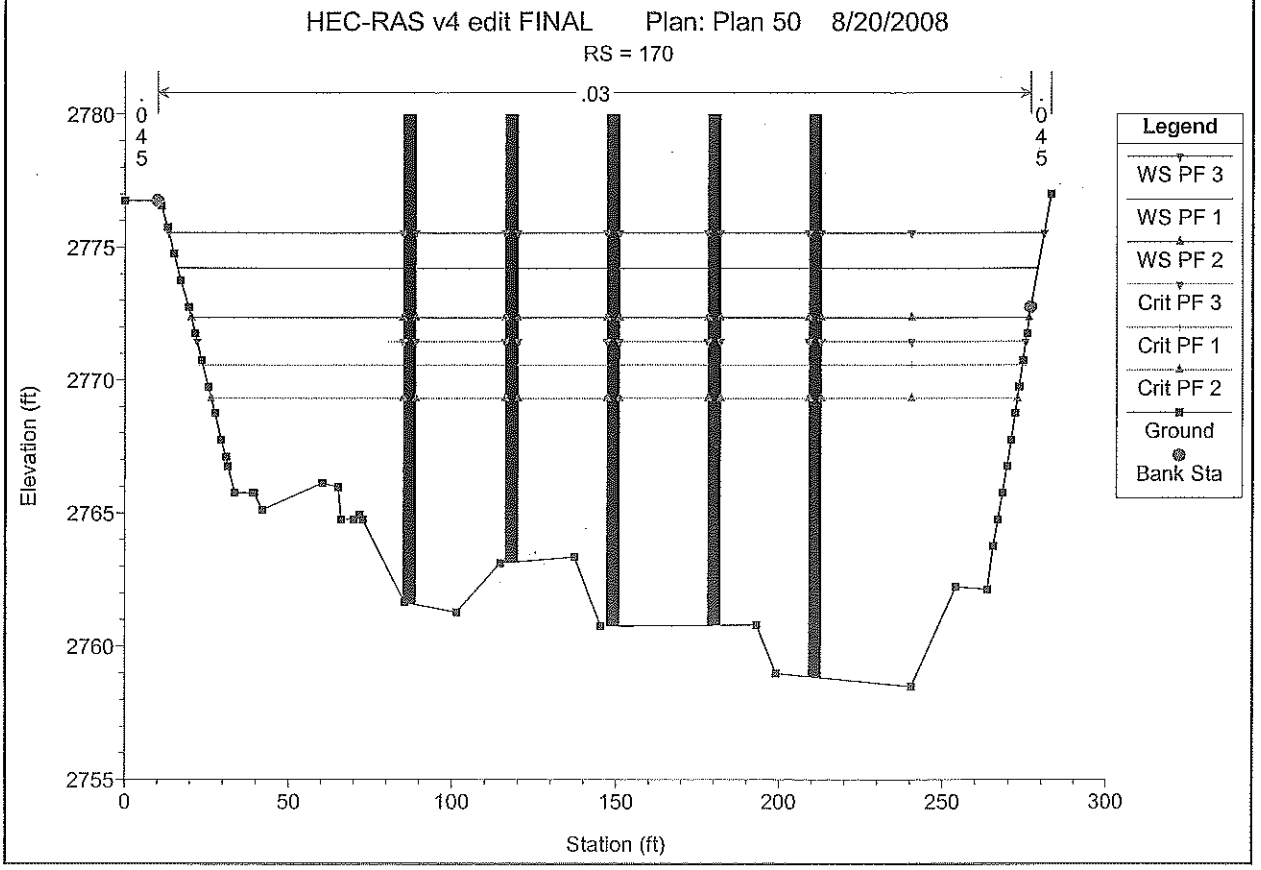
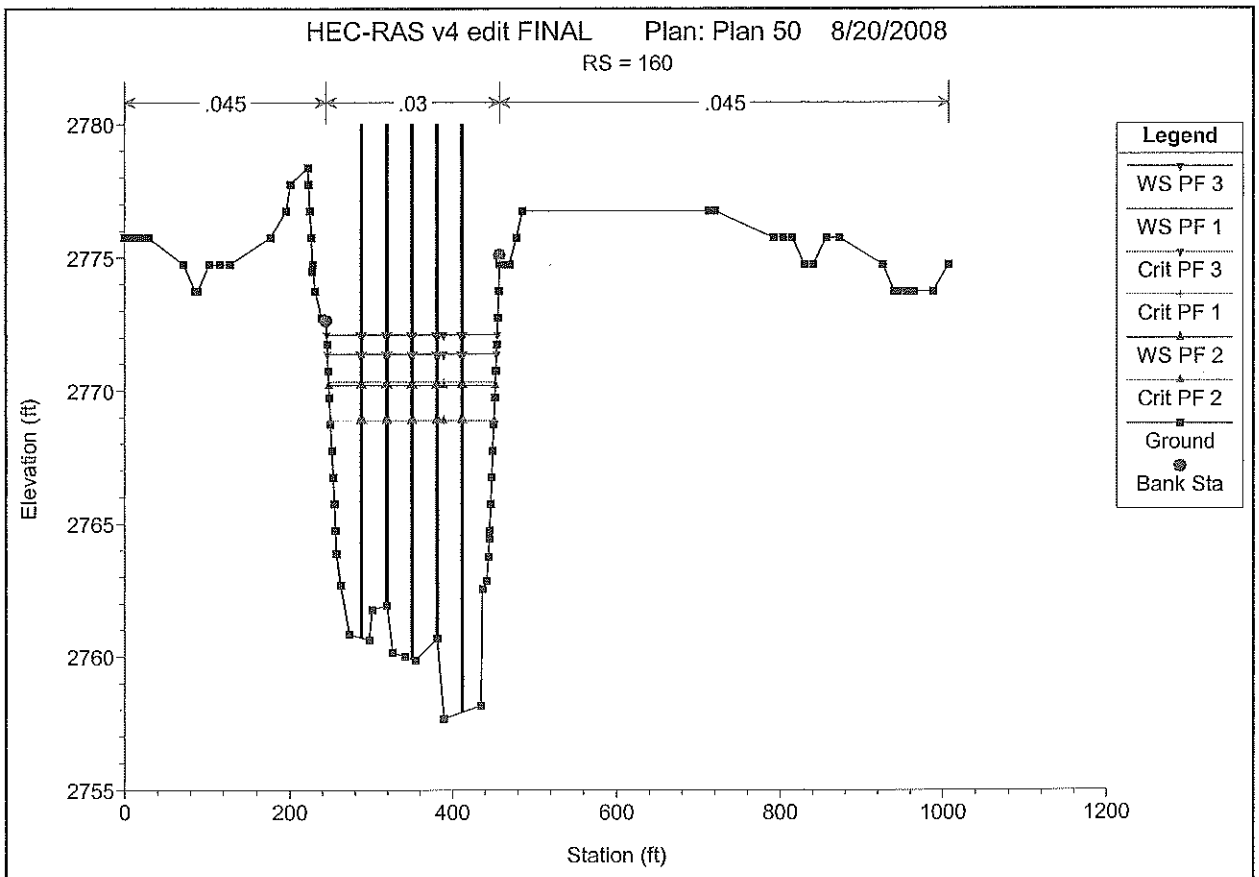
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 180
.045
.03
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2755
2760
2765
2770
2775
2780
0
100
200
300
400
500
600
700
800


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 170
.045
.03
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2755
2760
2765
2770
2775
2780
0
50
100
150
200
250
300


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 160
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
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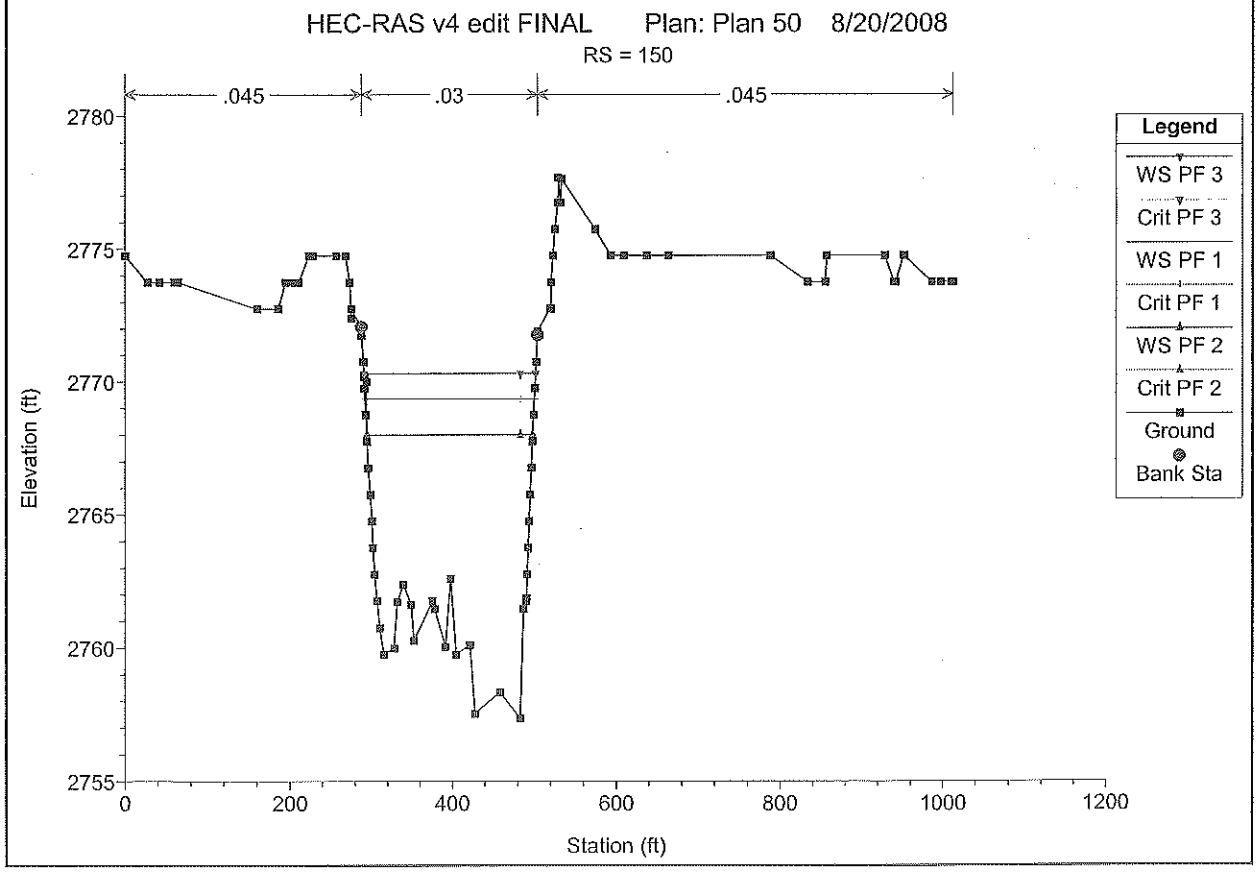
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 150
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
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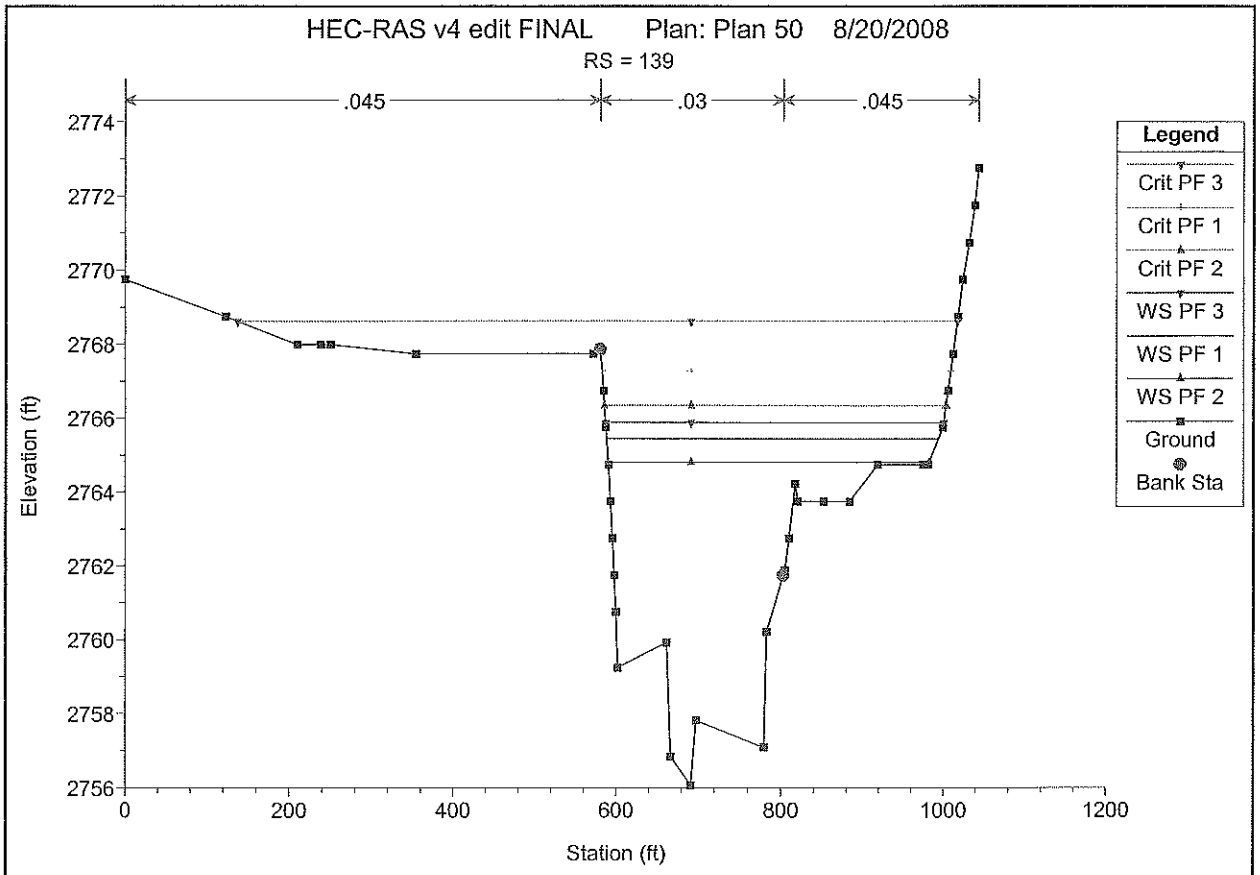
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 139
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
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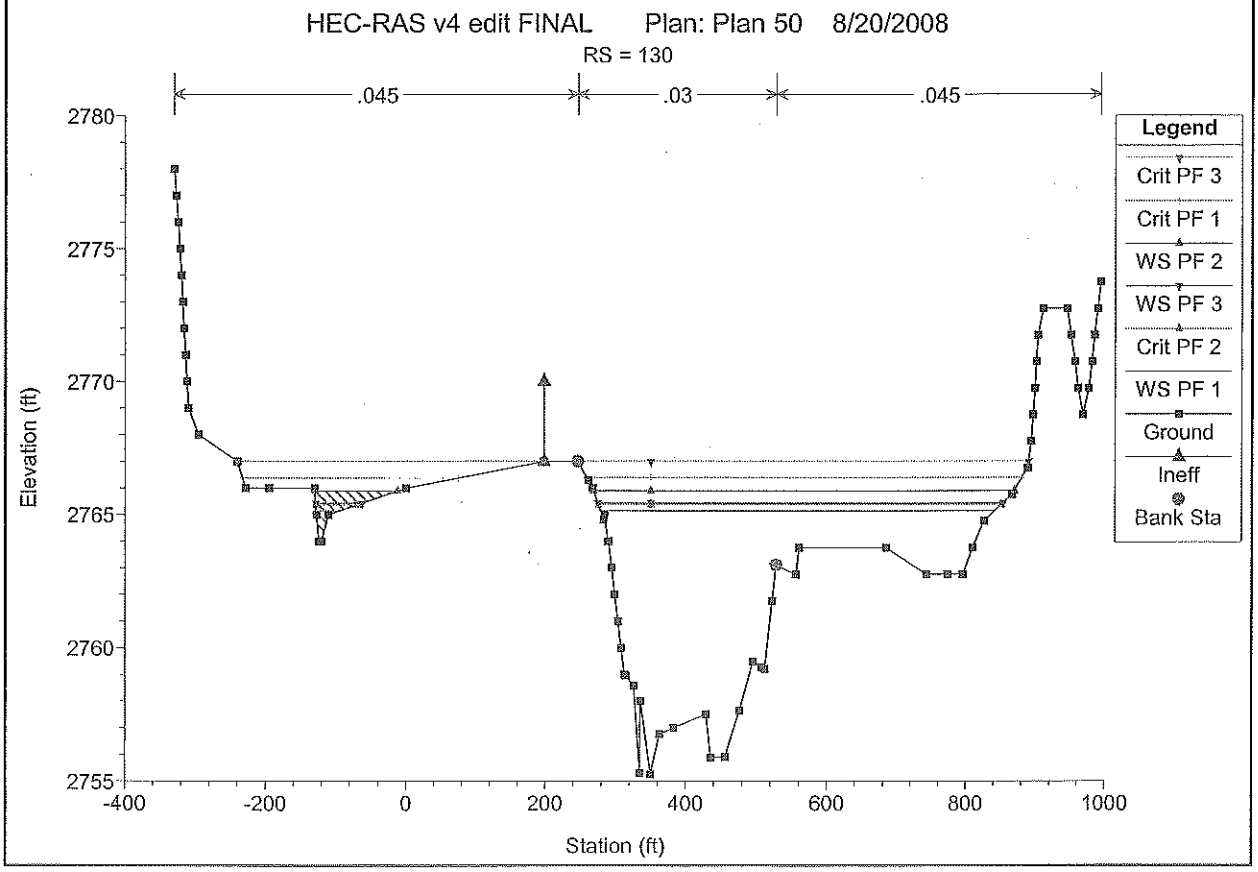
WS PF 3
WS PF 1
WS PF 2
Ground
Bank Sta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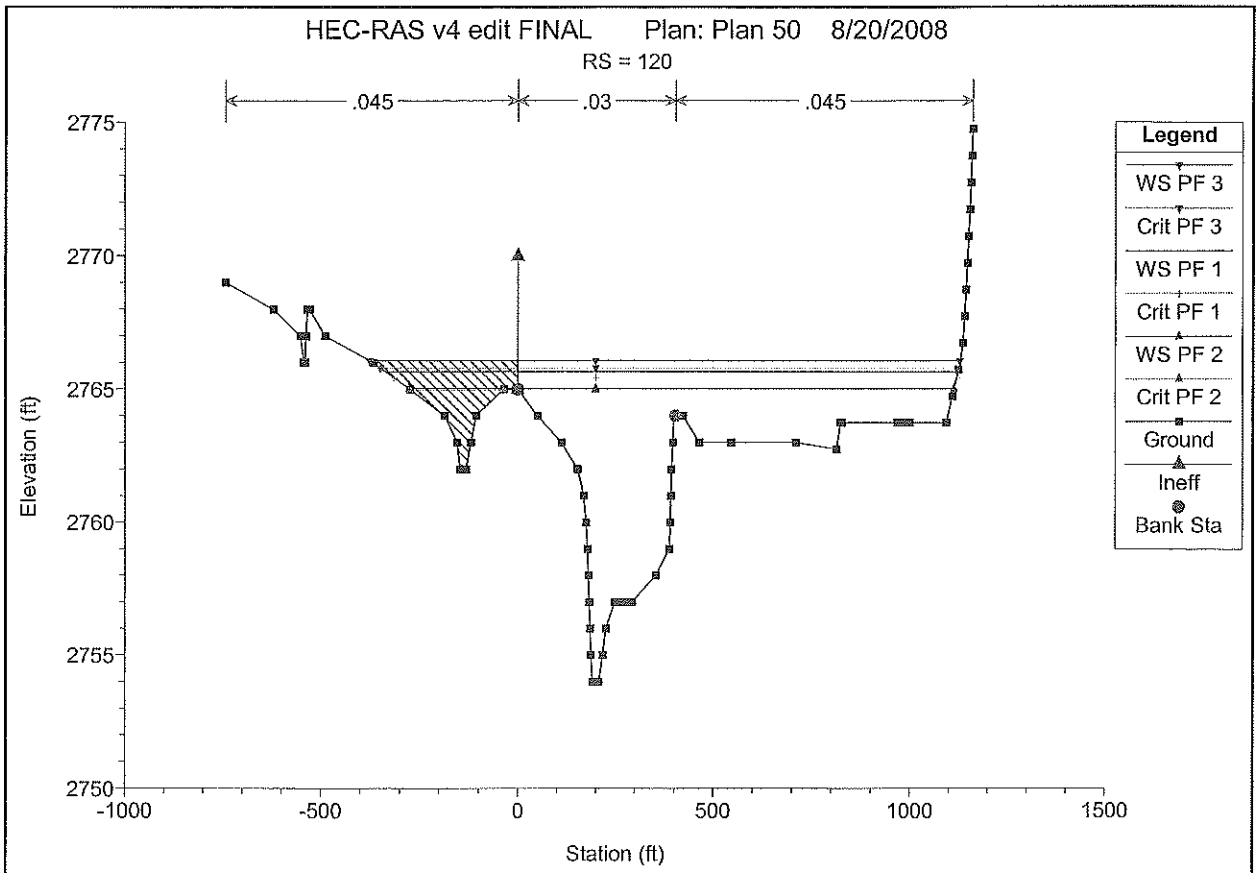
RS = 130
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
WS PF 1
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 120
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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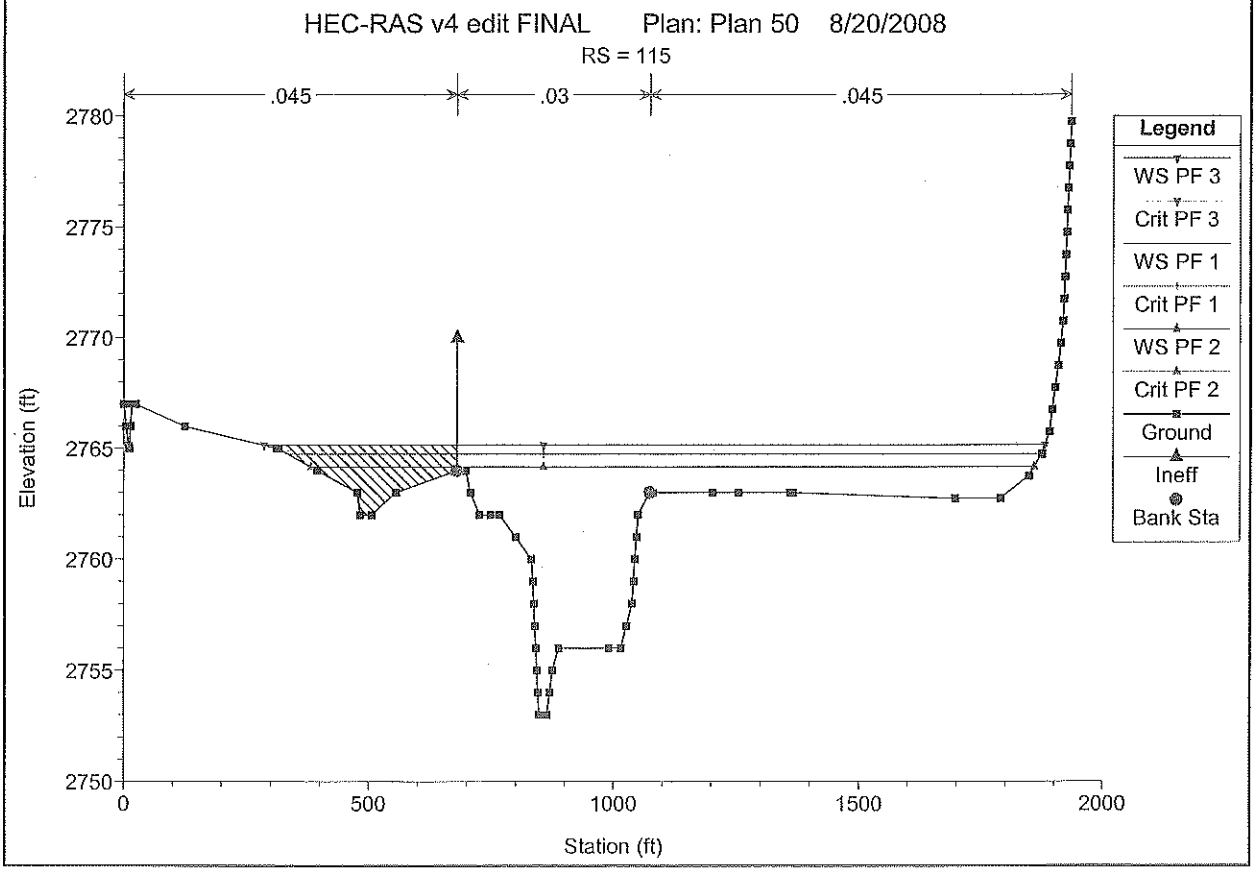
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 115
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
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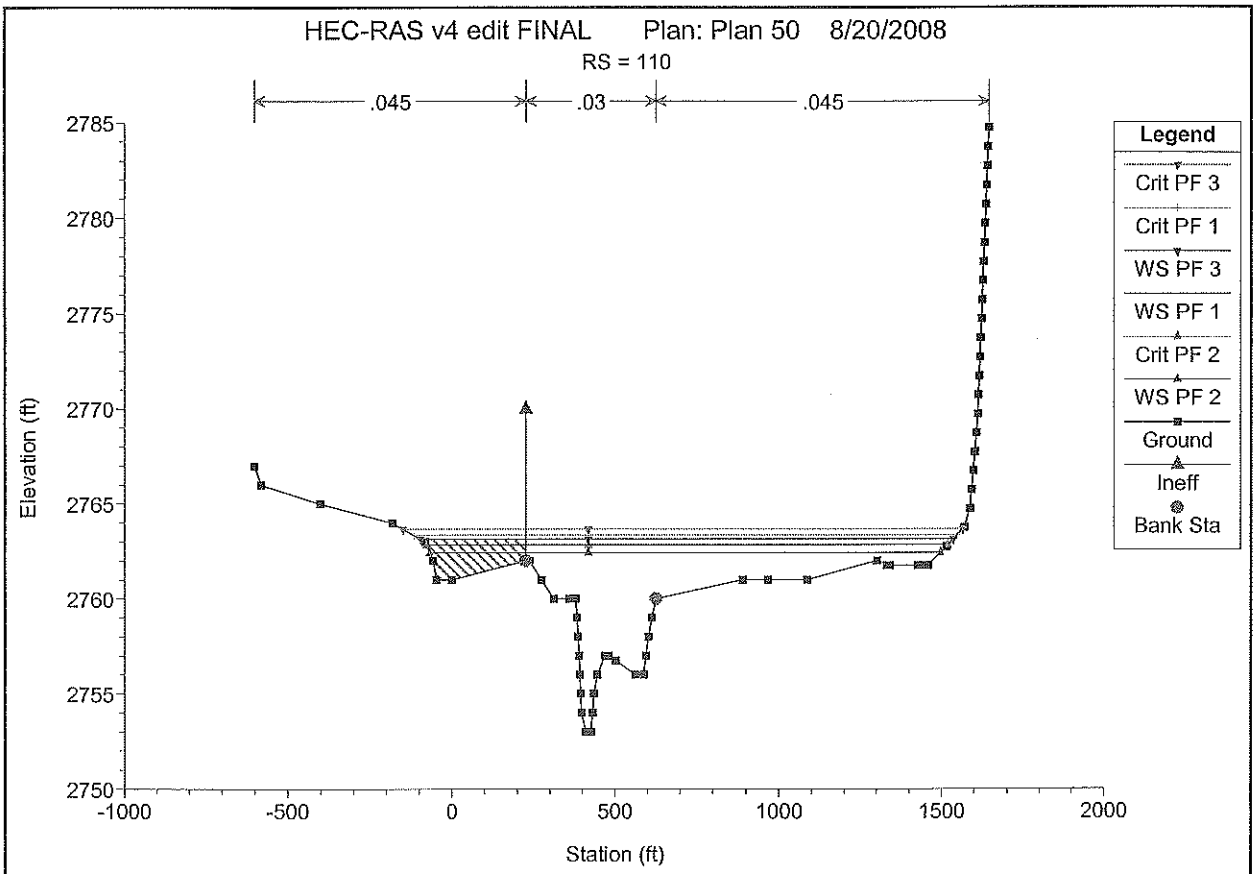
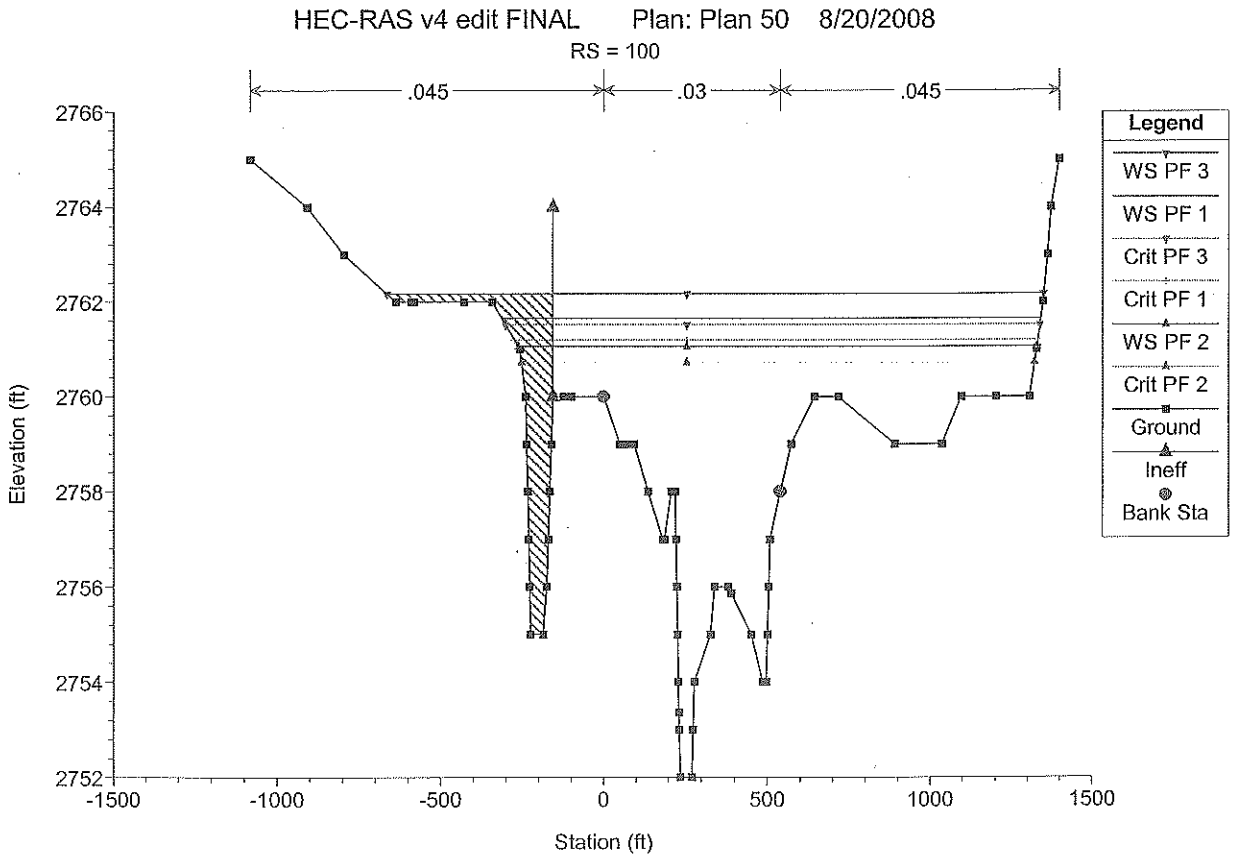
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 110
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
Crit PF 2
WS PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 50 8/20/2008
RS = 100
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta

ALTERNATIVE 4

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX

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PROJECT DATA
Project Title: HEC-RAS v4 edit FINAL
Project File : v4_FINAL.prj
Run Date and Time: 7/28/2008 2:26:04 PM

Project in English units

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PLAN DATA

Plan Title: Plan 46
Plan File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.p46

          Geometry Title: Alternative 4
          Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g02

          Flow Title    : Flow Profiles
          Flow File     : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Plan Summary Information:
Number of:  Cross Sections =   18    Multiple Openings  =    0
            Culverts       =    0    Inline Structures  =    0
            Bridges        =    0    Lateral Structures =    0

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

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

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FLOW DATA

Flow Title: Flow Profiles
Flow File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.f02

Flow Data (cfs)
*********************************************************************************************
* River           Reach           RS      *            PF 1            PF 2            PF 3 *
* River #1        Reach #1        225     *           31000           24490           36000 *
*********************************************************************************************

Boundary Conditions
*****************************************************************************************************************
* River           Reach           Profile         *            Upstream                    Downstream     *
*****************************************************************************************************************
* River #1        Reach #1        PF 1            *        Known WS = 2784.88        Known WS = 2761.65 *
* River #1        Reach #1        PF 2            *         Known WS = 2783.7        Known WS = 2761.06 *
* River #1        Reach #1        PF 3            *        Known WS = 2785.58        Known WS = 2762.17 *
*****************************************************************************************************************

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GEOMETRY DATA

Geometry Title: Alternative 4
Geometry File : g:\06000\06099 - Houghton Road\01\Calcs\HYDRAULIC\HEC-RAS bridge\v4_FINAL.g02

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 225

INPUT
Description:
Station Elevation Data     num=      87
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
  ***************************************************************************************
    -600     2787   -527.4     2786   -514.33     2786     -503     2787   -490.5     2787
  -483.14    2786   -430.62    2785   -415.31     2785   -385.29    2785   -379.5     2784
  -373.64    2783   -367.89    2782   -362.54     2781   -335.28    2780   -319.81    2779
  -309.13    2779    -289.6    2780   -286.98     2781   -284.35    2782   -281.73    2783
   -279.1    2784   -265.97    2784   -248.75     2784   -107.38    2784    -45.25    2784
   -31.61    2784    48.35     2784    54.16      2784    56.16     2783    58.16     2782
    60.16    2781    62.16     2780    64.15      2779    66.14     2778    68.14     2777
```

70.13	2776	72.11	2775	74.12	2774	76.14	2773	78.74	2772
82.21	2771	85.67	2770	89.14	2769	92.61	2768	122.93	2768
133.3	2769	169.83	2770	179.3	2771	182.56	2772	185.85	2773
191.57	2774	200.62	2775	210.54	2776	215.34	2776	220.78	2775
226.28	2774	226.63	2774	232.86	2775	239.08	2776	251.88	2777
259.19	2778	262.5	2779	265.81	2780	269.11	2781	272.46	2782
277.36	2783	282.24	2784	287.11	2785	294.48	2785	301.44	2784
367.61	2783	378.84	2782	390.07	2781	426.4	2780	455.43	2780
512.28	2781	521.82	2781	734.04	2780	745.89	2779	758.18	2779
772.24	2780	777.86	2781	783.57	2782	799.74	2782	826.6	2782
838.75	2783	841.94	2787						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	48.35	.03	287.11	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.35	287.11	299.75	282.05	262.04	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	48.35	2790	F
287.11	841.94	2790	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2786.45	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.66	Wt. n-Val.		0.030	
W.S. Elev (ft)	2783.79	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2781.42	Flow Area (sq ft)		2368.69	
E.G. Slope (ft/ft)	0.003148	Area (sq ft)	331.46	2368.69	1497.45
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	849.40	Top Width (ft)	98.63	226.64	524.13
Vel Total (ft/s)	13.09	Avg. Vel. (ft/s)		13.09	
Max Chl Dpth (ft)	15.79	Hydr. Depth (ft)		10.45	
Conv. Total (cfs)	552522.3	Conv. (cfs)		552522.3	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		231.77	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.01	
Alpha	1.00	Stream Power (lb/ft s)		26.29	
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	17.64	203.66	75.58
C & E Loss (ft)	0.15	Cum SA (acres)	13.35	27.77	37.33

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2784.51	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	2782.23	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2780.05	Flow Area (sq ft)		2023.49	
E.G. Slope (ft/ft)	0.003108	Area (sq ft)	187.89	2023.49	748.39
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	754.54	Top Width (ft)	85.48	215.90	453.17
Vel Total (ft/s)	12.10	Avg. Vel. (ft/s)		12.10	
Max Chl Dpth (ft)	14.23	Hydr. Depth (ft)		9.37	
Conv. Total (cfs)	439315.6	Conv. (cfs)		439315.6	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		220.49	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		1.78	
Alpha	1.00	Stream Power (lb/ft s)		21.55	
Frctn Loss (ft)	1.14	Cum Volume (acre-ft)	9.77	176.48	46.41
C & E Loss (ft)	0.08	Cum SA (acres)	9.02	26.38	31.65

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2787.78	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.95	Wt. n-Val.		0.030	
W.S. Elev (ft)	2784.84	Reach Len. (ft)	299.75	282.05	262.04
Crit W.S. (ft)	2782.42	Flow Area (sq ft)		2613.48	
E.G. Slope (ft/ft)	0.003262	Area (sq ft)	712.12	2613.48	2061.12
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	1215.25	Top Width (ft)	432.69	237.96	544.60
Vel Total (ft/s)	13.77	Avg. Vel. (ft/s)		13.77	
Max Chl Dpth (ft)	16.84	Hydr. Depth (ft)		10.98	
Conv. Total (cfs)	630296.7	Conv. (cfs)		630296.7	
Length Wtd. (ft)	282.05	Wetted Per. (ft)		243.24	
Min Ch El (ft)	2768.00	Shear (lb/sq ft)		2.19	
Alpha	1.00	Stream Power (lb/ft s)		30.14	
Frctn Loss (ft)	1.26	Cum Volume (acre-ft)	25.16	221.98	101.75
C & E Loss (ft)	0.16	Cum SA (acres)	17.59	28.21	40.26

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 220

INPUT
Description:
Station Elevation Data num= 110

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-581.45	2790	-578.15	2789	-569.74	2788	-557.64	2787	-527.23	2786
-505.43	2785	-463.74	2785	-455.79	2785	-443.54	2785	-433.72	2785
-425.53	2784	-417.97	2783	-380.36	2783	-349.98	2783	-307.83	2783
-282.84	2783	-261.98	2782	-239.35	2781	-190.7	2780	-183.94	2779
-175.54	2778	-157.15	2777	-133.21	2777	-112.75	2778	-89.46	2779
0	2780	93.96	2781	93.97	2781	123.68	2781	123.69	2781
125.31	2780	126.91	2779	128.5	2778	128.51	2778	130.1	2777
131.69	2776	131.7	2775.99	133.28	2775	134.86	2774	134.87	2774
136.44	2773	136.45	2772.99	138.01	2772	138.02	2772	139.58	2771
139.59	2770.99	141.14	2770	141.15	2769.99	142.52	2769	159.27	2768
159.28	2768	162.78	2767	187.06	2767	198.25	2768	198.26	2768
204.67	2769	210.08	2770	213.61	2771	215.17	2772	215.18	2772
221.37	2773	224.62	2773.16	241.47	2774	241.48	2774	279.56	2774
320.64	2774	324.91	2775	324.92	2775	329.19	2776	333.46	2777
333.47	2777	337.74	2778	342.02	2779	346.29	2780	346.3	2780
351.04	2781	354.75	2781.74	356.06	2782	468.74	2782	570.77	2781
570.78	2781	576.15	2780	582.31	2779	588.49	2778	588.5	2778
635.74	2778	648.28	2778	648.29	2778	650.75	2778	650.76	2778
657.91	2779	677.66	2780	677.67	2780	685.61	2780	704.82	2779
761.06	2779	800.38	2779	800.39	2779	821.89	2778	871.9	2778
871.91	2778	918.79	2779	922.82	2780	922.83	2780	927.55	2781
927.56	2781	954.11	2782	954.12	2782	1008.32	2783	1008.33	2783

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-581.45	.045	123.69	.03	354.75	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
123.69	354.75	277.65	269.4	261.19	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-581.45	123.69	2785	F
354.75	1008.33	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2785.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.92	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2780.92	Flow Area (sq ft)		1897.98	
E.G. Slope (ft/ft)	0.006598	Area (sq ft)	500.52	1897.98	790.65
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	904.77	Top Width (ft)	321.96	226.84	355.97
Vel Total (ft/s)	16.33	Avg. Vel. (ft/s)		16.33	
Max Chl Dpth (ft)	13.92	Hydr. Depth (ft)		8.37	
Conv. Total (cfs)	381638.5	Conv. (cfs)		381638.5	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		232.04	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.37	
Alpha	1.00	Stream Power (lb/ft s)		55.03	
Frctn Loss (ft)	1.49	Cum Volume (acre-ft)	14.78	189.85	68.69
C & E Loss (ft)	0.48	Cum SA (acres)	11.90	26.30	34.68

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: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2783.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.12	Wt. n-Val.		0.030	
W.S. Elev (ft)	2780.16	Reach Len. (ft)	277.65	269.40	261.19
Crit W.S. (ft)	2779.58	Flow Area (sq ft)		1728.23	
E.G. Slope (ft/ft)	0.005463	Area (sq ft)	297.80	1728.23	524.30
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	784.47	Top Width (ft)	214.10	222.03	348.34
Vel Total (ft/s)	14.17	Avg. Vel. (ft/s)		14.17	
Max Chl Dpth (ft)	13.16	Hydr. Depth (ft)		7.78	
Conv. Total (cfs)	331339.7	Conv. (cfs)		331339.7	
Length Wtd. (ft)	269.40	Wetted Per. (ft)		226.94	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.60	
Alpha	1.00	Stream Power (lb/ft s)		36.81	
Frctn Loss (ft)	1.39	Cum Volume (acre-ft)	8.10	164.33	42.58
C & E Loss (ft)	0.29	Cum SA (acres)	7.98	24.96	29.24

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

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2786.37	Element	Left OB	Channel	Right OB	
Vel Head (ft)	4.54	Wt. n-Val.		0.030		
W.S. Elev (ft)	2781.82	Reach Len. (ft)	277.65	269.40	261.19	
Crit W.S. (ft)	2781.82	Flow Area (sq ft)		2104.79		
E.G. Slope (ft/ft)	0.006460	Area (sq ft)	832.95	2104.79	1156.10	
Q Total (cfs)	36000.00	Flow (cfs)		36000.00		
Top Width (ft)	1075.72	Top Width (ft)	381.66	231.06	463.00	
Vel Total (ft/s)	17.10	Avg. Vel. (ft/s)		17.10		
Max Chl Dpth (ft)	14.82	Hydr. Depth (ft)		9.11		
Conv. Total (cfs)	447891.0	Conv. (cfs)		447891.0		
Length Wtd. (ft)	269.40	Wetted Per. (ft)		236.36		
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		3.59		
Alpha	1.00	Stream Power (lb/ft s)		61.43		
Frctn Loss (ft)	1.57	Cum Volume (acre-ft)	19.85	206.70	92.07	
C & E Loss (ft)	0.44	Cum SA (acres)	14.79	26.70	37.23	

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 215

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600	2791	-597.36	2790	-594.38	2789	-591.34	2788	-588.34	2787
-585.87	2786	-583.46	2785	-574.84	2784	-529.58	2783	-494.62	2782
-493.31	2782	-466.31	2782	-418.17	2781	-406.34	2781	-357.18	2781
-292.94	2780	22.72	2779	71.36	2778	79.77	2777	83.57	2776
87.37	2775	91.17	2774	94.97	2773	97.27	2772	99.2	2771
101.13	2770	103.06	2769	111.41	2768	118.38	2767	160.1	2767
165.01	2768	169.93	2769	174.87	2770	240.22	2771	270.17	2772
274.15	2773	280.87	2774	287.59	2775	294.31	2776	301.03	2777
307.75	2778	350.35	2779	373.61	2780	494.04	2780	528.29	2779
542.52	2778	588.86	2777	611.04	2776	639.44	2776	644.41	2777
652.37	2778	665.66	2779	769.93	2779	798.66	2778	809.36	2777
839.56	2776	858.07	2776	928.58	2777	933.82	2778	939.05	2779
944.29	2780	950.35	2781						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600	.045	22.72	.03	350.35	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
22.72	350.35	294.95	268.22	230.48	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-600	22.72	2785	F
357.15	950.35	2785	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2783.03	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.55	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2780.49	Reach Len. (ft)	294.95	268.22	230.48	
Crit W.S. (ft)	2779.67	Flow Area (sq ft)		2416.70	9.10	
E.G. Slope (ft/ft)	0.004711	Area (sq ft)	318.35	2416.70	1327.16	
Q Total (cfs)	31000.00	Flow (cfs)		30974.96	25.04	
Top Width (ft)	1271.30	Top Width (ft)	346.79	327.63	596.88	
Vel Total (ft/s)	12.78	Avg. Vel. (ft/s)		12.82	2.75	
Max Chl Dpth (ft)	13.48	Hydr. Depth (ft)		7.38	1.34	
Conv. Total (cfs)	451664.8	Conv. (cfs)		451300.0	364.8	
Length Wtd. (ft)	268.20	Wetted Per. (ft)		330.12	6.81	
Min Ch El (ft)	2767.00	Shear (lb/sq ft)		2.15	0.39	
Alpha	1.01	Stream Power (lb/ft s)		27.59	1.08	
Frctn Loss (ft)	1.56	Cum Volume (acre-ft)	12.17	176.51	62.34	
C & E Loss (ft)	0.02	Cum SA (acres)	9.77	24.59	31.82	

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2781.60	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.17	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2779.44	Reach Len. (ft)	294.95	268.22	230.48	
Crit W.S. (ft)	2777.92	Flow Area (sq ft)		2073.47	1.98	
E.G. Slope (ft/ft)	0.004906	Area (sq ft)	30.14	2073.47	781.98	

* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24487.99	*	2.01 *
* Top Width (ft)	* 903.76	* Top Width (ft)	*	137.95	* 327.63	*	438.18 *
* Vel Total (ft/s)	* 11.80	* Avg. Vel. (ft/s)	*		* 11.81	*	1.01 *
* Max Chl Dpth (ft)	* 12.44	* Hydr. Depth (ft)	*		* 6.33	*	0.29 *
* Conv. Total (cfs)	*349644.7	* Conv. (cfs)	*		*349616.0	*	28.7 *
* Length Wtd. (ft)	* 268.22	* Wetted Per. (ft)	*		* 330.12	*	6.81 *
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 1.92	*	0.09 *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 22.72	*	0.09 *
* Frctn Loss (ft)	* 1.47	* Cum Volume (acre-ft)	*	7.05	* 152.57	*	38.67 *
* C & E Loss (ft)	* 0.10	* Cum SA (acres)	*	6.86	* 23.26	*	26.89 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2784.13	* Element	*	Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.72	* Wt. n-Val.	*		* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2779.41	* Reach Len. (ft)	*	294.95	* 268.22	* 230.48	*
* Crit W.S. (ft)	* 2780.35	* Flow Area (sq ft)	*		* 2063.55	* 1.77	*
* E.G. Slope (ft/ft)	*0.010772	* Area (sq ft)	*	26.11	* 2063.55	* 768.74	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*35997.52	* 2.48	*
* Top Width (ft)	* 892.30	* Top Width (ft)	*	128.39	* 327.63	* 436.28	*
* Vel Total (ft/s)	* 17.43	* Avg. Vel. (ft/s)	*		* 17.44	* 1.40	*
* Max Chl Dpth (ft)	* 12.41	* Hydr. Depth (ft)	*		* 6.30	* 0.26	*
* Conv. Total (cfs)	*346857.0	* Conv. (cfs)	*		*346833.1	* 23.9	*
* Length Wtd. (ft)	* 268.20	* Wetted Per. (ft)	*		* 330.12	* 6.81	*
* Min Ch El (ft)	* 2767.00	* Shear (lb/sq ft)	*		* 4.20	* 0.18	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 73.33	* 0.24	*
* Frctn Loss (ft)	* 2.21	* Cum Volume (acre-ft)	*	17.11	* 193.81	* 86.30	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	13.16	* 24.97	* 34.53	*

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 210

PUT
Description:
Station Elevation Data num= 67

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-614.23	2787.75	-596.1	2786.75	-542.4	2785.75	-516.9	2784.75	-424.44	2783.75
-412.49	2782.75	-394.83	2781.75	-379.82	2780.75	-371.56	2781	-360.26	2780
-302.66	2779	-125.77	2778	-116.44	2778	0	2779	83.98	2779
120.42	2778	175.57	2777	179.48	2776	183.19	2775	186.89	2774
190.59	2773	194.29	2772	198	2771	201.7	2770	205.4	2769
209.11	2768	212.81	2767	216.2	2766	262.35	2766	287.31	2767
299.68	2767.58	308.47	2768	316.57	2769	356.57	2770	363.17	2771
371.31	2772	379.21	2773	387.12	2774	393.96	2775	400.77	2776
419.08	2777	420.22	2777.02	492.78	2778	516.88	2779	542.96	2779
542.97	2779	551.39	2778	559.71	2777	623.32	2776	653.95	2775
677.99	2775	689.88	2776	701.76	2777	713.64	2778	846.55	2778
880.52	2777	931.83	2776	949.52	2775	978.42	2775	1020.01	2776
1023.25	2777	1026.61	2778	1029.97	2779	1033.37	2780	1041.03	2781
1066.33	2782	1122.14	2782						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-614.23	.045	83.98	.03	516.88	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
83.98	516.88	283.6	269.08	254.74	.1	.3

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
-614.23	83.98	2783	F
516.88	1122.14	2783	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2781.45	* Element	*	Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.79	* Wt. n-Val.	*		* 0.030	*	*
* W.S. Elev (ft)	* 2778.66	* Reach Len. (ft)	*	283.60	* 269.08	* 254.74	*
* Crit W.S. (ft)	* 2778.66	* Flow Area (sq ft)	*		* 2313.85	*	*
* E.G. Slope (ft/ft)	*0.007383	* Area (sq ft)	*	69.68	* 2313.85	* 952.49	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*		*31000.00	*	*
* Top Width (ft)	* 1097.58	* Top Width (ft)	*	202.40	* 412.21	* 482.97	*
* Vel Total (ft/s)	* 13.40	* Avg. Vel. (ft/s)	*		* 13.40	*	*
* Max Chl Dpth (ft)	* 12.66	* Hydr. Depth (ft)	*		* 5.61	*	*
* Conv. Total (cfs)	*360784.2	* Conv. (cfs)	*		*360784.2	*	*
* Length Wtd. (ft)	* 268.92	* Wetted Per. (ft)	*		* 414.26	*	*
* Min Ch El (ft)	* 2766.00	* Shear (lb/sq ft)	*		* 2.57	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 34.49	*	*
* Frctn Loss (ft)	* 1.53	* Cum Volume (acre-ft)	*	10.86	* 161.94	* 56.31	*
* C & E Loss (ft)	* 0.31	* Cum SA (acres)	*	7.91	* 22.31	* 28.97	*

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

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2780.03	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.19	Wt. n-Val.		0.030		
W.S. Elev (ft)	2776.84	Reach Len. (ft)	283.60	269.08	254.74	
Crit W.S. (ft)	2776.53	Flow Area (sq ft)		1708.58		
E.G. Slope (ft/ft)	0.006179	Area (sq ft)		1708.58	279.01	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00		
Top Width (ft)	503.53	Top Width (ft)		239.90	263.64	
Vel Total (ft/s)	14.33	Avg. Vel. (ft/s)		14.33		
Max Chl Dpth (ft)	10.84	Hydr. Depth (ft)		7.12		
Conv. Total (cfs)	311544.8	Conv. (cfs)		311544.8		
Length Wtd. (ft)	269.02	Wetted Per. (ft)		241.89		
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72		
Alpha	1.00	Stream Power (lb/ft s)		39.06		
Frctn Loss (ft)	1.68	Cum Volume (acre-ft)	6.95	140.93	35.86	
C & E Loss (ft)	0.23	Cum SA (acres)	6.40	21.51	25.03	

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2782.30	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.01	Wt. n-Val.		0.030		
W.S. Elev (ft)	2779.29	Reach Len. (ft)	283.60	269.08	254.74	
Crit W.S. (ft)	2779.29	Flow Area (sq ft)		2585.10		
E.G. Slope (ft/ft)	0.007343	Area (sq ft)	271.74	2585.10	1268.72	
Q Total (cfs)	36000.00	Flow (cfs)		36000.00		
Top Width (ft)	1350.50	Top Width (ft)	403.52	432.90	514.09	
Vel Total (ft/s)	13.93	Avg. Vel. (ft/s)		13.93		
Max Chl Dpth (ft)	13.29	Hydr. Depth (ft)		5.97		
Conv. Total (cfs)	420112.1	Conv. (cfs)		420112.1		
Length Wtd. (ft)	268.78	Wetted Per. (ft)		434.97		
Min Ch El (ft)	2766.00	Shear (lb/sq ft)		2.72		
Alpha	1.00	Stream Power (lb/ft s)		37.94		
Frctn Loss (ft)	1.51	Cum Volume (acre-ft)	16.10	179.50	80.91	
C & E Loss (ft)	0.36	Cum SA (acres)	11.36	22.63	32.02	

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 205

INPUT
Description:
Station Elevation Data num= 63

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2779.75	17.21	2778.75	28.7	2777.75	66.51	2776.75	94.56	2776.75
100.85	2776.75	468.23	2777	600.71	2777	670.1	2776	673.71	2775
677.6	2774	681.95	2773	686.31	2772	690.66	2771	695.01	2770
699.36	2769	703.71	2768	708.06	2767	712.41	2766	716.76	2765
780.93	2765	805.65	2766	827.39	2767	839.98	2768	855.27	2769
866.08	2770	876.89	2771	884.28	2772	887.51	2773	890.74	2774
893.96	2775	894.82	2775	897.09	2774	899.36	2773	907.15	2773
937.24	2774	983.75	2775	1019.24	2776	1175.04	2776	1314.05	2775
1444.32	2775	1447.57	2776	1450.85	2777	1454.14	2778	1457.58	2779
1460.79	2780	1572.29	2780	1594.22	2779	1655.34	2779	1675.82	2780
1723.5	2781	1758.89	2782	1762.13	2782	1876.53	2781	1913.81	2781
1931.12	2782	1958.13	2783	2003.69	2783	2099.98	2783	2221.07	2784
2374.26	2785	2425.16	2785	2552.13	2785				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	600.71	.03	1019.24	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
600.71 1019.24 280.12 286.64 293.88 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2779.34	Element	Left OB	Channel	Right OB

* Vel Head (ft)	* 3.12	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.22	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.30	* Flow Area (sq ft)	*	* 2116.44	* 294.44	*
* E.G. Slope (ft/ft)	*0.008080	* Area (sq ft)	*	* 2116.44	* 294.44	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30320.23	* 679.77	*
* Top Width (ft)	* 793.24	* Top Width (ft)	*	* 364.20	* 429.04	*
* Vel Total (ft/s)	* 12.86	* Avg. Vel. (ft/s)	*	* 14.33	* 2.31	*
Max Chl Dpth (ft)	* 11.22	* Hydr. Depth (ft)	*	* 5.81	* 0.69	*
Conv. Total (cfs)	*344871.9	* Conv. (cfs)	*	*337309.5	* 7562.4	*
Length Wtd. (ft)	* 287.14	* Wetted Per. (ft)	*	* 366.68	* 429.23	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.91	* 0.35	*
* Alpha	* 1.21	* Stream Power (lb/ft s)	*	* 41.71	* 0.80	*
* Frctn Loss (ft)	* 2.08	* Cum Volume (acre-ft)	* 10.63	* 148.26	* 52.67	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 7.26	* 19.91	* 26.30	*

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2778.12	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.43	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2775.69	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2775.69	* Flow Area (sq ft)	*	* 1931.75	* 123.12	*
* E.G. Slope (ft/ft)	*0.006333	* Area (sq ft)	*	* 1931.75	* 123.12	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24275.54	* 214.46	*
* Top Width (ft)	* 564.95	* Top Width (ft)	*	* 336.91	* 228.04	*
* Vel Total (ft/s)	* 11.92	* Avg. Vel. (ft/s)	*	* 12.57	* 1.74	*
* Max Chl Dpth (ft)	* 10.69	* Hydr. Depth (ft)	*	* 5.73	* 0.54	*
* Conv. Total (cfs)	*307743.6	* Conv. (cfs)	*	*305048.6	* 2695.0	*
* Length Wtd. (ft)	* 286.88	* Wetted Per. (ft)	*	* 339.34	* 228.14	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 2.25	* 0.21	*
* Alpha	* 1.10	* Stream Power (lb/ft s)	*	* 28.28	* 0.37	*
* Frctn Loss (ft)	* 1.49	* Cum Volume (acre-ft)	* 6.95	* 129.69	* 34.68	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 6.40	* 19.73	* 23.59	*

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: 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 #PF 3

E.G. Elev (ft)	* 2780.06	* Element	* Left OB	* Channel	* Right OB	*
Vel Head (ft)	* 3.45	* Wt. n-Val.	*	* 0.030	* 0.045	*
W.S. Elev (ft)	* 2776.61	* Reach Len. (ft)	* 280.12	* 286.64	* 293.88	*
* Crit W.S. (ft)	* 2777.75	* Flow Area (sq ft)	*	* 2263.62	* 461.87	*
* E.G. Slope (ft/ft)	*0.009177	* Area (sq ft)	*	* 2263.62	* 461.87	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*34469.06	* 1530.94	*
* Top Width (ft)	* 821.56	* Top Width (ft)	*	* 391.24	* 430.32	*
* Vel Total (ft/s)	* 13.21	* Avg. Vel. (ft/s)	*	* 15.23	* 3.31	*
* Max Chl Dpth (ft)	* 11.61	* Hydr. Depth (ft)	*	* 5.79	* 1.07	*
* Conv. Total (cfs)	*375805.2	* Conv. (cfs)	*	*359823.7	* 15981.5	*
* Length Wtd. (ft)	* 287.82	* Wetted Per. (ft)	*	* 393.72	* 430.56	*
* Min Ch El (ft)	* 2765.00	* Shear (lb/sq ft)	*	* 3.29	* 0.61	*
* Alpha	* 1.28	* Stream Power (lb/ft s)	*	* 50.16	* 2.04	*
* Frctn Loss (ft)	* 2.20	* Cum Volume (acre-ft)	* 15.22	* 164.52	* 75.85	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 10.05	* 20.08	* 29.26	*

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.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 200

INPUT
Description:
Station Elevation Data num= 62

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2780	57.36	2780	60.61	2779	63.64	2778	66.72	2777
82.64	2776	133.38	2775	157.32	2774	160.71	2773	164.05	2772
167.4	2771	170.76	2770	174.13	2769	177.5	2768	180.93	2767
196.35	2766	210.46	2765	223.84	2764	238.32	2763	259.65	2763
259.7	2763	274.72	2764	330.68	2765	338.84	2766	343.67	2767
348.5	2768	354.06	2769	359.85	2770	365.64	2771	371.43	2772
377.22	2773	380.61	2773	529.52	2773	534.88	2772	540.16	2771
545.4	2770	561.87	2770	628.9	2771	670.42	2772	691.36	2773
726.72	2773	751.79	2773	852.22	2774	1033.68	2775	1050.22	2775
1183.08	2776	1186.05	2777	1189.02	2778	1191.99	2779	1246.04	2779
1253.82	2778	1267.34	2778	1270.81	2779	1388.57	2780	1424.17	2780
1424.18	2780	1474.73	2780	1528.93	2781	1568.19	2781	1595.98	2781
1670.08	2782	1757.29	2783						

nning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	157.32	.03	380.61	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
157.32	380.61	179.8	195.07	210.23	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2777.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.87	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2774.60	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2774.99	Flow Area (sq ft)	4.36	1897.21	1052.36
E.G. Slope (ft/ft)	0.004947	Area (sq ft)	4.36	1897.21	1052.36
Q Total (cfs)	31000.00	Flow (cfs)	4.55	27365.53	3629.92
Top Width (ft)	818.81	Top Width (ft)	14.44	223.29	581.08
Vel Total (ft/s)	10.49	Avg. Vel. (ft/s)	1.04	14.42	3.45
Max Chl Dpth (ft)	11.60	Hydr. Depth (ft)	0.30	8.50	1.81
Conv. Total (cfs)	440756.3	Conv. (cfs)	64.7	389081.7	51610.0
Length Wtd. (ft)	197.55	Wetted Per. (ft)	14.45	225.19	581.41
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.09	2.60	0.56
Alpha	1.68	Stream Power (lb/ft s)	0.10	37.53	1.93
Frctn Loss (ft)	1.79	Cum Volume (acre-ft)	10.61	135.05	48.12
C & E Loss (ft)	0.07	Cum SA (acres)	7.21	17.98	22.89

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 #PF 2

E.G. Elev (ft)	2776.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2773.47	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2773.95	Flow Area (sq ft)		1643.45	496.72
E.G. Slope (ft/ft)	0.005630	Area (sq ft)		1643.45	496.72
Q Total (cfs)	24490.00	Flow (cfs)		23109.66	1380.34
Top Width (ft)	639.31	Top Width (ft)		221.48	417.84
Vel Total (ft/s)	11.44	Avg. Vel. (ft/s)		14.06	2.78
Max Chl Dpth (ft)	10.46	Hydr. Depth (ft)		7.42	1.19
Conv. Total (cfs)	326395.8	Conv. (cfs)		307999.0	18396.8
Length Wtd. (ft)	196.56	Wetted Per. (ft)		223.29	418.17
Min Ch El (ft)	2763.00	Shear (lb/sq ft)		2.59	0.42
Alpha	1.43	Stream Power (lb/ft s)		36.37	1.16
Frctn Loss (ft)	1.71	Cum Volume (acre-ft)	6.95	117.92	32.59
C & E Loss (ft)	0.05	Cum SA (acres)	6.40	17.89	21.41

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2778.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2776.84	Reach Len. (ft)	179.80	195.07	210.23
Crit W.S. (ft)	2775.91	Flow Area (sq ft)	129.70	2396.84	2708.99
E.G. Slope (ft/ft)	0.002126	Area (sq ft)	129.70	2396.84	2708.99
Q Total (cfs)	36000.00	Flow (cfs)	255.50	26485.92	9258.58
Top Width (ft)	1116.32	Top Width (ft)	88.07	223.29	804.97
Vel Total (ft/s)	6.88	Avg. Vel. (ft/s)	1.97	11.05	3.42
Max Chl Dpth (ft)	13.84	Hydr. Depth (ft)	1.47	10.73	3.37
Conv. Total (cfs)	780785.1	Conv. (cfs)	5541.4	574439.2	200804.4
Length Wtd. (ft)	198.68	Wetted Per. (ft)	88.12	225.19	805.44
Min Ch El (ft)	2763.00	Shear (lb/sq ft)	0.20	1.41	0.45
Alpha	1.96	Stream Power (lb/ft s)	0.38	15.61	1.53
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	14.80	149.19	65.16
C & E Loss (ft)	0.19	Cum SA (acres)	9.76	18.06	25.09

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 195

INPUT
Description:
Station Elevation Data num= 56

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
26.87	2778.75	80.18	2778.75	91.81	2777.75	102.18	2776.75	109.95	2775.75
196.7	2774	238.41	2773	243.26	2772	248.12	2771	252.97	2770
267.11	2769	278.26	2768	282.3	2767	286.64	2766	294.54	2765
315.54	2764	336.81	2763	362.46	2762	375.59	2762	395.84	2763
410.49	2764	456.09	2765	471.11	2766	476.14	2767	481.17	2768
488.94	2768	495.94	2767	498.12	2767	504.07	2768	509.82	2769
514.48	2770	532.03	2770	544.86	2770	571.92	2770	575.9	2769
579.84	2768	583.78	2767	597.25	2767	608.28	2768	619.31	2769
630.34	2770	641.37	2771	679.44	2772	894.51	2772	904.56	2771
913.16	2770	918.98	2770	922.78	2771	926.49	2772	930.19	2773
933.9	2774	939.14	2774	962.74	2773	967.03	2773	999.74	2774
1400	2780								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
26.87	.045	238.41	.03	514.48	.045

ınk Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
238.41 514.48 215.83 225.58 311.98 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2776.47	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.00	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2775.47	Reach Len. (ft)	215.83	225.58	311.98

Crit W.S. (ft)	2773.18	Flow Area (sq ft)	135.84	2785.41	2062.05	
E.G. Slope (ft/ft)	0.001484	Area (sq ft)	135.84	2785.41	2062.05	
Q Total (cfs)	31000.00	Flow (cfs)	193.44	24729.52	6077.04	
Top Width (ft)	974.08	Top Width (ft)	114.63	276.07	583.39	
Vel Total (ft/s)	6.22	Avg. Vel. (ft/s)	1.42	8.88	2.95	
Max Chl Dpth (ft)	13.47	Hydr. Depth (ft)	1.19	10.09	3.53	
Conv. Total (cfs)	804808.9	Conv. (cfs)	5022.1	642017.4	157769.4	
Length Wtd. (ft)	234.02	Wetted Per. (ft)	114.65	277.47	584.64	
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.11	0.93	0.33	
Alpha	1.67	Stream Power (lb/ft s)	0.16	8.26	0.96	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	10.32	124.57	40.61	
C & E Loss (ft)	0.14	Cum SA (acres)	6.94	16.86	20.08	

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.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2774.68	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.37	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2773.31	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2771.52	Flow Area (sq ft)	2.04	2189.66	960.47
E.G. Slope (ft/ft)	0.002552	Area (sq ft)	2.04	2189.66	960.47
Q Total (cfs)	24490.00	Flow (cfs)	0.99	21716.72	2772.29
Top Width (ft)	727.91	Top Width (ft)	13.05	276.07	438.79
Vel Total (ft/s)	7.77	Avg. Vel. (ft/s)	0.48	9.92	2.89
Max Chl Dpth (ft)	11.31	Hydr. Depth (ft)	0.16	7.93	2.19
Conv. Total (cfs)	484791.1	Conv. (cfs)	19.6	429892.8	54878.7
Length Wtd. (ft)	230.47	Wetted Per. (ft)	13.06	277.47	439.91
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.02	1.26	0.35
Alpha	1.46	Stream Power (lb/ft s)	0.01	12.47	1.00
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	6.94	109.34	29.08
C & E Loss (ft)	0.25	Cum SA (acres)	6.37	16.78	19.35

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2777.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.82	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2776.98	Reach Len. (ft)	215.83	225.58	311.98
Crit W.S. (ft)	2773.66	Flow Area (sq ft)	333.97	3202.55	3019.69
E.G. Slope (ft/ft)	0.001075	Area (sq ft)	333.97	3202.55	3019.69
Q Total (cfs)	36000.00	Flow (cfs)	649.49	26564.15	8786.36
Top Width (ft)	1098.89	Top Width (ft)	138.64	276.07	684.18
Vel Total (ft/s)	5.49	Avg. Vel. (ft/s)	1.94	8.29	2.91
Max Chl Dpth (ft)	14.98	Hydr. Depth (ft)	2.41	11.60	4.41
Conv. Total (cfs)	1097904.0	Conv. (cfs)	19807.8	810135.8	267960.5
Length Wtd. (ft)	236.08	Wetted Per. (ft)	138.74	277.47	685.45
Min Ch El (ft)	2762.00	Shear (lb/sq ft)	0.16	0.77	0.30
Alpha	1.75	Stream Power (lb/ft s)	0.31	6.43	0.86
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	13.84	136.65	51.33
C & E Loss (ft)	0.08	Cum SA (acres)	9.30	16.94	21.50

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 190

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-99.71	2778	85.29	2776.24	86.48	2775.75	90.2	2774.75	93.57	2773.75
96.92	2772.75	100.08	2771.75	102.72	2770.75	105.24	2769.76	105.24	2769.75
107.77	2768.75	110.47	2768.2	124.39	2767.75	204.15	2766.75	210.65	2766.39
214.06	2765.75	219.98	2764.75	224.93	2763.09	252.41	2763.52	259.56	2764.25
288.16	2763.13	292.48	2761.87	301.29	2761.46	303.05	2760.65	305.84	2761.23
314.29	2763	332	2762	335.19	2761	387.24	2760.49	390.36	2761
390.36	2761.01	392.23	2764.51	402.23	2762	413.83	2763	425.43	2764
429.38	2764.26	440.47	2765	486.39	2766	526.25	2767	551.56	2768
588.96	2768.96	589.86	2769	593.28	2770	594.72	2769.73	596.66	2771
600.08	2772	603.53	2773	608.4	2774	612.53	2775	616.08	2776
632.62	2776	1014.62	2780						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-99.71	.045	85.29	.03	616.08	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
85.29	616.08	77.8	72.37	83.03	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2776.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.54	Wt. n-Val.		0.030	
W.S. Elev (ft)	2775.57	Reach Len. (ft)	77.80	72.37	83.03
Crit W.S. (ft)	2770.00	Flow Area (sq ft)		5260.27	
E.G. Slope (ft/ft)	0.000670	Area (sq ft)		5260.27	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	527.41	Top Width (ft)		527.41	
Vel Total (ft/s)	5.89	Avg. Vel. (ft/s)		5.89	
Max Chl Dpth (ft)	15.08	Hydr. Depth (ft)		9.97	

```
* Conv. Total (cfs)       *1197790.0  * Conv. (cfs)              *          *1197790.0  *          *
* Length Wtd. (ft)        *   72.37  * Wetted Per. (ft)         *          *  533.65  *          *
* Min Ch El (ft)          * 2760.49  * Shear (lb/sq ft)         *          *    0.41  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)    *          *    2.43  *          *
* Frctn Loss (ft)         *    0.06  * Cum Volume (acre-ft)      *    9.99  *  103.74  *   33.22  *
* C & E Loss (ft)         *    0.03  * Cum SA (acres)            *    6.66  *   14.78  *   17.99  *
*****************************************************************************************************

 OSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************************
* E.G. Elev (ft)          * 2774.12  * Element                  *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.52  * Wt. n-Val.               *          *    0.030  *          *
* W.S. Elev (ft)          * 2773.60  * Reach Len. (ft)          *   77.80  *   72.37  *   83.03  *
* Crit W.S. (ft)          * 2769.25  * Flow Area (sq ft)        *          * 4232.78  *          *
* E.G. Slope (ft/ft)      *0.000829  * Area (sq ft)             *          * 4232.78  *          *
* Q Total (cfs)           *24490.00  * Flow (cfs)               *          *24490.00  *          *
* Top Width (ft)          *  512.34  * Top Width (ft)            *          *  512.34  *          *
* Vel Total (ft/s)        *    5.79  * Avg. Vel. (ft/s)          *          *    5.79  *          *
* Max Chl Dpth (ft)       *   13.11  * Hydr. Depth (ft)          *          *    8.26  *          *
* Conv. Total (cfs)       *850471.6  * Conv. (cfs)               *          *850471.6  *          *
* Length Wtd. (ft)        *   72.37  * Wetted Per. (ft)          *          *  518.07  *          *
* Min Ch El (ft)          * 2760.49  * Shear (lb/sq ft)         *          *    0.42  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)    *          *    2.45  *          *
* Frctn Loss (ft)         *    0.07  * Cum Volume (acre-ft)      *    6.94  *   92.71  *   25.64  *
* C & E Loss (ft)         *    0.03  * Cum SA (acres)            *    6.34  *   14.74  *   17.77  *
*****************************************************************************************************

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************************
* E.G. Elev (ft)          * 2777.54  * Element                  *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.55  * Wt. n-Val.               *   0.045  *    0.030  *   0.045  *
* W.S. Elev (ft)          * 2776.99  * Reach Len. (ft)          *   77.80  *   72.37  *   83.03  *
* Crit W.S. (ft)          * 2770.53  * Flow Area (sq ft)        *   29.24  * 6010.34  *   62.71  *
* E.G. Slope (ft/ft)      *0.000583  * Area (sq ft)             *   29.24  * 6010.34  *   62.71  *
* Q Total (cfs)           *36000.00  * Flow (cfs)               *   12.08  *35953.69  *   34.23  *
* Top Width (ft)          *  719.88  * Top Width (ft)            *   78.40  *  530.79  *  110.69  *
* Vel Total (ft/s)        *    5.90  * Avg. Vel. (ft/s)          *    0.41  *    5.98  *    0.55  *
* Max Chl Dpth (ft)       *   16.50  * Hydr. Depth (ft)          *    0.37  *   11.32  *    0.57  *
* Conv. Total (cfs)       *1491078.0  * Conv. (cfs)              *   500.2  *1489160.0  *  1417.9  *
* Length Wtd. (ft)        *   72.38  * Wetted Per. (ft)          *   78.40  *  537.21  *  110.69  *
* Min Ch El (ft)          * 2760.49  * Shear (lb/sq ft)         *    0.01  *    0.41  *    0.02  *
* Alpha                   *    1.03  * Stream Power (lb/ft s)    *    0.01  *    2.44  *    0.01  *
* Frctn Loss (ft)         *    0.05  * Cum Volume (acre-ft)      *   12.94  *  112.80  *   40.30  *
* C & E Loss (ft)         *    0.04  * Cum SA (acres)            *    8.76  *   14.85  *   18.65  *
*****************************************************************************************************

CROSS SECTION


RIVER: River #1
REACH: Reach #1           RS: 180

  PUT
  scription:
ocation Elevation Data     num=      52
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
   15.05 2776.75   32.58 2776.75   48.65 2776.75   49.95 2775.75   51.72 2774.75
   53.59 2773.75    55.5 2772.75   57.44 2771.75   59.59 2770.75    62.1 2769.75
   64.56 2768.76   64.56 2768.75   67.13 2767.47   67.71 2767.75   72.88 2766.28
   97.35 2766.75  119.19 2765.75  133.29 2765.33  136.67 2764.75  143.41 2762.38
   166.6 2762.71  170.36 2763.69   207.2 2762.94   207.2 2762.93  210.09 2761.47
  227.57 2761.13  247.23 2760.75  264.13 2759.08  318.52    2763  323.83 2759.53
  323.83 2759.52  327.41  2764.6  338.72    2764  354.33 2764.52  369.01    2765
  401.74    2766  408.05 2765.89  412.18    2767  414.21    2768  416.27    2769
  417.18 2767.25  417.18 2767.26  418.65    2770  421.02    2771  423.39    2772
  425.77    2773  428.14    2774  430.51    2775  431.09 2776.49  433.02    2776
  461.43    2776  761.43    2780

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
   15.05    .045   48.65     .03  433.02    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
          48.65  433.02            44.45  181.54  256.85            .1        .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************************
* E.G. Elev (ft)          * 2776.02  * Element                  *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.85  * Wt. n-Val.               *          *    0.030  *          *
* W.S. Elev (ft)          * 2775.17  * Reach Len. (ft)          *   44.45  *  181.54  *  256.85  *
* Crit W.S. (ft)          * 2769.77  * Flow Area (sq ft)        *          * 4180.06  *          *
* E.G. Slope (ft/ft)      *0.000952  * Area (sq ft)             *          * 4180.06  *          *
* Q Total (cfs)           *31000.00  * Flow (cfs)               *          *31000.00  *          *
* Top Width (ft)          *  379.59  * Top Width (ft)            *          *  379.59  *          *
* Vel Total (ft/s)        *    7.42  * Avg. Vel. (ft/s)          *          *    7.42  *          *
* Max Chl Dpth (ft)       *   16.09  * Hydr. Depth (ft)          *          *   11.01  *          *
* Conv. Total (cfs)       *1004737.0  * Conv. (cfs)              *          *1004737.0  *          *
* Length Wtd. (ft)        *  181.54  * Wetted Per. (ft)          *          *  391.01  *          *
* Min Ch El (ft)          * 2759.08  * Shear (lb/sq ft)         *          *    0.64  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)    *          *    4.71  *          *
* Frctn Loss (ft)         *    0.29  * Cum Volume (acre-ft)      *    9.99  *   95.89  *   33.22  *
* C & E Loss (ft)         *    0.12  * Cum SA (acres)            *    6.66  *   14.02  *   17.99  *
*****************************************************************************************************

Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
 rning: The conveyance ratio (upstream 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 #PF 2
*****************************************************************************************************
* E.G. Elev (ft)          * 2774.02  * Element                  *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.78  * Wt. n-Val.               *          *    0.030  *          *
```

* W.S. Elev (ft)	* 2773.24	* Reach Len. (ft)	* 44.45	* 181.54	* 256.85	*
* Crit W.S. (ft)	* 2768.85	* Flow Area (sq ft)	*	* 3455.69	*	*
* E.G. Slope (ft/ft)	*0.001087	* Area (sq ft)	*	* 3455.69	*	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24490.00	*	*
* Top Width (ft)	* 371.77	* Top Width (ft)	*	* 371.77	*	*
* Vel Total (ft/s)	* 7.09	* Avg. Vel. (ft/s)	*	* 7.09	*	*
* Max Chl Dpth (ft)	* 14.16	* Hydr. Depth (ft)	*	* 9.30	*	*
Conv. Total (cfs)	*742810.8	* Conv. (cfs)	*	*742810.8	*	*
Length Wtd. (ft)	* 181.54	* Wetted Per. (ft)	*	* 382.24	*	*
Min Ch El (ft)	* 2759.08	* Shear (lb/sq ft)	*	* 0.61	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 4.35	*	*
* Frctn Loss (ft)	* 0.33	* Cum Volume (acre-ft)	* 6.94	* 86.32	* 25.64	*
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 6.34	* 14.00	* 17.77	*

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 conveyance ratio (upstream 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 #PF 3

* E.G. Elev (ft)	* 2777.45	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.91	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2776.55	* Reach Len. (ft)	* 44.45	* 181.54	* 256.85	*
* Crit W.S. (ft)	* 2770.43	* Flow Area (sq ft)	*	* 4706.06	* 26.70	*
* E.G. Slope (ft/ft)	*0.000882	* Area (sq ft)	*	* 4706.06	* 26.70	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*35986.15	* 13.85	*
* Top Width (ft)	* 453.48	* Top Width (ft)	*	* 384.11	* 69.37	*
* Vel Total (ft/s)	* 7.61	* Avg. Vel. (ft/s)	*	* 7.65	* 0.52	*
* Max Chl Dpth (ft)	* 17.47	* Hydr. Depth (ft)	*	* 12.25	* 0.38	*
* Conv. Total (cfs)	*1212478.0	* Conv. (cfs)	*	*1212011.0	* 466.5	*
* Length Wtd. (ft)	* 181.56	* Wetted Per. (ft)	*	* 396.91	* 69.37	*
* Min Ch El (ft)	* 2759.08	* Shear (lb/sq ft)	*	* 0.65	* 0.02	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*	* 4.99	* 0.01	*
* Frctn Loss (ft)	* 0.28	* Cum Volume (acre-ft)	* 12.92	* 103.90	* 40.21	*
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 8.69	* 14.09	* 18.48	*

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: River #1
REACH: Reach #1 RS: 170

INPUT
Description:
ation Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2776.75	10.041	2776.75	11.208	2776.56	13.039	2775.75	14.984	2774.75
17.041	2773.75	19.445	2772.75	21.468	2771.75	23.419	2770.75	25.484	2769.75
27.471	2768.75	29.409	2767.75	30.901	2767.12	31.424	2766.75	33.545	2765.75
38.947	2765.75	39.428	2765.75	41.868	2765.12	60.352	2766.13	65.082	2765.97
66.072	2764.75	69.89	2764.75	71.743	2764.93	72.768	2764.75	85.567	2761.65
101.392	2761.27	114.672	2763.12	137.165	2763.34	145.296	2760.76	193.16	2760.8
199.171	2758.99	240.331	2758.49	254.092	2762.23	263.715	2762.13	265.413	2763.75
266.813	2764.75	268.199	2765.75	269.584	2766.75	270.801	2767.75	271.974	2768.75
273.155	2769.75	274.336	2770.75	275.524	2771.75	276.705	2772.75	282.843	2777

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	10.041	.03	276.705	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
10.041 276.705 130.15 130.15 130.15 .1 .3
Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
85	89	2780	147	151	2780	209	213	2780

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2775.61	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.06	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2773.55	* Reach Len. (ft)	* 130.15	* 130.15	* 130.15	*
* Crit W.S. (ft)	* 2770.35	* Flow Area (sq ft)	*	* 2690.82	* 0.46	*
* E.G. Slope (ft/ft)	*0.003348	* Area (sq ft)	*	* 2690.82	* 0.46	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30999.59	* 0.41	*
* Top Width (ft)	* 248.32	* Top Width (ft)	*	* 247.17	* 1.15	*
* Vel Total (ft/s)	* 11.52	* Avg. Vel. (ft/s)	*	* 11.52	* 0.91	*
* Max Chl Dpth (ft)	* 15.05	* Hydr. Depth (ft)	*	* 10.89	* 0.40	*
* Conv. Total (cfs)	*535776.1	* Conv. (cfs)	*	*535769.0	* 7.1	*
* Length Wtd. (ft)	* 130.15	* Wetted Per. (ft)	*	* 333.85	* 1.40	*
* Min Ch El (ft)	* 2758.49	* Shear (lb/sq ft)	*	* 1.68	* 0.07	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 19.41	* 0.06	*
* Frctn Loss (ft)	* 0.52	* Cum Volume (acre-ft)	* 9.99	* 81.58	* 33.22	*
* C & E Loss (ft)	* 0.11	* Cum SA (acres)	* 6.66	* 12.72	* 17.99	*

rning: Divided flow computed for this cross-section.
rning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2773.59	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.84	* Wt. n-Val.	*	* 0.030	*	*

* W.S. Elev (ft)	* 2771.75	* Reach Len. (ft)	* 130.15	* 130.15	* 130.15	*
* Crit W.S. (ft)	* 2769.11	* Flow Area (sq ft)	*	* 2251.21	*	*
* E.G. Slope (ft/ft)	*0.003537	* Area (sq ft)	*	* 2251.21	*	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24490.00	*	*
* Top Width (ft)	* 242.05	* Top Width (ft)	*	* 242.05	*	*
* Vel Total (ft/s)	* 10.88	* Avg. Vel. (ft/s)	*	* 10.88	*	*
* Max Chl Dpth (ft)	* 13.26	* Hydr. Depth (ft)	*	* 9.30	*	*
Conv. Total (cfs)	*411790.7	* Conv. (cfs)	*	*411790.7	*	*
Length Wtd. (ft)	* 130.15	* Wetted Per. (ft)	*	* 317.20	*	*
Min Ch El (ft)	* 2758.49	* Shear (lb/sq ft)	*	* 1.57	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 17.05	*	*
* Frctn Loss (ft)	* 0.51	* Cum Volume (acre-ft)	* 6.94	* 74.43	* 25.64	*
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 6.34	* 12.72	* 17.77	*

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.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2777.05	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.22	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2774.82	* Reach Len. (ft)	* 130.15	* 130.15	* 130.15	*
* Crit W.S. (ft)	* 2771.24	* Flow Area (sq ft)	*	* 3008.37	* 3.10	*
* E.G. Slope (ft/ft)	*0.003245	* Area (sq ft)	*	* 3008.37	* 3.10	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*35994.76	* 5.24	*
* Top Width (ft)	* 252.85	* Top Width (ft)	*	* 249.86	* 2.99	*
* Vel Total (ft/s)	* 11.95	* Avg. Vel. (ft/s)	*	* 11.96	* 1.69	*
* Max Chl Dpth (ft)	* 16.33	* Hydr. Depth (ft)	*	* 12.04	* 1.04	*
* Conv. Total (cfs)	*631968.9	* Conv. (cfs)	*	*631876.9	* 92.0	*
* Length Wtd. (ft)	* 130.15	* Wetted Per. (ft)	*	* 344.50	* 3.64	*
* Min Ch El (ft)	* 2758.49	* Shear (lb/sq ft)	*	* 1.77	* 0.17	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 21.17	* 0.29	*
* Frctn Loss (ft)	* 0.52	* Cum Volume (acre-ft)	* 12.92	* 87.82	* 40.12	*
* C & E Loss (ft)	* 0.14	* Cum SA (acres)	* 8.69	* 12.77	* 18.26	*

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.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 160

INPUT
Description:
Station Elevation Data num= 84

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2775.75	5.607	2775.75	12.07	2775.75	19.049	2775.75	29.317	2775.75
71.828	2774.75	85.786	2773.75	89.067	2773.75	103.188	2774.75	115.831	2774.75
128.085	2774.75	176.975	2775.75	196.024	2776.75	201.271	2777.75	222.357	2778.36
223.106	2777.75	224.726	2776.75	226.578	2775.75	228.113	2774.48	228.466	2774.75
231.408	2773.75	239.405	2772.75	244.73	2772.63	245.868	2771.75	247.233	2770.75
248.605	2769.75	250.054	2768.75	251.681	2767.76	251.681	2767.75	253.342	2766.75
254.813	2765.75	256.164	2764.75	257.132	2763.88	262.209	2762.7	273.085	2760.84
297.19	2760.63	301.164	2761.77	319.273	2761.94	326.146	2760.17	341.547	2760.01
354.324	2759.87	381.194	2760.68	389.17	2757.67	435.231	2758.17	436.985	2762.55
442.317	2762.86	444.608	2763.75	445.477	2764.44	445.88	2764.75	447.146	2765.75
448.419	2766.75	449.692	2767.75	450.979	2768.75	452.237	2769.75	453.482	2770.75
453.482	2770.76	454.74	2771.75	455.985	2772.75	457.201	2773.75	457.201	2773.76
458.12	2775.1	458.403	2774.75	466.584	2774.75	469.887	2774.75	478.704	2775.75
485.853	2776.75	713.195	2776.75	716.745	2776.75	720.132	2776.75	792.165	2775.75
803.98	2775.75	814.743	2775.75	830.143	2774.75	840.806	2774.75	857.466	2775.75
873.256	2775.75	926.755	2774.75	940.777	2773.75	941.237	2773.75	945.579	2773.75
955.669	2773.75	965.18	2773.75	989.002	2773.75	1007.684	2774.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	244.73	.03	458.12	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
244.73	458.12	203.69	188.86	197	.1	.3

Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
250	254	2780	312	316	2780	374	378	2780

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2774.98	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 3.17	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2771.80	* Reach Len. (ft)	* 203.69	* 188.86	* 197.00	*
* Crit W.S. (ft)	* 2769.83	* Flow Area (sq ft)	*	* 2168.83	*	*
* E.G. Slope (ft/ft)	*0.004844	* Area (sq ft)	*	* 2168.83	*	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*31000.00	*	*
* Top Width (ft)	* 197.01	* Top Width (ft)	*	* 197.01	*	*
* Vel Total (ft/s)	* 14.29	* Avg. Vel. (ft/s)	*	* 14.29	*	*
* Max Chl Dpth (ft)	* 14.13	* Hydr. Depth (ft)	*	* 11.01	*	*
* Conv. Total (cfs)	*445397.6	* Conv. (cfs)	*	*445397.6	*	*
* Length Wtd. (ft)	* 188.86	* Wetted Per. (ft)	*	* 256.89	*	*
Min Ch El (ft)	* 2757.67	* Shear (lb/sq ft)	*	* 2.55	*	*
Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 36.49	*	*
Frctn Loss (ft)	* 1.07	* Cum Volume (acre-ft)	* 9.99	* 74.32	* 33.22	*
* C & E Loss (ft)	* 0.13	* Cum SA (acres)	* 6.66	* 12.05	* 17.99	*

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for

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

CROSS SECTION OUTPUT  Profile #PF 2
*********************************************************************************************
* E.G. Elev (ft)         * 2773.00  * Element                 *  Left OB *  Channel * Right OB *
  Vel Head (ft)          *    2.59  * Wt. n-Val.              *          *   0.030  *          *
  W.S. Elev (ft)         * 2770.41  * Reach Len. (ft)         *  203.69  *  188.86  *  197.00  *
  Crit W.S. (ft)         * 2768.41  * Flow Area (sq ft)       *          * 1897.59  *          *
* E.G. Slope (ft/ft)      *0.004406  * Area (sq ft)            *          * 1897.59  *          *
* Q Total (cfs)           *24490.00  * Flow (cfs)              *          *24490.00  *          *
* Top Width (ft)          *  193.37  * Top Width (ft)          *          *  193.37  *          *
* Vel Total (ft/s)        *   12.91  * Avg. Vel. (ft/s)        *          *   12.91  *          *
* Max Chl Dpth (ft)       *   12.74  * Hydr. Depth (ft)        *          *    9.81  *          *
* Conv. Total (cfs)       *368965.5  * Conv. (cfs)             *          *368965.5  *          *
* Length Wtd. (ft)        *  188.86  * Wetted Per. (ft)        *          *  243.97  *          *
* Min Ch El (ft)          * 2757.67  * Shear (lb/sq ft)        *          *    2.14  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *          *   27.61  *          *
* Frctn Loss (ft)         *    1.04  * Cum Volume (acre-ft)    *    6.94  *   68.23  *   25.64  *
* C & E Loss (ft)         *    0.13  * Cum SA (acres)          *    6.34  *   12.07  *   17.77  *
*********************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
        additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
        section.  This may indicate the need for additional cross sections.

CROSS SECTION OUTPUT  Profile #PF 3
*********************************************************************************************
* E.G. Elev (ft)         * 2776.38  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.61  * Wt. n-Val.              *   0.045  *   0.030  *          *
* W.S. Elev (ft)         * 2772.77  * Reach Len. (ft)         *  203.69  *  188.86  *  197.00  *
* Crit W.S. (ft)         * 2770.85  * Flow Area (sq ft)       *    0.44  * 2361.00  *          *
* E.G. Slope (ft/ft)      *0.005147  * Area (sq ft)            *    0.44  * 2361.00  *          *
* Q Total (cfs)           *36000.00  * Flow (cfs)              *    0.19  *35999.81  *          *
* Top Width (ft)          *  204.78  * Top Width (ft)          *    5.50  *  199.28  *          *
* Vel Total (ft/s)        *   15.24  * Avg. Vel. (ft/s)        *    0.44  *   15.25  *          *
* Max Chl Dpth (ft)       *   15.10  * Hydr. Depth (ft)        *    0.08  *   11.85  *          *
* Conv. Total (cfs)       *501812.0  * Conv. (cfs)             *     2.7  *501809.3  *          *
* Length Wtd. (ft)        *  188.86  * Wetted Per. (ft)        *    5.51  *  265.61  *          *
* Min Ch El (ft)          * 2757.67  * Shear (lb/sq ft)        *    0.03  *    2.86  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *    0.01  *   43.55  *          *
* Frctn Loss (ft)         *    1.10  * Cum Volume (acre-ft)    *   12.92  *   79.80  *   40.12  *
* C & E Loss (ft)         *    0.12  * Cum SA (acres)          *    8.68  *   12.10  *   18.26  *
*********************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
        additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
        section.  This may indicate the need for additional cross sections.

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 150

INPUT
Description:
Station Elevation Data     num=      99
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 2774.75  27.415 2773.75   42.03 2773.75  59.892 2773.75  62.416 2773.75
  64.078 2773.75 160.259 2772.75 185.715 2772.75 194.744 2773.75 204.594 2773.75
 210.718 2773.75 222.774 2774.75 228.183 2774.75 257.019 2774.75  267.81 2774.75
 273.007 2773.75 274.803  2772.4 275.015 2772.75  287.29 2772.06 287.545 2771.75
 289.737 2770.75 290.925 2770.17 291.165 2769.75 292.615 2768.75 292.615 2768.76
 293.301 2770.01 294.086 2767.76 294.086 2767.75 295.641 2766.75 298.583 2765.75
 300.223 2764.76 300.223 2764.75 301.687 2763.75 304.049 2762.75 306.828 2761.76
 307.153 2761.75 310.201 2760.75  315.32 2759.75 327.928 2759.98 331.711 2761.72
 339.341 2762.38 348.858 2761.61 352.302 2760.28 375.078 2761.75 377.814 2761.46
 391.136 2760.05 397.352 2762.59 404.677 2759.75 421.315 2760.11 427.849 2757.53
 458.495 2758.34 483.223 2757.36 487.119 2761.47 490.188 2761.75 490.492 2761.76
 490.492 2761.77 490.584 2761.86 491.482 2762.75 491.482 2762.76 492.726 2763.75
 492.726 2763.76 493.964 2764.75 495.201 2765.75 496.467 2766.75 497.853 2767.75
 499.401 2768.75 500.936 2769.75 500.936 2769.76 502.477 2770.75 504.047 2771.75
 504.294  2771.9 518.734 2772.75 520.388 2772.75 520.388 2772.76 520.685 2773.75
  522.75 2774.75 525.055 2775.75 528.562 2776.75 529.291 2777.69 531.794 2776.75
 533.505 2777.63 573.760 2775.75 592.796 2774.75 608.727 2774.75 636.672 2774.75
 663.471 2774.75 788.445 2774.75 833.707 2773.75 855.161 2773.75 857.438 2774.75
 928.516 2774.75 939.879 2773.75 942.008 2773.75 951.829 2774.75 952.204 2774.75
 986.569 2773.75 998.018 2773.751010.809 2773.751012.796 2773.75

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .045  287.29     .03 504.047    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        287.29 504.047            262.45  206.64   129.8              .1       .3
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*********************************************************************************************
  E.G. Elev (ft)         * 2773.78  * Element                 *  Left OB *  Channel * Right OB *
  Vel Head (ft)          *    4.42  * Wt. n-Val.              *          *   0.030  *          *
  W.S. Elev (ft)         * 2769.35  * Reach Len. (ft)         *  262.45  *  206.64  *  129.80  *
* Crit W.S. (ft)          * 2769.35  * Flow Area (sq ft)       *          * 1836.44  *          *
* E.G. Slope (ft/ft)      *0.006782  * Area (sq ft)            *          * 1836.44  *          *
* Q Total (cfs)           *31000.00  * Flow (cfs)              *          *31000.00  *          *
* Top Width (ft)          *  207.99  * Top Width (ft)          *          *  207.99  *          *
* Vel Total (ft/s)        *   16.88  * Avg. Vel. (ft/s)        *          *   16.88  *          *
```

Max Chl Dpth (ft)	11.99	Hydr. Depth (ft)			8.83		
Conv. Total (cfs)	376419.2	Conv. (cfs)			376419.2		
Length Wtd. (ft)	205.33	Wetted Per. (ft)			218.15		
Min Ch El (ft)	2757.36	Shear (lb/sq ft)			3.56		
Alpha	1.00	Stream Power (lb/ft s)			60.17		
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)		9.99	65.63		33.22
C & E Loss (ft)	0.37	Cum SA (acres)		6.66	11.18		17.99

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2771.83	Element	Left OB	Channel	Right OB	
Vel Head (ft)	3.84	Wt. n-Val.		0.030		
W.S. Elev (ft)	2768.00	Reach Len. (ft)	262.45	206.64	129.80	
Crit W.S. (ft)	2768.00	Flow Area (sq ft)		1557.52		
E.G. Slope (ft/ft)	0.007077	Area (sq ft)		1557.52		
Q Total (cfs)	24490.00	Flow (cfs)		24490.00		
Top Width (ft)	204.23	Top Width (ft)		204.23		
Vel Total (ft/s)	15.72	Avg. Vel. (ft/s)		15.72		
Max Chl Dpth (ft)	10.64	Hydr. Depth (ft)		7.63		
Conv. Total (cfs)	291109.0	Conv. (cfs)		291109.0		
Length Wtd. (ft)	206.12	Wetted Per. (ft)		212.48		
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		3.24		
Alpha	1.00	Stream Power (lb/ft s)		50.93		
Frctn Loss (ft)	1.24	Cum Volume (acre-ft)	6.94	60.74	25.64	
C & E Loss (ft)	0.32	Cum SA (acres)	6.34	11.21	17.77	

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2775.16	Element	Left OB	Channel	Right OB	
Vel Head (ft)	4.85	Wt. n-Val.		0.030		
W.S. Elev (ft)	2770.31	Reach Len. (ft)	262.45	206.64	129.80	
Crit W.S. (ft)	2770.31	Flow Area (sq ft)		2036.48		
E.G. Slope (ft/ft)	0.006667	Area (sq ft)		2036.48		
Q Total (cfs)	36000.00	Flow (cfs)		36000.00		
Top Width (ft)	211.14	Top Width (ft)		211.14		
Vel Total (ft/s)	17.68	Avg. Vel. (ft/s)		17.68		
Max Chl Dpth (ft)	12.94	Hydr. Depth (ft)		9.65		
Conv. Total (cfs)	440907.8	Conv. (cfs)		440907.8		
Length Wtd. (ft)	204.75	Wetted Per. (ft)		222.84		
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		3.80		
Alpha	1.00	Stream Power (lb/ft s)		67.24		
Frctn Loss (ft)	1.03	Cum Volume (acre-ft)	12.91	70.27	40.12	
C & E Loss (ft)	0.64	Cum SA (acres)	8.67	11.21	18.26	

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 139

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2769.75	122.83	2768.75	210.08	2768	238.55	2768	250.4	2768
250.9	2768	353.99	2767.75	571.8	2767.75	580.55	2767.87	584.21	2766.75
587.25	2765.75	590.19	2764.75	592.82	2763.75	595.21	2762.75	597.5	2761.75
599.8	2760.75	601.9	2759.24	661.57	2759.92	666.41	2756.85	691.06	2756.07
697.71	2757.82	779.92	2757.09	782.85	2760.21	803.38	2761.75	805.38	2761.89
809.83	2762.75	817.41	2764.24	820.11	2763.75	852.39	2763.75	884.33	2763.75
918.74	2764.75	974.69	2764.75	981.1	2764.75	999.39	2765.75	1005.92	2766.75
1011.93	2767.75	1018.14	2768.75	1024.29	2769.75	1031.8	2770.75	1039.15	2771.75
1043.88	2772.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	580.55	.03	803.38	.045

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

580.55 803.38 172.75 171.78 164.65 .1 .3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2771.69	Element	Left OB	Channel	Right OB
Vel Head (ft)	6.25	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.45	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2767.29	Flow Area (sq ft)		1468.72	238.15
E.G. Slope (ft/ft)	0.013412	Area (sq ft)		1468.72	238.15
Q Total (cfs)	31000.00	Flow (cfs)		29944.19	1055.81
Top Width (ft)	405.73	Top Width (ft)		215.24	190.49
Vel Total (ft/s)	18.16	Avg. Vel. (ft/s)		20.39	4.43
Max Chl Dpth (ft)	9.38	Hydr. Depth (ft)		6.82	1.25
Conv. Total (cfs)	267675.2	Conv. (cfs)		258558.6	9116.6
Length Wtd. (ft)	171.40	Wetted Per. (ft)		219.19	190.80
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		5.61	1.05
Alpha	1.22	Stream Power (lb/ft s)		114.39	4.63
Frctn Loss (ft)	1.90	Cum Volume (acre-ft)	9.99	57.80	32.87
C & E Loss (ft)	0.18	Cum SA (acres)	6.66	10.17	17.70

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2769.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.81	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2766.35	Flow Area (sq ft)		1332.37	120.66
E.G. Slope (ft/ft)	0.011932	Area (sq ft)		1332.37	120.66
Q Total (cfs)	24490.00	Flow (cfs)		24155.58	334.42
Top Width (ft)	392.22	Top Width (ft)		213.37	178.85
Vel Total (ft/s)	16.85	Avg. Vel. (ft/s)		18.13	2.77
Max Chl Dpth (ft)	8.74	Hydr. Depth (ft)		6.24	0.67
Conv. Total (cfs)	224196.8	Conv. (cfs)		221135.2	3061.5
Length Wtd. (ft)	171.15	Wetted Per. (ft)		217.21	179.14
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		4.57	0.50
Alpha	1.14	Stream Power (lb/ft s)		82.84	1.39
Frctn Loss (ft)	1.87	Cum Volume (acre-ft)	6.94	53.89	25.46
C & E Loss (ft)	0.12	Cum SA (acres)	6.34	10.22	17.51

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: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2772.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	7.11	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.88	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2768.62	Flow Area (sq ft)		1562.17	322.22
E.G. Slope (ft/ft)	0.014387	Area (sq ft)		1562.17	322.22
Q Total (cfs)	36000.00	Flow (cfs)		34229.51	1770.49
Top Width (ft)	413.39	Top Width (ft)		216.53	196.86
Vel Total (ft/s)	19.10	Avg. Vel. (ft/s)		21.91	5.49
Max Chl Dpth (ft)	9.81	Hydr. Depth (ft)		7.21	1.64
Conv. Total (cfs)	300138.3	Conv. (cfs)		285377.4	14760.9
Length Wtd. (ft)	171.29	Wetted Per. (ft)		220.55	197.19
Min Ch El (ft)	2756.07	Shear (lb/sq ft)		6.36	1.47
Alpha	1.25	Stream Power (lb/ft s)		139.40	8.06
Frctn Loss (ft)	1.93	Cum Volume (acre-ft)	12.91	61.73	39.64
C & E Loss (ft)	0.23	Cum SA (acres)	8.67	10.20	17.97

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: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 130

INPUT
Description:
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-329.97	2778	-326.97	2777	-324.12	2776	-321.7	2775	-319.71	2774
-317.71	2773	-315.72	2772	-313.73	2771	-311.73	2770	-309.74	2769
-295.4	2768	-239.67	2767	-228.16	2766	-194.92	2766	-129.95	2766
-127.06	2765	-123.98	2764	-120.22	2764	-110.54	2765	-110.53	2765
-.01	2766	0	2766	197.95	2767	197.96	2767	246.6	2767
261.24	2766.28	267.04	2766	267.05	2766	282.58	2764.8	282.59	2764.8
284.05	2765	284.06	2765	289.71	2764	289.72	2764	294.36	2763
294.37	2763	299.03	2762	299.04	2762	303.71	2761	303.72	2761
308.4	2760	308.41	2760	313.09	2759	313.1	2759	314.9	2758.96
314.91	2758.96	326.53	2758.59	326.54	2758.59	334.76	2755.3	334.76	2755.31
335.91	2758	335.92	2758	350.25	2755.25	350.26	2755.25	362.85	2756.77
362.86	2756.77	383.3	2757	429.42	2757.52	429.43	2757.51	436.01	2755.89
436.02	2755.89	456.36	2755.9	456.37	2755.9	476.41	2757.65	476.42	2757.65

495.5	2759.49	495.51	2759.49	507.59	2759.28	512.02	2759.21	512.03	2759.21
522.41	2761.75	522.42	2761.76	528.15	2763.11	528.16	2763.11	555.77	2762.75
555.78	2762.76	560.43	2763.75	560.44	2763.75	684.75	2763.75	684.76	2763.75
743.07	2762.75	743.08	2762.75	773.59	2762.75	773.6	2762.75	795.48	2762.75
795.94	2762.75	809.75	2763.75	809.76	2763.75	826.38	2764.75	866.79	2765.75
889.01	2766.75	894.02	2767.75	896.67	2768.75	896.67	2768.76	899.25	2769.75
901.38	2770.75	903.52	2771.75	911.41	2772.75	945.7	2772.75	951.33	2771.75
957.1	2770.75	961.49	2769.75	968.66	2768.75	968.68	2768.75	977.22	2769.75
981.89	2770.75	985.39	2771.75	990.06	2772.75	994.39	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-329.97	.045	246.6	.03	528.16	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
246.6	528.16	295.76	287.33	274.51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-329.97	197.95	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2769.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.14	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2766.38	Flow Area (sq ft)		1717.40	522.14
E.G. Slope (ft/ft)	0.008922	Area (sq ft)	13.46	1717.40	522.14
Q Total (cfs)	31000.00	Flow (cfs)		28714.42	2285.58
Top Width (ft)	595.82	Top Width (ft)	32.04	249.94	313.85
Vel Total (ft/s)	13.84	Avg. Vel. (ft/s)		16.72	4.38
Max Chl Dpth (ft)	9.89	Hydr. Depth (ft)		6.87	1.66
Conv. Total (cfs)	328199.1	Conv. (cfs)		304001.5	24197.6
Length Wtd. (ft)	285.18	Wetted Per. (ft)		254.20	314.04
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		3.76	0.93
Alpha	1.36	Stream Power (lb/ft s)		62.92	4.05
Frctn Loss (ft)	1.86	Cum Volume (acre-ft)	9.96	51.51	31.43
C & E Loss (ft)	0.66	Cum SA (acres)	6.60	9.26	16.75

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2767.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.82	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.89	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2765.37	Flow Area (sq ft)		1909.06	769.47
E.G. Slope (ft/ft)	0.003800	Area (sq ft)	69.64	1909.06	769.47
Q Total (cfs)	24490.00	Flow (cfs)		21800.10	2689.90
Top Width (ft)	718.73	Top Width (ft)	117.34	259.67	341.72
Vel Total (ft/s)	9.14	Avg. Vel. (ft/s)		11.42	3.50
Max Chl Dpth (ft)	10.64	Hydr. Depth (ft)		7.35	2.25
Conv. Total (cfs)	397259.9	Conv. (cfs)		353626.2	43633.7
Length Wtd. (ft)	285.65	Wetted Per. (ft)		263.96	341.92
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		1.72	0.53
Alpha	1.40	Stream Power (lb/ft s)		19.59	1.87
Frctn Loss (ft)	1.20	Cum Volume (acre-ft)	6.80	47.50	23.77
C & E Loss (ft)	0.14	Cum SA (acres)	6.10	9.29	16.52

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2770.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.79	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.43	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2767.00	Flow Area (sq ft)		1792.04	616.93
E.G. Slope (ft/ft)	0.010327	Area (sq ft)	27.94	1792.04	616.93
Q Total (cfs)	36000.00	Flow (cfs)		32832.83	3167.17
Top Width (ft)	645.25	Top Width (ft)	65.65	253.77	325.82
Vel Total (ft/s)	14.94	Avg. Vel. (ft/s)		18.32	5.13
Max Chl Dpth (ft)	10.18	Hydr. Depth (ft)		7.06	1.89
Conv. Total (cfs)	354255.9	Conv. (cfs)		323089.5	31166.4
Length Wtd. (ft)	284.82	Wetted Per. (ft)		258.05	326.02
Min Ch El (ft)	2755.25	Shear (lb/sq ft)		4.48	1.22
Alpha	1.38	Stream Power (lb/ft s)		82.03	6.26
Frctn Loss (ft)	2.07	Cum Volume (acre-ft)	12.86	55.12	37.86
C & E Loss (ft)	0.70	Cum SA (acres)	8.54	9.27	16.98

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1

REACH: Reach #1 RS: 120

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
741.52	2769	-620.87	2768	-551.88	2767	-543.14	2766	-540.36	2766
537.06	2767	-533.83	2768	-527.7	2768	-488.6	2767	-366.95	2766
-274.11	2765	-186.15	2764	-155.02	2763	-147.68	2762	-131.64	2762
-119.22	2763	-106.8	2764	-35.92	2765	0	2765	50.02	2764
110.9	2763	152.46	2762.03	153.73	2762	168.97	2761	175.86	2760
175.87	2760	179.66	2759	179.67	2759	181.81	2758	183.96	2757
186.11	2756	188.37	2755	192.2	2754	208.49	2754	208.5	2754
217.9	2755	217.91	2755	226.38	2756	226.39	2756	249.43	2757
265.63	2757	283.93	2757	293.22	2757	353.9	2758	388.76	2759
390.5	2760	392.24	2761	392.25	2761	393.98	2762	393.99	2762
396.77	2763	400.02	2764	404.19	2764	422.66	2764	464.57	2763
544.99	2763	709.9	2763	814.02	2762.75	823.72	2763.75	825.7	2763.75
826.66	2763.75	968	2763.75	980.94	2763.75	999.92	2763.75	1093.44	2763.75
1109.22	2764.75	1125.21	2765.75	1136.78	2766.75	1141.28	2767.75	1145.01	2768.75
1148.2	2769.75	1151.41	2770.75	1154.48	2771.75	1157.68	2772.75	1160.12	2773.75
1162.38	2774.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-741.52	.045	0	.03	404.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	404.19	158.39	153.64	149.14	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-741.52	0	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2767.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.44	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.67	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.44	Flow Area (sq ft)		2335.00	1637.41
E.G. Slope (ft/ft)	0.004458	Area (sq ft)	446.32	2335.00	1637.41
Q Total (cfs)	31000.00	Flow (cfs)		24756.40	6243.60
Top Width (ft)	1460.10	Top Width (ft)	336.19	404.19	719.72
Vel Total (ft/s)	7.80	Avg. Vel. (ft/s)		10.60	3.81
Max Chl Dpth (ft)	11.67	Hydr. Depth (ft)		5.78	2.28
Conv. Total (cfs)	464316.0	Conv. (cfs)		370799.7	93516.3
Length Wtd. (ft)	152.85	Wetted Per. (ft)		406.74	719.84
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.60	0.63
Alpha	1.52	Stream Power (lb/ft s)		16.94	2.41
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	8.40	38.15	24.63
C & E Loss (ft)	0.02	Cum SA (acres)	5.34	7.10	13.49

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2766.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.02	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2764.98	Flow Area (sq ft)		2074.09	1176.16
E.G. Slope (ft/ft)	0.004660	Area (sq ft)	248.65	2074.09	1176.16
Q Total (cfs)	24490.00	Flow (cfs)		20776.47	3713.53
Top Width (ft)	1389.85	Top Width (ft)	276.26	404.19	709.40
Vel Total (ft/s)	7.53	Avg. Vel. (ft/s)		10.02	3.16
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		5.13	1.66
Conv. Total (cfs)	358749.9	Conv. (cfs)		304351.0	54398.9
Length Wtd. (ft)	153.08	Wetted Per. (ft)		406.74	709.50
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.48	0.48
Alpha	1.53	Stream Power (lb/ft s)		14.86	1.52
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	5.72	34.36	17.64
C & E Loss (ft)	0.01	Cum SA (acres)	4.77	7.10	13.21

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2767.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.07	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2765.81	Flow Area (sq ft)		2497.72	1928.23
E.G. Slope (ft/ft)	0.004493	Area (sq ft)	589.49	2497.72	1928.23
Q Total (cfs)	36000.00	Flow (cfs)		27806.80	8193.20
Top Width (ft)	1508.19	Top Width (ft)	379.26	404.19	724.74
Vel Total (ft/s)	8.13	Avg. Vel. (ft/s)		11.13	4.25
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		6.18	2.66
Conv. Total (cfs)	537097.4	Conv. (cfs)		414859.9	122237.5
Length Wtd. (ft)	152.72	Wetted Per. (ft)		406.74	724.88
Min Ch El (ft)	2754.00	Shear (lb/sq ft)		1.72	0.75
Alpha	1.51	Stream Power (lb/ft s)		19.17	3.17
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	10.76	40.97	29.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.03	7.10	13.67

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 115

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2767	4.83	2766	9.61	2765	11.16	2765	13.74	2766
16.32	2767	24.15	2767	124.55	2766	311.87	2765.02	314.97	2765
395.1	2764	477.26	2763	482.56	2762	505.65	2762	555.24	2763
679.5	2764	697.39	2764	706.13	2763	725.14	2762	747.88	2762
765.91	2762	799.67	2761	831.73	2760	835.05	2759	837.03	2758
839.03	2757	841.23	2756	843.42	2755	845.62	2754	847.82	2753
863.85	2753	869.22	2754	874.61	2755	887.51	2756	990.68	2756
1015.46	2756	1026.66	2757	1037.87	2758	1040.87	2759	1043.78	2760
1046.68	2761	1049.37	2762	1074.62	2763	1080.06	2763	1202.38	2763
1254.26	2763	1359.68	2763	1365.58	2763	1696.27	2762.75	1789.59	2762.75
1848.13	2763.75	1874.7	2764.73	1875.36	2764.75	1890.38	2765.75	1895.84	2766.75
1902.22	2767.75	1908.29	2768.75	1913.86	2769.75	1918.72	2770.75	1920.54	2771.75
1922.37	2772.75	1924.2	2773.75	1926.03	2774.75	1927.8	2775.75	1929.57	2776.75
1931.38	2777.75	1933.2	2778.75	1935.07	2779.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	679.5	.03	1074.62	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
679.5	1074.62	257.93	242.39	227.54	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
0	679.5	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2766.39	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.65	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.74	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.74	Flow Area (sq ft)		2381.48	1412.74
E.G. Slope (ft/ft)	0.004600	Area (sq ft)	465.63	2381.48	1412.74
Q Total (cfs)	31000.00	Flow (cfs)		26379.82	4620.18
Top Width (ft)	1539.72	Top Width (ft)	344.05	395.12	800.55
Vel Total (ft/s)	8.17	Avg. Vel. (ft/s)		11.08	3.27
Max Chl Dpth (ft)	11.74	Hydr. Depth (ft)		6.03	1.76
Conv. Total (cfs)	457069.9	Conv. (cfs)		388949.0	68120.9
Length Wtd. (ft)	239.83	Wetted Per. (ft)		397.73	800.58
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.72	0.51
Alpha	1.59	Stream Power (lb/ft s)		19.05	1.66
Frctn Loss (ft)	1.17	Cum Volume (acre-ft)	6.74	29.83	19.40
C & E Loss (ft)	0.05	Cum SA (acres)	4.11	5.69	10.89

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2765.65	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.49	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.16	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2764.16	Flow Area (sq ft)		2151.22	950.85
E.G. Slope (ft/ft)	0.004527	Area (sq ft)	278.74	2151.22	950.85
Q Total (cfs)	24490.00	Flow (cfs)		22088.98	2401.02
Top Width (ft)	1477.14	Top Width (ft)	297.35	395.12	784.67
Vel Total (ft/s)	7.89	Avg. Vel. (ft/s)		10.27	2.53
Max Chl Dpth (ft)	11.16	Hydr. Depth (ft)		5.44	1.21
Conv. Total (cfs)	364000.3	Conv. (cfs)		328313.5	35686.8
Length Wtd. (ft)	240.55	Wetted Per. (ft)		397.73	784.69
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		1.53	0.34
Alpha	1.54	Stream Power (lb/ft s)		15.69	0.86
Frctn Loss (ft)	1.15	Cum Volume (acre-ft)	4.76	26.91	14.00
C & E Loss (ft)	0.05	Cum SA (acres)	3.72	5.69	10.65

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2766.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.75	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.15	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2765.15	Flow Area (sq ft)		2543.06	1741.41
E.G. Slope (ft/ft)	0.004615	Area (sq ft)	614.55	2543.06	1741.41
Q Total (cfs)	36000.00	Flow (cfs)		29476.35	6523.65
Top Width (ft)	1597.71	Top Width (ft)	395.79	395.12	806.80
Vel Total (ft/s)	8.40	Avg. Vel. (ft/s)		11.59	3.75
Max Chl Dpth (ft)	12.15	Hydr. Depth (ft)		6.44	2.16

* Conv. Total (cfs)	*529952.8	* Conv. (cfs)	*		*433918.7	* 96034.1	*
* Length Wtd. (ft)	* 239.39	* Wetted Per. (ft)	*		* 397.73	* 806.84	*
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*		* 1.84	* 0.62	*
* Alpha	* 1.59	* Stream Power (lb/ft s)	*		* 21.35	* 2.33	*
* Frctn Loss (ft)	* 1.19	* Cum Volume (acre-ft)	*	8.57	* 32.08	* 23.56	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	*	5.62	* 5.69	* 11.05	*

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 110

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600.38	2767	-579.98	2766	-400.38	2765	-181.14	2764	-81.76	2763
-57.48	2762	-47.61	2761	0	2761	227.2	2762	237.17	2762
274.46	2761	312.01	2760	358.58	2760	379.63	2760	383.11	2759
386.65	2758	390.19	2757	392.73	2756	392.74	2756	395.22	2755
397.63	2754	410.68	2753	426.46	2753	431.11	2754	435.76	2755
446.04	2756	470.07	2757	481.43	2757	501.92	2756.75	563.14	2756
587.96	2756	594.62	2757	602.49	2758	613.17	2759	626.03	2759.97
626.5	2760	890.32	2761	967.13	2761	1086.65	2761	1302.26	2762
1331.06	2761.75	1340.58	2761.75	1426.39	2761.75	1446.33	2761.75	1459.98	2761.75
1515.86	2762.75	1570.65	2763.75	1587.84	2764.75	1592.77	2765.75	1597.63	2766.75
1602.74	2767.75	1607.53	2768.75	1611.47	2769.75	1613.74	2770.75	1616.01	2771.75
1618.28	2772.75	1620.53	2773.75	1622.77	2774.75	1624.98	2775.75	1627.19	2776.75
1629.4	2777.75	1631.62	2778.75	1633.89	2779.75	1636.29	2780.75	1638.58	2781.75
1640.84	2782.75	1643.09	2783.75	1645.32	2784.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600.38	.045	227.2	.03	626.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
227.2	626.5	308.04	322.72	332.25	.1	.3

effective Flow num= 1

Sta L	Sta R	Elev	Permanent
-600.38	227.2	2770	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2764.92	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.08	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2762.85	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25	*
* Crit W.S. (ft)	* 2763.33	* Flow Area (sq ft)	*	* 1956.99	* 1473.46	*
* E.G. Slope (ft/ft)	*0.007990	* Area (sq ft)	* 415.36	* 1956.99	* 1473.46	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*24934.30	* 6065.70	*
* Top Width (ft)	* 1599.06	* Top Width (ft)	* 305.20	* 399.30	* 894.56	*
* Vel Total (ft/s)	* 9.04	* Avg. Vel. (ft/s)	*	* 12.74	* 4.12	*
* Max Chl Dpth (ft)	* 9.84	* Hydr. Depth (ft)	*	* 4.90	* 1.65	*
* Conv. Total (cfs)	*346800.4	* Conv. (cfs)	*	*278942.8	* 67857.6	*
* Length Wtd. (ft)	* 324.49	* Wetted Per. (ft)	*	* 400.88	* 894.58	*
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*	* 2.44	* 0.82	*
* Alpha	* 1.64	* Stream Power (lb/ft s)	*	* 31.03	* 3.38	*
* Frctn Loss (ft)	* 1.43	* Cum Volume (acre-ft)	* 4.13	* 17.76	* 11.87	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 2.19	* 3.48	* 6.46	*

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2764.24	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.82	* Wt. n-Val.	* .	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2762.42	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25	*
* Crit W.S. (ft)	* 2762.82	* Flow Area (sq ft)	*	* 1787.46	* 1098.66	*
* E.G. Slope (ft/ft)	*0.007531	* Area (sq ft)	* 287.97	* 1787.46	* 1098.66	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*20814.43	* 3675.57	*
* Top Width (ft)	* 1565.13	* Top Width (ft)	* 294.89	* 399.30	* 870.94	*
* Vel Total (ft/s)	* 8.49	* Avg. Vel. (ft/s)	*	* 11.64	* 3.35	*
* Max Chl Dpth (ft)	* 9.42	* Hydr. Depth (ft)	*	* 4.48	* 1.26	*
* Conv. Total (cfs)	*282197.7	* Conv. (cfs)	*	*239844.2	* 42353.5	*
* Length Wtd. (ft)	* 324.13	* Wetted Per. (ft)	*	* 400.88	* 870.95	*
* Min Ch El (ft)	* 2753.00	* Shear (lb/sq ft)	*	* 2.10	* 0.59	*
* Alpha	* 1.62	* Stream Power (lb/ft s)	*	* 24.41	* 1.98	*
* Frctn Loss (ft)	* 1.38	* Cum Volume (acre-ft)	* 3.08	* 15.95	* 8.65	*
C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 1.97	* 3.48	* 6.33	*

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2765.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.27	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2763.14	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2763.67	Flow Area (sq ft)		2074.07	1738.11
E.G. Slope (ft/ft)	0.008280	Area (sq ft)	506.61	2074.07	1738.11
Q Total (cfs)	36000.00	Flow (cfs)		27964.04	8035.96
Top Width (ft)	1632.62	Top Width (ft)	322.69	399.30	910.63
Vel Total (ft/s)	9.44	Avg. Vel. (ft/s)		13.48	4.62
Max Chl Dpth (ft)	10.14	Hydr. Depth (ft)		5.19	1.91
Conv. Total (cfs)	395617.6	Conv. (cfs)		307307.4	88310.2
Length Wtd. (ft)	324.71	Wetted Per. (ft)		400.88	910.65
Min Ch El (ft)	2753.00	Shear (lb/sq ft)		2.67	0.99
Alpha	1.64	Stream Power (lb/ft s)		36.06	4.56
Frctn Loss (ft)	1.45	Cum Volume (acre-ft)	5.25	19.23	14.47
C & E Loss (ft)	0.05	Cum SA (acres)	3.49	3.48	6.56

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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 100

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-1079.5	2765	-908.05	2764	-796.29	2763	-637.85	2762	-590.66	2762
-582.71	2762	-429.48	2762	-343.01	2762	-257.47	2761	-240.37	2760
-236.92	2759	-233.51	2758	-230.22	2757	-227.02	2756	-223.93	2755
-185.04	2755	-174.13	2756	-169.65	2757	-165.16	2758	-160.66	2759
-156.1	2760	-123.66	2760	-99.38	2760	0	2760	48.99	2759
69.53	2759	69.54	2759	92.94	2759	92.95	2759	136.19	2758
136.2	2758	181.29	2757	186.69	2757	207.37	2758	220.09	2758
222.63	2757	222.64	2757	225.18	2756	227.72	2755	227.73	2755
230.27	2754	232.22	2753.36	233.31	2753	236.48	2752	271.72	2752
275.17	2753	279.24	2754	328.16	2755	339.63	2756	339.64	2756
380.46	2756	380.47	2756	390.22	2755.86	451.75	2755	486.38	2754
497.38	2754	501.1	2755	504.87	2756	504.88	2756	507.69	2757
539.73	2758	571.48	2759	643.34	2760	716.38	2760	890.83	2759
890.84	2759	1036.2	2759	1036.21	2759	1095.21	2760	1202.49	2760
1202.5	2760	1304.69	2760	1327.57	2761	1346.89	2762	1361.89	2763
1372.87	2764	1372.88	2764	1398.46	2765				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-1079.5	.045	0	.03	539.73	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	539.73	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-1079.5	-156.1	2764	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2762.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.02	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.65	Reach Len. (ft)			
Crit W.S. (ft)	2761.20	Flow Area (sq ft)	257.55	2837.18	1638.16
E.G. Slope (ft/ft)	0.003515	Area (sq ft)	753.97	2837.18	1638.16
Q Total (cfs)	31000.00	Flow (cfs)	703.96	25126.95	5169.09
Top Width (ft)	1653.19	Top Width (ft)	313.06	539.73	800.40
Vel Total (ft/s)	6.55	Avg. Vel. (ft/s)	2.73	8.86	3.16
Max Chl Dpth (ft)	9.65	Hydr. Depth (ft)	1.65	5.26	2.05
Conv. Total (cfs)	522910.6	Conv. (cfs)	11874.5	423843.4	87192.6
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	800.47
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.36	1.15	0.45
Alpha	1.52	Stream Power (lb/ft s)	0.99	10.18	1.42
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2762.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.95	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.06	Reach Len. (ft)			
Crit W.S. (ft)	2760.72	Flow Area (sq ft)	165.48	2518.82	1169.41
E.G. Slope (ft/ft)	0.003685	Area (sq ft)	584.19	2518.82	1169.41
Q Total (cfs)	24490.00	Flow (cfs)	344.82	21098.36	3046.82
Top Width (ft)	1591.34	Top Width (ft)	262.61	539.73	789.00
Vel Total (ft/s)	6.35	Avg. Vel. (ft/s)	2.08	8.38	2.61
Max Chl Dpth (ft)	9.06	Hydr. Depth (ft)	1.06	4.67	1.48
Conv. Total (cfs)	403456.7	Conv. (cfs)	5680.7	347581.5	50194.4
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	789.06
Min Ch El (ft)	2752.00	Shear (lb/sq ft)	0.24	1.07	0.34
Alpha	1.52	Stream Power (lb/ft s)	0.51	8.96	0.89

* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2763.17	* Element	* Left OB	* Channel	* Right OB
* Vel Head (ft)	* 1.00	* Wt. n-Val.	* 0.045	* 0.030	* 0.045
* W.S. Elev (ft)	* 2762.17	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 2761.51	* Flow Area (sq ft)	* 338.72	* 3117.85	* 2056.93
* E.G. Slope (ft/ft)	*0.003152	* Area (sq ft)	* 979.48	* 3117.85	* 2056.93
* Q Total (cfs)	*36000.00	* Flow (cfs)	* 1052.54	*27848.25	* 7099.21
* Top Width (ft)	* 2014.21	* Top Width (ft)	* 664.77	* 539.73	* 809.71
* Vel Total (ft/s)	* 6.53	* Avg. Vel. (ft/s)	* 3.11	* 8.93	* 3.45
* Max Chl Dpth (ft)	* 10.17	* Hydr. Depth (ft)	* 2.17	* 5.78	* 2.54
* Conv. Total (cfs)	*641195.8	* Conv. (cfs)	* 18746.7	*496005.0	*126444.0
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 809.80
* Min Ch El (ft)	* 2752.00	* Shear (lb/sq ft)	* 0.43	* 1.13	* 0.50
* Alpha	* 1.51	* Stream Power (lb/ft s)	* 1.33	* 10.12	* 1.73
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

SUMMARY OF MANNING'S N VALUES

River:River #1

Reach	River Sta.	n1	n2	n3
Reach #1	225	.045	.03	.045
Reach #1	220	.045	.03	.045
Reach #1	215	.045	.03	.045
Reach #1	210	.045	.03	.045
Reach #1	205	.045	.03	.045
Reach #1	200	.045	.03	.045
Reach #1	195	.045	.03	.045
Reach #1	190	.045	.03	.045
Reach #1	180	.045	.03	.045
Reach #1	170	.045	.03	.045
Reach #1	160	.045	.03	.045
Reach #1	150	.045	.03	.045
Reach #1	139	.045	.03	.045
Reach #1	130	.045	.03	.045
Reach #1	120	.045	.03	.045
Reach #1	115	.045	.03	.045
Reach #1	110	.045	.03	.045
Reach #1	100	.045	.03	.045

SUMMARY OF REACH LENGTHS

River: River #1

Reach	River Sta.	Left	Channel	Right
Reach #1	225	299.75	282.05	262.04
Reach #1	220	277.65	269.4	261.19
Reach #1	215	294.95	268.22	230.48
Reach #1	210	283.6	269.08	254.74
Reach #1	205	280.12	286.64	293.88
Reach #1	200	179.8	195.07	210.23
Reach #1	195	215.83	225.58	311.98
Reach #1	190	77.8	72.37	83.03
Reach #1	180	44.45	181.54	256.85
Reach #1	170	130.15	130.15	130.15
Reach #1	160	203.69	188.86	197
Reach #1	150	262.45	206.64	129.8
Reach #1	139	172.75	171.78	164.65
Reach #1	130	295.76	287.33	274.51
Reach #1	120	158.39	153.64	149.14
Reach #1	115	257.93	242.39	227.54
Reach #1	110	308.04	322.72	332.25
Reach #1	100			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River #1

Reach	River Sta.	Contr.	Expan.
Reach #1	225	.1	.3
Reach #1	220	.1	.3
Reach #1	215	.1	.3
Reach #1	210	.1	.3
Reach #1	205	.1	.3
Reach #1	200	.1	.3
Reach #1	195	.1	.3
Reach #1	190	.1	.3
Reach #1	180	.1	.3
Reach #1	170	.1	.3

```
*Reach #1        *    160     *       .1*       .3*
*Reach #1        *    150     *       .1*       .3*
*Reach #1        *    139     *       .1*       .3*
*Reach #1        *    130     *       .1*       .3*
*Reach #1        *    120     *       .1*       .3*
*Reach #1        *    115     *       .1*       .3*
*Reach #1        *    110     *       .1*       .3*
*Reach #1        *    100     *       .1*       .3*
*****************************************************
```

Profile Outp[illegible]le - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #1	225	PF 1	31000.00	2768.00	2783.79	2781.42	2786.45	0.003148	13.09	2368.69	849.40	0.71
Reach #1	225	PF 2	24490.00	2768.00	2782.23	2780.05	2784.51	0.003108	12.10	2023.49	754.54	0.70
Reach #1	225	PF 3	36000.00	2768.00	2784.84	2782.42	2787.78	0.003262	13.77	2613.48	1215.25	0.73
Reach #1	220	PF 1	31000.00	2767.00	2780.92	2780.92	2785.06	0.006598	16.33	1897.98	904.77	1.00
Reach #1	220	PF 2	24490.00	2767.00	2780.16	2779.58	2783.28	0.005463	14.17	1728.23	784.47	0.90
Reach #1	220	PF 3	36000.00	2767.00	2781.82	2781.82	2786.37	0.006460	17.10	2104.79	1075.72	1.00
Reach #1	215	PF 1	31000.00	2767.00	2780.49	2779.67	2783.03	0.004711	12.82	2425.80	1271.30	0.83
Reach #1	215	PF 2	24490.00	2767.00	2779.44	2777.92	2781.60	0.004906	11.81	2075.45	903.76	0.83
Reach #1	215	PF 3	36000.00	2767.00	2779.41	2780.35	2784.13	0.010772	17.44	2065.33	892.30	1.22
Reach #1	210	PF 1	31000.00	2766.00	2778.66	2778.66	2781.45	0.007383	13.40	2313.85	1097.58	1.00
Reach #1	210	PF 2	24490.00	2766.00	2776.84	2776.53	2780.03	0.006179	14.33	1708.58	503.53	0.95
Reach #1	210	PF 3	36000.00	2766.00	2779.29	2779.29	2782.30	0.007343	13.93	2585.10	1350.50	1.00
Reach #1	205	PF 1	31000.00	2765.00	2776.22	2777.30	2779.34	0.008080	14.33	2410.89	793.24	1.05
Reach #1	205	PF 2	24490.00	2765.00	2775.69	2775.69	2778.12	0.006333	12.57	2054.88	564.95	0.92
Reach #1	205	PF 3	36000.00	2765.00	2776.61	2777.75	2780.06	0.009177	15.23	2725.49	821.56	1.12
Reach #1	200	PF 1	31000.00	2763.00	2774.60	2774.99	2777.48	0.004947	14.42	2953.93	818.81	0.87
Reach #1	200	PF 2	24490.00	2763.00	2773.47	2773.95	2776.37	0.005630	14.06	2140.17	639.31	0.91
Reach #1	200	PF 3	36000.00	2763.00	2776.84	2775.91	2778.28	0.002126	11.05	5235.53	1116.32	0.59
Reach #1	195	PF 1	31000.00	2762.00	2775.47	2773.18	2776.47	0.001484	8.88	4983.29	974.08	0.49
Reach #1	195	PF 2	24490.00	2762.00	2773.31	2771.52	2774.68	0.002552	9.92	3152.17	727.91	0.62
Reach #1	195	PF 3	36000.00	2762.00	2776.98	2773.66	2777.80	0.001075	8.29	6556.21	1098.89	0.43
Reach #1	190	PF 1	31000.00	2760.49	2775.57	2770.00	2776.11	0.000670	5.89	5260.27	527.41	0.33
Reach #1	190	PF 2	24490.00	2760.49	2773.60	2769.25	2774.12	0.000829	5.79	4232.78	512.34	0.35
Reach #1	190	PF 3	36000.00	2760.49	2776.99	2770.53	2777.54	0.000583	5.98	6102.29	719.88	0.31
Reach #1	180	PF 1	31000.00	2759.08	2775.17	2769.77	2776.02	0.000952	7.42	4180.06	379.59	0.39
Reach #1	180	PF 2	24490.00	2759.08	2773.24	2768.85	2774.02	0.001087	7.09	3455.69	371.77	0.41
Reach #1	180	PF 3	36000.00	2759.08	2776.55	2770.43	2777.45	0.000882	7.65	4732.77	453.48	0.38
Reach #1	170	PF 1	31000.00	2758.49	2773.55	2770.35	2775.61	0.003348	11.52	2691.28	248.32	0.62
Reach #1	170	PF 2	24490.00	2758.49	2771.75	2769.11	2773.59	0.003537	10.88	2251.21	242.05	0.63
Reach #1	170	PF 3	36000.00	2758.49	2774.82	2771.24	2777.05	0.003245	11.96	3011.47	252.85	0.61
Reach #1	160	PF 1	31000.00	2757.67	2771.80	2769.83	2774.98	0.004844	14.29	2168.83	197.01	0.76
Reach #1	160	PF 2	24490.00	2757.67	2770.41	2768.41	2773.00	0.004406	12.91	1897.59	193.37	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.77	2770.85	2776.38	0.005147	15.25	2361.44	204.78	0.78
Reach #1	150	PF 1	31000.00	2757.36	2769.35	2769.35	2773.78	0.006782	16.88	1836.44	207.99	1.00
Reach #1	150	PF 2	24490.00	2757.36	2768.00	2768.00	2771.83	0.007077	15.72	1557.52	204.23	1.00
Reach #1	150	PF 3	36000.00	2757.36	2770.31	2770.31	2775.16	0.006667	17.68	2036.48	211.14	1.00
Reach #1	139	PF 1	31000.00	2756.07	2765.45	2767.29	2771.69	0.013412	20.39	1706.88	405.73	1.38
Reach #1	139	PF 2	24490.00	2756.07	2764.81	2766.35	2769.85	0.011932	18.13	1453.04	392.22	1.28
Reach #1	139	PF 3	36000.00	2756.07	2765.88	2768.62	2772.99	0.014387	21.91	1884.39	413.39	1.44
Reach #1	130	PF 1	31000.00	2755.25	2765.14	2766.38	2769.18	0.008922	16.72	2239.54	595.82	1.12
Reach #1	130	PF 2	24490.00	2755.25	2765.89	2765.37	2767.71	0.003800	11.42	2678.53	718.73	0.74
Reach #1	130	PF 3	36000.00	2755.25	2765.43	2767.00	2770.22	0.010327	18.32	2408.98	645.25	1.22
Reach #1	120	PF 1	31000.00	2754.00	2765.67	2765.44	2767.11	0.004458	10.60	3972.41	1460.10	0.78
Reach #1	120	PF 2	24490.00	2754.00	2765.02	2764.98	2766.37	0.004660	10.02	3250.25	1389.85	0.78
Reach #1	120	PF 3	36000.00	2754.00	2766.07	2765.81	2767.62	0.004493	11.13	4425.95	1508.19	0.79
Reach #1	115	PF 1	31000.00	2753.00	2764.74	2764.74	2766.39	0.004600	11.08	3794.22	1539.72	0.80
Reach #1	115	PF 2	24490.00	2753.00	2764.16	2764.16	2765.65	0.004527	10.27	3102.07	1477.14	0.78
Reach #1	115	PF 3	36000.00	2753.00	2765.15	2765.15	2766.90	0.004615	11.59	4284.47	1597.71	0.81
Reach #1	110	PF 1	31000.00	2753.00	2762.85	2763.33	2764.92	0.007990	12.74	3430.45	1599.06	1.01
Reach #1	110	PF 2	24490.00	2753.00	2762.42	2762.82	2764.24	0.007531	11.64	2886.12	1565.13	0.97
Reach #1	110	PF 3	36000.00	2753.00	2763.14	2763.67	2765.41	0.008280	13.48	3812.18	1632.62	1.04
Reach #1	100	PF 1	31000.00	2752.00	2761.65	2761.20	2762.67	0.003515	8.86	4732.88	1653.19	0.68
Reach #1	100	PF 2	24490.00	2752.00	2761.06	2760.72	2762.01	0.003685	8.38	3853.71	1591.34	0.68
Reach #1	100	PF 3	36000.00	2752.00	2762.17	2761.51	2763.17	0.003152	8.93	5513.50	2014.21	0.65

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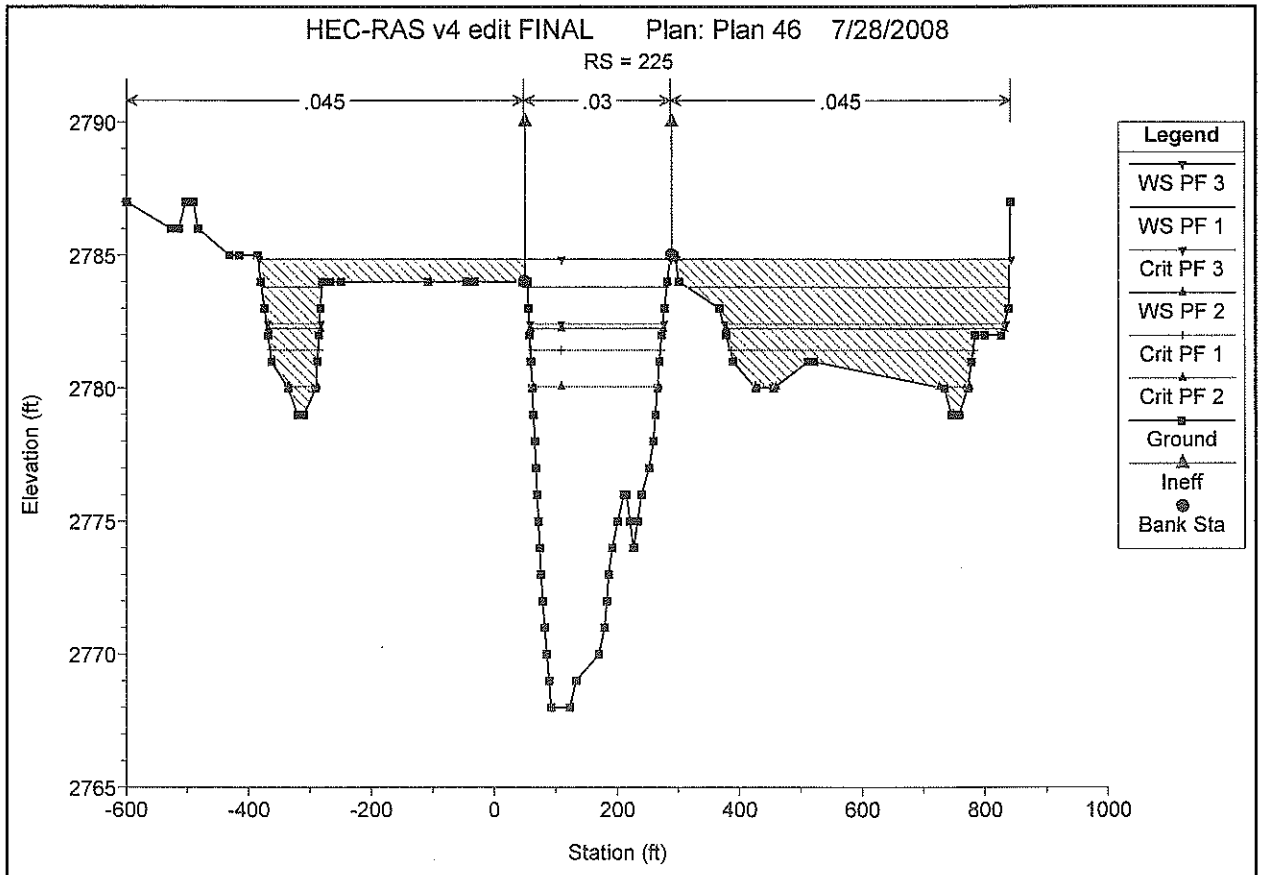
ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Alt 4

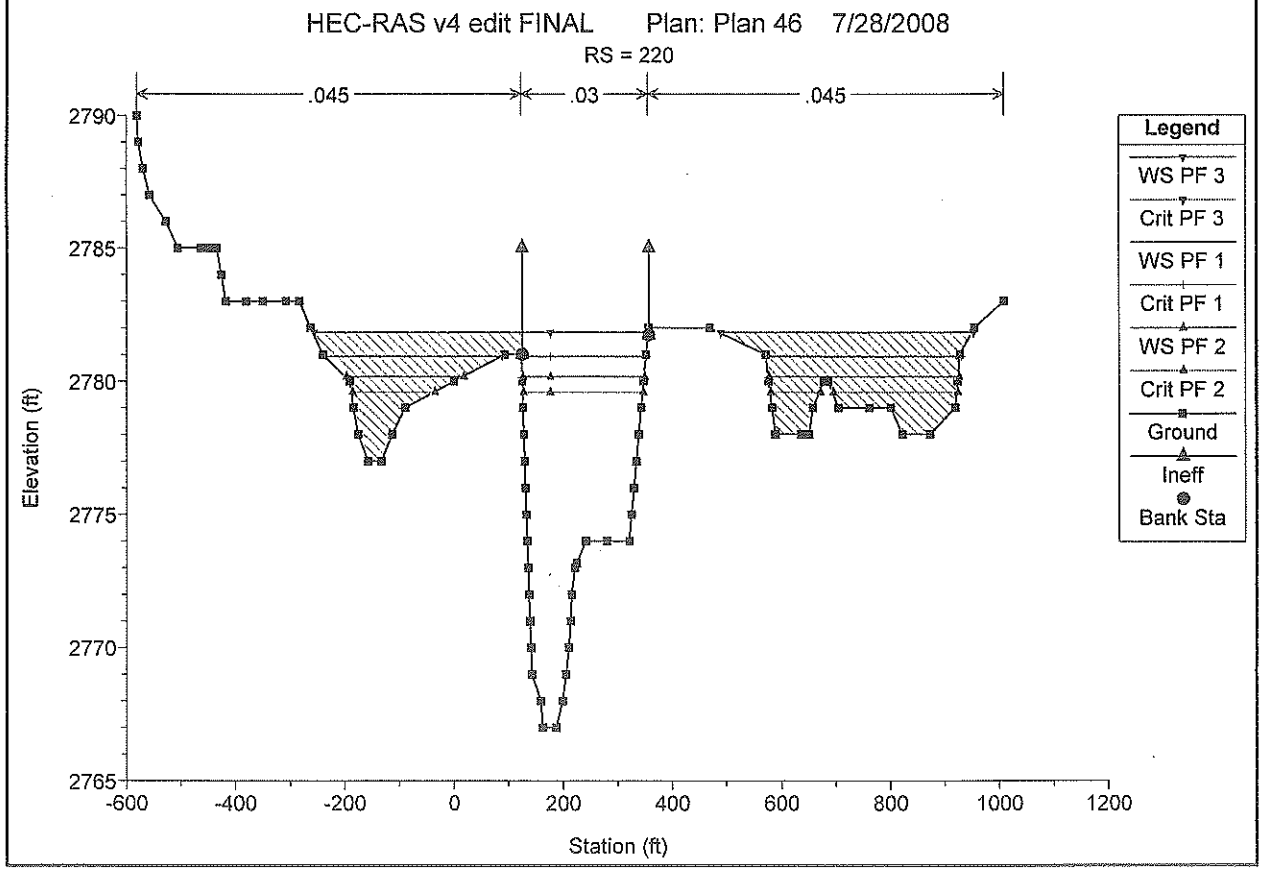
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The conveyance ratio (upstream conveyance divided by downstream 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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 225 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 1
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:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 220 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 215 Profile: PF 3
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 2
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 210 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate

the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 1
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 2
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 205 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 200 Profile: PF 3
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 1
Warning: The conveyance ratio (upstream 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: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 195 Profile: PF 2
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 1
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 2
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 3
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 1
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 2
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 3
Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 1
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 2
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 139 Profile: PF 3
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: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 1
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 2
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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Warning:The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 3
Warning:Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 1
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 2
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:Divided flow computed for this cross-section.
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 1
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 2
Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 3
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: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Program found supercritical flow starting at this cross section.

```
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 1
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 2
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
.ver: River #1  Reach: Reach #1     RS: 100     Profile: PF 3
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
```


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 225
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Ineff
Bank Sta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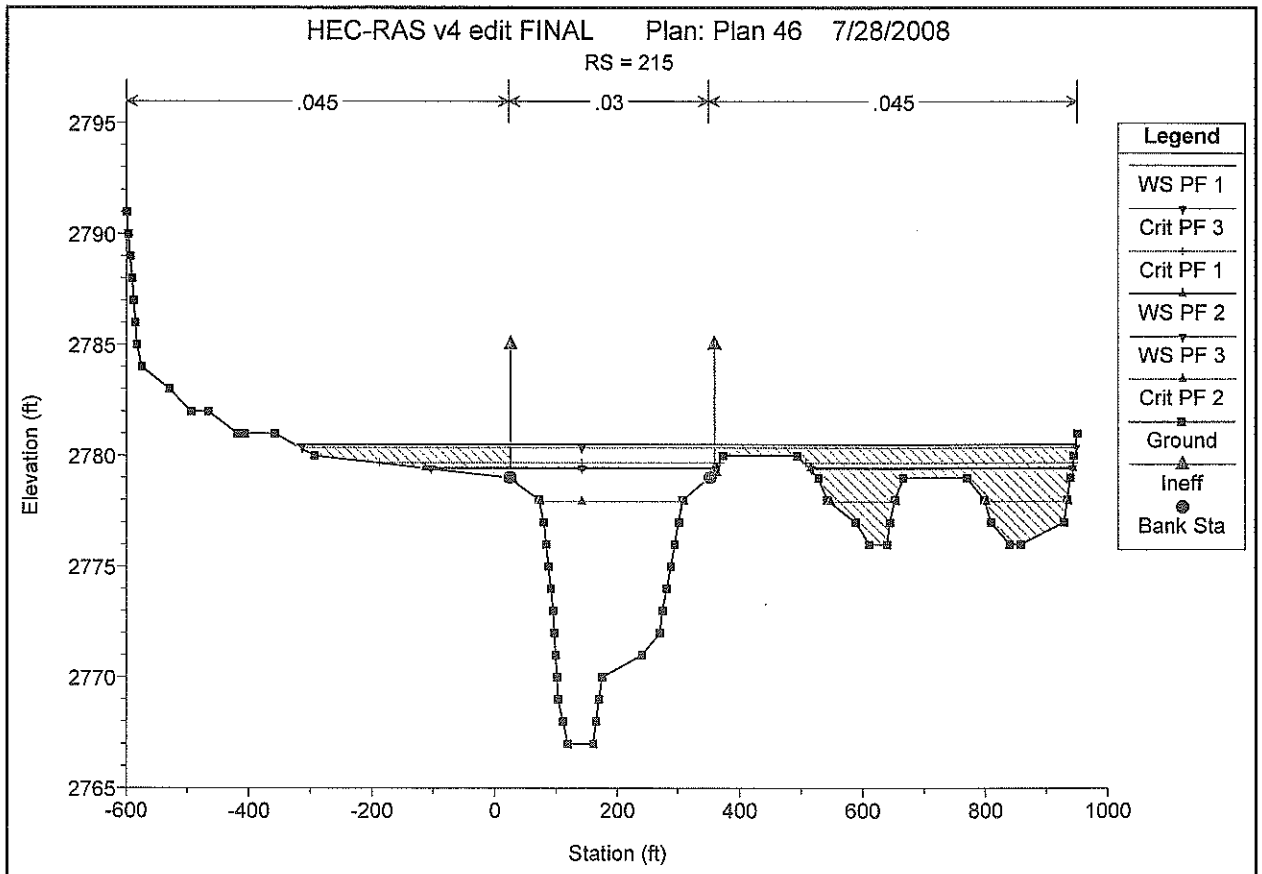
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta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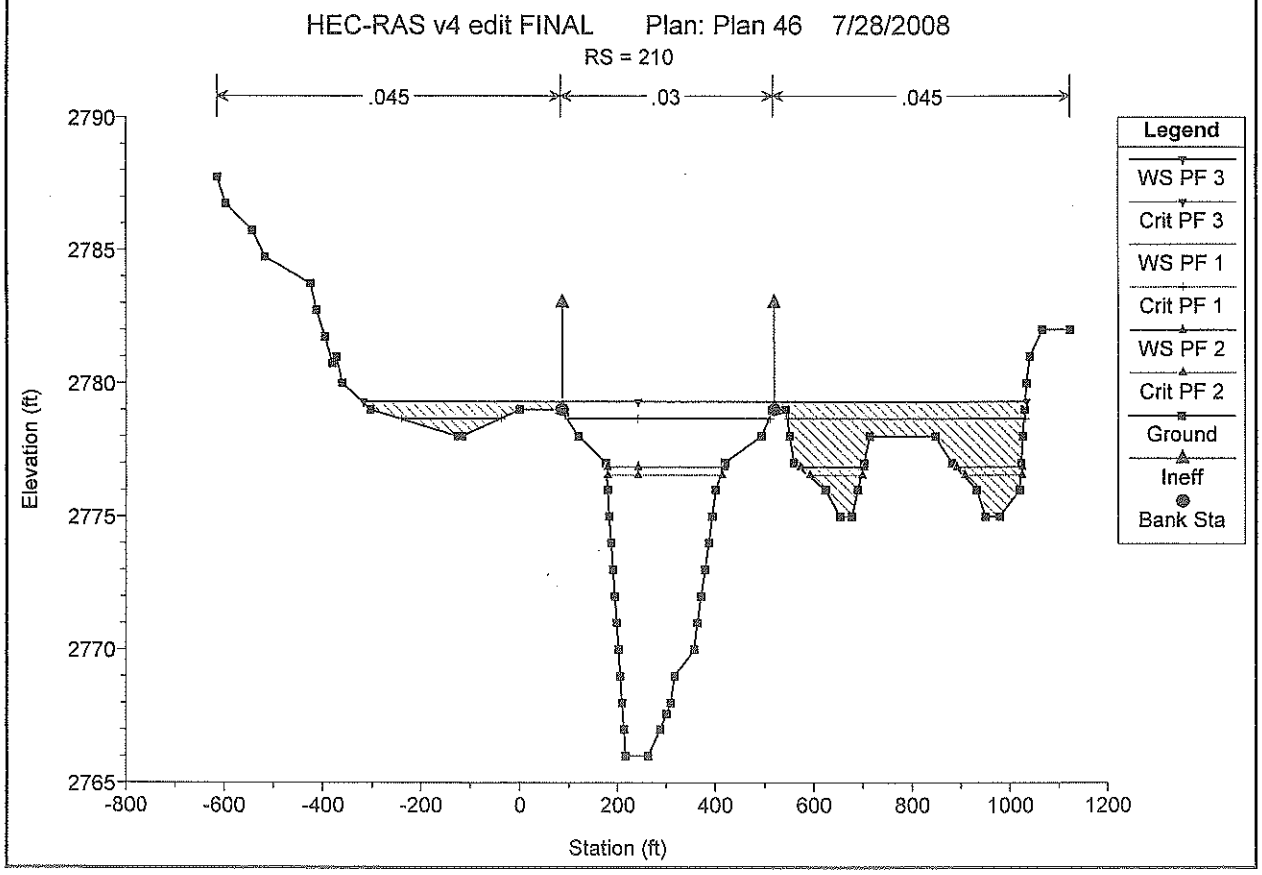
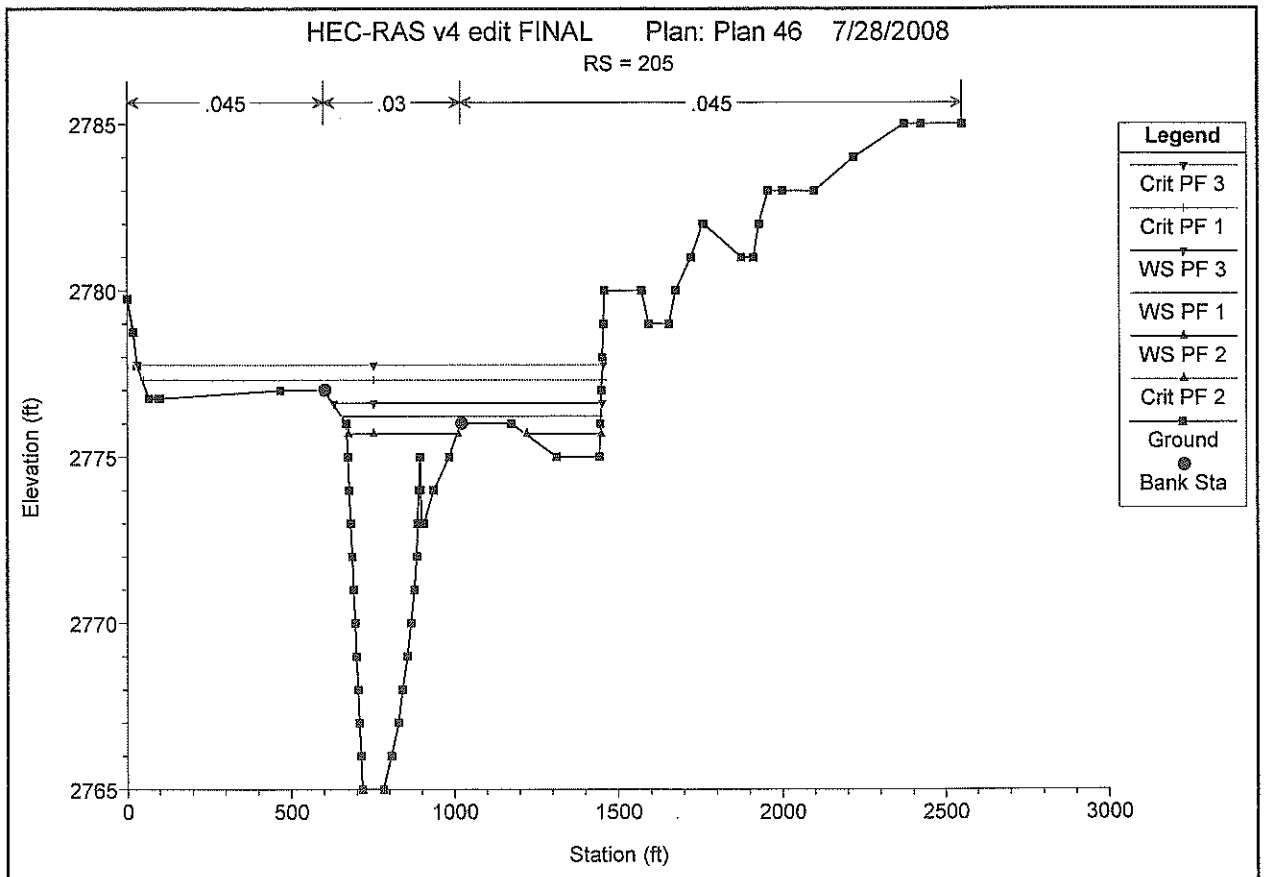
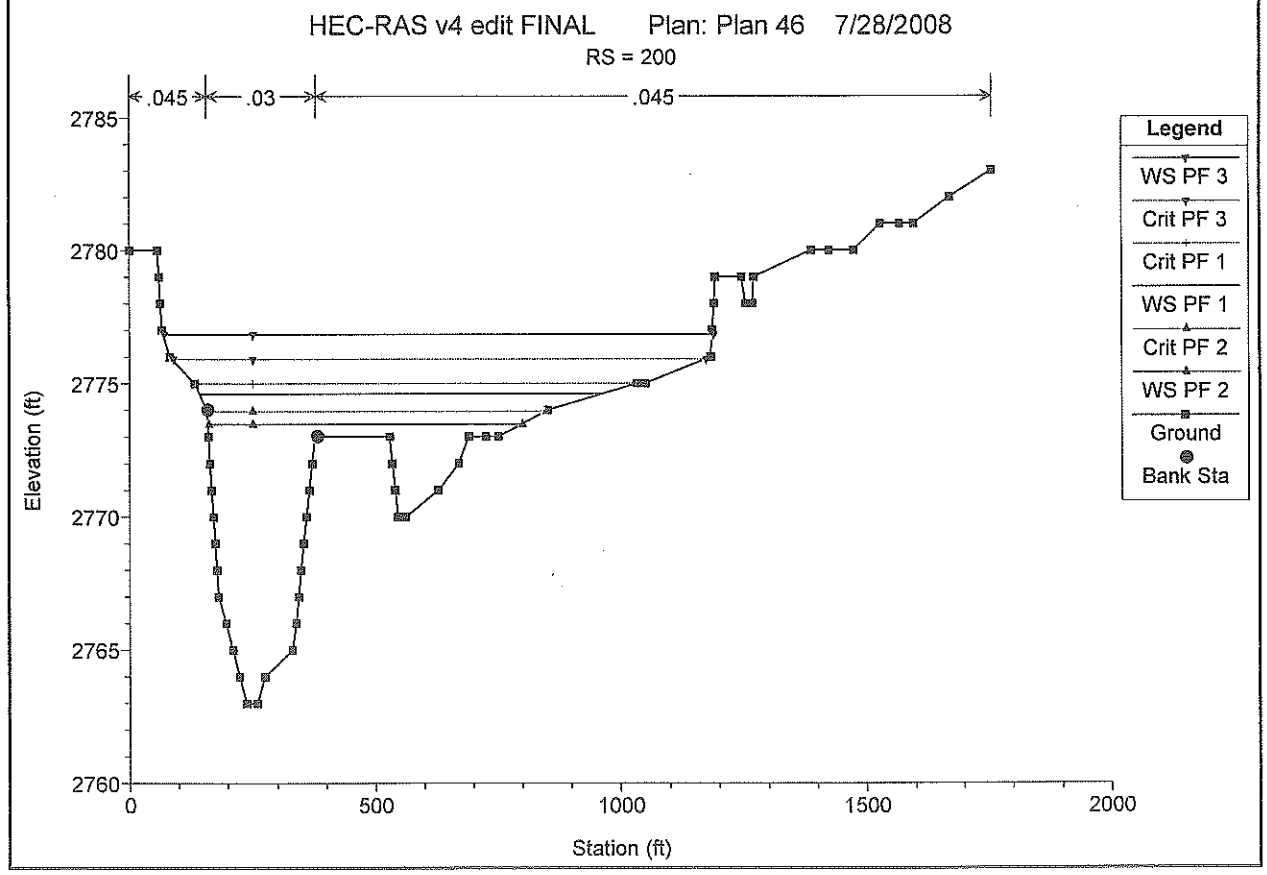
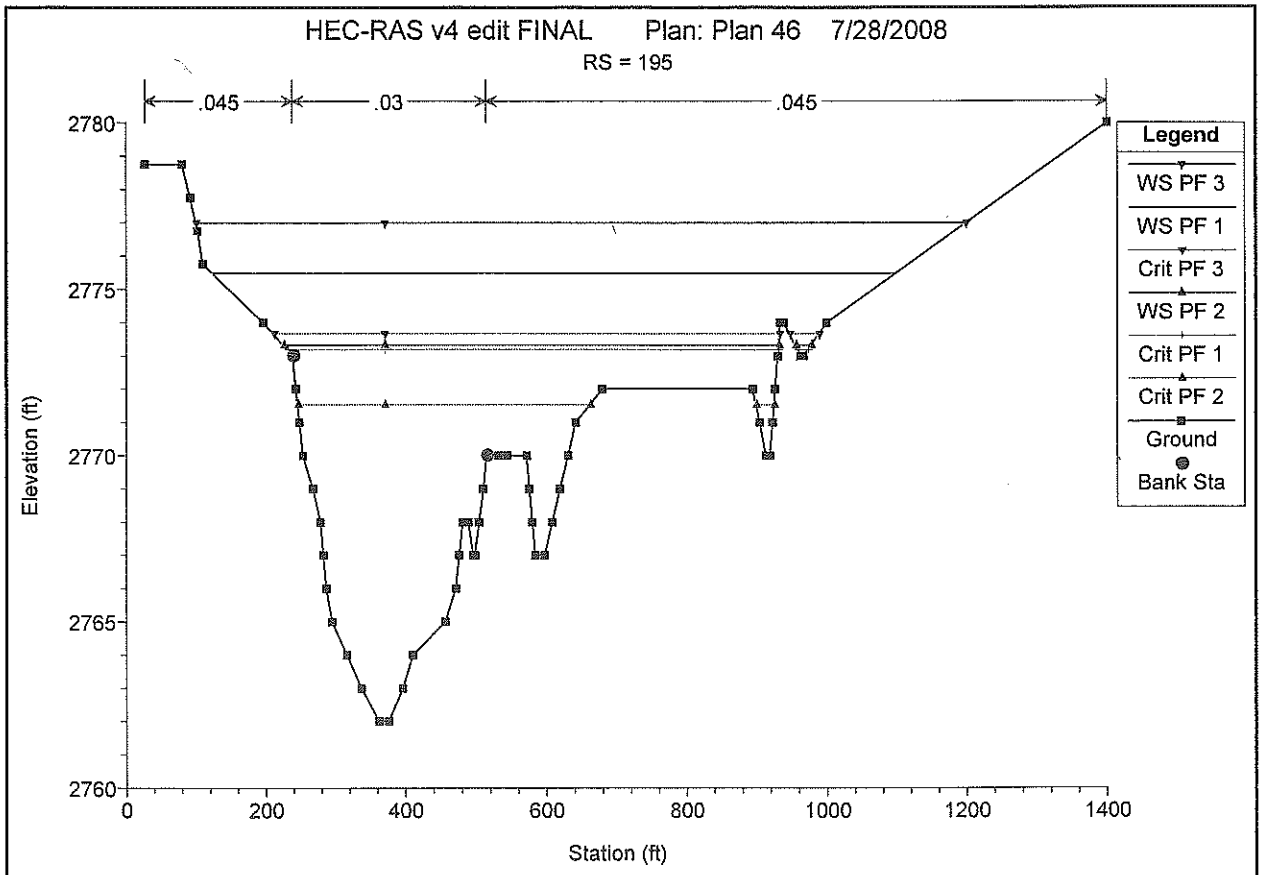
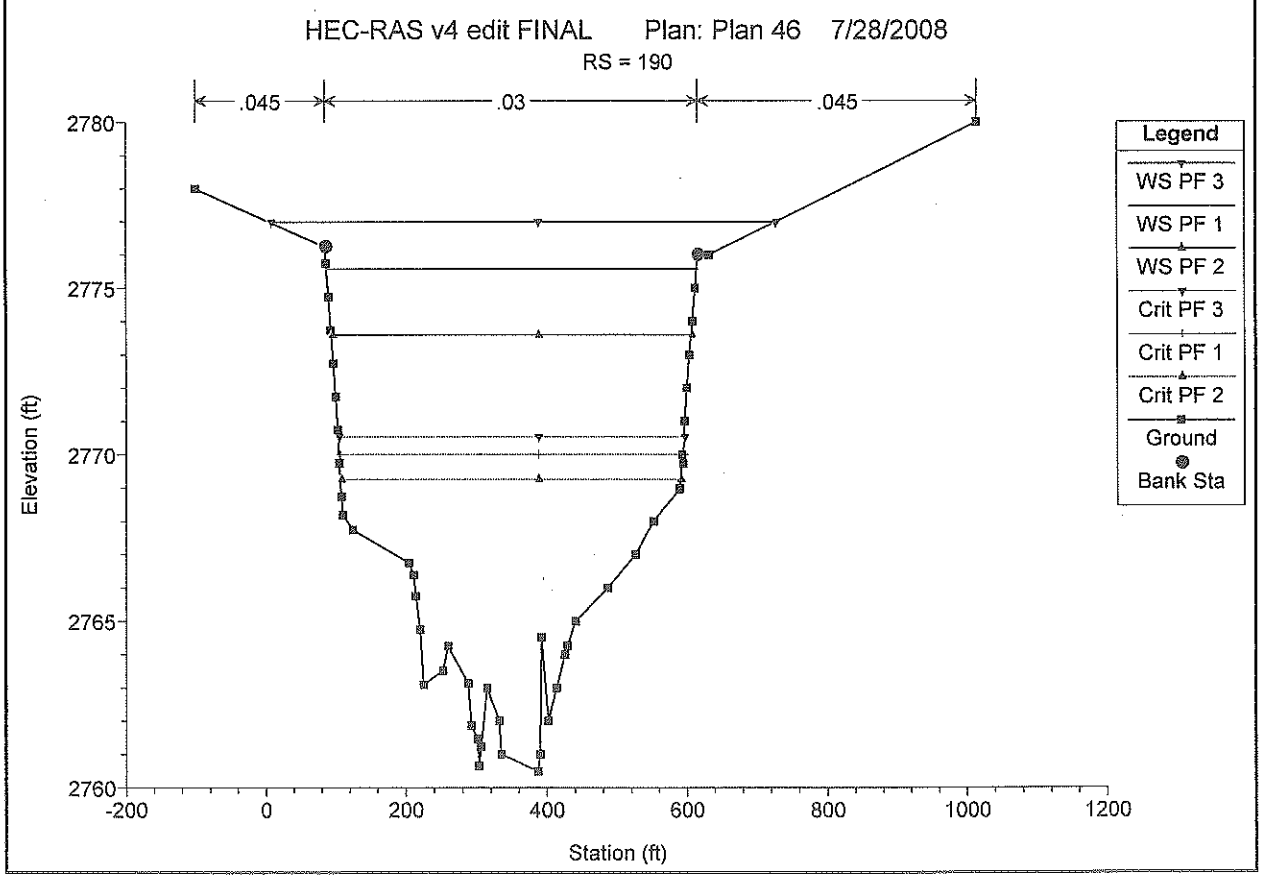
RS = 215
.045
.03
.045
Legend
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)

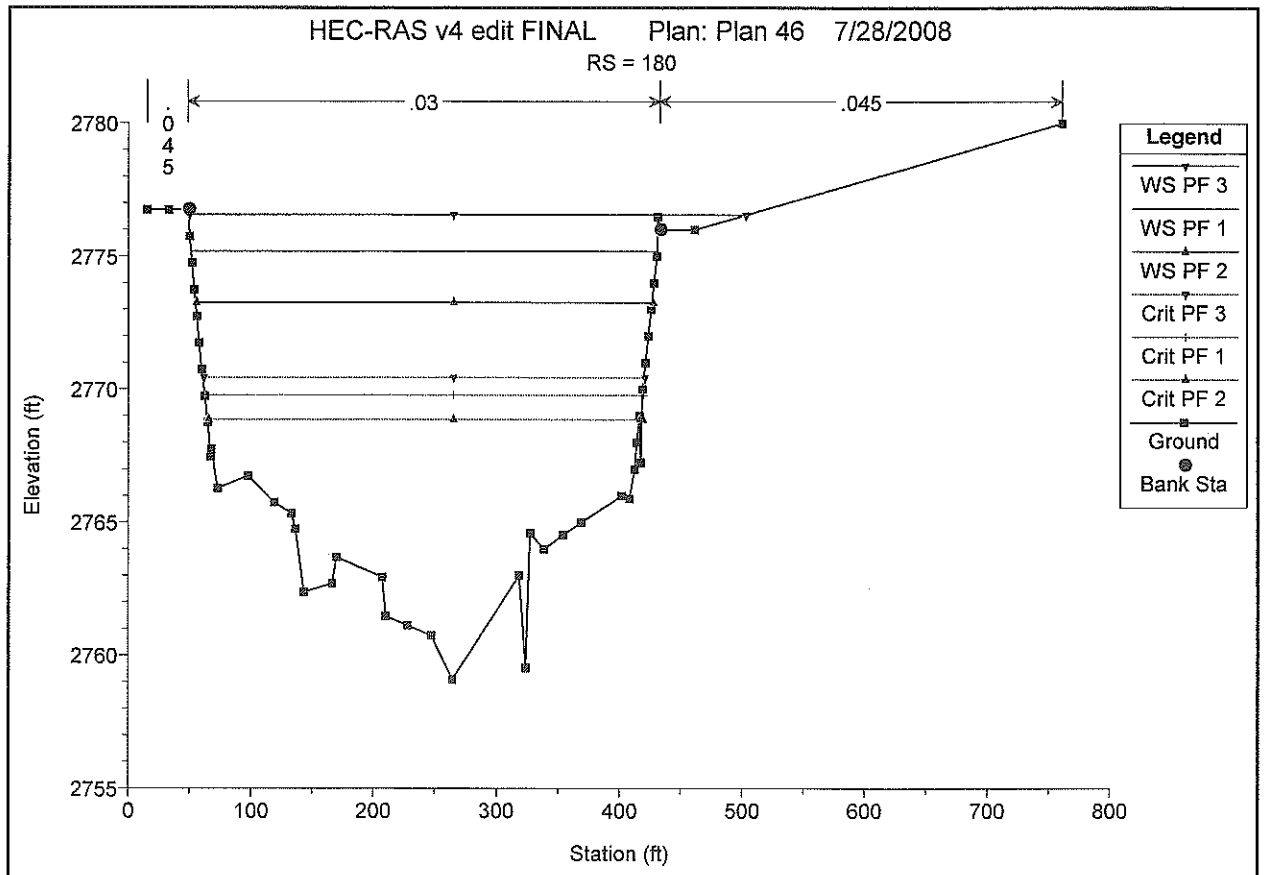

HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 210
.045
.03
.045
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 205
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 200
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 195
.045
.03
.045
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
2780
2775
2770
2765
2760
0
200
400
600
800
1000
1200
1400
Station (ft)


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 190
.045
.03
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
2780
2775
2770
2765
2760
-200
0
200
400
600
800
1000
1200
Station (ft)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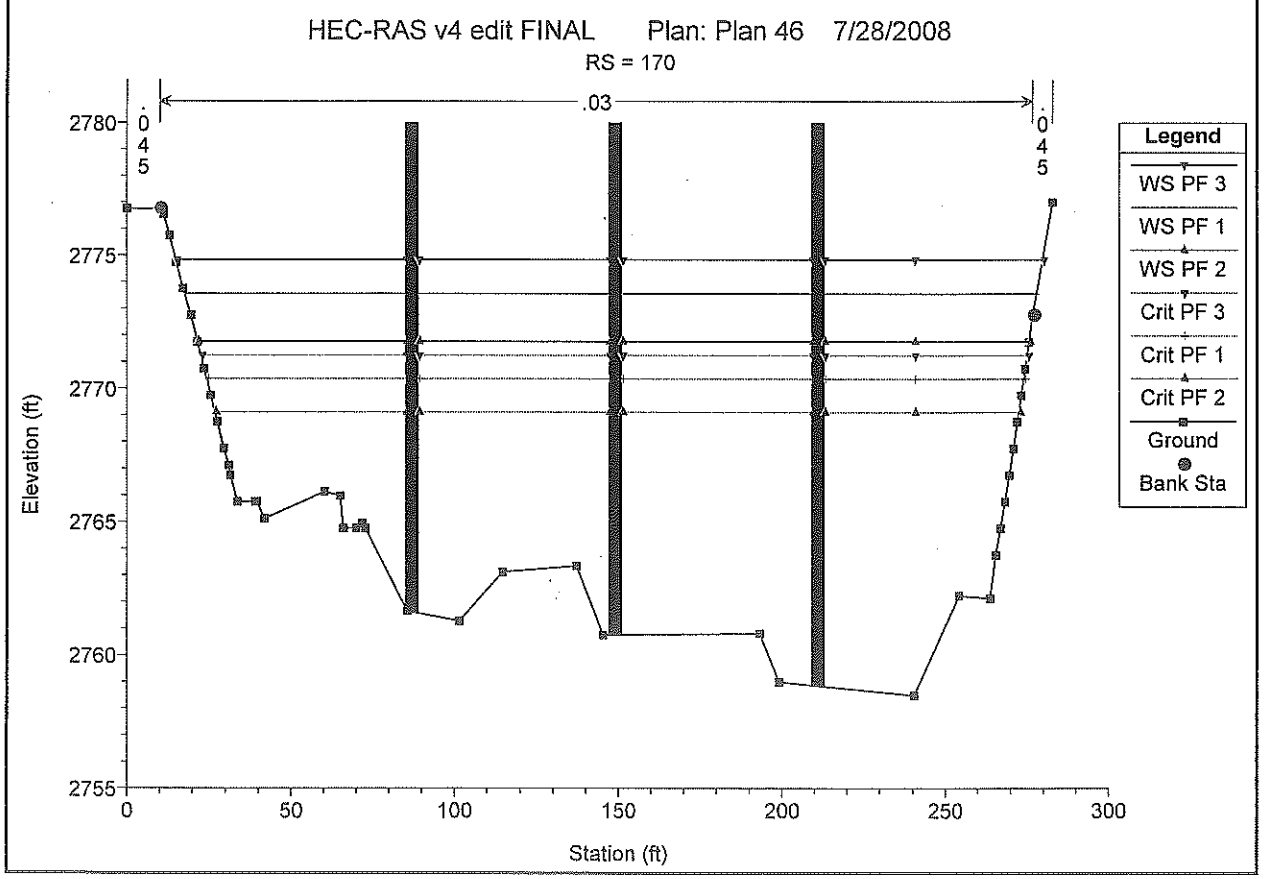
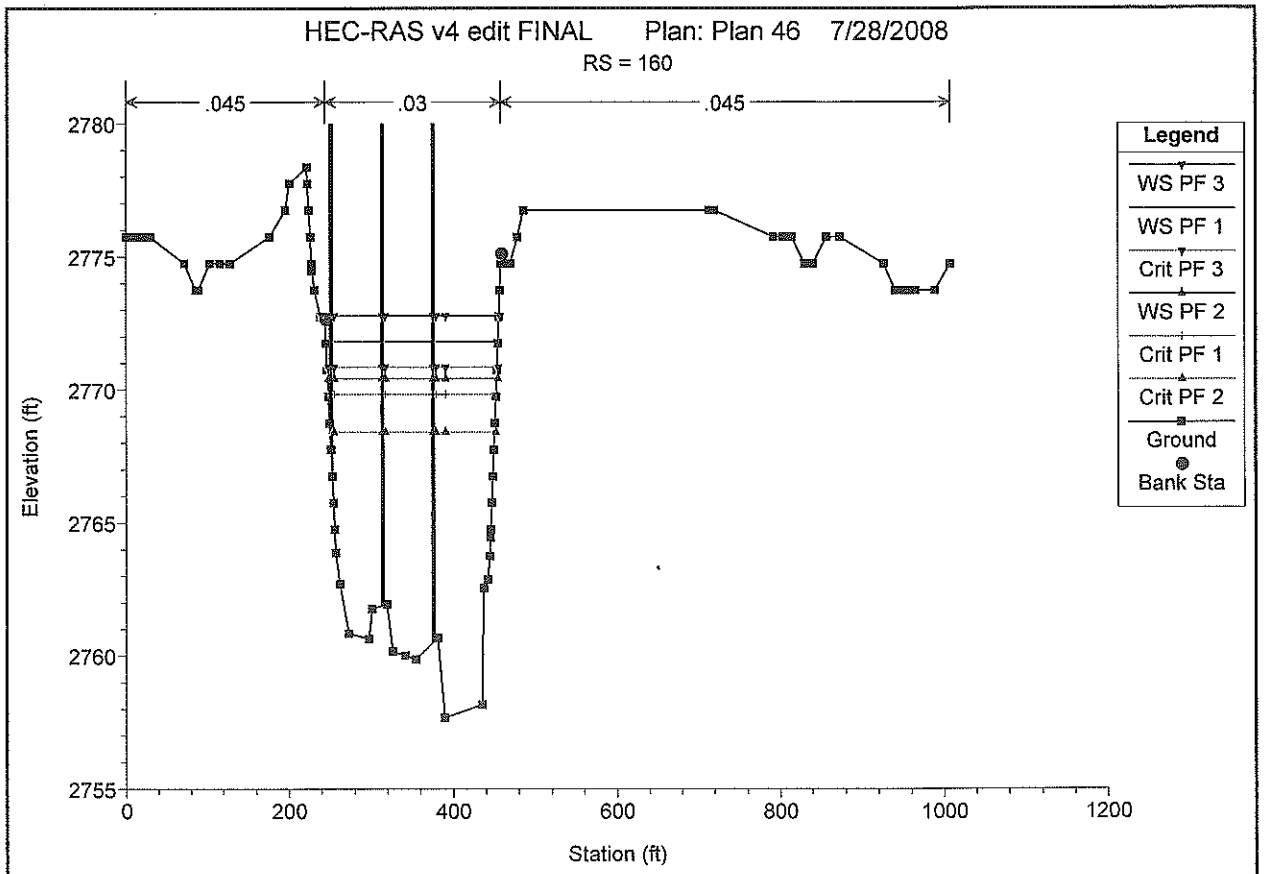
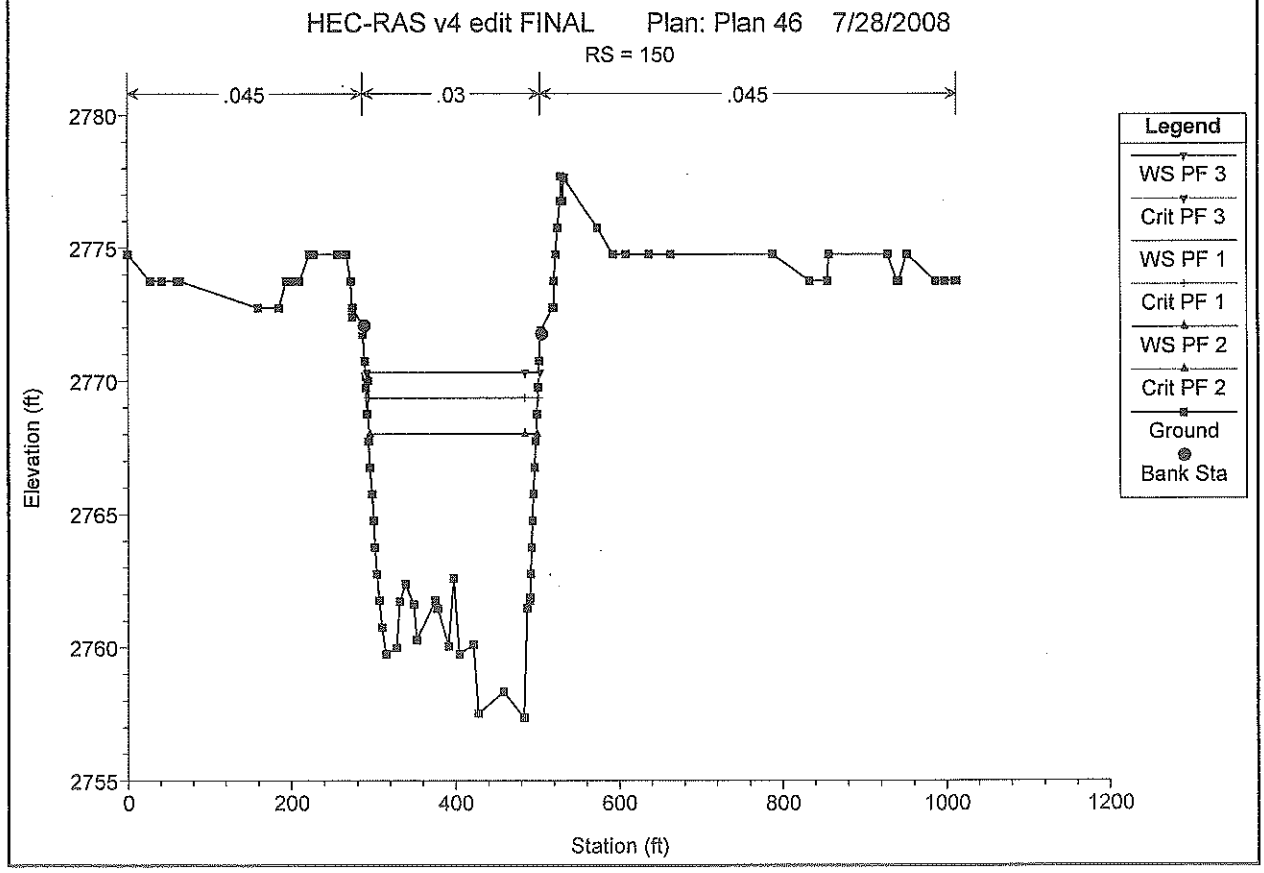
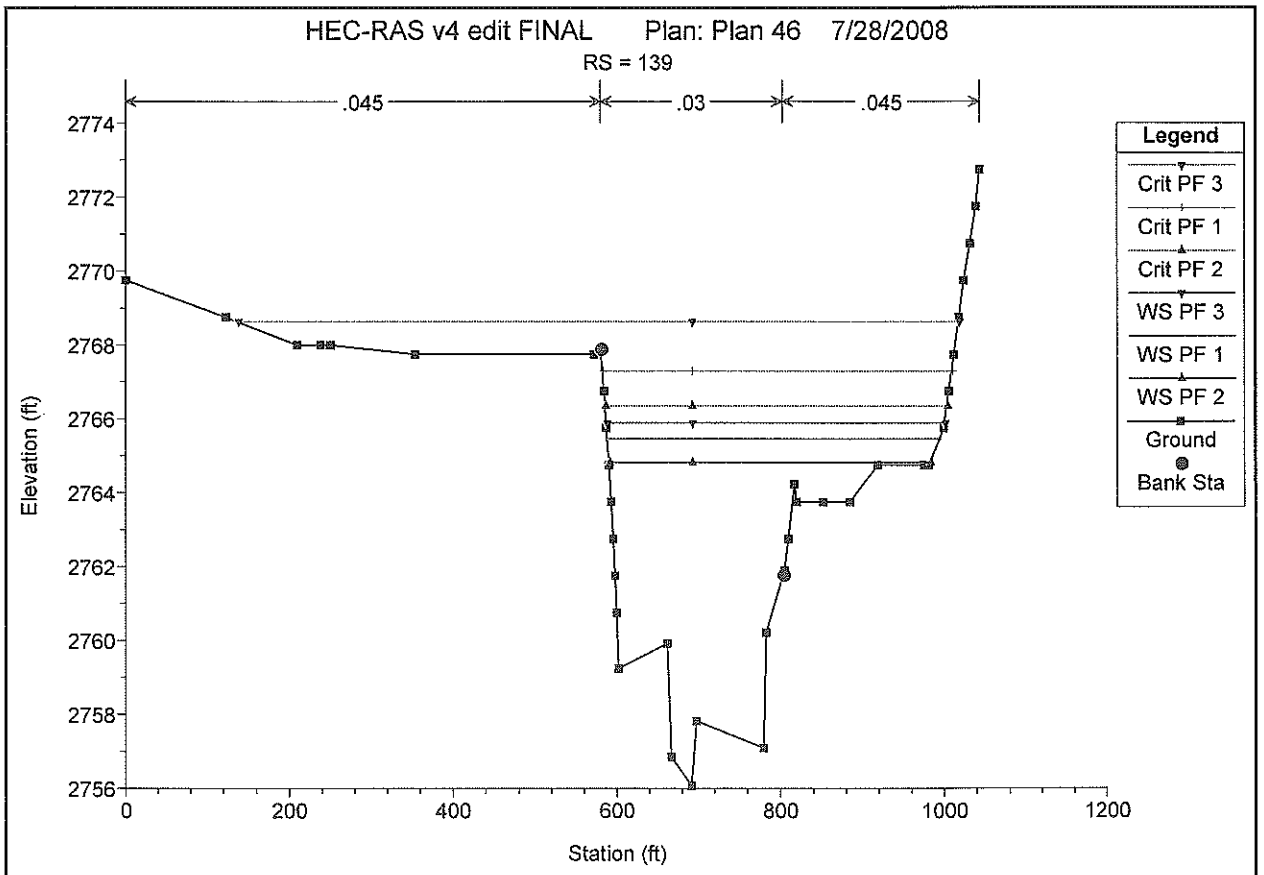
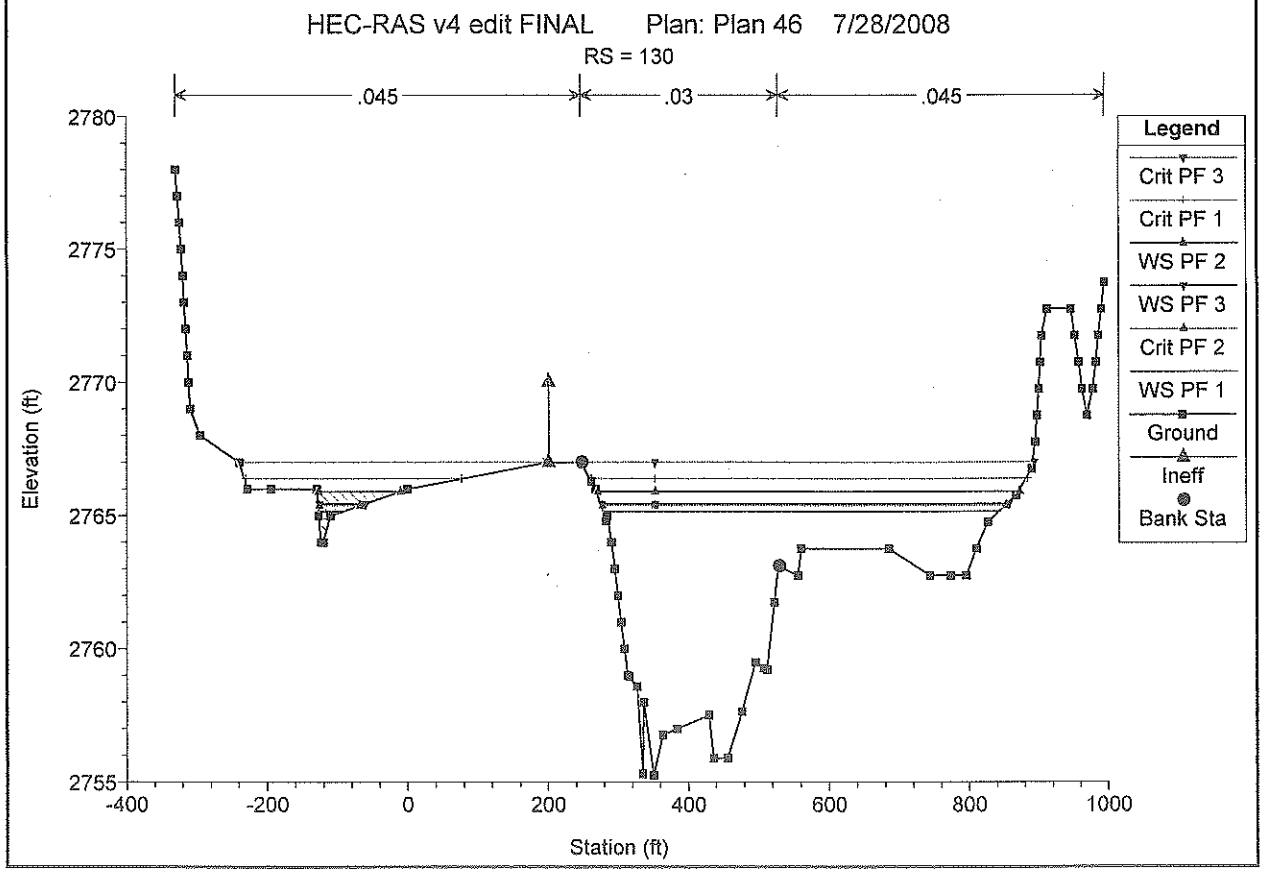
RS = 180
.03
.045
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2755
2760
2765
2770
2775
2780
0
100
200
300
400
500
600
700
800


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 170
.03
.045
.045
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)
2755
2760
2765
2770
2775
2780
0
50
100
150
200
250
300


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 160
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 150
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 139
.045
.03
.045
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Ground
Bank Sta
Elevation (ft)
Station (ft)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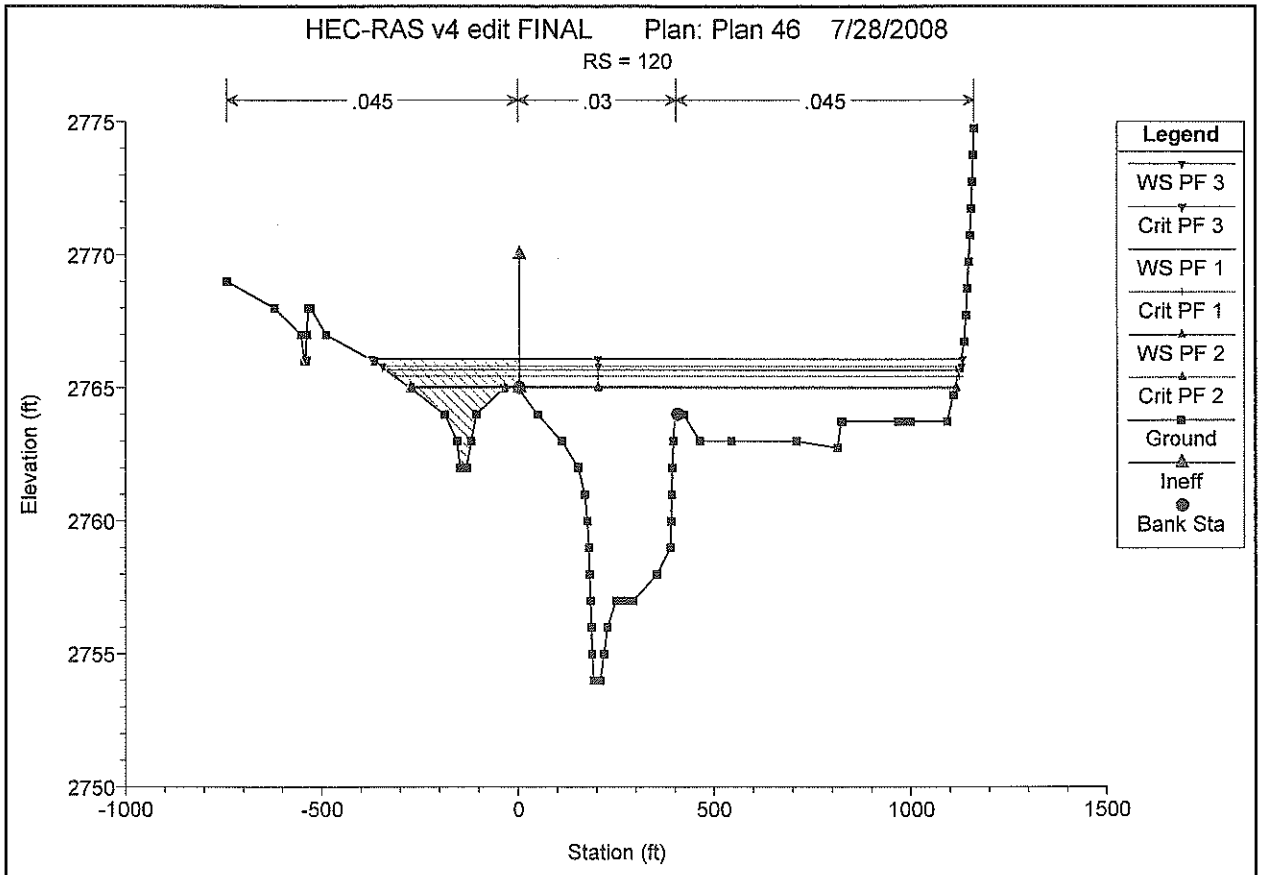
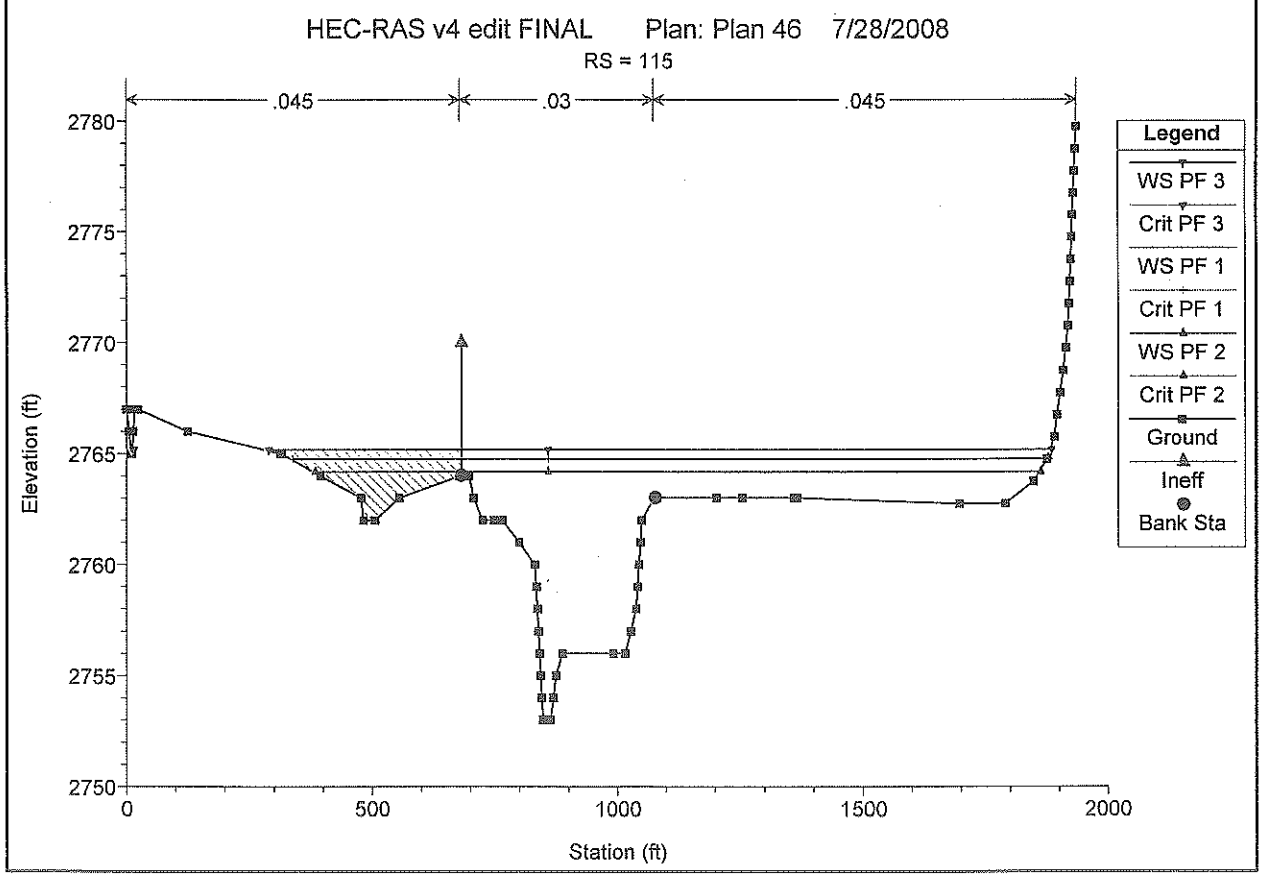
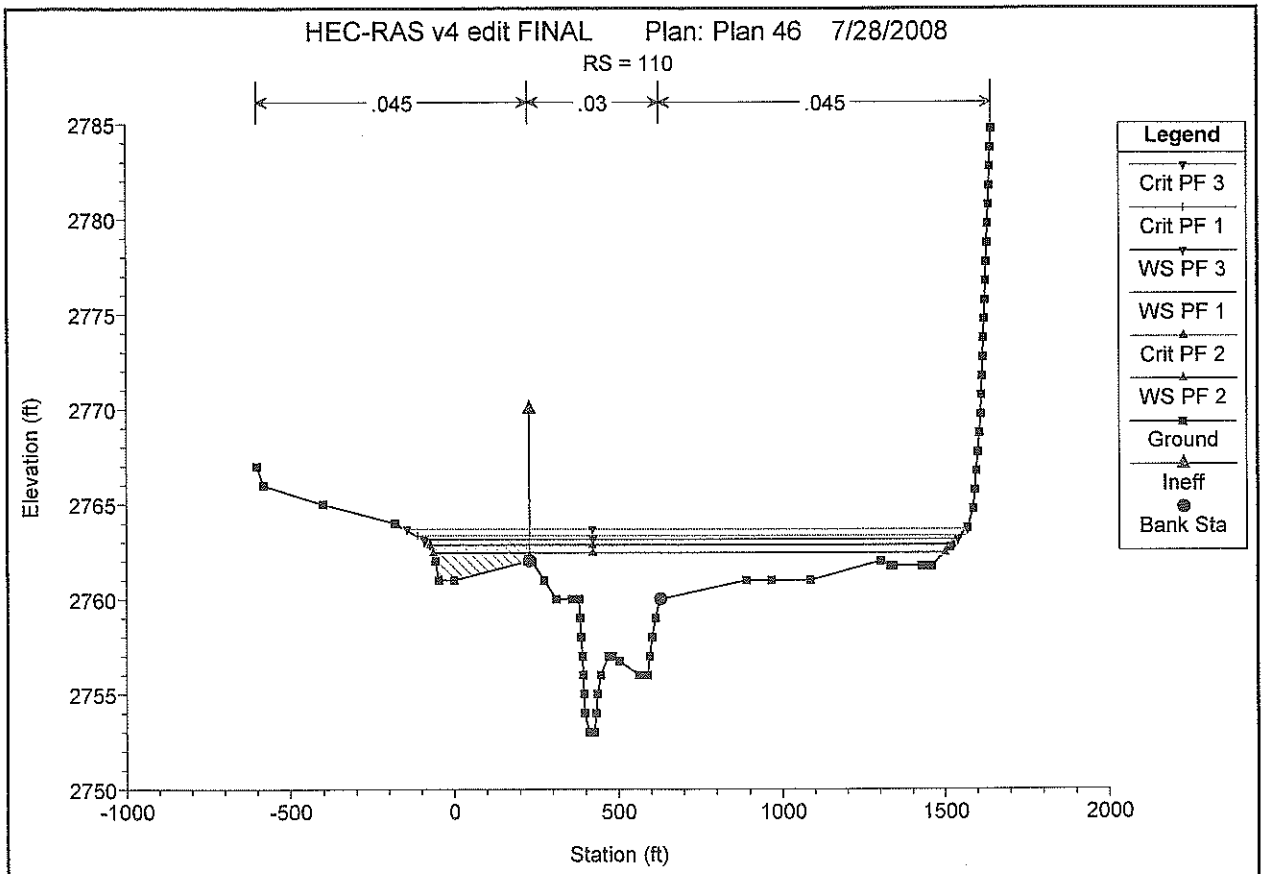
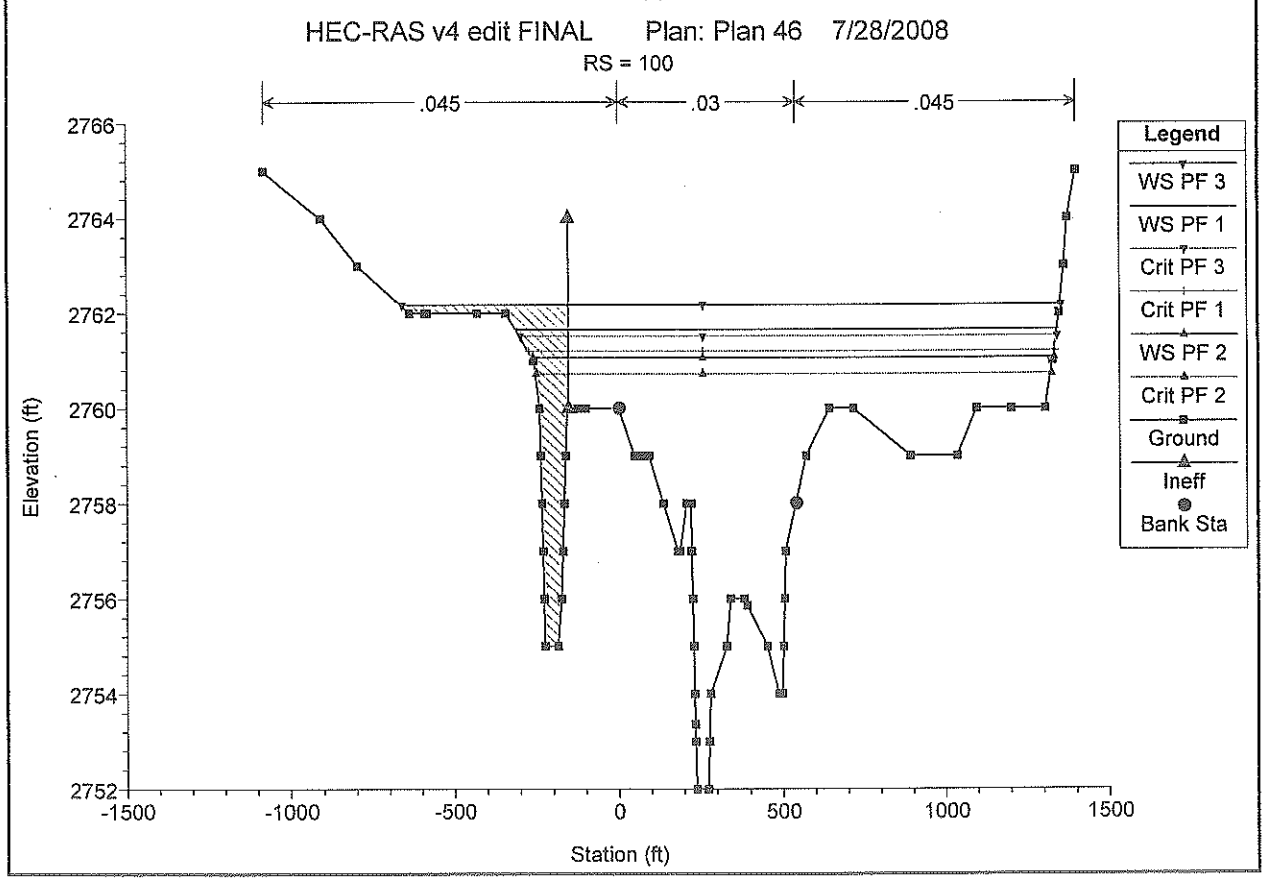
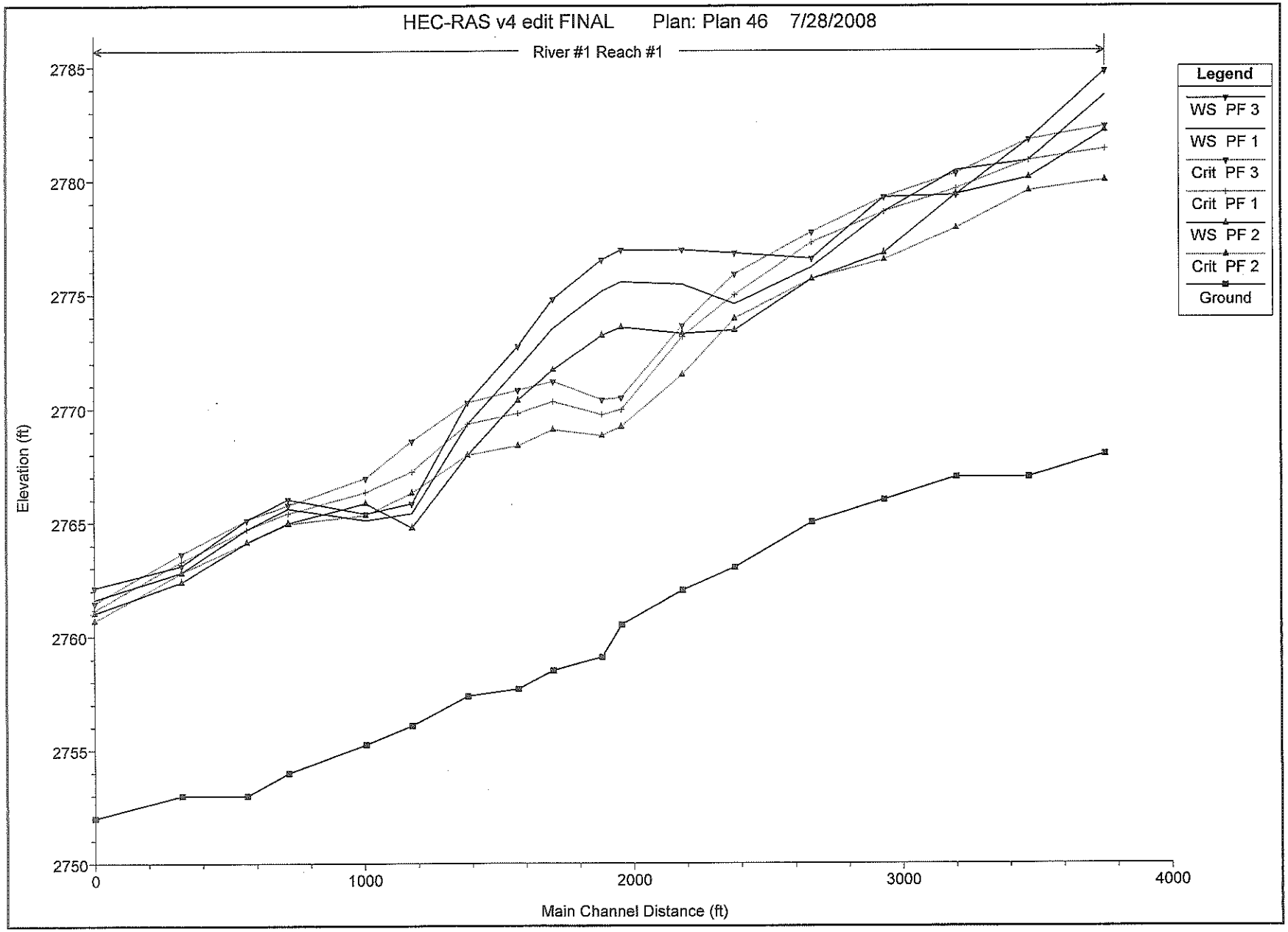
RS = 130
.045
.03
.045
Legend
Crit PF 3
Crit PF 1
WS PF 2
WS PF 3
Crit PF 2
WS PF 1
Ground
Ineff
Bank Sta
Elevation (ft)
Station (ft)


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 120
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 115
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 110
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
Crit PF 2
WS PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
RS = 100
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Ineff
Bank Sta


HEC-RAS v4 edit FINAL Plan: Plan 46 7/28/2008
River #1 Reach #1
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
Ground
Elevation (ft)
2785
2780
2775
2770
2765
2760
2755
2750
0
1000
2000
3000
4000
Main Channel Distance (ft)

SCOUR CALCULATIONS

M M L A P S O M A S	Project Name	Houghton Road			
	Project Number	06099-01	Made by	DB	Date 8/18/2008
	Reference	COT SMDDFM	Checked By		Date

Depth of Scour

Basic Channel Information

New Channel Alignment (x-s 160)

	Discharge (cfs)	36000		Manning's 'n'	0.035
	Channel Invert (ft)	2757.67	V_m	Flow Velocity (ft)	15.25
	Water Surface Elevation (ft)	2772.72	A	Flow Area (ft^2)	2361.4
Y_{max}	Flow Depth (ft)	15.0	T_w	Top Width (ft)	204.8
S_e*	Energy Slope (ft/ft)	0.00515	Y_h	Hydraulic Depth (ft)	11.53027

General Scour (ft)

$$Z_{gs} = Y_{\max}\left[\frac{0.0685V_m^{0.8}}{Y_h^{0.4}S_e^{0.3}} - 1\right]$$

= 1.605778437 (ft)

= 1.605778437

Anti-dune Scour (ft)

$$Z_a = 0.0137V_m^2$$

= 3.19

Low Flow Thalweg (ft)

Z_{lft} = 2

Total Scour (ft)

$Z_t = 1.3\ (Z_{gs} + Z_a + Z_{bs} + Z_{lft})$

= 8.83

Total Scour Depth 8.83 (ft)

Use Minimum Scour Depth of 9 ft.

M M L A P S O M A S	Project Name	Houghton Road			
	Project Number	06099-01	Made by	DB	Date 8/18/2008
	Reference	COT SMDDFM	Checked By		Date

Depth of Scour

Basic Channel Information

New Channel Alignment (x-s 170)

	Discharge (cfs)	36000		Manning's 'n'	0.035
	Channel Invert (ft)	2758.49	V_m	Flow Velocity (ft)	11.96
	Water Surface Elevation (ft)	2774.82	A	Flow Area (ft^2)	3011.5
Y_{max}	Flow Depth (ft)	16.3	T_w	Top Width (ft)	252.9
S_e*	Energy Slope (ft/ft)	0.00325	Y_h	Hydraulic Depth (ft)	11.9101

General Scour (ft)

$$Z_{gs} = Y_{\max}\left[\frac{0.0685V_m^{0.8}}{Y_h^{0.4}S_e^{0.3}} - 1\right]$$

= 0.540620506 (ft)

= 0.540620506

Anti-dune Scour (ft)

$$Z_a = 0.0137V_m^2$$

= 1.96

Low Flow Thalweg (ft)

Z_{lft} = 2

Total Scour (ft)

$Z_t = 1.3\ (Z_{gs} + Z_a + Z_{bs} + Z_{lft})$

= 5.85

Total Scour Depth 5.85 (ft)

Use Minimum Scour Depth of 6 ft.

M M L A P S O M A S	Project Name	Houghton Road			
	Project Number	06099-01	Made by	DB	Date 8/18/2008
	Reference	COT SMDDFM	Checked By		Date

Depth of Scour

Basic Channel Information

New Channel Alignment (x-s 180)

	Discharge (cfs)	36000		Manning's 'n'	0.035
	Channel Invert (ft)	2759.08	V_m	Flow Velocity (ft)	7.65
	Water Surface Elevation (ft)	2776.55	A	Flow Area (ft^2)	4732.8
Y_{max}	Flow Depth (ft)	17.5	T_w	Top Width (ft)	453.5
S_e*	Energy Slope (ft/ft)	0.00088	Y_h	Hydraulic Depth (ft)	10.4366

General Scour (ft)

$$Z_{gs} = Y_{\max}\left[\frac{0.0685V_m^{0.8}}{Y_h^{0.4}S_e^{0.3}} - 1\right]$$

= 2.20202848 (ft)

= 2.20202848

Anti-dune Scour (ft)

$$Z_a = 0.0137V_m^2$$

= 0.80

Low Flow Thalweg (ft)

Z_{lft} = 2

Total Scour (ft)

$Z_t = 1.3\ (Z_{gs} + Z_a + Z_{bs} + Z_{lft})$

= 6.50

Total Scour Depth 6.50 (ft)

Use Minimum Scour Depth of 6.5 ft.

M M L A P S O M A S	Project Name	Houghton Road			
	Project Number	06099-01	Made by	DB	Date 8/18/2008
	Reference	COT SMDDFM	Checked By		Date

Depth of Scour

Basic Channel Information

New Channel Alignment (x-s 190)

	Discharge (cfs)	36000		Manning's 'n'	0.035
	Channel Invert (ft)	2760.49	V_m	Flow Velocity (ft)	5.98
	Water Surface Elevation (ft)	2776.99	A	Flow Area (ft^2)	6102.3
Y_{max}	Flow Depth (ft)	16.5	T_w	Top Width (ft)	719.9
S_e*	Energy Slope (ft/ft)	0.00058	Y_h	Hydraulic Depth (ft)	8.476816

General Scour (ft)

$$Z_{gs} = Y_{\max}\left[\frac{0.0685V_m^{0.8}}{Y_h^{0.4}S_e^{0.3}} - 1\right]$$

= 2.273351105 (ft)

= 2.273351105

Anti-dune Scour (ft)

$$Z_a = 0.0137V_m^2$$

= 0.49

Low Flow Thalweg (ft)

Z_{lft} = 2

Total Scour (ft)

$Z_t = 1.3\ (Z_{gs} + Z_a + Z_{bs} + Z_{lft})$

= 6.19

Total Scour Depth 6.19 (ft)

Use Minimum Scour Depth of 6.5 ft.

MMLA
McGovern MacVittie Lodge & Associates, Inc.

Project Name: Local Pier Scour (Design 6')
Project Number # : 06099-01 Made by DB Date 08/18/08
Reference: City of Tucson Drainage Checked By _____ Date _____

Local Pier Scour

General Equation

$Z_{lsp} = 2.2\ Y\ (b_p / Y)^{0.65}\ F_u^{0.43}$

Where
- Z_{lsp} = Local scour depth due to piers (ft)
- Y = Flow depth at bridge cross-section (ft)
- b_p = Pier width normal to the flow direction (ft)
- F_u = Upstream Froude number
- RF = Reduction factor for non square-nosed piers

Y = 15
b_p = 6
F_u = 0.61

RF = 0.90

Table 6.1: Reduction Factors

Pier Description	Factor
Square-nose	1.00
Cylinder	0.90
Round-nose	0.90
Sharp-nose	0.80
Group of Cylinders	0.90

Z_{lsp} = 13.24 feet

Round to nearest foot = 14 feet

Pier Location	Flow cfs	Flow depth ft	Pier width ft	Froude number	Local Scour Depth ft
160	36000	15.00	6	0.78	14

EXISTING BRIDGE

TOTAL PIER SCOUR = 8.83 + 1.3 (13.24) = 26.04 ≈ 26 FEET

MMLA
McGovern MacVittie Lodge & Associates, Inc.

Project Name: Local Pier Scour (Design 6' (2)
Project Number # : 06099-01 Made by DB Date 08/18/08
Reference: City of Tucson Drainage Checked By _____ Date _____

Local Pier Scour

General Equation

$Z_{lsp} = 2.2\ Y\ (b_p / Y)^{0.65}\ F_u^{\ 0.43}$

Where
- Z_{lsp} = Local scour depth due to piers (ft)
- Y = Flow depth at bridge cross-section (ft)
- b_p = Pier width normal to the flow direction (ft)
- F_u = Upstream Froude number
- RF = Reduction factor for non square-nosed piers

Y = 16.3
b_p = 6
F_u = 0.38

RF = 0.90

Table 6.1: Reduction Factors

Pier Description	Factor
Square-nose	1.00
Cylinder	0.90
Round-nose	0.90
Sharp-nose	0.80
Group of Cylinders	0.90

Z_{lsp} = 11.12 feet

Round to nearest foot = 12 feet

Pier Location	Flow cfs	Flow depth ft	Pier width ft	Froude number	Local Scour Depth ft
170	36000	16.30	6	0.38	12

PROPOSED BRIDGE

TOTAL PIER SCOUR = 5.85 + 1.3 (11.12) = 20.31 ≈ 21 FEET

Project Name:					
Project Number # :	06099-01	Made by		Date	08/18/08
Reference:	City of Tucson Drainage	Checked By		Date	

Scour Channel Drop (drop structure 6ft - submerged)

General Equation

$Z_{lss} = 0.581\ q^{0.667}(h/Y)^{0.411}(1-(h/Y))^{-0.118}$

Equation 6.14 - Standard Manual for Drainage Design and Floodplain Management in Tucson, Arizona (December, 1998)

Where:

$h/Y \leq 0.99$

Z_{lsf} = depth of local scour due to a submerged drop (ft)

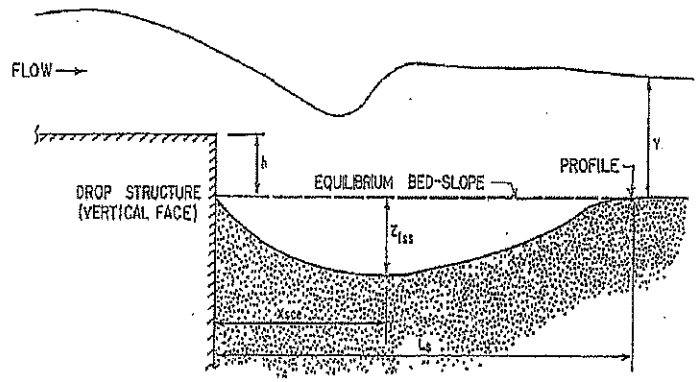
q = discharge per unit with of the channel bottom (cfs/ft)

h = drop height (ft)

Equation 6.16

Ls = longitudinal extent of a scour hol — Equation 6.20

Xse = width of extent of a scour hole



Q Total	q	h	Y	h/Y	Z_{lss}	L_s	X_{se}
(cfs)	(ft)	ft	ft		ft	ft	ft
1000	3.57	6	7.54	0.80	1.49	18	9
5000	17.86	6	7.57	0.79	4.35	52	26
10000	35.71	6	11.23	0.53	5.34	64	32
24490	87.46	6	13.10	0.46	8.94	107	54
31000	110.71	6	13.70	0.44	10.23	123	61
36000	128.57	6	14.22	0.42	11.09	133	67

NOTE: All hydraulic parameters are obtained from HEC-RAS

Project Name:					
Project Number # :	06099-01	Made by		Date	08/18/08
Reference:	City of Tucson Drainage	Checked By		Date	

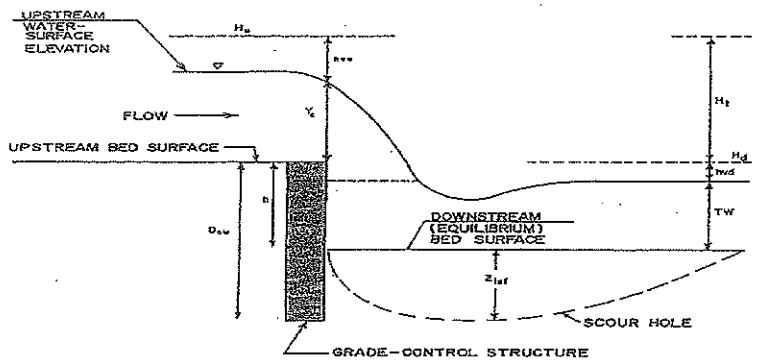
Scour Channel Drop (drop structure 6ft)

General Equation

$Z_{lsf} = 1.32\ q^{0.54} H_t^{0.225} - TW$ Equation 6.13 - Standard Manual for Drainage Design and Floodplain Management in Tucson, Arizona (December, 1998)

Where

Z_{lsf} = depth of local scour due to a free-overfall drop (ft)
q = discharge per unit with of the channel bottom (cfs/ft)
H_t = total drop in head (ft)
TW = tailwater elevation (ft)
Ls = longitudinal extent of a scour hole Equation 6.16
Xse = width of extent of a scour hole Equation 6.20



Q Total	q	E.G. Elev upstream	E.G. Elev downstream	H_t	TW	Z_{lsf}	L_s	X_{se}
(cfs)	(ft)	(ft)	(ft)	ft	ft	ft	ft	ft
1000	3.57	2759.74	2755.55	4.19	7.54	-3.92	-47	-24
5000	17.86	2762.80	2756.21	6.59	7.57	2.00	24	12
10000	35.71	2765.28	2759.43	5.85	11.23	2.31	28	14
24490	87.46	2770.24	2761.54	8.70	13.10	10.92	131	66
31000	110.71	2772.00	2762.24	9.76	13.70	14.29	172	86
36000	128.57	2773.41	2762.82	10.59	14.22	16.69	200	100

NOTE: All hydraulic parameters are obtained from HEC-RAS

Project Name:					
Project Number # :	06099-01	Made by		Date	08/18/08
Reference:	City of Tucson Drainage	Checked By		Date	

Scour Channel Drop (drop structure 4ft - submerged)

General Equation

$Z_{lss} = 0.581\ q^{0.667}(h/Y)^{0.411}(1-(h/Y))^{-0.118}$ Equation 6.14 - Standard Manual for Drainage Design and Floodplain Management in Tucson, Arizona (December, 1998)

Where:

$h/Y \leq 0.99$

Z_{lsf} = depth of local scour due to a submerged drop (ft)

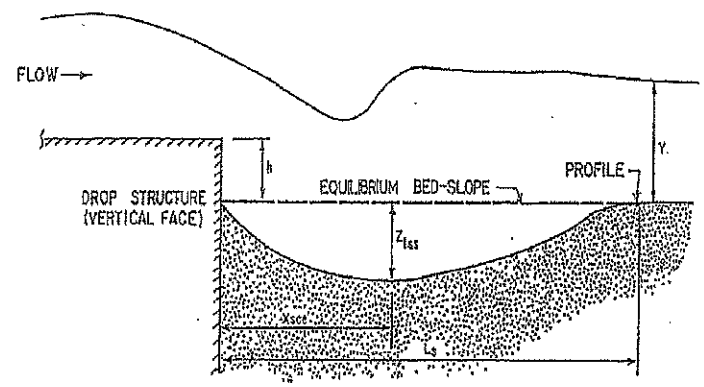
q = discharge per unit with of the channel bottom (cfs/ft)

h = drop height (ft)

Equation 6.16

Ls = longitudinal extent of a scour hol Equation 6.20

Xse = width of extent of a scour hole



Q Total	q	h	Y	h/Y	Z_{lss}	L_s	X_{se}
(cfs)	(ft)	ft	ft		ft	ft	ft
1000	3.57	4	5.57	0.72	1.38	17	8
5000	17.86	4	6.57	0.61	3.62	43	22
10000	35.71	4	9.33	0.43	4.76	57	29
24490	87.46	4	11.29	0.35	7.88	95	47
31000	110.71	4	11.90	0.34	9.00	108	54
36000	128.57	4	12.40	0.32	9.75	117	58

NOTE: All hydraulic parameters are obtained from HEC-RAS

Project Name:					
Project Number # :	06099-01	Made by		Date	08/18/08
Reference:	City of Tucson Drainage	Checked By		Date	

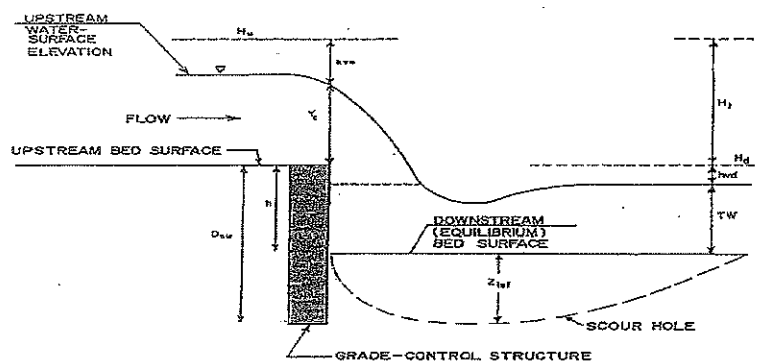
Scour Channel Drop (drop structure 4ft)

General Equation

$Z_{lsf} = 1.32\ q^{0.54} H_t^{0.225} - TW$ Equation 6.13 - Standard Manual for Drainage Design and Floodplain Management in Tucson, Arizona (December, 1998)

Where

Z_{lsf} = depth of local scour due to a free-overfall drop (ft)
q = discharge per unit with of the channel bottom (cfs/ft)
H_t = total drop in head (ft)
TW = tailwater elevation (ft)
Ls = longitudinal extent of a scour hole Equation 6.16
Xse = width of extent of a scour hole Equation 6.20



Q Total	q	E.G. Elev upstream	E.G. Elev downstream	H_t	TW	Z_{lsf}	L_s	X_{se}
(cfs)	(ft)	(ft)	(ft)	ft	ft	ft	ft	ft
1000	3.57	2759.74	2755.62	4.12	5.57	-1.96	-24	-12
5000	17.86	2762.80	2757.21	5.59	6.57	2.65	32	16
10000	35.71	2765.28	2760.03	5.25	9.33	3.89	47	23
24490	87.46	2770.24	2762.42	7.82	11.29	12.16	146	73
31000	110.71	2772.00	2763.16	8.84	11.90	15.48	186	93
36000	128.57	2773.41	2763.71	9.70	12.40	17.91	215	107

NOTE: All hydraulic parameters are obtained from HEC-RAS

Project Name:					
Project Number # :	06099-01	Made by		Date	08/18/08
Reference:	City of Tucson Drainage	Checked By		Date	

Scour Channel Drop (drop structure 2ft - submerged)

General Equation

$Z_{lss} = 0.581\ q^{0.667}(h/Y)^{0.411}(1-(h/Y))^{-0.118}$ Equation 6.14 - Standard Manual for Drainage Design and Floodplain Management in Tucson, Arizona (December, 1998)

Where:

$h/Y \leq 0.99$

Z_{lsf} = depth of local scour due to a submerged drop (ft)

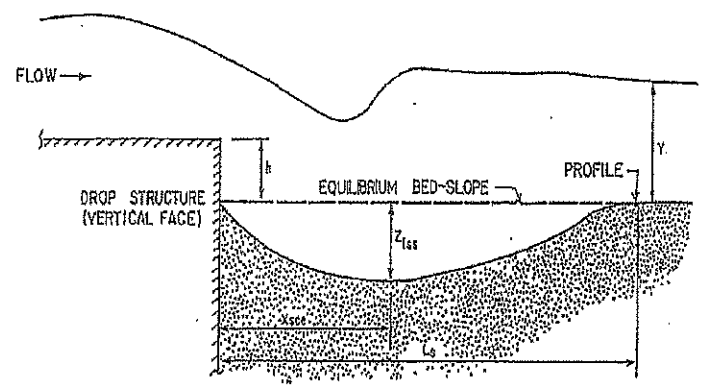
q = discharge per unit with of the channel bottom (cfs/ft)

h = drop height (ft)

Equation 6.16

Ls = longitudinal extent of a scour hol Equation 6.20

Xse = width of extent of a scour hole



Q Total	q	h	Y	h/Y	Z_{lss}	L_s	X_{se}
(cfs)	(ft)	ft	ft		ft	ft	ft
1000	3.57	2	3.99	0.50	1.11	13	7
5000	17.86	2	6.35	0.31	2.58	31	16
10000	35.71	2	8.27	0.24	3.64	44	22
24490	87.46	2	11.02	0.18	5.82	70	35
31000	110.71	2	11.68	0.17	6.64	80	40
36000	128.57	2	12.07	0.17	7.23	87	43

NOTE: All hydraulic parameters are obtained from HEC-RAS

Project Name:					
Project Number # :	06099-01	Made by		Date	08/18/08
Reference:	City of Tucson Drainage	Checked By		Date	

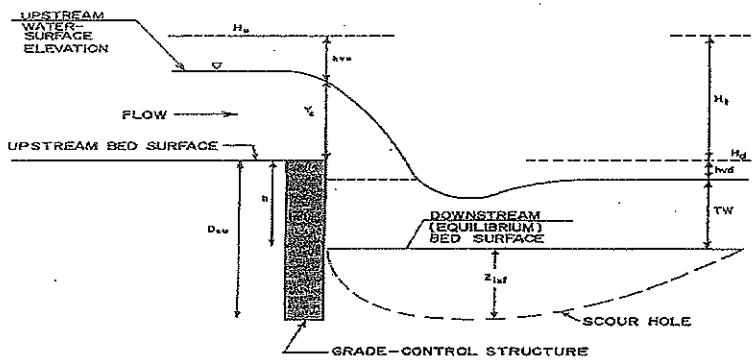
Scour Channel Drop (drop structure 2ft)

General Equation

$Z_{lsf} = 1.32\ q^{0.54} H_t^{0.225} - TW$ Equation 6.13 - Standard Manual for Drainage Design and Floodplain Management in Tucson, Arizona (December, 1998)

Where

Z_{lsf} = depth of local scour due to a free-overfall drop (ft)
q = discharge per unit with of the channel bottom (cfs/ft)
H_t = total drop in head (ft)
TW = tailwater elevation (ft)
Ls = longitudinal extent of a scour hole Equation 6.16
Xse = width of extent of a scour hole Equation 6.20



Q Total	q	E.G. Elev upstream	E.G. Elev downstream	H_t	TW	Z_{lsf}	L_s	X_{se}
(cfs)	(ft)	(ft)	(ft)	ft	ft	ft	ft	ft
1000	3.57	2759.74	2756.24	3.50	3.99	-0.51	-6	-3
5000	17.86	2762.80	2759.08	3.72	6.35	2.06	25	12
10000	35.71	2765.28	2761.40	3.88	8.27	4.08	49	24
24490	87.46	2770.24	2764.37	5.87	11.02	10.96	132	66
31000	110.71	2772.00	2765.11	6.89	11.68	14.20	170	85
36000	128.57	2773.41	2765.62	7.79	12.07	16.78	201	101

NOTE: All hydraulic parameters are obtained from HEC-RAS

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X    X    X   X
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****

PROJECT DATA
Project Title: Drop structure
Project File : Drop_6ft.prj
Run Date and Time: 7/28/2008 8:33:30 AM

Project in English units

****

PLAN DATA

Plan Title: Plan 48
Plan File : g:\bill s\houghton\hec-ras\Drop_6ft.p48

Geometry Title: alternative 1 - Pier Drop 6 ft
Geometry File : g:\bill s\houghton\hec-ras\Drop_6ft.g12

Flow Title : Flow Profiles
Flow File : g:\bill s\houghton\hec-ras\Drop_6ft.f02

Plan Summary Information:
Number of: Cross Sections = 20 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

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

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

****

FLOW DATA

Flow Title: Flow Profiles
Flow File : g:\bill s\houghton\hec-ras\Drop_6ft.f02

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2	PF 3	PF 4	PF 5	PF 6
River #1	Reach #1	180	31000	24490	36000	1000	5000	10000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River #1	Reach #1	PF 1	Known WS = 2773.55	Known WS = 2761.65
River #1	Reach #1	PF 2	Known WS = 2771.75	Known WS = 2761.06
River #1	Reach #1	PF 3	Known WS = 2774.82	Known WS = 2762.17
River #1	Reach #1	PF 4	Known WS = 2761.91	Known WS = 2755.53
River #1	Reach #1	PF 5	Known WS = 2763.98	Known WS = 2755.72
River #1	Reach #1	PF 6	Known WS = 2765.3	Known WS = 2759.21

****

GEOMETRY DATA

Geometry Title: alternative 1 - Pier Drop 6 ft
Geometry File : g:\bill s\houghton\hec-ras\Drop_6ft.g12

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 180

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
15.05	2776.75	32.58	2776.75	48.65	2776.75	49.95	2775.75	51.72	2774.75
53.59	2773.75	55.5	2772.75	57.44	2771.75	59.59	2770.75	62.1	2769.75
64.56	2768.76	64.56	2768.75	67.13	2767.47	67.71	2767.75	72.88	2766.28
97.35	2766.75	119.19	2765.75	133.29	2765.33	136.67	2764.75	143.41	2762.38

166.6	2762.71	170.36	2763.69	207.2	2762.94	207.2	2762.93	210.09	2761.47		
227.57	2761.13	247.23	2760.75	264.13	2759.08	318.52	2763	323.83	2759.53		
323.83	2759.52	327.41	2764.6	338.72	2764	354.33	2764.52	369.01	2765		
401.74	2766	408.05	2765.89	412.18	2767	414.21	2768	416.27	2769		
417.18	2767.25	417.18	2767.26	418.65	2770	421.02	2771	423.39	2772		
425.77	2773	428.14	2774	430.51	2775	431.09	2776.49	433.02	2776		
461.43	2776	761.43	2780								

anning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
15.05	.045	48.65	.03	433.02	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.65	433.02	44.45	181.54	256.85	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2775.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.		0.030	
W.S. Elev (ft)	2775.13	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2769.76	Flow Area (sq ft)		4166.17	
E.G. Slope (ft/ft)	0.000962	Area (sq ft)		4166.17	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	379.51	Top Width (ft)		379.51	
Vel Total (ft/s)	7.44	Avg. Vel. (ft/s)		7.44	
Max Chl Dpth (ft)	16.05	Hydr. Depth (ft)		10.98	
Conv. Total (cfs)	999369.6	Conv. (cfs)		999369.6	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		390.90	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.64	
Alpha	1.00	Stream Power (lb/ft s)		4.76	
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	50.31	128.72	96.85
C & E Loss (ft)	0.12	Cum SA (acres)	12.07	13.99	18.33

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 #PF 2

E.G. Elev (ft)	2774.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.78	Wt. n-Val.		0.030	
W.S. Elev (ft)	2773.22	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2768.85	Flow Area (sq ft)		3447.07	
E.G. Slope (ft/ft)	0.001096	Area (sq ft)		3447.07	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	371.67	Top Width (ft)		371.67	
Vel Total (ft/s)	7.10	Avg. Vel. (ft/s)		7.10	
Max Chl Dpth (ft)	14.14	Hydr. Depth (ft)		9.27	
Conv. Total (cfs)	739866.1	Conv. (cfs)		739866.1	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		382.13	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)		4.38	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	45.66	121.60	91.77
C & E Loss (ft)	0.11	Cum SA (acres)	14.37	14.13	18.48

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 #PF 3

E.G. Elev (ft)	2777.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2776.50	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2770.43	Flow Area (sq ft)		4689.56	23.79
E.G. Slope (ft/ft)	0.000892	Area (sq ft)		4689.56	23.79
Q Total (cfs)	36000.00	Flow (cfs)		35988.14	11.86
Top Width (ft)	450.20	Top Width (ft)		384.05	66.15
Vel Total (ft/s)	7.64	Avg. Vel. (ft/s)		7.67	0.50
Max Chl Dpth (ft)	17.42	Hydr. Depth (ft)		12.21	0.36
Conv. Total (cfs)	1205476.0	Conv. (cfs)		1205079.0	397.3
Length Wtd. (ft)	181.56	Wetted Per. (ft)		396.84	66.15
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.66	0.02
Alpha	1.01	Stream Power (lb/ft s)		5.05	0.01
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	56.77	138.10	106.33
C & E Loss (ft)	0.13	Cum SA (acres)	12.59	14.04	18.99

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 #PF 4

E.G. Elev (ft)	2763.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.80	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2762.13	Flow Area (sq ft)		227.08	
E.G. Slope (ft/ft)	0.004290	Area (sq ft)		227.08	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	140.27	Top Width (ft)		140.27	
Vel Total (ft/s)	4.40	Avg. Vel. (ft/s)		4.40	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		1.62	
Conv. Total (cfs)	15268.4	Conv. (cfs)		15268.4	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		143.57	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)		1.87	
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	2.91	40.01	8.49
C & E Loss (ft)	0.01	Cum SA (acres)	2.20	10.49	6.73

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2766.37	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.53	Wt. n-Val.		0.030		
W.S. Elev (ft)	2765.84	Reach Len. (ft)	44.45	181.54	256.85	
Crit W.S. (ft)	2764.60	Flow Area (sq ft)		856.67		
E.G. Slope (ft/ft)	0.003189	Area (sq ft)		856.67		
Q Total (cfs)	5000.00	Flow (cfs)		5000.00		
Top Width (ft)	279.32	Top Width (ft)		279.32		
Vel Total (ft/s)	5.84	Avg. Vel. (ft/s)		5.84		
Max Chl Dpth (ft)	6.76	Hydr. Depth (ft)		3.07		
Conv. Total (cfs)	88535.0	Conv. (cfs)		88535.0		
Length Wtd. (ft)	181.54	Wetted Per. (ft)		284.23		
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.60		
Alpha	1.00	Stream Power (lb/ft s)		3.50		
Frctn Loss (ft)	0.72	Cum Volume (acre-ft)	3.34	48.71	9.72	
C & E Loss (ft)	0.04	Cum SA (acres)	2.52	11.51	6.99	

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2768.77	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.58	Wt. n-Val.		0.030		
W.S. Elev (ft)	2768.18	Reach Len. (ft)	44.45	181.54	256.85	
Crit W.S. (ft)	2766.24	Flow Area (sq ft)		1630.48		
E.G. Slope (ft/ft)	0.002022	Area (sq ft)		1630.48		
Q Total (cfs)	10000.00	Flow (cfs)		10000.00		
Top Width (ft)	349.86	Top Width (ft)		349.86		
Vel Total (ft/s)	6.13	Avg. Vel. (ft/s)		6.13		
Max Chl Dpth (ft)	9.10	Hydr. Depth (ft)		4.66		
Conv. Total (cfs)	222397.3	Conv. (cfs)		222397.3		
Length Wtd. (ft)	181.54	Wetted Per. (ft)		356.78		
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.58		
Alpha	1.00	Stream Power (lb/ft s)		3.54		
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	24.17	87.06	58.21	
C & E Loss (ft)	0.07	Cum SA (acres)	9.16	13.69	17.92	

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 170

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2776.75	10.041	2776.75	11.208	2776.56	13.039	2775.75	14.984	2774.75
17.041	2773.75	19.445	2772.75	21.468	2771.75	23.419	2770.75	25.484	2769.75
27.471	2768.75	29.409	2767.75	30.901	2767.12	31.424	2766.75	33.545	2765.75
38.947	2765.75	39.428	2765.75	41.868	2765.12	60.352	2766.13	65.082	2765.97
66.072	2764.75	69.89	2764.75	71.743	2764.93	72.768	2764.75	85.567	2761.65
101.392	2761.27	114.672	2763.12	137.165	2763.34	145.296	2760.76	193.16	2760.8
199.171	2758.99	240.331	2758.49	254.092	2762.23	263.715	2762.13	265.413	2763.75
266.813	2764.75	268.199	2765.75	269.584	2766.75	270.801	2767.75	271.974	2768.75
273.155	2769.75	274.336	2770.75	275.524	2771.75	276.705	2772.75	282.843	2777

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	10.041	.03	276.705	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
10.041 276.705 130.15 130.15 130.15 .1 .3
Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
85	89	2780	147	151	2780	209	213	2780

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2775.57	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.08	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2773.49	Reach Len. (ft)	130.15	130.15	130.15	
Crit W.S. (ft)	2770.35	Flow Area (sq ft)		2676.35	0.39	
E.G. Slope (ft/ft)	0.003402	Area (sq ft)		2676.35	0.39	
Q Total (cfs)	31000.00	Flow (cfs)		30999.66	0.34	
Top Width (ft)	248.09	Top Width (ft)		247.03	1.06	
Vel Total (ft/s)	11.58	Avg. Vel. (ft/s)		11.58	0.87	
Max Chl Dpth (ft)	15.00	Hydr. Depth (ft)		10.83	0.37	
Conv. Total (cfs)	531513.9	Conv. (cfs)		531508.1	5.8	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		333.35	1.29	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.71	0.06	
Alpha	1.00	Stream Power (lb/ft s)		19.75	0.06	
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)	50.31	114.46	96.84	
C & E Loss (ft)	0.12	Cum SA (acres)	12.07	12.68	18.33	

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.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2773.56	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.85	Wt. n-Val.		0.030		
W.S. Elev (ft)	2771.71	Reach Len. (ft)	130.15	130.15	130.15	
Crit W.S. (ft)	2769.11	Flow Area (sq ft)		2241.82		
E.G. Slope (ft/ft)	0.003581	Area (sq ft)		2241.82		
Q Total (cfs)	24490.00	Flow (cfs)		24490.00		
Top Width (ft)	241.93	Top Width (ft)		241.93		
Vel Total (ft/s)	10.92	Avg. Vel. (ft/s)		10.92		
Max Chl Dpth (ft)	13.22	Hydr. Depth (ft)		9.27		
Conv. Total (cfs)	409256.4	Conv. (cfs)		409256.4		
Length Wtd. (ft)	130.15	Wetted Per. (ft)		316.82		
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.58		
Alpha	1.00	Stream Power (lb/ft s)		17.28		
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	45.66	109.75	91.77	
C & E Loss (ft)	0.08	Cum SA (acres)	14.37	12.86	18.48	

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.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2777.00	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.25	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2774.76	Reach Len. (ft)	130.15	130.15	130.15	
Crit W.S. (ft)	2771.24	Flow Area (sq ft)		2991.72	2.90	
E.G. Slope (ft/ft)	0.003299	Area (sq ft)		2991.72	2.90	
Q Total (cfs)	36000.00	Flow (cfs)		35995.16	4.84	
Top Width (ft)	252.63	Top Width (ft)		249.73	2.90	
Vel Total (ft/s)	12.02	Avg. Vel. (ft/s)		12.03	1.67	
Max Chl Dpth (ft)	16.27	Hydr. Depth (ft)		11.98	1.00	
Conv. Total (cfs)	626805.7	Conv. (cfs)		626721.4	84.3	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		343.95	3.52	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.79	0.17	
Alpha	1.00	Stream Power (lb/ft s)		21.55	0.28	
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	56.77	122.09	106.25	
C & E Loss (ft)	0.15	Cum SA (acres)	12.59	12.72	18.79	

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.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2762.22	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.38	Wt. n-Val.		0.030		
W.S. Elev (ft)	2761.84	Reach Len. (ft)	130.15	130.15	130.15	
Crit W.S. (ft)	2761.35	Flow Area (sq ft)		203.00		
E.G. Slope (ft/ft)	0.005401	Area (sq ft)		203.00		
Q Total (cfs)	1000.00	Flow (cfs)		1000.00		
Top Width (ft)	119.52	Top Width (ft)		119.52		
Vel Total (ft/s)	4.93	Avg. Vel. (ft/s)		4.93		
Max Chl Dpth (ft)	3.35	Hydr. Depth (ft)		1.70		
Conv. Total (cfs)	13607.4	Conv. (cfs)		13607.4		
Length Wtd. (ft)	130.15	Wetted Per. (ft)		128.95		
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		0.53		
Alpha	1.00	Stream Power (lb/ft s)		2.61		
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	2.91	39.11	8.49	
C & E Loss (ft)	0.06	Cum SA (acres)	2.20	9.95	6.73	

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 #PF 5

E.G. Elev (ft)	2765.61	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.89	Wt. n-Val.		0.030		
W.S. Elev (ft)	2764.72	Reach Len. (ft)	130.15	130.15	130.15	
Crit W.S. (ft)	2763.92	Flow Area (sq ft)		660.60		
E.G. Slope (ft/ft)	0.005075	Area (sq ft)		660.60		
Q Total (cfs)	5000.00	Flow (cfs)		5000.00		
Top Width (ft)	181.90	Top Width (ft)		181.90		
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57		
Max Chl Dpth (ft)	6.23	Hydr. Depth (ft)		3.63		
Conv. Total (cfs)	70183.8	Conv. (cfs)		70183.8		
Length Wtd. (ft)	130.15	Wetted Per. (ft)		210.28		
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.00		
Alpha	1.00	Stream Power (lb/ft s)		7.53		
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	3.34	45.55	9.72	
C & E Loss (ft)	0.07	Cum SA (acres)	2.52	10.55	6.99	

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2768.16	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.24	Wt. n-Val.		0.030		
W.S. Elev (ft)	2766.91	Reach Len. (ft)	130.15	130.15	130.15	
Crit W.S. (ft)	2765.78	Flow Area (sq ft)		1117.67		
E.G. Slope (ft/ft)	0.004905	Area (sq ft)		1117.67		
Q Total (cfs)	10000.00	Flow (cfs)		10000.00		
Top Width (ft)	226.59	Top Width (ft)		226.59		
Vel Total (ft/s)	8.95	Avg. Vel. (ft/s)		8.95		
Max Chl Dpth (ft)	8.42	Hydr. Depth (ft)		4.93		
Conv. Total (cfs)	142789.4	Conv. (cfs)		142789.4		
Length Wtd. (ft)	130.15	Wetted Per. (ft)		269.80		
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.27		
Alpha	1.00	Stream Power (lb/ft s)		11.35		

```
* Frctn Loss (ft)        *    0.52  * Cum Volume (acre-ft)   *   24.17  *   81.33  *   58.21  *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)         *    9.16  *   12.49  *   17.92  *
*****************************************************************************************
```

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 160

INPUT
Description:
Station Elevation Data num= 84

```
    Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 2775.75   5.607 2775.75   12.07 2775.75  19.049 2775.75  29.317 2775.75
  71.828 2774.75  85.786 2773.75  89.067 2773.75 103.188 2774.75 115.831 2774.75
 128.085 2774.75 176.975 2775.75 196.024 2776.75 201.271 2777.75 222.357 2778.36
 223.106 2777.75 224.726 2776.75 226.578 2775.75 228.113 2774.48 228.466 2774.75
 231.408 2773.75 239.405 2772.75  244.73 2772.63 245.868 2771.75 247.233 2770.75
 248.605 2769.75 250.054 2768.75 251.681 2767.76 251.681 2767.75 253.342 2766.75
 254.813 2765.75 256.164 2764.75 257.132 2763.88 262.209  2762.7 273.085 2760.84
  297.19 2760.63 301.164 2761.77 319.273 2761.94 326.146 2760.17 341.547 2760.01
 354.324 2759.87 381.194 2760.68  389.17 2757.67 435.231 2758.17 436.985 2762.55
 442.317 2762.86 444.608 2763.75 445.477 2764.44  445.88 2764.75 447.146 2765.75
 448.419 2766.75 449.692 2767.75 450.979 2768.75 452.237 2769.75 453.482 2770.75
 453.482 2770.76  454.74 2771.75 455.985 2772.75 457.201 2773.75 457.201 2773.76
  458.12  2775.1 458.403 2774.75 466.584 2774.75 469.887 2774.75 478.704 2775.75
 485.853 2776.75 713.195 2776.75 716.745 2776.75 720.132 2776.75 792.165 2775.75
  803.98 2775.75 814.743 2775.75 830.143 2774.75 840.806 2774.75 857.466 2775.75
 873.256 2775.75 926.755 2774.75 940.777 2773.75 941.237 2773.75 945.579 2773.75
 955.669 2773.75  965.18 2773.75 989.002 2773.751007.684 2774.75
```

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
       0    .045  244.73     .03  458.12    .045
```

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

```
        244.73  458.12          203.69  188.86     197            .1       .3
```

Blocked Obstructions num= 3

```
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*********************************************************************
     250     254    2780     312     316    2780     374     378    2780
```

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

```
*****************************************************************************************
* E.G. Elev (ft)         * 2774.92  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.25  * Wt. n-Val.              *          *    0.030  *          *
* W.S. Elev (ft)         * 2771.67  * Reach Len. (ft)        *  203.69  *   188.86  *  197.00  *
* Crit W.S. (ft)         * 2769.83  * Flow Area (sq ft)      *          * 2143.16  *          *
* E.G. Slope (ft/ft)     *0.005009  * Area (sq ft)           *          * 2143.16  *          *
* Q Total (cfs)          *31000.00  * Flow (cfs)             *          *31000.00  *          *
* Top Width (ft)         *  196.67  * Top Width (ft)          *          *   196.67  *          *
* Vel Total (ft/s)       *   14.46  * Avg. Vel. (ft/s)        *          *    14.46  *          *
* Max Chl Dpth (ft)      *   14.00  * Hydr. Depth (ft)        *          *    10.90  *          *
* Conv. Total (cfs)      *438025.0  * Conv. (cfs)             *          *438025.0  *          *
* Length Wtd. (ft)       *  188.86  * Wetted Per. (ft)        *          *   255.68  *          *
* Min Ch El (ft)         * 2757.67  * Shear (lb/sq ft)        *          *     2.62  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)  *          *    37.91  *          *
* Frctn Loss (ft)        *    0.87  * Cum Volume (acre-ft)    *   50.31  *   107.26  *   96.84  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)          *   12.07  *    12.02  *   18.33  *
*****************************************************************************************
```

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 2

```
*****************************************************************************************
* E.G. Elev (ft)         * 2772.97  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    2.63  * Wt. n-Val.              *          *    0.030  *          *
* W.S. Elev (ft)         * 2770.34  * Reach Len. (ft)        *  203.69  *   188.86  *  197.00  *
* Crit W.S. (ft)         * 2768.41  * Flow Area (sq ft)      *          * 1883.39  *          *
* E.G. Slope (ft/ft)     *0.004500  * Area (sq ft)           *          * 1883.39  *          *
* Q Total (cfs)          *24490.00  * Flow (cfs)             *          *24490.00  *          *
* Top Width (ft)         *  193.18  * Top Width (ft)          *          *   193.18  *          *
* Vel Total (ft/s)       *   13.00  * Avg. Vel. (ft/s)        *          *    13.00  *          *
* Max Chl Dpth (ft)      *   12.67  * Hydr. Depth (ft)        *          *     9.75  *          *
* Conv. Total (cfs)      *365056.1  * Conv. (cfs)             *          *365056.1  *          *
* Length Wtd. (ft)       *  188.86  * Wetted Per. (ft)        *          *   243.29  *          *
* Min Ch El (ft)         * 2757.67  * Shear (lb/sq ft)        *          *     2.18  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)  *          *    28.28  *          *
* Frctn Loss (ft)        *    0.81  * Cum Volume (acre-ft)    *   45.66  *   103.58  *   91.77  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)          *   14.37  *    12.21  *   18.48  *
*****************************************************************************************
```

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

```
*****************************************************************************************
* E.G. Elev (ft)         * 2776.32  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.72  * Wt. n-Val.              *          *    0.030  *          *
* W.S. Elev (ft)         * 2772.60  * Reach Len. (ft)        *  203.69  *   188.86  *  197.00  *
* Crit W.S. (ft)         * 2770.85  * Flow Area (sq ft)      *          * 2327.25  *          *
* E.G. Slope (ft/ft)     *0.005364  * Area (sq ft)           *          * 2327.25  *          *
* Q Total (cfs)          *36000.00  * Flow (cfs)             *          *36000.00  *          *
* Top Width (ft)         *  199.04  * Top Width (ft)          *          *   199.04  *          *
* Vel Total (ft/s)       *   15.47  * Avg. Vel. (ft/s)        *          *    15.47  *          *
* Max Chl Dpth (ft)      *   14.93  * Hydr. Depth (ft)        *          *    11.69  *          *
* Conv. Total (cfs)      *491555.4  * Conv. (cfs)             *          *491555.4  *          *
* Length Wtd. (ft)       *  188.86  * Wetted Per. (ft)        *          *   264.28  *          *
* Min Ch El (ft)         * 2757.67  * Shear (lb/sq ft)        *          *     2.95  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)  *          *    45.61  *          *
```

* Frctn Loss (ft)	*	0.91	* Cum Volume (acre-ft)	*	56.77	*	114.14	*	106.25	*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	12.59	*	12.05	*	18.78	*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	*	2761.77	* Element	*	Left OB	*	Channel	*	Right OB	*
Vel Head (ft)	*	0.18	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2761.59	* Reach Len. (ft)	*	203.69	*	188.86	*	197.00	*
* Crit W.S. (ft)	*	2760.46	* Flow Area (sq ft)	*		*	293.37	*		*
* E.G. Slope (ft/ft)	*	0.001922	* Area (sq ft)	*		*	293.37	*		*
* Q Total (cfs)	*	1000.00	* Flow (cfs)	*		*	1000.00	*		*
* Top Width (ft)	*	143.78	* Top Width (ft)	*		*	143.78	*		*
* Vel Total (ft/s)	*	3.41	* Avg. Vel. (ft/s)	*		*	3.41	*		*
* Max Chl Dpth (ft)	*	3.92	* Hydr. Depth (ft)	*		*	2.04	*		*
* Conv. Total (cfs)	*	22810.8	* Conv. (cfs)	*		*	22810.8	*		*
* Length Wtd. (ft)	*	188.86	* Wetted Per. (ft)	*		*	149.16	*		*
* Min Ch El (ft)	*	2757.67	* Shear (lb/sq ft)	*		*	0.24	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	0.80	*		*
* Frctn Loss (ft)	*	0.44	* Cum Volume (acre-ft)	*	2.91	*	38.37	*	8.49	*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	2.20	*	9.56	*	6.73	*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	*	2765.07	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.64	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2764.42	* Reach Len. (ft)	*	203.69	*	188.86	*	197.00	*
* Crit W.S. (ft)	*	2762.91	* Flow Area (sq ft)	*		*	775.80	*		*
* E.G. Slope (ft/ft)	*	0.002752	* Area (sq ft)	*		*	775.80	*		*
* Q Total (cfs)	*	5000.00	* Flow (cfs)	*		*	5000.00	*		*
* Top Width (ft)	*	180.92	* Top Width (ft)	*		*	180.92	*		*
* Vel Total (ft/s)	*	6.44	* Avg. Vel. (ft/s)	*		*	6.44	*		*
* Max Chl Dpth (ft)	*	6.75	* Hydr. Depth (ft)	*		*	4.29	*		*
* Conv. Total (cfs)	*	95311.4	* Conv. (cfs)	*		*	95311.4	*		*
* Length Wtd. (ft)	*	188.86	* Wetted Per. (ft)	*		*	198.59	*		*
* Min Ch El (ft)	*	2757.67	* Shear (lb/sq ft)	*		*	0.67	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	4.33	*		*
* Frctn Loss (ft)	*	0.61	* Cum Volume (acre-ft)	*	3.34	*	43.40	*	9.72	*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	2.52	*	10.01	*	6.99	*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	*	2767.62	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	1.18	* Wt. n-Val.	*		*	0.030	*		*
W.S. Elev (ft)	*	2766.44	* Reach Len. (ft)	*	203.69	*	188.86	*	197.00	*
Crit W.S. (ft)	*	2764.67	* Flow Area (sq ft)	*		*	1145.67	*		*
E.G. Slope (ft/ft)	*	0.003300	* Area (sq ft)	*		*	1145.67	*		*
* Q Total (cfs)	*	10000.00	* Flow (cfs)	*		*	10000.00	*		*
* Top Width (ft)	*	186.02	* Top Width (ft)	*		*	186.02	*		*
* Vel Total (ft/s)	*	8.73	* Avg. Vel. (ft/s)	*		*	8.73	*		*
* Max Chl Dpth (ft)	*	8.77	* Hydr. Depth (ft)	*		*	6.16	*		*
* Conv. Total (cfs)	*	174087.6	* Conv. (cfs)	*		*	174087.6	*		*
* Length Wtd. (ft)	*	188.86	* Wetted Per. (ft)	*		*	213.21	*		*
* Min Ch El (ft)	*	2757.67	* Shear (lb/sq ft)	*		*	1.11	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	9.66	*		*
* Frctn Loss (ft)	*	0.67	* Cum Volume (acre-ft)	*	24.17	*	77.95	*	58.21	*
* C & E Loss (ft)	*	0.02	* Cum SA (acres)	*	9.16	*	11.87	*	17.92	*

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 150

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.75	27.415	2773.75	42.03	2773.75	59.892	2773.75	62.416	2773.75
64.078	2773.75	160.259	2772.75	185.715	2772.75	194.744	2773.75	204.594	2773.75
210.718	2773.75	222.774	2774.75	228.183	2774.75	257.019	2774.75	267.81	2774.75
273.007	2773.75	274.803	2772.4	275.015	2772.75	287.29	2772.06	287.545	2771.75
289.737	2770.75	290.925	2770.17	291.165	2769.75	292.615	2768.75	292.615	2768.76
293.301	2770.01	294.086	2767.76	294.086	2767.75	295.641	2766.75	298.583	2765.75
300.223	2764.76	300.223	2764.75	301.687	2763.75	304.049	2762.75	306.828	2761.76
307.153	2761.75	310.201	2760.75	315.32	2759.75	327.928	2759.98	331.711	2761.72
339.341	2762.38	348.858	2761.61	352.302	2760.28	375.078	2761.75	377.814	2761.46
391.136	2760.05	397.352	2762.59	404.677	2759.75	421.315	2760.11	427.849	2757.53
458.495	2758.34	483.223	2757.36	487.119	2761.47	490.188	2761.75	490.492	2761.76
490.492	2761.77	490.584	2761.86	491.482	2762.75	491.482	2762.76	492.726	2763.75
492.726	2763.76	493.964	2764.75	495.201	2765.75	496.467	2766.75	497.853	2767.75
499.401	2768.75	500.936	2769.75	500.936	2769.76	502.477	2770.75	504.047	2771.75
504.294	2771.9	518.734	2772.75	520.388	2772.75	520.388	2772.76	520.685	2773.75
522.75	2774.75	525.055	2775.75	528.562	2776.75	529.291	2777.69	531.794	2776.75
533.505	2777.63	573.768	2775.75	592.796	2774.75	608.727	2774.75	636.672	2774.75
63.471	2774.75	788.445	2774.75	833.707	2773.75	855.161	2773.75	857.438	2774.75
28.516	2774.75	939.879	2773.75	942.008	2773.75	951.829	2774.75	952.204	2774.75
986.569	2773.75	998.018	2773.75	1010.809	2773.75	1012.796	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	287.29	.03	504.047	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
287.29	504.047	23.86	18.79	11.8	.1	.3

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2774.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.25	Wt. n-Val.		0.030	
W.S. Elev (ft)	2770.81	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.32	Flow Area (sq ft)		2143.28	
E.G. Slope (ft/ft)	0.004221	Area (sq ft)		2143.28	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	212.96	Top Width (ft)		212.96	
Vel Total (ft/s)	14.46	Avg. Vel. (ft/s)		14.46	
Max Chl Dpth (ft)	13.45	Hydr. Depth (ft)		10.06	
Conv. Total (cfs)	477138.7	Conv. (cfs)		477138.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		224.93	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		2.51	
Alpha	1.00	Stream Power (lb/ft s)		36.32	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	50.31	97.97	96.84
C & E Loss (ft)	0.02	Cum SA (acres)	12.07	11.13	18.33

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2772.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.030	
W.S. Elev (ft)	2769.43	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.97	Flow Area (sq ft)		1853.82	
E.G. Slope (ft/ft)	0.004114	Area (sq ft)		1853.82	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	208.31	Top Width (ft)		208.31	
Vel Total (ft/s)	13.21	Avg. Vel. (ft/s)		13.21	
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		8.90	
Conv. Total (cfs)	381810.9	Conv. (cfs)		381810.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		218.63	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		2.18	
Alpha	1.00	Stream Power (lb/ft s)		28.77	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	45.66	95.48	91.77
C & E Loss (ft)	0.02	Cum SA (acres)	14.37	11.33	18.48

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2775.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.68	Wt. n-Val.		0.030	
W.S. Elev (ft)	2771.72	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.31	Flow Area (sq ft)		2339.88	
E.G. Slope (ft/ft)	0.004348	Area (sq ft)		2339.88	
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	216.41	Top Width (ft)		216.41	
Vel Total (ft/s)	15.39	Avg. Vel. (ft/s)		15.39	
Max Chl Dpth (ft)	14.36	Hydr. Depth (ft)		10.81	
Conv. Total (cfs)	545981.9	Conv. (cfs)		545981.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		228.84	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		2.78	
Alpha	1.00	Stream Power (lb/ft s)		42.70	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	56.77	104.03	106.25
C & E Loss (ft)	0.02	Cum SA (acres)	12.59	11.15	18.78

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.08	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.15	Flow Area (sq ft)		252.50	
E.G. Slope (ft/ft)	0.002820	Area (sq ft)		252.50	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	133.45	Top Width (ft)		133.45	
Vel Total (ft/s)	3.96	Avg. Vel. (ft/s)		3.96	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		1.89	
Conv. Total (cfs)	18832.1	Conv. (cfs)		18832.1	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		136.65	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		1.29	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	2.91	37.19	8.49
C & E Loss (ft)	0.00	Cum SA (acres)	2.20	8.96	6.73

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2764.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.65	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.71	Flow Area (sq ft)		699.46	
E.G. Slope (ft/ft)	0.003824	Area (sq ft)		699.46	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	190.67	Top Width (ft)		190.67	
Vel Total (ft/s)	7.15	Avg. Vel. (ft/s)		7.15	
Max Chl Dpth (ft)	6.29	Hydr. Depth (ft)		3.67	
Conv. Total (cfs)	80856.3	Conv. (cfs)		80856.3	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		196.18	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		0.85	
Alpha	1.00	Stream Power (lb/ft s)		6.08	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	3.34	40.21	9.72
C & E Loss (ft)	0.01	Cum SA (acres)	2.52	9.20	6.99

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2766.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	
W.S. Elev (ft)	2765.59	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2764.36	Flow Area (sq ft)		1074.28	
E.G. Slope (ft/ft)	0.003828	Area (sq ft)		1074.28	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	196.14	Top Width (ft)		196.14	
Vel Total (ft/s)	9.31	Avg. Vel. (ft/s)		9.31	
Max Chl Dpth (ft)	8.23	Hydr. Depth (ft)		5.48	
Conv. Total (cfs)	161634.2	Conv. (cfs)		161634.2	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		202.91	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		1.27	
Alpha	1.00	Stream Power (lb/ft s)		11.78	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	24.17	73.14	58.21
C & E Loss (ft)	0.01	Cum SA (acres)	9.16	11.05	17.92

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 149.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.3	29.96	2773.35	45.93	2773.32	65.45	2773.3	66.42	2773.3
68.21	2773.29	70.02	2773.29	113.61	2772.85	129	2772.72	135.41	2772.66
135.68	2772.66	175.13	2772.3	191.43	2772.3	202.95	2772.3	212.82	2773.2
223.58	2773.2	230.27	2773.2	243.45	2774.11	249.36	2774.11	280.87	2774.11
292.66	2774.11	298.34	2773.2	300.3	2771.98	300.54	2772.3	309.22	2771.89
313.95	2771.68	314.19	2771.39	316.3	2770.45	317.44	2769.9	317.67	2769.52
319.06	2768.59	319.72	2769.72	320.18	2768.47	320.48	2767.66	321.97	2766.72
324.8	2765.76	325.36	2765.43	326.37	2764.83	327.78	2763.89	330.04	2762.94
330.36	2762.82	332.71	2761.98	333.03	2761.97	334.84	2761.37	335.95	2761
338.91	2760.38	340.87	2759.98	342.81	2759.97	346.73	2759.94	350.3	2759.87
352.98	2759.91	356.61	2761.5	363.94	2762.1	373.08	2761.41	376.39	2760.2
398.26	2761.55	400.89	2761.29	413.68	2760.01	419.65	2762.33	426.68	2759.75
442.66	2760.09	448.94	2757.75	451.9	2757.82	460.15	2757.75	478.37	2758.17
502.12	2757.24	503.84	2758.58	507.57	2761.13	511.86	2761.37	512.29	2761.38
512.42	2761.47	513.68	2762.27	515.42	2763.17	517.15	2764.08	518.88	2764.98
520.65	2765.89	522.59	2766.79	524.76	2767.69	525.17	2767.87	525.93	2768.47
526.91	2768.91	529.06	2769.87	531.26	2770.84	531.49	2770.98	535.29	2771.2
544.25	2771.79	545.24	2771.85	546.82	2771.86	547.1	2772.78	549.07	2773.7
551.26	2774.63	554.6	2775.57	555.29	2776.43	557.68	2775.6	559.31	2776.41
559.52	2776.4	564.95	2776.12	597.64	2774.66	615.75	2773.75	629.96	2773.75
630.92	2773.75	657.53	2773.75	683.04	2773.75	694.29	2773.75	763.59	2773.84
802.02	2773.84	845.12	2772.93	865.54	2772.93	867.71	2773.84	876.27	2773.84
889.18	2773.84	926.02	2773.93	935.38	2774	939.17	2773.7	946.2	2773.17
948.23	2773.18	951.28	2773.5	957.58	2774.16	957.93	2774.16	963.78	2774.04
976.17	2773.79	990.65	2773.47	991.29	2773.48	1001.55	2773.54	1006.1	2773.57
1013.73	2773.64	1015.62	2773.66						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	313.95	.03	531.26	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
313.95	531.26	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.49	Wt. n-Val.		0.030	
W.S. Elev (ft)	2770.46	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.35	Flow Area (sq ft)		2068.13	
E.G. Slope (ft/ft)	0.004726	Area (sq ft)		2068.13	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	214.10	Top Width (ft)		214.10	
Vel Total (ft/s)	14.99	Avg. Vel. (ft/s)		14.99	
Max Chl Dpth (ft)	13.22	Hydr. Depth (ft)		9.66	
Conv. Total (cfs)	450943.7	Conv. (cfs)		450943.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		223.91	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		2.73	
Alpha	1.00	Stream Power (lb/ft s)		40.85	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	50.31	97.06	96.84
C & E Loss (ft)	0.03	Cum SA (acres)	12.07	11.04	18.33

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2772.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.93	Wt. n-Val.		0.030	
W.S. Elev (ft)	2769.11	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2768.00	Flow Area (sq ft)		1784.08	
E.G. Slope (ft/ft)	0.004623	Area (sq ft)		1784.08	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	208.51	Top Width (ft)		208.51	
Vel Total (ft/s)	13.73	Avg. Vel. (ft/s)		13.73	
Max Chl Dpth (ft)	11.87	Hydr. Depth (ft)		8.56	
Conv. Total (cfs)	360198.3	Conv. (cfs)		360198.3	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		216.79	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		2.38	
Alpha	1.00	Stream Power (lb/ft s)		32.60	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	45.66	94.70	91.77
C & E Loss (ft)	0.02	Cum SA (acres)	14.37	11.24	18.48

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2775.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2771.40	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.36	Flow Area (sq ft)		2271.29	1.58
E.G. Slope (ft/ft)	0.004754	Area (sq ft)		2271.29	1.58
Q Total (cfs)	36000.00	Flow (cfs)		35998.68	1.32
Top Width (ft)	224.11	Top Width (ft)		217.08	7.03
Vel Total (ft/s)	15.84	Avg. Vel. (ft/s)		15.85	0.84
Max Chl Dpth (ft)	14.16	Hydr. Depth (ft)		10.46	0.22
Conv. Total (cfs)	522134.9	Conv. (cfs)		522115.7	19.2
Length Wtd. (ft)	18.79	Wetted Per. (ft)		227.16	7.08
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		2.97	0.07
Alpha	1.00	Stream Power (lb/ft s)		47.03	0.06
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	56.77	103.03	106.25
C & E Loss (ft)	0.01	Cum SA (acres)	12.59	11.06	18.78

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.00	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.12	Flow Area (sq ft)		240.74	
E.G. Slope (ft/ft)	0.003214	Area (sq ft)		240.74	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	131.19	Top Width (ft)		131.19	
Vel Total (ft/s)	4.15	Avg. Vel. (ft/s)		4.15	
Max Chl Dpth (ft)	3.76	Hydr. Depth (ft)		1.84	
Conv. Total (cfs)	17638.4	Conv. (cfs)		17638.4	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		133.81	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		0.36	
Alpha	1.00	Stream Power (lb/ft s)		1.50	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	2.91	37.08	8.49
C & E Loss (ft)	0.00	Cum SA (acres)	2.20	8.90	6.73

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2764.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.51	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.68	Flow Area (sq ft)		673.19	
E.G. Slope (ft/ft)	0.004215	Area (sq ft)		673.19	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	187.37	Top Width (ft)		187.37	
Vel Total (ft/s)	7.43	Avg. Vel. (ft/s)		7.43	
Max Chl Dpth (ft)	6.27	Hydr. Depth (ft)		3.59	
Conv. Total (cfs)	77010.0	Conv. (cfs)		77010.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		191.79	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		0.92	
Alpha	1.00	Stream Power (lb/ft s)		6.86	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	3.34	39.91	9.72
C & E Loss (ft)	0.01	Cum SA (acres)	2.52	9.12	6.99

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2766.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.46	Wt. n-Val.		0.030	
W.S. Elev (ft)	2765.38	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2764.36	Flow Area (sq ft)		1031.39	
E.G. Slope (ft/ft)	0.004290	Area (sq ft)		1031.39	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	194.23	Top Width (ft)		194.23	
Vel Total (ft/s)	9.70	Avg. Vel. (ft/s)		9.70	
Max Chl Dpth (ft)	8.14	Hydr. Depth (ft)		5.31	
Conv. Total (cfs)	152675.8	Conv. (cfs)		152675.8	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		199.62	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		1.38	
Alpha	1.00	Stream Power (lb/ft s)		13.42	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	24.17	72.69	58.21
C & E Loss (ft)	0.01	Cum SA (acres)	9.16	10.96	17.92

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 148.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2773.84	32.5	2772.94	49.83	2772.9	71.01	2772.84	72.06	2772.84
74	2772.84	75.97	2772.83	123.25	2772.37	139.96	2772.25	146.91	2772.2
147.2	2772.19	190	2771.85	207.69	2771.84	220.18	2771.84	230.89	2772.66
242.57	2772.66	249.83	2772.66	264.12	2773.48	270.53	2773.48	304.72	2773.48
317.51	2773.48	323.68	2772.66	325.81	2771.55	326.06	2771.84	335.48	2771.48
340.61	2771.3	340.84	2771.04	342.86	2770.15	343.96	2769.64	344.18	2769.29
345.51	2768.42	346.14	2769.43	346.58	2768.3	346.87	2767.57	348.3	2766.69
351.01	2765.77	351.55	2765.46	352.52	2764.9	353.87	2764.03	356.04	2763.13
356.35	2763.02	358.6	2762.21	358.9	2762.19	360.64	2761.61	361.7	2761.25
364.54	2760.62	366.42	2760.2	368.28	2760.14	372.03	2760.02	375.46	2759.8
378.03	2759.85	381.51	2761.28	388.53	2761.83	397.3	2761.21	400.47	2760.12
421.44	2761.35	423.96	2761.12	436.22	2759.98	441.95	2762.07	448.69	2759.75
464.01	2760.06	470.03	2757.96	472.87	2758.03	480.77	2757.66	498.24	2758.01
521.01	2757.13	523.23	2758.51	528.02	2760.78	533.54	2760.99	534.09	2760.99
534.25	2761.07	535.87	2761.79	538.11	2762.6	540.33	2763.41	542.56	2764.21
544.84	2765.02	547.33	2765.83	550.11	2766.63	550.65	2766.79	551.62	2767.65
552.87	2768.07	555.65	2769	558.47	2769.93	558.69	2770.06	562.3	2770.27

570.81	2770.88	571.75	2770.95	573.25	2770.98	573.51	2771.8	575.38	2772.65
577.47	2773.51	580.64	2774.39	581.3	2775.17	583.56	2774.44	585.11	2775.19
585.3	2775.19	590.47	2774.88	621.51	2773.57	638.71	2772.75	652.21	2772.75
653.12	2772.75	678.38	2772.75	702.61	2772.75	713.29	2772.75	779.11	2772.93
815.6	2772.93	856.53	2772.11	875.92	2772.11	877.98	2772.93	886.12	2772.93
898.38	2772.93	933.36	2773.11	942.25	2773.24	945.85	2773.01	952.52	2772.58
954.45	2772.61	957.34	2772.93	963.33	2773.57	963.66	2773.57	969.22	2773.51
980.98	2773.38	994.73	2773.2	995.34	2773.2	1005.09	2773.33	1009.4	2773.39
1016.65	2773.53	1018.45	2773.57						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	340.61	.03	558.47	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
340.61	558.47	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.80	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2770.02	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.39	Flow Area (sq ft)		1982.40	0.01
E.G. Slope (ft/ft)	0.005431	Area (sq ft)		1982.40	0.01
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	0.00
Top Width (ft)	215.47	Top Width (ft)		215.32	0.14
Vel Total (ft/s)	15.64	Avg. Vel. (ft/s)		15.64	0.27
Max Chl Dpth (ft)	12.89	Hydr. Depth (ft)		9.21	0.04
Conv. Total (cfs)	420668.8	Conv. (cfs)		420668.8	0.0
Length Wtd. (ft)	18.79	Wetted Per. (ft)		223.55	0.17
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		3.01	0.01
Alpha	1.00	Stream Power (lb/ft s)		47.01	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	50.31	96.19	96.84
C & E Loss (ft)	0.03	Cum SA (acres)	12.07	10.95	18.33

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2771.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	2768.79	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2768.02	Flow Area (sq ft)		1722.12	
E.G. Slope (ft/ft)	0.005184	Area (sq ft)		1722.12	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	209.44	Top Width (ft)		209.44	
Vel Total (ft/s)	14.22	Avg. Vel. (ft/s)		14.22	
Max Chl Dpth (ft)	11.66	Hydr. Depth (ft)		8.22	
Conv. Total (cfs)	340133.7	Conv. (cfs)		340133.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		216.27	
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		2.58	
Alpha	1.00	Stream Power (lb/ft s)		36.65	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	45.66	93.94	91.77
C & E Loss (ft)	0.01	Cum SA (acres)	14.37	11.15	18.48

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2775.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2771.16	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.34	Flow Area (sq ft)		2229.34	9.29
E.G. Slope (ft/ft)	0.005027	Area (sq ft)		2229.34	9.29
Q Total (cfs)	36000.00	Flow (cfs)		35984.21	15.79
Top Width (ft)	232.57	Top Width (ft)		217.73	14.84
Vel Total (ft/s)	16.08	Avg. Vel. (ft/s)		16.14	1.70
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)		10.24	0.63
Conv. Total (cfs)	507756.3	Conv. (cfs)		507533.7	222.7
Length Wtd. (ft)	18.78	Wetted Per. (ft)		226.23	15.03
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		3.09	0.19
Alpha	1.01	Stream Power (lb/ft s)		49.92	0.33
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	56.77	102.06	106.25
C & E Loss (ft)	0.01	Cum SA (acres)	12.59	10.96	18.78

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.90	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.11	Flow Area (sq ft)		227.75	
E.G. Slope (ft/ft)	0.003837	Area (sq ft)		227.75	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	130.90	Top Width (ft)		130.90	
Vel Total (ft/s)	4.39	Avg. Vel. (ft/s)		4.39	
Max Chl Dpth (ft)	3.77	Hydr. Depth (ft)		1.74	
Conv. Total (cfs)	16143.0	Conv. (cfs)		16143.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		133.04	
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		0.41	
Alpha	1.00	Stream Power (lb/ft s)		1.80	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	2.91	36.98	8.49
C & E Loss (ft)	0.00	Cum SA (acres)	2.20	8.85	6.73

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2764.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.94	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.34	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.66	Flow Area (sq ft)		643.83	
E.G. Slope (ft/ft)	0.004768	Area (sq ft)		643.83	

* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*	*
* Top Width (ft)	* 184.58	* Top Width (ft)	*	* 184.58	*	*
* Vel Total (ft/s)	* 7.77	* Avg. Vel. (ft/s)	*	* 7.77	*	*
* Max Chl Dpth (ft)	* 6.21	* Hydr. Depth (ft)	*	* 3.49	*	*
* Conv. Total (cfs)	* 72409.7	* Conv. (cfs)	*	* 72409.7	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 188.17	*	*
* Min Ch El (ft)	* 2757.13	* Shear (lb/sq ft)	*	* 1.02	*	*
Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 7.91	*	*
Frctn Loss (ft)	* 0.10	* Cum Volume (acre-ft)	* 3.34	* 39.63	* 9.72	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.52	* 9.04	* 6.99	*

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2766.74	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.60	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2765.14	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2764.34	* Flow Area (sq ft)	*	* 985.55	*	*
* E.G. Slope (ft/ft)	*0.004921	* Area (sq ft)	*	* 985.55	*	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*	*
* Top Width (ft)	* 193.12	* Top Width (ft)	*	* 193.12	*	*
* Vel Total (ft/s)	* 10.15	* Avg. Vel. (ft/s)	*	* 10.15	*	*
* Max Chl Dpth (ft)	* 8.01	* Hydr. Depth (ft)	*	* 5.10	*	*
* Conv. Total (cfs)	*142557.6	* Conv. (cfs)	*	*142557.6	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 197.48	*	*
* Min Ch El (ft)	* 2757.13	* Shear (lb/sq ft)	*	* 1.53	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 15.56	*	*
* Frctn Loss (ft)	* 0.10	* Cum Volume (acre-ft)	* 24.17	* 72.25	* 58.21	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 9.16	* 10.88	* 17.92	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 147.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2773.39	35.05	2772.54	53.73	2772.47	76.57	2772.39	77.71	2772.39
79.79	2772.38	81.92	2772.37	132.9	2771.88	150.91	2771.77	158.41	2771.73
158.73	2771.73	204.87	2771.41	223.94	2771.39	237.42	2771.39	248.96	2772.11
261.55	2772.11	269.38	2772.11	284.79	2772.84	291.71	2772.84	328.57	2772.84
342.37	2772.84	349.01	2772.11	351.31	2771.13	351.58	2771.39	361.73	2771.06
367.27	2770.92	367.49	2770.68	369.43	2769.85	370.47	2769.37	370.68	2769.05
371.96	2768.26	372.57	2769.14	372.99	2768.12	373.26	2767.47	374.63	2766.66
377.22	2765.78	377.74	2765.49	378.67	2764.97	379.96	2764.16	382.04	2763.31
382.33	2763.21	384.48	2762.43	384.77	2762.41	386.44	2761.84	387.46	2761.49
390.17	2760.86	391.97	2760.43	393.75	2760.32	397.34	2760.1	400.62	2759.74
403.08	2759.78	406.41	2761.06	413.13	2761.55	421.52	2761.01	424.55	2760.04
444.62	2761.15	447.03	2760.95	458.77	2759.94	464.25	2761.8	470.7	2759.75
485.36	2760.04	491.12	2758.18	493.84	2758.24	501.4	2757.57	518.12	2757.84
539.91	2757.01	542.62	2758.43	548.47	2760.44	555.22	2760.6	555.89	2760.61
556.09	2760.68	558.06	2761.31	560.8	2762.02	563.52	2762.74	566.24	2763.45
569.02	2764.16	572.07	2764.87	575.47	2765.57	576.12	2765.71	577.32	2766.82
578.84	2767.22	582.23	2768.12	585.68	2769.02	585.89	2769.13	589.31	2769.34
597.37	2769.98	598.26	2770.05	599.67	2770.09	599.93	2770.83	601.7	2771.61
603.67	2772.39	606.67	2773.21	607.3	2773.91	609.44	2773.29	610.91	2773.97
611.09	2773.97	615.98	2773.64	645.38	2772.48	661.67	2771.75	674.45	2771.75
675.31	2771.75	699.24	2771.75	722.18	2771.75	732.3	2771.75	794.62	2772.02
829.18	2772.02	867.94	2771.3	886.31	2771.3	888.26	2772.02	895.96	2772.02
907.57	2772.02	940.69	2772.3	949.11	2772.49	952.52	2772.31	958.84	2772
960.66	2772.04	963.41	2772.35	969.07	2772.98	969.39	2772.99	974.65	2772.98
985.79	2772.98	998.82	2772.92	999.39	2772.93	1008.62	2773.12	1012.71	2773.2
1019.57	2773.42	1021.27	2773.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	367.27	.03	585.68	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
367.27	585.68	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2773.68	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.10	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2769.59	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2769.33	* Flow Area (sq ft)	*	* 1908.07	* 1.68	*
* E.G. Slope (ft/ft)	*0.006135	* Area (sq ft)	*	* 1908.07	* 1.68	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30998.28	* 1.72	*
* Top Width (ft)	* 222.39	* Top Width (ft)	*	* 215.68	* 6.71	*
* Vel Total (ft/s)	* 16.23	* Avg. Vel. (ft/s)	*	* 16.25	* 1.02	*
* Max Chl Dpth (ft)	* 12.57	* Hydr. Depth (ft)	*	* 8.85	* 0.25	*
* Conv. Total (cfs)	*395784.1	* Conv. (cfs)	*	*395762.1	* 22.0	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 222.66	* 6.76	*
* Min Ch El (ft)	* 2757.01	* Shear (lb/sq ft)	*	* 3.28	* 0.10	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 53.32	* 0.10	*
* Frctn Loss (ft)	* 0.12	* Cum Volume (acre-ft)	* 50.31	* 95.35	* 96.84	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 12.07	* 10.85	* 18.33	*

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	* 2771.82	* Element	* Left OB	* Channel	* Right OB	*
Vel Head (ft)	* 3.28	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2768.54	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2767.99	* Flow Area (sq ft)	*	* 1684.75	*	*
* E.G. Slope (ft/ft)	*0.005621	* Area (sq ft)	*	* 1684.75	*	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24490.00	*	*
* Top Width (ft)	* 211.69	* Top Width (ft)	*	* 211.69	*	*

* Vel Total (ft/s)	*	14.54	* Avg. Vel. (ft/s)	*		*	14.54	*	*
* Max Chl Dpth (ft)	*	11.53	* Hydr. Depth (ft)	*		*	7.96	*	*
* Conv. Total (cfs)	*	326645.9	* Conv. (cfs)	*		*	326645.9	*	*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	217.54	*	*
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*		*	2.72	*	*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	39.51	*	*
* Frctn Loss (ft)	*	0.12	* Cum Volume (acre-ft)	*	45.66	*	93.21	*	91.77 *
C & E Loss (ft)	*	0.05	* Cum SA (acres)	*	14.37	*	11.06	*	18.48 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	*	2775.10	* Element	*	Left OB	*	Channel	*	Right OB *
* Vel Head (ft)	*	4.02	* Wt. n-Val.	*	0.045	*	0.030	*	0.045 *
* W.S. Elev (ft)	*	2771.07	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80 *
* Crit W.S. (ft)	*	2770.31	* Flow Area (sq ft)	*	0.46	*	2231.46	*	20.68 *
* E.G. Slope (ft/ft)	*	0.004984	* Area (sq ft)	*	0.46	*	2231.46	*	20.68 *
* Q Total (cfs)	*	36000.00	* Flow (cfs)	*	0.20	*	35941.22	*	58.58 *
* Top Width (ft)	*	239.16	* Top Width (ft)	*	5.95	*	218.41	*	14.80 *
* Vel Total (ft/s)	*	15.98	* Avg. Vel. (ft/s)	*	0.43	*	16.11	*	2.83 *
* Max Chl Dpth (ft)	*	14.06	* Hydr. Depth (ft)	*	0.08	*	10.22	*	1.40 *
* Conv. Total (cfs)	*	509925.8	* Conv. (cfs)	*	2.8	*	509093.3	*	829.7 *
* Length Wtd. (ft)	*	18.77	* Wetted Per. (ft)	*	5.95	*	225.73	*	15.44 *
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*	0.02	*	3.08	*	0.42 *
* Alpha	*	1.01	* Stream Power (lb/ft s)	*	0.01	*	49.54	*	1.18 *
* Frctn Loss (ft)	*	0.09	* Cum Volume (acre-ft)	*	56.77	*	101.10	*	106.24 *
* C & E Loss (ft)	*	0.05	* Cum SA (acres)	*	12.59	*	10.87	*	18.77 *

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	*	2761.11	* Element	*	Left OB	*	Channel	*	Right OB *
* Vel Head (ft)	*	0.33	* Wt. n-Val.	*		*	0.030	*	*
* W.S. Elev (ft)	*	2760.78	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80 *
* Crit W.S. (ft)	*	2760.07	* Flow Area (sq ft)	*		*	216.35	*	*
* E.G. Slope (ft/ft)	*	0.004593	* Area (sq ft)	*		*	216.35	*	*
* Q Total (cfs)	*	1000.00	* Flow (cfs)	*		*	1000.00	*	*
* Top Width (ft)	*	132.11	* Top Width (ft)	*		*	132.11	*	*
* Vel Total (ft/s)	*	4.62	* Avg. Vel. (ft/s)	*		*	4.62	*	*
* Max Chl Dpth (ft)	*	3.77	* Hydr. Depth (ft)	*		*	1.64	*	*
* Conv. Total (cfs)	*	14754.9	* Conv. (cfs)	*		*	14754.9	*	*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	133.90	*	*
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*		*	0.46	*	*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	2.14	*	*
* Frctn Loss (ft)	*	0.09	* Cum Volume (acre-ft)	*	2.91	*	36.89	*	8.49 *
* C & E Loss (ft)	*	0.00	* Cum SA (acres)	*	2.20	*	8.79	*	6.73 *

Warning: Divided flow computed for this cross-section.

OSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	*	2764.17	* Element	*	Left OB	*	Channel	*	Right OB *
* Vel Head (ft)	*	1.02	* Wt. n-Val.	*		*	0.030	*	*
* W.S. Elev (ft)	*	2763.15	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80 *
* Crit W.S. (ft)	*	2762.58	* Flow Area (sq ft)	*		*	616.73	*	*
* E.G. Slope (ft/ft)	*	0.005401	* Area (sq ft)	*		*	616.73	*	*
* Q Total (cfs)	*	5000.00	* Flow (cfs)	*		*	5000.00	*	*
* Top Width (ft)	*	182.60	* Top Width (ft)	*		*	182.60	*	*
* Vel Total (ft/s)	*	8.11	* Avg. Vel. (ft/s)	*		*	8.11	*	*
* Max Chl Dpth (ft)	*	6.14	* Hydr. Depth (ft)	*		*	3.38	*	*
* Conv. Total (cfs)	*	68035.1	* Conv. (cfs)	*		*	68035.1	*	*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	185.55	*	*
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*		*	1.12	*	*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	9.09	*	*
* Frctn Loss (ft)	*	0.11	* Cum Volume (acre-ft)	*	3.34	*	39.35	*	9.72 *
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	2.52	*	8.96	*	6.99 *

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	*	2766.63	* Element	*	Left OB	*	Channel	*	Right OB *
* Vel Head (ft)	*	1.74	* Wt. n-Val.	*		*	0.030	*	*
* W.S. Elev (ft)	*	2764.89	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80 *
* Crit W.S. (ft)	*	2764.33	* Flow Area (sq ft)	*		*	944.08	*	*
* E.G. Slope (ft/ft)	*	0.005658	* Area (sq ft)	*		*	944.08	*	*
* Q Total (cfs)	*	10000.00	* Flow (cfs)	*		*	10000.00	*	*
* Top Width (ft)	*	193.38	* Top Width (ft)	*		*	193.38	*	*
* Vel Total (ft/s)	*	10.59	* Avg. Vel. (ft/s)	*		*	10.59	*	*
* Max Chl Dpth (ft)	*	7.88	* Hydr. Depth (ft)	*		*	4.88	*	*
* Conv. Total (cfs)	*	132943.8	* Conv. (cfs)	*		*	132943.8	*	*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	196.94	*	*
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*		*	1.69	*	*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	17.94	*	*
* Frctn Loss (ft)	*	0.11	* Cum Volume (acre-ft)	*	24.17	*	71.84	*	58.21 *
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	9.16	*	10.80	*	17.92 *

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 146.*

INPUT
cription:
tion Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2772.93	37.59	2772.13	57.63	2772.04	82.12	2771.94	83.35	2771.93
85.58	2771.92	87.86	2771.91	142.55	2771.4	161.87	2771.3	169.91	2771.26
170.25	2771.26	219.75	2770.96	240.2	2770.93	254.65	2770.93	267.03	2771.57
280.54	2771.57	288.93	2771.57	305.47	2772.2	312.88	2772.2	352.42	2772.2

367.22	2772.2	374.35	2771.57	376.81	2770.71	377.1	2770.93	387.99	2770.65
393.93	2770.54	394.14	2770.32	395.99	2769.55	396.99	2769.11	397.19	2768.82
398.41	2768.1	398.99	2768.85	399.39	2767.95	399.65	2767.37	400.96	2766.62
403.43	2765.79	403.93	2765.52	404.81	2765.05	406.04	2764.3	408.03	2763.5
408.31	2763.4	410.37	2762.66	410.64	2762.62	412.24	2762.08	413.21	2761.74
415.8	2761.09	417.52	2760.66	419.22	2760.5	422.65	2760.18	425.78	2759.68
428.13	2759.72	431.31	2760.83	437.73	2761.27	445.74	2760.8	448.64	2759.97
467.8	2760.95	470.1	2760.78	481.31	2759.91	486.54	2761.54	492.71	2759.75
506.71	2760.02	512.21	2758.39	514.8	2758.45	522.02	2757.48	537.99	2757.68
558.8	2756.89	562	2758.35	568.92	2760.1	576.89	2760.22	577.68	2760.22
577.92	2760.28	580.25	2760.83	583.49	2761.45	586.7	2762.06	589.92	2762.68
593.2	2763.29	596.8	2763.91	600.83	2764.52	601.6	2764.63	603.01	2765.99
604.81	2766.38	608.82	2767.25	612.9	2768.11	613.1	2768.21	616.31	2768.41
623.92	2769.07	624.77	2769.15	626.1	2769.2	626.34	2769.85	628.01	2770.56
629.88	2771.27	632.71	2772.03	633.3	2772.65	635.32	2772.14	636.71	2772.75
636.88	2772.75	641.5	2772.41	669.25	2771.39	684.63	2770.75	696.69	2770.75
697.5	2770.75	720.09	2770.75	741.75	2770.75	751.3	2770.75	810.14	2771.11
842.76	2771.11	879.35	2770.48	896.69	2770.48	898.53	2771.11	905.8	2771.11
916.76	2771.11	948.03	2771.48	955.98	2771.74	959.2	2771.62	965.16	2771.42
966.88	2771.48	969.47	2771.78	974.82	2772.39	975.12	2772.4	980.09	2772.45
990.6	2772.58	1002.9	2772.64	1003.45	2772.66	1012.15	2772.91	1016.01	2773.02
1022.49	2773.31	1024.1	2773.39						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	393.93	.03	612.9	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
393.93	612.9	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.28	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2769.27	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.27	Flow Area (sq ft)		1866.91	7.60
E.G. Slope (ft/ft)	0.006578	Area (sq ft)		1866.91	7.60
Q Total (cfs)	31000.00	Flow (cfs)		30986.00	14.00
Top Width (ft)	229.50	Top Width (ft)		216.27	13.23
Vel Total (ft/s)	16.54	Avg. Vel. (ft/s)		16.60	1.84
Max Chl Dpth (ft)	12.38	Hydr. Depth (ft)		8.63	0.57
Conv. Total (cfs)	382215.9	Conv. (cfs)		382043.3	172.6
Length Wtd. (ft)	18.78	Wetted Per. (ft)		222.30	13.34
Min Ch El (ft)	2756.89	Shear (lb/sq ft)		3.45	0.23
Alpha	1.01	Stream Power (lb/ft s)		57.24	0.43
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	50.31	94.53	96.84
C & E Loss (ft)	0.06	Cum SA (acres)	12.07	10.76	18.33

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2771.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.75	Wt. n-Val.		0.030	
W.S. Elev (ft)	2767.91	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.91	Flow Area (sq ft)		1575.60	
E.G. Slope (ft/ft)	0.007013	Area (sq ft)		1575.60	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	212.57	Top Width (ft)		212.57	
Vel Total (ft/s)	15.54	Avg. Vel. (ft/s)		15.54	
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		7.41	
Conv. Total (cfs)	292429.9	Conv. (cfs)		292429.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		217.22	
Min Ch El (ft)	2756.89	Shear (lb/sq ft)		3.18	
Alpha	1.00	Stream Power (lb/ft s)		49.37	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	45.66	92.50	91.77
C & E Loss (ft)	0.02	Cum SA (acres)	14.37	10.97	18.48

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 #PF 3

E.G. Elev (ft)	2774.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.86	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2771.09	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.19	Flow Area (sq ft)	13.73	2264.69	90.08
E.G. Slope (ft/ft)	0.004698	Area (sq ft)	13.73	2264.69	90.08
Q Total (cfs)	36000.00	Flow (cfs)	11.41	35809.57	179.02
Top Width (ft)	499.82	Top Width (ft)	78.40	218.97	202.45
Vel Total (ft/s)	15.20	Avg. Vel. (ft/s)	0.83	15.81	1.99
Max Chl Dpth (ft)	14.20	Hydr. Depth (ft)	0.18	10.34	0.44
Conv. Total (cfs)	525219.0	Conv. (cfs)	166.4	522440.8	2611.8
Length Wtd. (ft)	18.66	Wetted Per. (ft)	78.55	225.31	203.32
Min Ch El (ft)	2756.89	Shear (lb/sq ft)	0.05	2.95	0.13
Alpha	1.08	Stream Power (lb/ft s)	0.04	46.62	0.26
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	56.76	100.13	106.23
C & E Loss (ft)	0.27	Cum SA (acres)	12.56	10.78	18.74

Warning: Divided flow computed for this cross-section.

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.65	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.08	Flow Area (sq ft)		204.77	

* E.G. Slope (ft/ft)	*0.005412	* Area (sq ft)	*	*	* 204.77	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	*	* 1000.00	*
* Top Width (ft)	* 130.48	* Top Width (ft)	*	*	* 130.48	*
* Vel Total (ft/s)	* 4.88	* Avg. Vel. (ft/s)	*	*	* 4.88	*
* Max Chl Dpth (ft)	* 3.76	* Hydr. Depth (ft)	*	*	* 1.57	*
* Conv. Total (cfs)	* 13592.8	* Conv. (cfs)	*	*	* 13592.8	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	*	* 131.98	*
* Min Ch El (ft)	* 2756.89	* Shear (lb/sq ft)	*	*	* 0.52	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	* 2.56	*
* Frctn Loss (ft)	* 0.11	* Cum Volume (acre-ft)	* 2.91	*	* 36.79	* 8.49 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 2.20	*	* 8.73	* 6.73 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2764.06	* Element	* Left OB	*	* Channel	* Right OB *
* Vel Head (ft)	* 1.12	* Wt. n-Val.	*	*	* 0.030	* *
* W.S. Elev (ft)	* 2762.94	* Reach Len. (ft)	* 23.86	*	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2762.54	* Flow Area (sq ft)	*	*	* 589.06	* *
* E.G. Slope (ft/ft)	*0.006231	* Area (sq ft)	*	*	* 589.06	* *
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	*	* 5000.00	* *
* Top Width (ft)	* 181.73	* Top Width (ft)	*	*	* 181.73	* *
* Vel Total (ft/s)	* 8.49	* Avg. Vel. (ft/s)	*	*	* 8.49	* *
* Max Chl Dpth (ft)	* 6.05	* Hydr. Depth (ft)	*	*	* 3.24	* *
* Conv. Total (cfs)	* 63342.5	* Conv. (cfs)	*	*	* 63342.5	* *
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	*	* 184.15	* *
* Min Ch El (ft)	* 2756.89	* Shear (lb/sq ft)	*	*	* 1.24	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	* 10.56	* *
* Frctn Loss (ft)	* 0.12	* Cum Volume (acre-ft)	* 3.34	*	* 39.09	* 9.72 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.52	*	* 8.88	* 6.99 *

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2766.51	* Element	* Left OB	*	* Channel	* Right OB *
* Vel Head (ft)	* 1.88	* Wt. n-Val.	*	*	* 0.030	* *
* W.S. Elev (ft)	* 2764.63	* Reach Len. (ft)	* 23.86	*	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2764.27	* Flow Area (sq ft)	*	*	* 908.85	* *
* E.G. Slope (ft/ft)	*0.006513	* Area (sq ft)	*	*	* 908.85	* *
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*	*10000.00	* *
* Top Width (ft)	* 196.11	* Top Width (ft)	*	*	* 196.11	* *
* Vel Total (ft/s)	* 11.00	* Avg. Vel. (ft/s)	*	*	* 11.00	* *
* Max Chl Dpth (ft)	* 7.74	* Hydr. Depth (ft)	*	*	* 4.63	* *
* Conv. Total (cfs)	*123907.9	* Conv. (cfs)	*	*	*123907.9	* *
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	*	* 199.02	* *
* Min Ch El (ft)	* 2756.89	* Shear (lb/sq ft)	*	*	* 1.86	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	* 20.43	* *
* Frctn Loss (ft)	* 0.13	* Cum Volume (acre-ft)	* 24.17	*	* 71.44	* 58.21 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 9.16	*	* 10.71	* 17.92 *

OSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 145.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2772.48	40.14	2771.73	61.53	2771.62	87.68	2771.48	88.99	2771.48
91.38	2771.46	93.81	2771.45	152.2	2770.91	172.82	2770.83	181.41	2770.8
181.77	2770.8	234.62	2770.51	256.45	2770.48	271.89	2770.48	285.1	2771.02
299.52	2771.02	308.49	2771.02	326.14	2771.57	334.06	2771.57	376.27	2771.57
392.07	2771.57	399.68	2771.02	402.31	2770.29	402.62	2770.48	414.25	2770.23
420.59	2770.16	420.79	2769.97	422.55	2769.25	423.5	2768.84	423.7	2768.59
424.86	2767.93	425.41	2768.57	425.79	2767.78	426.04	2767.28	427.29	2766.59
429.65	2765.8	430.11	2765.56	430.96	2765.12	432.13	2764.44	434.03	2763.69
434.29	2763.59	436.26	2762.88	436.52	2762.84	438.03	2762.32	438.96	2761.99
441.43	2761.33	443.07	2760.89	444.69	2760.68	447.96	2760.27	450.94	2759.62
453.17	2759.65	456.21	2760.61	462.33	2760.99	469.96	2760.6	472.72	2759.89
490.98	2760.76	493.17	2760.6	503.86	2759.87	508.84	2761.28	514.71	2759.75
528.05	2760	533.29	2758.61	535.77	2758.66	542.65	2757.39	557.87	2757.51
577.69	2756.77	581.39	2758.28	589.37	2759.75	598.57	2759.84	599.48	2759.84
599.76	2759.89	602.45	2760.36	606.18	2760.87	609.89	2761.39	613.59	2761.91
617.39	2762.43	621.54	2762.94	626.18	2763.46	627.07	2763.56	628.7	2765.17
630.78	2765.54	635.4	2766.37	640.11	2767.2	640.3	2767.29	643.32	2767.48
650.48	2768.17	651.27	2768.25	652.53	2768.32	652.76	2768.88	654.33	2769.51
656.08	2770.15	658.75	2770.85	659.3	2771.39	661.2	2770.98	662.51	2771.53
662.67	2771.54	667.02	2771.17	693.12	2770.3	707.59	2769.75	718.93	2769.75
719.7	2769.75	740.95	2769.75	761.32	2769.75	770.31	2769.75	825.65	2770.2
856.34	2770.2	890.76	2769.66	907.07	2769.66	908.8	2770.2	915.64	2770.2
925.95	2770.2	955.37	2770.66	962.84	2770.98	965.87	2770.92	971.48	2770.83
973.1	2770.91	975.54	2771.2	980.57	2771.8	980.86	2771.81	985.53	2771.93
995.42	2772.17	1006.98	2772.37	1007.5	2772.39	1015.69	2772.7	1019.32	2772.84
1025.41	2773.21	1026.93	2773.3						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	420.59	.03	640.11	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
420.59	640.11	23.86	18.79	11.8	.1	.3

OSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2773.39	* Element	* Left OB	*	* Channel	* Right OB *
* Vel Head (ft)	* 4.59	* Wt. n-Val.	*	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2768.80	* Reach Len. (ft)	* 23.86	*	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2769.10	* Flow Area (sq ft)	*	*	* 1800.68	* 12.70 *

E.G. Slope (ft/ft)	0.007389	Area (sq ft)		1800.68	12.70	
Q Total (cfs)	31000.00	Flow (cfs)		30964.50	35.50	
Top Width (ft)	229.19	Top Width (ft)		216.58	12.62	
Vel Total (ft/s)	17.10	Avg. Vel. (ft/s)		17.20	2.79	
Max Chl Dpth (ft)	12.03	Hydr. Depth (ft)		8.31	1.01	
Conv. Total (cfs)	360642.4	Conv. (cfs)		360229.4	413.0	
Length Wtd. (ft)	18.78	Wetted Per. (ft)		221.84	13.00	
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		3.74	0.45	
Alpha	1.01	Stream Power (lb/ft s)		64.39	1.26	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	50.31	93.74	96.84	
C & E Loss (ft)	0.03	Cum SA (acres)	12.07	10.67	18.32	

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2771.51	Element			
Vel Head (ft)	3.92	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.60	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.82	Flow Area (sq ft)		1541.65	0.77
E.G. Slope (ft/ft)	0.007592	Area (sq ft)		1541.65	0.77
Q Total (cfs)	24490.00	Flow (cfs)		24489.31	0.69
Top Width (ft)	218.64	Top Width (ft)		214.23	4.42
Vel Total (ft/s)	15.88	Avg. Vel. (ft/s)		15.89	0.90
Max Chl Dpth (ft)	10.83	Hydr. Depth (ft)		7.20	0.18
Conv. Total (cfs)	281071.7	Conv. (cfs)		281063.7	8.0
Length Wtd. (ft)	18.79	Wetted Per. (ft)		218.31	4.45
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		3.35	0.08
Alpha	1.00	Stream Power (lb/ft s)		53.17	0.07
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	45.66	91.83	91.77
C & E Loss (ft)	0.02	Cum SA (acres)	14.37	10.88	18.48

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	2774.61	Element			
Vel Head (ft)	2.96	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2771.65	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2771.65	Flow Area (sq ft)	220.16	2425.33	538.47
E.G. Slope (ft/ft)	0.003423	Area (sq ft)	220.16	2425.33	538.47
Q Total (cfs)	36000.00	Flow (cfs)	303.20	34284.95	1411.86
Top Width (ft)	924.32	Top Width (ft)	365.57	219.52	339.23
Vel Total (ft/s)	11.31	Avg. Vel. (ft/s)	1.38	14.14	2.62
Max Chl Dpth (ft)	14.88	Hydr. Depth (ft)	0.60	11.05	1.59
Conv. Total (cfs)	615327.1	Conv. (cfs)	5182.4	586012.6	24132.0
Length Wtd. (ft)	18.63	Wetted Per. (ft)	365.77	225.10	340.56
Min Ch El (ft)	2756.77	Shear (lb/sq ft)	0.13	2.30	0.34
Alpha	1.49	Stream Power (lb/ft s)	0.18	32.55	0.89
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	56.70	99.12	106.14
C & E Loss (ft)	0.04	Cum SA (acres)	12.44	10.68	18.67

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: 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 #PF 4

			Left OB	Channel	Right OB
E.G. Elev (ft)	2760.91	Element			
Vel Head (ft)	0.41	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.49	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.07	Flow Area (sq ft)		193.97	
E.G. Slope (ft/ft)	0.006284	Area (sq ft)		193.97	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	127.62	Top Width (ft)		127.62	
Vel Total (ft/s)	5.16	Avg. Vel. (ft/s)		5.16	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		1.52	
Conv. Total (cfs)	12615.0	Conv. (cfs)		12615.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		128.93	
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		3.04	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	2.91	36.71	8.49
C & E Loss (ft)	0.00	Cum SA (acres)	2.20	8.68	6.73

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2763.93	Element			
Vel Head (ft)	1.20	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.73	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.45	Flow Area (sq ft)		568.55	
E.G. Slope (ft/ft)	0.007058	Area (sq ft)		568.55	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	183.01	Top Width (ft)		183.01	
Vel Total (ft/s)	8.79	Avg. Vel. (ft/s)		8.79	
Max Chl Dpth (ft)	5.96	Hydr. Depth (ft)		3.11	
Conv. Total (cfs)	59516.9	Conv. (cfs)		59516.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		185.04	
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		1.35	
Alpha	1.00	Stream Power (lb/ft s)		11.91	
rctn Loss (ft)	0.15	Cum Volume (acre-ft)	3.34	38.84	9.72
& E Loss (ft)	0.02	Cum SA (acres)	2.52	8.80	6.99

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2766.37	Element			
Vel Head (ft)	1.97	Wt. n-Val.		0.030	

* W.S. Elev (ft)	* 2764.40	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	* 2764.15	* Flow Area (sq ft)	*		*	887.87	*		*
* E.G. Slope (ft/ft)	*0.007013	* Area (sq ft)	*		*	887.87	*		*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*		*	10000.00	*		*
* Top Width (ft)	* 195.70	* Top Width (ft)	*		*	195.70	*		*
* Vel Total (ft/s)	* 11.26	* Avg. Vel. (ft/s)	*		*	11.26	*		*
* Max Chl Dpth (ft)	* 7.63	* Hydr. Depth (ft)	*		*	4.54	*		*
Conv. Total (cfs)	*119414.4	* Conv. (cfs)	*		*	119414.4	*		*
Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*		*	198.43	*		*
* Min Ch El (ft)	* 2756.77	* Shear (lb/sq ft)	*		*	1.96	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		*	22.06	*		*
* Frctn Loss (ft)	* 0.14	* Cum Volume (acre-ft)	*	24.17	*	71.05	*	58.21	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	9.16	*	10.63	*	17.92	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 144.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2772.02	42.68	2771.32	65.43	2771.19	93.24	2771.03	94.63	2771.02
97.17	2771.01	99.76	2770.99	161.84	2770.43	183.78	2770.36	192.91	2770.33
193.29	2770.33	249.49	2770.06	272.71	2770.02	289.12	2770.02	303.18	2770.48
318.51	2770.48	328.04	2770.48	346.81	2770.93	355.23	2770.93	400.12	2770.93
416.92	2770.93	425.01	2770.48	427.81	2769.86	428.14	2770.02	440.51	2769.82
447.25	2769.77	447.44	2769.61	449.12	2768.95	450.02	2768.57	450.2	2768.36
451.31	2767.77	451.83	2768.28	452.2	2767.61	452.43	2767.18	453.62	2766.56
455.86	2765.81	456.3	2765.59	457.11	2765.19	458.22	2764.58	460.02	2763.88
460.28	2763.79	462.14	2763.1	462.39	2763.06	463.83	2762.56	464.71	2762.24
467.06	2761.57	468.61	2761.11	470.16	2760.86	473.26	2760.35	476.1	2759.55
478.22	2759.59	481.11	2760.39	486.92	2760.72	494.18	2760.4	496.8	2759.81
514.16	2760.56	516.25	2760.43	526.4	2759.84	531.14	2761.02	536.72	2759.75
549.4	2759.97	554.38	2758.82	556.74	2758.87	563.28	2757.3	577.74	2757.34
596.59	2756.66	600.78	2758.2	609.82	2759.41	620.25	2759.46	621.28	2759.45
621.59	2759.5	624.64	2759.88	628.87	2760.3	633.07	2760.72	637.27	2761.14
641.57	2761.57	646.28	2761.98	651.54	2762.4	652.55	2762.48	654.39	2764.34
656.75	2764.7	661.99	2765.49	667.32	2766.3	667.5	2766.37	670.33	2766.55
677.04	2767.27	677.78	2767.35	678.96	2767.43	679.17	2767.9	680.64	2768.46
682.29	2769.03	684.78	2769.66	685.3	2770.13	687.09	2769.83	688.31	2770.32
688.46	2770.32	692.53	2769.93	716.99	2769.2	730.54	2768.75	741.18	2768.75
741.89	2768.75	761.8	2768.75	780.89	2768.75	789.31	2768.75	841.17	2769.3
869.92	2769.3	902.17	2768.84	917.45	2768.84	919.07	2769.3	925.48	2769.3
935.14	2769.3	962.7	2769.84	969.71	2770.23	972.55	2770.23	977.81	2770.25
979.32	2770.34	981.6	2770.63	986.32	2771.21	986.59	2771.22	990.96	2771.4
1000.23	2771.77	1011.07	2772.09	1011.55	2772.11	1019.22	2772.49	1022.62	2772.66
1028.34	2773.1	1029.75	2773.2						

nning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	447.25	.03	667.32	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
447.25	667.32	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2773.21	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.87	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2768.34	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2769.48	* Flow Area (sq ft)	*	* 1745.92	* 17.59	*
* E.G. Slope (ft/ft)	*0.008168	* Area (sq ft)	*	* 1745.92	* 17.59	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30937.25	* 62.75	*
* Top Width (ft)	* 230.10	* Top Width (ft)	*	* 217.09	* 13.01	*
* Vel Total (ft/s)	* 17.58	* Avg. Vel. (ft/s)	*	* 17.72	* 3.57	*
* Max Chl Dpth (ft)	* 11.68	* Hydr. Depth (ft)	*	* 8.04	* 1.35	*
* Conv. Total (cfs)	*343001.2	* Conv. (cfs)	*	*342306.9	* 694.2	*
* Length Wtd. (ft)	* 18.70	* Wetted Per. (ft)	*	* 221.69	* 13.46	*
* Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)	*	* 4.02	* 0.67	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*	* 71.16	* 2.38	*
* Frctn Loss (ft)	* 0.15	* Cum Volume (acre-ft)	* 50.31	* 92.98	* 96.84	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 12.07	* 10.57	* 18.32	*

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2771.30	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 3.67	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2767.62	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2767.63	* Flow Area (sq ft)	*	* 1590.52	* 8.83	*
* E.G. Slope (ft/ft)	*0.006860	* Area (sq ft)	*	* 1590.52	* 8.83	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24470.24	* 19.76	*
* Top Width (ft)	* 226.85	* Top Width (ft)	*	* 215.13	* 11.73	*
* Vel Total (ft/s)	* 15.31	* Avg. Vel. (ft/s)	*	* 15.39	* 2.24	*
* Max Chl Dpth (ft)	* 10.96	* Hydr. Depth (ft)	*	* 7.39	* 0.75	*
* Conv. Total (cfs)	*295691.4	* Conv. (cfs)	*	*295452.9	* 238.5	*
* Length Wtd. (ft)	* 18.78	* Wetted Per. (ft)	*	* 218.99	* 11.92	*
* Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)	*	* 3.11	* 0.32	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*	* 47.85	* 0.71	*
* Frctn Loss (ft)	* 0.14	* Cum Volume (acre-ft)	* 45.66	* 91.16	* 91.76	*
* C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 14.37	* 10.79	* 18.48	*

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2774.36	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.72	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2769.63	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2771.29	* Flow Area (sq ft)	*	* 2027.60	* 181.31	*

* E.G. Slope (ft/ft)	*0.006682	* Area (sq ft)	*		* 2027.60	* 181.31 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*35568.54	* 431.46 *
* Top Width (ft)	* 486.90	* Top Width (ft)	*		* 219.91	* 266.99 *
* Vel Total (ft/s)	* 16.30	* Avg. Vel. (ft/s)	*		* 17.54	* 2.38 *
* Max Chl Dpth (ft)	* 12.97	* Hydr. Depth (ft)	*		* 9.22	* 0.68 *
* Conv. Total (cfs)	*440409.0	* Conv. (cfs)	*		*435130.7	* 5278.3 *
* Length Wtd. (ft)	* 18.70	* Wetted Per. (ft)	*		* 224.82	* 267.72 *
Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)	*		* 3.76	* 0.28 *
Alpha	* 1.14	* Stream Power (lb/ft s)	*		* 66.00	* 0.67 *
* Frctn Loss (ft)	* 0.09	* Cum Volume (acre-ft)	*	56.64	* 98.16	* 106.05 *
* C & E Loss (ft)	* 0.18	* Cum SA (acres)	*	12.34	* 10.59	* 18.59 *

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.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 4

			Left OB	Channel	Right OB
* E.G. Elev (ft)	* 2760.78	* Element			
* Vel Head (ft)	* 0.46	* Wt. n-Val.		* 0.030	
* W.S. Elev (ft)	* 2760.32	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2760.00	* Flow Area (sq ft)		* 183.94	
* E.G. Slope (ft/ft)	*0.007410	* Area (sq ft)		* 183.94	
* Q Total (cfs)	* 1000.00	* Flow (cfs)		* 1000.00	
* Top Width (ft)	* 126.60	* Top Width (ft)		* 126.60	
* Vel Total (ft/s)	* 5.44	* Avg. Vel. (ft/s)		* 5.44	
* Max Chl Dpth (ft)	* 3.66	* Hydr. Depth (ft)		* 1.45	
* Conv. Total (cfs)	* 11617.2	* Conv. (cfs)		* 11617.2	
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)		* 127.75	
* Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)		* 0.67	
* Alpha	* 1.00	* Stream Power (lb/ft s)		* 3.62	
* Frctn Loss (ft)	* 0.15	* Cum Volume (acre-ft)	* 2.91	* 36.63	* 8.49 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.20	* 8.62	* 6.73 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
* E.G. Elev (ft)	* 2763.76	* Element			
* Vel Head (ft)	* 1.42	* Wt. n-Val.		* 0.030	
* W.S. Elev (ft)	* 2762.34	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2762.34	* Flow Area (sq ft)		* 522.79	
* E.G. Slope (ft/ft)	*0.009536	* Area (sq ft)		* 522.79	
* Q Total (cfs)	* 5000.00	* Flow (cfs)		* 5000.00	
* Top Width (ft)	* 186.31	* Top Width (ft)		* 186.31	
* Vel Total (ft/s)	* 9.56	* Avg. Vel. (ft/s)		* 9.56	
* Max Chl Dpth (ft)	* 5.68	* Hydr. Depth (ft)		* 2.81	
* Conv. Total (cfs)	* 51203.3	* Conv. (cfs)		* 51203.3	
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)		* 188.01	
Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)		* 1.66	
Alpha	* 1.00	* Stream Power (lb/ft s)		* 15.83	
Frctn Loss (ft)	* 0.18	* Cum Volume (acre-ft)	* 3.34	* 38.61	* 9.72 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 2.52	* 8.72	* 6.99 *

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 #PF 6

			Left OB	Channel	Right OB
* E.G. Elev (ft)	* 2766.20	* Element			
* Vel Head (ft)	* 2.20	* Wt. n-Val.		* 0.030	
* W.S. Elev (ft)	* 2764.00	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2764.00	* Flow Area (sq ft)		* 840.44	
* E.G. Slope (ft/ft)	*0.008338	* Area (sq ft)		* 840.44	
* Q Total (cfs)	*10000.00	* Flow (cfs)		*10000.00	
* Top Width (ft)	* 194.34	* Top Width (ft)		* 194.34	
* Vel Total (ft/s)	* 11.90	* Avg. Vel. (ft/s)		* 11.90	
* Max Chl Dpth (ft)	* 7.34	* Hydr. Depth (ft)		* 4.32	
* Conv. Total (cfs)	*109511.6	* Conv. (cfs)		*109511.6	
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)		* 196.96	
* Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)		* 2.22	
* Alpha	* 1.00	* Stream Power (lb/ft s)		* 26.43	
* Frctn Loss (ft)	* 0.16	* Cum Volume (acre-ft)	* 24.17	* 70.68	* 58.21 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 9.16	* 10.54	* 17.92 *

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

RIVER: River #1
REACH: Reach #1 RS: 143.*

PUT
cription:
ation Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2771.57	45.22	2770.92	69.33	2770.76	98.8	2770.58	100.27	2770.57
102.96	2770.55	105.7	2770.53	171.49	2769.94	194.73	2769.89	204.4	2769.86
204.81	2769.86	264.36	2769.61	288.97	2769.57	306.35	2769.57	321.25	2769.93

337.5	2769.93	347.6	2769.93	367.49	2770.3	376.41	2770.3	423.98	2770.3
441.78	2770.3	450.35	2769.93	453.31	2769.44	453.66	2769.57	466.77	2769.41
473.91	2769.39	474.09	2769.25	475.68	2768.65	476.54	2768.31	476.71	2768.13
477.76	2767.61	478.25	2767.99	478.6	2767.44	478.82	2767.08	479.94	2766.53
482.07	2765.82	482.49	2765.62	483.25	2765.26	484.31	2764.72	486.02	2764.06
486.26	2763.98	488.03	2763.33	488.26	2763.28	489.63	2762.8	490.46	2762.49
492.69	2761.8	494.16	2761.34	495.62	2761.04	498.57	2760.43	501.26	2759.49
503.27	2759.52	506.01	2760.17	511.52	2760.44	518.4	2760.2	520.88	2759.73
537.34	2760.36	539.32	2760.26	548.94	2759.8	553.44	2760.75	558.73	2759.75
570.75	2759.95	575.47	2759.04	577.7	2759.08	583.9	2757.21	597.62	2757.18
615.48	2756.54	620.16	2758.13	630.27	2759.07	641.92	2759.07	643.08	2759.07
643.43	2759.1	646.83	2759.4	651.56	2759.72	656.26	2760.05	660.95	2760.38
665.76	2760.7	671.02	2761.02	676.9	2761.34	678.02	2761.4	680.08	2763.51
682.72	2763.86	688.57	2764.62	694.53	2765.39	694.7	2765.45	697.34	2765.62
703.6	2766.36	704.29	2766.45	705.39	2766.55	705.59	2766.93	706.96	2767.41
708.49	2767.91	710.82	2768.48	711.31	2768.87	712.97	2768.67	714.11	2769.1
714.25	2769.11	718.05	2768.7	740.86	2768.11	753.5	2767.75	763.42	2767.75
764.09	2767.75	782.66	2767.75	800.46	2767.75	808.31	2767.75	856.68	2768.39
883.5	2768.39	913.58	2768.02	927.83	2768.02	929.35	2768.39	935.32	2768.39
944.33	2768.39	970.04	2769.02	976.58	2769.48	979.22	2769.53	984.13	2769.67
985.54	2769.77	987.67	2770.05	992.07	2770.62	992.32	2770.63	996.4	2770.87
1005.04	2771.37	1015.15	2771.81	1015.6	2771.84	1022.76	2772.28	1025.93	2772.48
1031.26	2772.99	1032.58	2773.11						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	473.91	.03	694.53	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
473.91	694.53	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

Element		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	2772.71	Element			
Vel Head (ft)	3.61	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2769.10	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.47	Flow Area (sq ft)		1963.96	280.16
E.G. Slope (ft/ft)	0.005376	Area (sq ft)		1963.96	280.16
Q Total (cfs)	31000.00	Flow (cfs)		30285.18	714.82
Top Width (ft)	496.33	Top Width (ft)		220.03	276.29
Vel Total (ft/s)	13.81	Avg. Vel. (ft/s)		15.42	2.55
Max Chl Dpth (ft)	12.56	Hydr. Depth (ft)		8.93	1.01
Conv. Total (cfs)	422808.7	Conv. (cfs)		413059.3	9749.4
Length Wtd. (ft)	18.65	Wetted Per. (ft)		224.45	277.14
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		2.94	0.34
Alpha	1.22	Stream Power (lb/ft s)		45.28	0.87
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	50.31	92.18	96.79
C & E Loss (ft)	0.38	Cum SA (acres)	12.07	10.48	18.28

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.

CROSS SECTION OUTPUT Profile #PF 2

Element		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	2771.10	Element			
Vel Head (ft)	4.22	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.88	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.33	Flow Area (sq ft)		1482.85	10.17
E.G. Slope (ft/ft)	0.008643	Area (sq ft)		1482.85	10.17
Q Total (cfs)	24490.00	Flow (cfs)		24460.91	29.09
Top Width (ft)	226.34	Top Width (ft)		215.31	11.03
Vel Total (ft/s)	16.40	Avg. Vel. (ft/s)		16.50	2.86
Max Chl Dpth (ft)	10.34	Hydr. Depth (ft)		6.89	0.92
Conv. Total (cfs)	263420.8	Conv. (cfs)		263107.8	312.9
Length Wtd. (ft)	18.76	Wetted Per. (ft)		218.70	11.31
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		3.66	0.49
Alpha	1.01	Stream Power (lb/ft s)		60.35	1.39
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	45.66	90.49	91.76
C & E Loss (ft)	0.05	Cum SA (acres)	14.37	10.69	18.48

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

CROSS SECTION OUTPUT Profile #PF 3

Element		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	2774.15	Element			
Vel Head (ft)	5.38	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2768.77	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.83	Flow Area (sq ft)		1891.42	191.23
E.G. Slope (ft/ft)	0.008315	Area (sq ft)		1891.42	191.23
Q Total (cfs)	36000.00	Flow (cfs)		35474.81	525.19
Top Width (ft)	479.04	Top Width (ft)		219.16	259.88
Vel Total (ft/s)	17.29	Avg. Vel. (ft/s)		18.76	2.75
Max Chl Dpth (ft)	12.23	Hydr. Depth (ft)		8.63	0.74
Conv. Total (cfs)	394788.2	Conv. (cfs)		389028.8	5759.4
Length Wtd. (ft)	18.67	Wetted Per. (ft)		223.52	260.61
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		4.39	0.38
Alpha	1.16	Stream Power (lb/ft s)		82.39	1.05
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	56.64	97.31	106.00
C & E Loss (ft)	0.07	Cum SA (acres)	12.34	10.49	18.52

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.

CROSS SECTION OUTPUT Profile #PF 4

Element		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	2760.62	Element			
Vel Head (ft)	0.53	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.10	Reach Len. (ft)	23.86	18.79	11.80

Crit W.S. (ft)	2759.90	Flow Area (sq ft)			171.80		
E.G. Slope (ft/ft)	0.009166	Area (sq ft)			171.80		
Q Total (cfs)	1000.00	Flow (cfs)			1000.00		
Top Width (ft)	125.33	Top Width (ft)			125.33		
Vel Total (ft/s)	5.82	Avg. Vel. (ft/s)			5.82		
Max Chl Dpth (ft)	3.56	Hydr. Depth (ft)			1.37		
Conv. Total (cfs)	10444.9	Conv. (cfs)			10444.9		
Length Wtd. (ft)	18.79	Wetted Per. (ft)			126.33		
Min Ch El (ft)	2756.54	Shear (lb/sq ft)			0.78		
Alpha	1.00	Stream Power (lb/ft s)			4.53		
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)		2.91	36.55		8.49
C & E Loss (ft)	0.02	Cum SA (acres)		2.20	8.57		6.73

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2763.56	Element			
Vel Head (ft)	1.53	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.03	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.14	Flow Area (sq ft)		504.01	
E.G. Slope (ft/ft)	0.010805	Area (sq ft)		504.01	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	186.70	Top Width (ft)		186.70	
Vel Total (ft/s)	9.92	Avg. Vel. (ft/s)		9.92	
Max Chl Dpth (ft)	5.49	Hydr. Depth (ft)		2.70	
Conv. Total (cfs)	48102.3	Conv. (cfs)		48102.3	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		188.43	
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		1.80	
Alpha	1.00	Stream Power (lb/ft s)		17.90	
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	3.34	38.39	9.72
C & E Loss (ft)	0.01	Cum SA (acres)	2.52	8.64	6.99

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2766.01	Element			
Vel Head (ft)	2.39	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.63	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2763.82	Flow Area (sq ft)		806.48	
E.G. Slope (ft/ft)	0.009527	Area (sq ft)		806.48	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	193.72	Top Width (ft)		193.72	
Vel Total (ft/s)	12.40	Avg. Vel. (ft/s)		12.40	
Max Chl Dpth (ft)	7.08	Hydr. Depth (ft)		4.16	
Conv. Total (cfs)	102449.7	Conv. (cfs)		102449.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		196.35	
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		2.44	
Alpha	1.00	Stream Power (lb/ft s)		30.29	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	24.17	70.32	58.21
C & E Loss (ft)	0.02	Cum SA (acres)	9.16	10.46	17.92

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 142.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2771.11	47.77	2770.51	73.23	2770.34	104.35	2770.12	105.91	2770.11
108.75	2770.09	111.65	2770.07	181.14	2769.46	205.69	2769.42	215.9	2769.4
216.33	2769.4	279.23	2769.17	305.22	2769.11	323.59	2769.11	339.32	2769.39
356.48	2769.39	367.15	2769.39	388.16	2769.66	397.58	2769.66	447.83	2769.66
466.63	2769.66	475.68	2769.39	478.81	2769.02	479.18	2769.11	493.03	2768.99
500.57	2769.01	500.74	2768.9	502.24	2768.35	503.05	2768.04	503.22	2767.9
504.21	2767.44	504.68	2767.7	505	2767.27	505.21	2766.98	506.27	2766.5
508.28	2765.83	508.68	2765.65	509.4	2765.33	510.4	2764.85	512.02	2764.25
512.24	2764.17	513.91	2763.55	514.13	2763.5	515.43	2763.04	516.22	2762.73
518.32	2762.04	519.71	2761.57	521.09	2761.21	523.88	2760.51	526.42	2759.43
528.32	2759.45	530.91	2759.95	536.12	2760.16	542.62	2760	544.97	2759.65
560.52	2760.16	562.39	2760.09	571.49	2759.77	575.73	2760.49	580.74	2759.75
592.1	2759.93	596.56	2759.25	598.67	2759.29	604.53	2757.12	617.49	2757.01
634.38	2756.42	639.55	2758.05	650.72	2758.72	663.6	2758.69	664.87	2758.68
665.26	2758.71	669.03	2758.92	674.25	2759.15	679.44	2759.38	684.63	2759.61
689.94	2759.84	695.76	2760.06	702.25	2760.28	703.5	2760.32	705.77	2762.69
708.69	2763.02	715.16	2763.74	721.74	2764.48	721.9	2764.52	724.35	2764.68
730.16	2765.46	730.8	2765.55	731.82	2765.66	732	2765.95	733.27	2766.36
734.7	2766.79	736.86	2767.3	737.31	2767.61	738.85	2767.52	739.91	2767.88
740.04	2767.89	743.56	2767.46	764.73	2767.02	776.46	2766.75	785.66	2766.75
786.28	2766.75	803.51	2766.75	820.03	2766.75	827.32	2766.75	872.2	2767.48
897.08	2767.48	924.99	2767.2	938.22	2767.2	939.62	2767.48	945.17	2767.48
953.53	2767.48	977.38	2768.2	983.44	2768.72	985.9	2768.84	990.45	2769.08
991.76	2769.2	993.73	2769.48	997.81	2770.03	998.05	2770.05	1001.83	2770.34
1009.85	2770.96	1019.23	2771.54	1019.65	2771.57	1026.29	2772.07	1029.23	2772.3
1034.18	2772.88	1035.4	2773.02						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	500.57	.03	721.74	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
500.57	721.74	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2772.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.65	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.83	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.04	Flow Area (sq ft)		1749.13	184.06
E.G. Slope (ft/ft)	0.007925	Area (sq ft)		1749.13	184.06
Q Total (cfs)	31000.00	Flow (cfs)		30510.07	489.93
Top Width (ft)	460.92	Top Width (ft)		218.37	242.56
Vel Total (ft/s)	16.04	Avg. Vel. (ft/s)		17.44	2.66
Max Chl Dpth (ft)	11.41	Hydr. Depth (ft)		8.01	0.76
Conv. Total (cfs)	348222.8	Conv. (cfs)		342719.4	5503.4
Length Wtd. (ft)	18.67	Wetted Per. (ft)		222.31	243.20
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		3.89	0.37
Alpha	1.16	Stream Power (lb/ft s)		67.90	1.00
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	50.31	91.38	96.73
C & E Loss (ft)	0.10	Cum SA (acres)	12.07	10.38	18.21

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.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2770.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.41	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.31	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.42	Flow Area (sq ft)		1635.29	72.85
E.G. Slope (ft/ft)	0.006233	Area (sq ft)		1635.29	72.85
Q Total (cfs)	24490.00	Flow (cfs)		24328.30	161.70
Top Width (ft)	366.58	Top Width (ft)		216.77	149.82
Vel Total (ft/s)	14.34	Avg. Vel. (ft/s)		14.88	2.22
Max Chl Dpth (ft)	10.89	Hydr. Depth (ft)		7.54	0.49
Conv. Total (cfs)	310209.6	Conv. (cfs)		308161.3	2048.2
Length Wtd. (ft)	18.75	Wetted Per. (ft)		220.36	150.26
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		2.89	0.19
Alpha	1.07	Stream Power (lb/ft s)		42.96	0.42
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	45.66	89.82	91.75
C & E Loss (ft)	0.24	Cum SA (acres)	14.37	10.60	18.46

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.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2773.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.92	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2768.02	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.32	Flow Area (sq ft)		1790.27	230.43
E.G. Slope (ft/ft)	0.009831	Area (sq ft)		1790.27	230.43
Q Total (cfs)	36000.00	Flow (cfs)		35285.93	714.07
Top Width (ft)	468.24	Top Width (ft)		218.66	249.57
Vel Total (ft/s)	17.82	Avg. Vel. (ft/s)		19.71	3.10
Max Chl Dpth (ft)	11.60	Hydr. Depth (ft)		8.19	0.92
Conv. Total (cfs)	363082.7	Conv. (cfs)		355880.9	7201.8
Length Wtd. (ft)	18.62	Wetted Per. (ft)		222.66	250.23
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		4.93	0.57
Alpha	1.20	Stream Power (lb/ft s)		97.26	1.75
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	56.64	96.52	105.94
C & E Loss (ft)	0.05	Cum SA (acres)	12.34	10.40	18.45

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2760.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.77	Wt. n-Val.		0.030	
W.S. Elev (ft)	2759.64	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2759.64	Flow Area (sq ft)		142.36	
E.G. Slope (ft/ft)	0.011829	Area (sq ft)		142.36	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	94.82	Top Width (ft)		94.82	
Vel Total (ft/s)	7.02	Avg. Vel. (ft/s)		7.02	
Max Chl Dpth (ft)	3.22	Hydr. Depth (ft)		1.50	
Conv. Total (cfs)	9194.4	Conv. (cfs)		9194.4	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		95.61	
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		1.10	
Alpha	1.00	Stream Power (lb/ft s)		7.72	
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	2.91	36.48	8.49
C & E Loss (ft)	0.02	Cum SA (acres)	2.20	8.52	6.73

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2763.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.67	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.67	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2761.89	Flow Area (sq ft)		482.82	
E.G. Slope (ft/ft)	0.012368	Area (sq ft)		482.82	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	185.39	Top Width (ft)		185.39	
Vel Total (ft/s)	10.36	Avg. Vel. (ft/s)		10.36	
Max Chl Dpth (ft)	5.25	Hydr. Depth (ft)		2.60	

* Conv. Total (cfs)	* 44959.4	* Conv. (cfs)	*	* 44959.4	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 187.30	*	*
* Min Ch El (ft)	* 2756.42	* Shear (lb/sq ft)	*	* 1.99	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 20.61	*	*
* Frctn Loss (ft)	* 0.22	* Cum Volume (acre-ft)	* 3.34	* 38.17	* 9.72	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.52	* 8.56	* 6.99	*

ROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2765.80	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.56	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2763.24	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2763.60	* Flow Area (sq ft)	*	* 778.45	* *
* E.G. Slope (ft/ft)	*0.010868	* Area (sq ft)	*	* 778.45	* *
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	* *
* Top Width (ft)	* 195.74	* Top Width (ft)	*	* 195.74	* *
* Vel Total (ft/s)	* 12.85	* Avg. Vel. (ft/s)	*	* 12.85	* *
* Max Chl Dpth (ft)	* 6.81	* Hydr. Depth (ft)	*	* 3.98	* *
* Conv. Total (cfs)	* 95921.6	* Conv. (cfs)	*	* 95921.6	* *
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 198.39	* *
* Min Ch El (ft)	* 2756.42	* Shear (lb/sq ft)	*	* 2.66	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 34.20	* *
* Frctn Loss (ft)	* 0.19	* Cum Volume (acre-ft)	* 24.17	* 69.98	* 58.21 *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 9.16	* 10.37	* 17.92 *

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 141.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2770.66	50.31	2770.11	77.13	2769.91	109.91	2769.67	111.55	2769.66
114.54	2769.64	117.59	2769.61	190.79	2769.97	216.64	2768.94	227.4	2768.93
227.86	2768.93	294.1	2768.72	321.48	2768.66	340.82	2768.66	357.39	2768.84
375.47	2768.84	386.71	2768.84	408.83	2769.02	418.76	2769.02	471.68	2769.02
491.48	2769.02	501.02	2768.84	504.31	2768.6	504.7	2768.66	519.28	2768.58
527.23	2768.63	527.39	2768.54	528.8	2768.05	529.57	2767.77	529.72	2767.66
530.66	2767.28	531.1	2767.41	531.4	2767.09	531.6	2766.89	532.6	2766.47
534.49	2765.84	534.87	2765.69	535.55	2765.4	536.49	2764.99	538.01	2764.44
538.22	2764.36	539.8	2763.78	540.01	2763.72	541.22	2763.27	541.97	2762.98
543.95	2762.28	545.26	2761.79	546.56	2761.39	549.19	2760.59	551.58	2759.37
553.37	2759.39	555.81	2759.73	560.71	2759.89	566.84	2759.8	569.05	2759.57
583.7	2759.96	585.46	2759.92	594.03	2759.73	598.03	2760.23	602.74	2759.75
613.45	2759.9	617.65	2759.47	619.64	2759.5	625.16	2757.03	637.36	2756.84
653.27	2756.3	658.94	2757.97	671.17	2758.38	685.27	2758.31	686.67	2758.3
687.09	2758.31	691.22	2758.44	696.94	2758.57	702.63	2758.71	708.31	2758.84
714.13	2758.97	720.49	2759.1	727.61	2759.22	728.97	2759.25	731.47	2761.86
734.66	2762.17	741.74	2762.87	748.96	2763.57	749.1	2763.6	751.36	2763.75
756.71	2764.56	757.31	2764.65	758.25	2764.77	758.42	2764.98	759.59	2765.32
760.9	2765.67	762.89	2766.12	763.31	2766.35	764.73	2766.37	765.71	2766.66
765.83	2766.67	769.08	2766.22	788.6	2765.93	799.42	2765.75	807.9	2765.75
808.48	2765.75	824.37	2765.75	839.6	2765.75	846.32	2765.75	887.71	2766.57
910.66	2766.57	936.4	2766.39	948.6	2766.39	949.89	2766.57	955.01	2766.57
962.72	2766.57	984.72	2767.39	990.31	2767.97	992.57	2768.14	996.77	2768.5
997.98	2768.64	999.8	2768.9	1003.56	2769.44	1003.78	2769.46	1007.27	2769.81
1014.67	2770.56	1023.32	2771.26	1023.7	2771.3	1029.83	2771.86	1032.54	2772.11
1037.1	2772.77	1038.23	2772.93						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	527.23	.03	748.96	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
527.23	748.96	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2772.25	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 5.27	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2766.98	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2768.55	* Flow Area (sq ft)	*	* 1635.54	* 196.56 *
* E.G. Slope (ft/ft)	*0.009774	* Area (sq ft)	*	* 1635.54	* 196.56 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30414.16	* 585.84 *
* Top Width (ft)	* 442.29	* Top Width (ft)	*	* 217.45	* 224.84 *
* Vel Total (ft/s)	* 16.92	* Avg. Vel. (ft/s)	*	* 18.60	* 2.98 *
* Max Chl Dpth (ft)	* 10.68	* Hydr. Depth (ft)	*	* 7.52	* 0.87 *
* Conv. Total (cfs)	*313560.3	* Conv. (cfs)	*	*307634.6	* 5925.7 *
* Length Wtd. (ft)	* 18.63	* Wetted Per. (ft)	*	* 221.01	* 225.33 *
* Min Ch El (ft)	* 2756.30	* Shear (lb/sq ft)	*	* 4.52	* 0.53 *
* Alpha	* 1.19	* Stream Power (lb/ft s)	*	* 83.97	* 1.59 *
* Frctn Loss (ft)	* 0.16	* Cum Volume (acre-ft)	* 50.31	* 90.65	* 96.68 *
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	* 12.07	* 10.29	* 18.15 *

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	* 2770.49	* Element	* Left OB	* Channel	* Right OB *
Vel Head (ft)	* 4.35	* Wt. n-Val.	*	* 0.030	* 0.045 *
W.S. Elev (ft)	* 2766.13	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2767.42	* Flow Area (sq ft)	*	* 1451.79	* 47.78 *
* E.G. Slope (ft/ft)	*0.009204	* Area (sq ft)	*	* 1451.79	* 47.78 *
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24364.44	* 125.56 *
* Top Width (ft)	* 320.18	* Top Width (ft)	*	* 215.35	* 104.82 *
* Vel Total (ft/s)	* 16.33	* Avg. Vel. (ft/s)	*	* 16.78	* 2.63 *

Max Chl Dpth (ft)	9.83	Hydr. Depth (ft)		6.74	0.46	
Conv. Total (cfs)	255273.5	Conv. (cfs)		253964.7	1308.8	
Length Wtd. (ft)	18.74	Wetted Per. (ft)		218.73	105.16	
Min Ch El (ft)	2756.30	Shear (lb/sq ft)		3.81	0.26	
Alpha	1.05	Stream Power (lb/ft s)		64.00	0.69	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	45.66	89.15	91.73	
C & E Loss (ft)	0.09	Cum SA (acres)	14.37	10.51	18.42	

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.

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	2773.69	Element			
Vel Head (ft)	6.41	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.27	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.74	Flow Area (sq ft)		1698.44	262.68
E.G. Slope (ft/ft)	0.011439	Area (sq ft)		1698.44	262.68
Q Total (cfs)	36000.00	Flow (cfs)		34995.41	1004.58
Top Width (ft)	450.33	Top Width (ft)		217.73	232.60
Vel Total (ft/s)	18.36	Avg. Vel. (ft/s)		20.60	3.82
Max Chl Dpth (ft)	10.97	Hydr. Depth (ft)		7.80	1.13
Conv. Total (cfs)	336601.5	Conv. (cfs)		327208.6	9392.9
Length Wtd. (ft)	18.56	Wetted Per. (ft)		221.41	233.09
Min Ch El (ft)	2756.30	Shear (lb/sq ft)		5.48	0.80
Alpha	1.23	Stream Power (lb/ft s)		112.87	3.08
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	56.64	95.77	105.87
C & E Loss (ft)	0.05	Cum SA (acres)	12.34	10.30	18.38

CROSS SECTION OUTPUT Profile #PF 4

			Left OB	Channel	Right OB
E.G. Elev (ft)	2760.13	Element			
Vel Head (ft)	0.90	Wt. n-Val.		0.030	
W.S. Elev (ft)	2759.23	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2759.39	Flow Area (sq ft)		131.42	
E.G. Slope (ft/ft)	0.018243	Area (sq ft)		131.42	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	107.60	Top Width (ft)		107.60	
Vel Total (ft/s)	7.61	Avg. Vel. (ft/s)		7.61	
Max Chl Dpth (ft)	2.93	Hydr. Depth (ft)		1.22	
Conv. Total (cfs)	7403.8	Conv. (cfs)		7403.8	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		108.34	
Min Ch El (ft)	2756.30	Shear (lb/sq ft)		1.38	
Alpha	1.00	Stream Power (lb/ft s)		10.51	
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	2.91	36.42	8.49
C & E Loss (ft)	0.01	Cum SA (acres)	2.20	8.48	6.73

Note: Program found supercritical flow starting at this cross section.

OSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2763.08	Element			
Vel Head (ft)	1.79	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.30	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2761.61	Flow Area (sq ft)		466.02	
E.G. Slope (ft/ft)	0.013814	Area (sq ft)		466.02	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	184.06	Top Width (ft)		184.06	
Vel Total (ft/s)	10.73	Avg. Vel. (ft/s)		10.73	
Max Chl Dpth (ft)	5.00	Hydr. Depth (ft)		2.53	
Conv. Total (cfs)	42541.7	Conv. (cfs)		42541.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		186.25	
Min Ch El (ft)	2756.30	Shear (lb/sq ft)		2.16	
Alpha	1.00	Stream Power (lb/ft s)		23.15	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	3.34	37.97	9.72
C & E Loss (ft)	0.01	Cum SA (acres)	2.52	8.48	6.99

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2765.56	Element			
Vel Head (ft)	2.77	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.79	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2763.34	Flow Area (sq ft)		749.37	
E.G. Slope (ft/ft)	0.012568	Area (sq ft)		749.37	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	198.42	Top Width (ft)		198.42	
Vel Total (ft/s)	13.34	Avg. Vel. (ft/s)		13.34	
Max Chl Dpth (ft)	6.49	Hydr. Depth (ft)		3.78	
Conv. Total (cfs)	89199.4	Conv. (cfs)		89199.4	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		201.15	
Min Ch El (ft)	2756.30	Shear (lb/sq ft)		2.92	
Alpha	1.00	Stream Power (lb/ft s)		39.01	
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	24.17	69.65	58.21
C & E Loss (ft)	0.02	Cum SA (acres)	9.16	10.29	17.92

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 140.*

UT
cription:
ation Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2770.2	52.86	2769.7	81.03	2769.49	115.47	2769.22	117.19	2769.2
120.34	2769.18	123.54	2769.15	200.43	2768.49	227.6	2768.47	238.9	2768.47
239.38	2768.47	308.98	2768.27	337.73	2768.2	358.06	2768.2	375.46	2768.3

394.45	2768.3	406.26	2768.3	429.5	2768.39	439.93	2768.39	495.53	2768.39		
516.33	2768.39	526.35	2768.3	529.82	2768.17	530.22	2768.2	545.54	2768.16		
553.89	2768.25	554.04	2768.18	555.37	2767.75	556.08	2767.51	556.23	2767.43		
557.1	2767.11	557.52	2767.12	557.81	2766.92	557.99	2766.79	558.93	2766.44		
560.71	2765.85	561.06	2765.72	561.7	2765.48	562.58	2765.13	564.01	2764.63		
564.21	2764.56	565.68	2764	565.88	2763.94	567.02	2763.51	567.72	2763.23		
569.58	2762.51	570.81	2762.02	572.03	2761.57	574.49	2760.67	576.74	2759.3		
578.42	2759.32	580.7	2759.5	585.31	2759.61	591.06	2759.59	593.13	2759.49		
606.88	2759.76	608.54	2759.75	616.58	2759.7	620.33	2759.97	624.75	2759.75		
634.79	2759.88	638.74	2759.68	640.6	2759.71	645.78	2756.94	657.24	2756.68		
672.17	2756.19	678.32	2757.9	691.62	2758.04	706.95	2757.93	708.47	2757.92		
708.93	2757.92	713.41	2757.96	719.63	2758	725.81	2758.04	731.99	2758.07		
738.31	2758.11	745.23	2758.14	752.96	2758.16	754.45	2758.17	757.16	2761.04		
760.63	2761.33	768.33	2761.99	776.17	2762.66	776.3	2762.68	778.37	2762.82		
783.27	2763.65	783.81	2763.75	784.68	2763.89	784.83	2764	785.91	2764.27		
787.11	2764.55	788.93	2764.94	789.31	2765.09	790.61	2765.21	791.51	2765.44		
791.62	2765.46	794.59	2764.99	812.47	2764.84	822.38	2764.75	830.15	2764.75		
830.67	2764.75	845.22	2764.75	859.17	2764.75	865.33	2764.75	903.23	2765.66		
924.24	2765.66	947.81	2765.57	958.98	2765.57	960.17	2765.66	964.85	2765.66		
971.91	2765.66	992.05	2766.57	997.17	2767.22	999.25	2767.45	1003.09	2767.91		
1004.2	2768.07	1005.86	2768.33	1009.31	2768.84	1009.51	2768.87	1012.7	2769.28		
1019.48	2770.15	1027.4	2770.98	1027.75	2771.02	1033.36	2771.65	1035.84	2771.93		
1040.02	2772.66	1041.05	2772.84								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	553.89	.03	776.17	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
553.89	776.17	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2772.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.81	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.19	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.98	Flow Area (sq ft)		1542.21	216.14
E.G. Slope (ft/ft)	0.011668	Area (sq ft)		1542.21	216.14
Q Total (cfs)	31000.00	Flow (cfs)		30208.78	791.22
Top Width (ft)	424.00	Top Width (ft)		216.49	207.51
Vel Total (ft/s)	17.63	Avg. Vel. (ft/s)		19.59	3.66
Max Chl Dpth (ft)	10.00	Hydr. Depth (ft)		7.12	1.04
Conv. Total (cfs)	286981.8	Conv. (cfs)		279657.1	7324.7
Length Wtd. (ft)	18.69	Wetted Per. (ft)		220.16	207.88
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		5.10	0.76
Alpha	1.20	Stream Power (lb/ft s)		99.96	2.77
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	50.31	89.96	96.62
C & E Loss (ft)	0.05	Cum SA (acres)	12.07	10.20	18.09

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2770.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.87	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.37	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2766.94	Flow Area (sq ft)		1365.33	71.76
E.G. Slope (ft/ft)	0.011146	Area (sq ft)		1365.33	71.76
Q Total (cfs)	24490.00	Flow (cfs)		24279.86	210.15
Top Width (ft)	328.25	Top Width (ft)		214.19	114.05
Vel Total (ft/s)	17.04	Avg. Vel. (ft/s)		17.78	2.93
Max Chl Dpth (ft)	9.18	Hydr. Depth (ft)		6.37	0.63
Conv. Total (cfs)	231964.1	Conv. (cfs)		229973.7	1990.5
Length Wtd. (ft)	18.76	Wetted Per. (ft)		217.72	114.38
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		4.36	0.44
Alpha	1.08	Stream Power (lb/ft s)		77.60	1.28
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	45.66	88.55	91.72
C & E Loss (ft)	0.05	Cum SA (acres)	14.37	10.42	18.39

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.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2773.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	6.87	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.54	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.18	Flow Area (sq ft)		1618.08	290.04
E.G. Slope (ft/ft)	0.013174	Area (sq ft)		1618.08	290.04
Q Total (cfs)	36000.00	Flow (cfs)		34660.52	1339.49
Top Width (ft)	432.76	Top Width (ft)		217.51	215.25
Vel Total (ft/s)	18.87	Avg. Vel. (ft/s)		21.42	4.62
Max Chl Dpth (ft)	10.35	Hydr. Depth (ft)		7.44	1.35
Conv. Total (cfs)	313644.7	Conv. (cfs)		301974.7	11670.1
Length Wtd. (ft)	18.64	Wetted Per. (ft)		221.24	215.62
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		6.02	1.11
Alpha	1.24	Stream Power (lb/ft s)		128.86	5.11
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	56.64	95.05	105.80
C & E Loss (ft)	0.05	Cum SA (acres)	12.34	10.21	18.32

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2759.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.99	Wt. n-Val.		0.030	
W.S. Elev (ft)	2758.75	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2758.97	Flow Area (sq ft)		125.23	
E.G. Slope (ft/ft)	0.022811	Area (sq ft)		125.23	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	112.60	Top Width (ft)		112.60	

Vel Total (ft/s)	7.99	Avg. Vel. (ft/s)		7.99	
Max Chl Dpth (ft)	2.56	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	6621.0	Conv. (cfs)		6621.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		113.54	
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		1.57	
Alpha	1.00	Stream Power (lb/ft s)		12.54	
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)	2.91	36.37	8.49
C & E Loss (ft)	0.01	Cum SA (acres)	2.20	8.43	6.73

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2762.80	Element			
Vel Head (ft)	1.91	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.89	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2761.30	Flow Area (sq ft)		450.44	
E.G. Slope (ft/ft)	0.015410	Area (sq ft)		450.44	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	183.13	Top Width (ft)		183.13	
Vel Total (ft/s)	11.10	Avg. Vel. (ft/s)		11.10	
Max Chl Dpth (ft)	4.70	Hydr. Depth (ft)		2.46	
Conv. Total (cfs)	40277.7	Conv. (cfs)		40277.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		185.70	
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		2.33	
Alpha	1.00	Stream Power (lb/ft s)		25.90	
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	3.34	37.77	9.72
C & E Loss (ft)	0.01	Cum SA (acres)	2.52	8.40	6.99

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2765.28	Element			
Vel Head (ft)	2.97	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.31	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.99	Flow Area (sq ft)		722.98	
E.G. Slope (ft/ft)	0.014520	Area (sq ft)		722.98	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	201.98	Top Width (ft)		201.98	
Vel Total (ft/s)	13.83	Avg. Vel. (ft/s)		13.83	
Max Chl Dpth (ft)	6.12	Hydr. Depth (ft)		3.58	
Conv. Total (cfs)	82988.7	Conv. (cfs)		82988.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		204.93	
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		3.20	
Alpha	1.00	Stream Power (lb/ft s)		44.23	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	24.17	69.33	58.21
C & E Loss (ft)	0.02	Cum SA (acres)	9.16	10.20	17.92

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 139

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2769.75	122.83	2768.75	210.08	2768	238.55	2762	250.4	2762
250.9	2762	353.99	2761.75	571.8	2761.75	580.55	2761.87	584.21	2760.75
587.25	2759.75	590.19	2758.75	592.82	2757.75	595.21	2756.75	597.5	2755.75
599.8	2754.75	601.9	2753.24	661.57	2753.92	666.41	2750.85	691.06	2750.07
697.71	2751.82	779.92	2751.09	782.85	2754.21	803.38	2755.75	805.38	2755.89
809.83	2756.75	817.41	2758.24	820.11	2757.75	852.39	2757.75	884.33	2757.75
918.74	2758.75	974.69	2758.75	981.1	2758.75	999.39	2759.75	1005.92	2760.75
1011.93	2761.75	1018.14	2762.75	1024.29	2763.75	1031.8	2770.75	1039.15	2771.75
1043.88	2772.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	580.55	.03	803.38	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
580.55	803.38	172.75	171.78	164.65	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2770.87	Element			
Vel Head (ft)	13.38	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2757.49	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2761.29	Flow Area (sq ft)		1052.61	9.94
E.G. Slope (ft/ft)	0.041964	Area (sq ft)		1052.61	9.94
Q Total (cfs)	31000.00	Flow (cfs)		30934.68	65.32
Top Width (ft)	220.15	Top Width (ft)		209.94	10.21
Vel Total (ft/s)	29.18	Avg. Vel. (ft/s)		29.39	6.57
Max Chl Dpth (ft)	7.42	Hydr. Depth (ft)		5.01	0.97
Conv. Total (cfs)	151328.6	Conv. (cfs)		151009.7	318.9
Length Wtd. (ft)	171.69	Wetted Per. (ft)		213.53	10.37
Min Ch El (ft)	2750.07	Shear (lb/sq ft)		12.91	2.51
Alpha	1.01	Stream Power (lb/ft s)		379.53	16.50
Frctn Loss (ft)	0.37	Cum Volume (acre-ft)	50.31	89.40	96.59
C & E Loss (ft)	0.76	Cum SA (acres)	12.07	10.10	18.06

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 #PF 2

E.G. Elev (ft)	2769.09	Element	Left OB	Channel	Right OB
Vel Head (ft)	12.52	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2756.58	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2760.35	Flow Area (sq ft)		861.91	2.73
E.G. Slope (ft/ft)	0.050404	Area (sq ft)		861.91	2.73
Q Total (cfs)	24490.00	Flow (cfs)		24477.47	12.53
Top Width (ft)	213.33	Top Width (ft)		207.77	5.55
Vel Total (ft/s)	28.32	Avg. Vel. (ft/s)		28.40	4.58
Max Chl Dpth (ft)	6.51	Hydr. Depth (ft)		4.15	0.49
Conv. Total (cfs)	109083.0	Conv. (cfs)		109027.2	55.8
Length Wtd. (ft)	170.92	Wetted Per. (ft)		211.19	5.62
Min Ch El (ft)	2750.07	Shear (lb/sq ft)		12.84	1.53
Alpha	1.00	Stream Power (lb/ft s)		364.72	7.01
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	45.66	88.07	91.71
C & E Loss (ft)	0.76	Cum SA (acres)	14.37	10.32	18.38

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 #PF 3

E.G. Elev (ft)	2772.29	Element	Left OB	Channel	Right OB
Vel Head (ft)	14.19	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2758.10	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2762.54	Flow Area (sq ft)		1180.89	41.91
E.G. Slope (ft/ft)	0.038693	Area (sq ft)		1180.89	41.91
Q Total (cfs)	36000.00	Flow (cfs)		35795.17	204.83
Top Width (ft)	302.93	Top Width (ft)		211.48	91.45
Vel Total (ft/s)	29.44	Avg. Vel. (ft/s)		30.31	4.89
Max Chl Dpth (ft)	8.03	Hydr. Depth (ft)		5.58	0.46
Conv. Total (cfs)	183015.5	Conv. (cfs)		181974.2	1041.3
Length Wtd. (ft)	171.62	Wetted Per. (ft)		215.19	91.70
Min Ch El (ft)	2750.07	Shear (lb/sq ft)		13.26	1.10
Alpha	1.05	Stream Power (lb/ft s)		401.81	5.40
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	56.64	94.45	105.75
C & E Loss (ft)	0.73	Cum SA (acres)	12.34	10.12	18.28

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 #PF 4

E.G. Elev (ft)	2755.60	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.04	Wt. n-Val.		0.030	
W.S. Elev (ft)	2755.57	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2752.54	Flow Area (sq ft)		653.10	
E.G. Slope (ft/ft)	0.000205	Area (sq ft)		653.10	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	202.99	Top Width (ft)		202.99	
Vel Total (ft/s)	1.53	Avg. Vel. (ft/s)		1.53	
Max Chl Dpth (ft)	5.49	Hydr. Depth (ft)		3.22	
Conv. Total (cfs)	69771.2	Conv. (cfs)		69771.2	
Length Wtd. (ft)	171.78	Wetted Per. (ft)		206.18	
Min Ch El (ft)	2750.07	Shear (lb/sq ft)		0.04	
Alpha	1.00	Stream Power (lb/ft s)		0.06	
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	2.91	36.20	8.49
C & E Loss (ft)	0.00	Cum SA (acres)	2.20	8.36	6.73

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: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2761.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	8.50	Wt. n-Val.		0.030	
W.S. Elev (ft)	2753.04	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2754.95	Flow Area (sq ft)		213.74	
E.G. Slope (ft/ft)	0.103913	Area (sq ft)		213.74	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	118.80	Top Width (ft)		118.80	
Vel Total (ft/s)	23.39	Avg. Vel. (ft/s)		23.39	
Max Chl Dpth (ft)	2.97	Hydr. Depth (ft)		1.80	
Conv. Total (cfs)	15510.9	Conv. (cfs)		15510.9	
Length Wtd. (ft)	171.78	Wetted Per. (ft)		120.53	
Min Ch El (ft)	2750.07	Shear (lb/sq ft)		11.50	
Alpha	1.00	Stream Power (lb/ft s)		269.12	
Frctn Loss (ft)	0.60	Cum Volume (acre-ft)	3.34	37.63	9.72
C & E Loss (ft)	0.66	Cum SA (acres)	2.52	8.34	6.99

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 #PF 6

E.G. Elev (ft)	2764.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	9.80	Wt. n-Val.		0.030	
W.S. Elev (ft)	2754.24	Reach Len. (ft)	172.75	171.78	164.65

* Crit W.S. (ft)	* 2756.58	* Flow Area (sq ft)	*	* 398.16	*	*
* E.G. Slope (ft/ft)	*0.092924	* Area (sq ft)	*	* 398.16	*	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*	*
* Top Width (ft)	* 182.77	* Top Width (ft)	*	* 182.77	*	*
* Vel Total (ft/s)	* 25.12	* Avg. Vel. (ft/s)	*	* 25.12	*	*
* Max Chl Dpth (ft)	* 4.17	* Hydr. Depth (ft)	*	* 2.18	*	*
* Conv. Total (cfs)	* 32804.8	* Conv. (cfs)	*	* 32804.8	*	*
* Length Wtd. (ft)	* 171.39	* Wetted Per. (ft)	*	* 185.58	*	*
* Min Ch El (ft)	* 2750.07	* Shear (lb/sq ft)	*	* 12.45	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 312.59	*	*
* Frctn Loss (ft)	* 0.56	* Cum Volume (acre-ft)	* 24.17	* 69.09	* 58.21	*
* C & E Loss (ft)	* 0.68	* Cum SA (acres)	* 9.16	* 10.12	* 17.92	*

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 130

INPUT
Description:
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-329.97	2778	-326.97	2777	-324.12	2776	-321.7	2769	-319.71	2768
-317.71	2767	-315.72	2766	-313.73	2765	-311.73	2764	-309.74	2763
-295.4	2762	-239.67	2761	-228.16	2760	-194.92	2760	-129.95	2760
-127.06	2759	-123.98	2758	-120.22	2758	-110.54	2759	-110.53	2759
-.01	2760	0	2760	197.95	2761	197.96	2761	246.6	2761
261.24	2760.28	267.04	2760	267.05	2760	282.58	2758.8	282.59	2758.8
284.05	2759	284.06	2759	289.71	2758	289.72	2758	294.36	2757
294.37	2757	299.03	2756	299.04	2756	303.71	2755	303.72	2755
308.4	2754	308.41	2754	313.09	2753	313.1	2753	314.9	2752.96
314.91	2752.96	326.53	2752.59	326.54	2752.59	334.76	2749.3	334.76	2749.31
335.91	2752	335.92	2752	350.25	2749.25	350.26	2749.25	362.85	2750.77
362.86	2750.77	383.3	2751	429.42	2751.52	429.43	2751.51	436.01	2749.89
436.02	2749.89	456.36	2749.9	456.37	2749.9	476.41	2751.65	476.42	2751.65
495.5	2753.49	495.51	2753.49	507.59	2753.28	512.02	2753.21	512.03	2753.21
522.41	2755.75	522.42	2755.76	528.15	2757.11	528.16	2757.11	555.77	2756.75
555.78	2756.76	560.43	2757.75	560.44	2757.75	684.75	2757.75	684.76	2757.75
743.07	2756.75	743.08	2756.75	773.59	2756.75	773.6	2756.75	795.48	2756.75
795.94	2756.75	809.75	2757.75	809.76	2757.75	826.38	2758.75	866.79	2759.75
889.01	2760.75	894.02	2761.75	896.67	2762.75	896.67	2762.76	899.25	2763.75
901.38	2764.75	903.52	2765.75	911.41	2766.75	945.7	2766.75	951.33	2765.75
957.1	2764.75	961.49	2763.75	968.66	2762.75	968.68	2762.75	977.22	2763.75
981.89	2764.75	985.39	2771.75	990.06	2772.75	994.39	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-329.97	.045	246.6	.03	528.16	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
246.6	528.16	295.76	287.33	274.51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-329.97	197.95	2770	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2764.61	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 6.53	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2758.08	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2760.33	* Flow Area (sq ft)	*	* 1461.01	* 208.02 *
* E.G. Slope (ft/ft)	*0.016040	* Area (sq ft)	* 0.35	* 1461.01	* 208.02 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30298.51	* 701.49 *
* Top Width (ft)	* 530.80	* Top Width (ft)	* 4.79	* 238.91	* 287.10 *
* Vel Total (ft/s)	* 18.57	* Avg. Vel. (ft/s)	*	* 20.74	* 3.37 *
* Max Chl Dpth (ft)	* 8.83	* Hydr. Depth (ft)	*	* 6.12	* 0.72 *
* Conv. Total (cfs)	*244770.1	* Conv. (cfs)	*	*239231.2	* 5538.9 *
* Length Wtd. (ft)	* 284.20	* Wetted Per. (ft)	*	* 243.06	* 287.27 *
* Min Ch El (ft)	* 2749.25	* Shear (lb/sq ft)	*	* 6.02	* 0.73 *
* Alpha	* 1.22	* Stream Power (lb/ft s)	*	* 124.83	* 2.45 *
* Frctn Loss (ft)	* 4.21	* Cum Volume (acre-ft)	* 50.31	* 84.45	* 96.18 *
* C & E Loss (ft)	* 2.06	* Cum SA (acres)	* 12.06	* 9.22	* 17.50 *

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	* 2762.17	* Element	* Left OB	* Channel	* Right OB *
Vel Head (ft)	* 1.13	* Wt. n-Val.	* 0.045	* 0.030	* 0.045 *
W.S. Elev (ft)	* 2761.05	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2759.36	* Flow Area (sq ft)	* 2.22	* 2222.22	* 1178.86 *
* E.G. Slope (ft/ft)	*0.002241	* Area (sq ft)	* 438.52	* 2222.22	* 1178.86 *
* Q Total (cfs)	*24490.00	* Flow (cfs)	* 0.44	*20445.49	* 4044.07 *
* Top Width (ft)	* 1132.71	* Top Width (ft)	* 488.81	* 281.56	* 362.33 *
* Vel Total (ft/s)	* 7.20	* Avg. Vel. (ft/s)	* 0.20	* 9.20	* 3.43 *

* Max Chl Dpth (ft)	* 11.80	* Hydr. Depth (ft)	* 0.05	* 7.89	* 3.25	*
* Conv. Total (cfs)	*517353.7	* Conv. (cfs)	* 9.4	*431913.0	* 85431.3	*
* Length Wtd. (ft)	* 284.47	* Wetted Per. (ft)	* 48.65	* 285.88	* 362.58	*
* Min Ch El (ft)	* 2749.25	* Shear (lb/sq ft)	* 0.01	* 1.09	* 0.45	*
* Alpha	* 1.40	* Stream Power (lb/ft s)	* 0.00	* 10.00	* 1.56	*
* Frctn Loss (ft)	* 0.43	* Cum Volume (acre-ft)	* 44.79	* 81.98	* 89.47	*
* C & E Loss (ft)	* 0.21	* Cum SA (acres)	* 13.40	* 9.36	* 17.68	*

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.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2765.97	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 7.55	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2758.41	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51	*
* Crit W.S. (ft)	* 2761.00	* Flow Area (sq ft)	*	* 1540.83	* 304.47	*
* E.G. Slope (ft/ft)	*0.017730	* Area (sq ft)	* 2.65	* 1540.83	* 304.47	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*34625.98	* 1374.02	*
* Top Width (ft)	* 542.46	* Top Width (ft)	* 9.04	* 240.79	* 292.63	*
* Vel Total (ft/s)	* 19.51	* Avg. Vel. (ft/s)	*	* 22.47	* 4.51	*
* Max Chl Dpth (ft)	* 9.16	* Hydr. Depth (ft)	*	* 6.40	* 1.04	*
* Conv. Total (cfs)	*270365.9	* Conv. (cfs)	*	*260046.8	* 10319.1	*
* Length Wtd. (ft)	* 284.00	* Wetted Per. (ft)	*	* 244.97	* 292.81	*
* Min Ch El (ft)	* 2749.25	* Shear (lb/sq ft)	*	* 6.96	* 1.15	*
* Alpha	* 1.28	* Stream Power (lb/ft s)	*	* 156.45	* 5.19	*
* Frctn Loss (ft)	* 4.33	* Cum Volume (acre-ft)	* 56.63	* 89.08	* 105.10	*
* C & E Loss (ft)	* 1.99	* Cum SA (acres)	* 12.32	* 9.23	* 17.56	*

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

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	* 2755.58	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.02	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2755.55	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51	*
* Crit W.S. (ft)	* 2751.85	* Flow Area (sq ft)	*	* 877.61	*	*
* E.G. Slope (ft/ft)	*0.000086	* Area (sq ft)	*	* 877.61	*	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	*	*
* Top Width (ft)	* 220.49	* Top Width (ft)	*	* 220.49	*	*
* Vel Total (ft/s)	* 1.14	* Avg. Vel. (ft/s)	*	* 1.14	*	*
* Max Chl Dpth (ft)	* 6.30	* Hydr. Depth (ft)	*	* 3.98	*	*
* Conv. Total (cfs)	*107966.9	* Conv. (cfs)	*	*107966.9	*	*
* Length Wtd. (ft)	* 287.33	* Wetted Per. (ft)	*	* 224.19	*	*
* Min Ch El (ft)	* 2749.25	* Shear (lb/sq ft)	*	* 0.02	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.02	*	*
* Frctn Loss (ft)	* 0.02	* Cum Volume (acre-ft)	* 2.91	* 33.18	* 8.49	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 2.20	* 7.53	* 6.73	*

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

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2756.58	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.37	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2756.21	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51	*
* Crit W.S. (ft)	* 2753.98	* Flow Area (sq ft)	*	* 1023.69	*	*
* E.G. Slope (ft/ft)	*0.001329	* Area (sq ft)	*	* 1023.69	*	*
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*	*
* Top Width (ft)	* 226.27	* Top Width (ft)	*	* 226.27	*	*
* Vel Total (ft/s)	* 4.88	* Avg. Vel. (ft/s)	*	* 4.88	*	*
* Max Chl Dpth (ft)	* 6.96	* Hydr. Depth (ft)	*	* 4.52	*	*
* Conv. Total (cfs)	*137148.5	* Conv. (cfs)	*	*137148.5	*	*
* Length Wtd. (ft)	* 287.33	* Wetted Per. (ft)	*	* 230.12	*	*
* Min Ch El (ft)	* 2749.25	* Shear (lb/sq ft)	*	* 0.37	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 1.80	*	*
* Frctn Loss (ft)	* 0.36	* Cum Volume (acre-ft)	* 3.34	* 35.19	* 9.72	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 2.52	* 7.66	* 6.99	*

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2759.70	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.39	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2759.31	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51	*
* Crit W.S. (ft)	* 2755.60	* Flow Area (sq ft)	*	* 1760.42	* 576.52	*
* E.G. Slope (ft/ft)	*0.000850	* Area (sq ft)	* 20.62	* 1760.42	* 576.52	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	* 9180.11	* 819.89	*
* Top Width (ft)	* 624.40	* Top Width (ft)	* 51.47	* 252.16	* 320.77	*
* Vel Total (ft/s)	* 4.28	* Avg. Vel. (ft/s)	*	* 5.21	* 1.42	*
* Max Chl Dpth (ft)	* 10.06	* Hydr. Depth (ft)	*	* 6.98	* 1.80	*
* Conv. Total (cfs)	*343095.8	* Conv. (cfs)	*	*314965.7	* 28130.0	*
* Length Wtd. (ft)	* 285.72	* Wetted Per. (ft)	*	* 256.42	* 320.97	*
* Min Ch El (ft)	* 2749.25	* Shear (lb/sq ft)	*	* 0.36	* 0.10	*

* Alpha	*	1.37	* Stream Power (lb/ft s)	*		*	1.90	*	0.14	*
* Frctn Loss (ft)	*	0.21	* Cum Volume (acre-ft)	*	24.13	*	64.83	*	57.12	*
* C & E Loss (ft)	*	0.06	* Cum SA (acres)	*	9.06	*	9.26	*	17.31	*

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 120

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-741.52	2769	-620.87	2768	-551.88	2767	-543.14	2760	-540.36	2760
-537.06	2761	-533.83	2762	-527.7	2762	-488.6	2761	-366.95	2760
-274.11	2759	-186.15	2758	-155.02	2757	-147.68	2756	-131.64	2756
-119.22	2757	-106.8	2758	-35.92	2759	0	2759	50.02	2758
110.9	2757	152.46	2756.03	153.73	2756	168.97	2755	175.86	2754
175.87	2754	179.66	2753	179.67	2753	181.81	2752	183.96	2751
186.11	2750	188.37	2749	192.2	2748	208.49	2748	208.5	2748
217.9	2749	217.91	2749	226.38	2750	226.39	2750	249.43	2751
265.63	2751	283.93	2751	293.22	2751	353.9	2752	388.76	2753
390.5	2754	392.24	2755	392.25	2755	393.98	2756	393.99	2756
396.77	2757	400.02	2758	404.19	2758	422.66	2758	464.57	2757
544.99	2757	709.9	2757	814.02	2756.75	823.72	2757.75	825.7	2757.75
826.66	2757.75	968	2757.75	980.94	2757.75	999.92	2757.75	1093.44	2757.75
1109.22	2758.75	1125.21	2759.75	1136.78	2760.75	1141.28	2761.75	1145.01	2762.75
1148.2	2763.75	1151.41	2764.75	1154.48	2765.75	1157.68	2772.75	1160.12	2773.75
1162.38	2774.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-741.52	.045	0	.03	404.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	404.19	158.39	153.64	149.14	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-741.52	0	2770	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2762.24	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.55	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2761.70	* Reach Len. (ft)	* 158.39	* 153.64	* 149.14 *
* Crit W.S. (ft)	* 2759.45	* Flow Area (sq ft)	*	* 3154.63	* 3118.22 *
* E.G. Slope (ft/ft)	*0.001237	* Area (sq ft)	* 1351.63	* 3154.63	* 3118.22 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*21529.21	* 9470.80 *
* Top Width (ft)	* 1667.32	* Top Width (ft)	* 526.28	* 404.19	* 736.85 *
* Vel Total (ft/s)	* 4.94	* Avg. Vel. (ft/s)	*	* 6.82	* 3.04 *
* Max Chl Dpth (ft)	* 13.70	* Hydr. Depth (ft)	*	* 7.80	* 4.23 *
* Conv. Total (cfs)	*881540.5	* Conv. (cfs)	*	*612221.5	*269319.0 *
* Length Wtd. (ft)	* 152.25	* Wetted Per. (ft)	*	* 406.74	* 737.12 *
* Min Ch El (ft)	* 2748.00	* Shear (lb/sq ft)	*	* 0.60	* 0.33 *
* Alpha	* 1.44	* Stream Power (lb/ft s)	*	* 4.09	* 0.99 *
* Frctn Loss (ft)	* 0.15	* Cum Volume (acre-ft)	* 45.72	* 69.22	* 85.70 *
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 10.26	* 7.10	* 14.27 *

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2761.54	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.44	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2761.10	* Reach Len. (ft)	* 158.39	* 153.64	* 149.14 *
* Crit W.S. (ft)	* 2758.98	* Flow Area (sq ft)	*	* 2914.35	* 2680.97 *
* E.G. Slope (ft/ft)	*0.001077	* Area (sq ft)	* 1046.46	* 2914.35	* 2680.97 *
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*17603.21	* 6886.79 *
* Top Width (ft)	* 1638.74	* Top Width (ft)	* 500.38	* 404.19	* 734.17 *
* Vel Total (ft/s)	* 4.38	* Avg. Vel. (ft/s)	*	* 6.04	* 2.57 *
* Max Chl Dpth (ft)	* 13.10	* Hydr. Depth (ft)	*	* 7.21	* 3.65 *
* Conv. Total (cfs)	*746379.9	* Conv. (cfs)	*	*536491.9	*209888.0 *
* Length Wtd. (ft)	* 152.35	* Wetted Per. (ft)	*	* 406.74	* 734.38 *
* Min Ch El (ft)	* 2748.00	* Shear (lb/sq ft)	*	* 0.48	* 0.25 *
* Alpha	* 1.47	* Stream Power (lb/ft s)	*	* 2.91	* 0.63 *
* Frctn Loss (ft)	* 0.13	* Cum Volume (acre-ft)	* 39.75	* 65.04	* 77.31 *
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 10.04	* 7.10	* 14.23 *

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2762.82	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.61	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2762.22	* Reach Len. (ft)	* 158.39	* 153.64	* 149.14 *
* Crit W.S. (ft)	* 2759.83	* Flow Area (sq ft)	*	* 3364.03	* 3500.48 *
* E.G. Slope (ft/ft)	*0.001277	* Area (sq ft)	* 1630.46	* 3364.03	* 3500.48 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*24351.57	*11648.43 *
* Top Width (ft)	* 1688.92	* Top Width (ft)	* 545.91	* 404.19	* 738.82 *

Vel Total (ft/s)	5.24	Avg. Vel. (ft/s)			7.24	3.33	
Max Chl Dpth (ft)	14.21	Hydr. Depth (ft)			8.32	4.74	
Conv. Total (cfs)	1007402.0	Conv. (cfs)			681439.1	325962.4	
Length Wtd. (ft)	152.16	Wetted Per. (ft)			406.74	739.16	
Min Ch El (ft)	2748.00	Shear (lb/sq ft)			0.66	0.38	
Alpha	1.42	Stream Power (lb/ft s)			4.77	1.26	
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)		51.09	72.90	93.11	
C & E Loss (ft)	0.04	Cum SA (acres)		10.44	7.10	14.31	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 4

			Left OB	Channel	Right OB
E.G. Elev (ft)	2755.55	Element			
Vel Head (ft)	0.02	Wt. n-Val.		0.030	
W.S. Elev (ft)	2755.54	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2751.40	Flow Area (sq ft)		995.15	
E.G. Slope (ft/ft)	0.000060	Area (sq ft)		995.15	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	232.39	Top Width (ft)		232.39	
Vel Total (ft/s)	1.00	Avg. Vel. (ft/s)		1.00	
Max Chl Dpth (ft)	7.54	Hydr. Depth (ft)		4.28	
Conv. Total (cfs)	129217.4	Conv. (cfs)		129217.4	
Length Wtd. (ft)	153.64	Wetted Per. (ft)		234.45	
Min Ch El (ft)	2748.00	Shear (lb/sq ft)		0.02	
Alpha	1.00	Stream Power (lb/ft s)		0.02	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	2.91	27.01	8.49
C & E Loss (ft)	0.00	Cum SA (acres)	2.20	6.03	6.73

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

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2756.21	Element			
Vel Head (ft)	0.34	Wt. n-Val.		0.030	
W.S. Elev (ft)	2755.87	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2753.51	Flow Area (sq ft)		1073.19	
E.G. Slope (ft/ft)	0.001202	Area (sq ft)		1073.19	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	238.03	Top Width (ft)		238.03	
Vel Total (ft/s)	4.66	Avg. Vel. (ft/s)		4.66	
Max Chl Dpth (ft)	7.87	Hydr. Depth (ft)		4.51	
Conv. Total (cfs)	144203.5	Conv. (cfs)		144203.5	
Length Wtd. (ft)	153.64	Wetted Per. (ft)		240.18	
Min Ch El (ft)	2748.00	Shear (lb/sq ft)		0.34	
Alpha	1.00	Stream Power (lb/ft s)		1.56	
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	3.34	28.27	9.72
C & E Loss (ft)	0.03	Cum SA (acres)	2.52	6.13	6.99

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

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2759.43	Element			
Vel Head (ft)	0.20	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2759.23	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2755.02	Flow Area (sq ft)		2158.46	1324.59
E.G. Slope (ft/ft)	0.000653	Area (sq ft)	308.34	2158.46	1324.59
Q Total (cfs)	10000.00	Flow (cfs)		8310.87	1689.13
Top Width (ft)	1412.57	Top Width (ft)	295.64	404.19	712.74
Vel Total (ft/s)	2.87	Avg. Vel. (ft/s)		3.85	1.28
Max Chl Dpth (ft)	11.23	Hydr. Depth (ft)		5.34	1.86
Conv. Total (cfs)	391371.4	Conv. (cfs)		325263.6	66107.8
Length Wtd. (ft)	152.84	Wetted Per. (ft)		406.74	712.85
Min Ch El (ft)	2748.00	Shear (lb/sq ft)		0.22	0.08
Alpha	1.53	Stream Power (lb/ft s)		0.83	0.10
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	23.02	51.91	51.13
C & E Loss (ft)	0.02	Cum SA (acres)	7.88	7.10	14.05

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 115

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2767	4.83	2766	9.61	2765	11.16	2759	13.74	2760
16.32	2761	24.15	2761	124.55	2760	311.87	2759.02	314.97	2759
395.1	2758	477.26	2757	482.56	2756	505.65	2756	555.24	2757
679.5	2758	697.39	2758	706.13	2757	725.14	2756	747.88	2756
765.91	2756	799.67	2755	831.73	2754	835.05	2753	837.03	2752
839.03	2751	841.23	2750	843.42	2749	845.62	2748	847.82	2747
863.85	2747	869.22	2748	874.61	2749	887.51	2750	990.68	2750
015.46	2750	1026.66	2751	1037.87	2752	1040.87	2753	1043.78	2754
1046.68	2755	1049.37	2756	1074.62	2757	1080.06	2757	1202.38	2757
1254.26	2757	1359.68	2757	1365.58	2757	1696.27	2756.75	1789.59	2756.75
1848.13	2757.75	1874.7	2758.73	1875.36	2758.75	1890.38	2759.75	1895.84	2760.75
1902.22	2761.75	1908.29	2762.75	1913.86	2763.75	1918.72	2764.75	1920.54	2765.75
1922.37	2766.75	1924.2	2767.75	1926.03	2768.75	1927.8	2769.75	1929.57	2770.75
1931.38	2777.75	1933.2	2778.75	1935.07	2779.75				

```
Manning's n Values          num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
**********************************************
       0    .045   679.5     .03 1074.62    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         679.5 1074.62            257.93  242.39  227.54          .1          .3
 neffective Flow      num=        1
   Sta L   Sta R    Elev  Permanent
       0   679.5    2770       F
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CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2762.05	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.42	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2761.63	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2758.74	Flow Area (sq ft)		3523.24	3772.45
E.G. Slope (ft/ft)	0.000809	Area (sq ft)	2050.53	3523.24	3772.45
Q Total (cfs)	31000.00	Flow (cfs)		21253.69	9746.31
Top Width (ft)	1891.00	Top Width (ft)	669.02	395.12	826.86
Vel Total (ft/s)	4.25	Avg. Vel. (ft/s)		6.03	2.58
Max Chl Dpth (ft)	14.63	Hydr. Depth (ft)		8.92	4.56
Conv. Total (cfs)	1089712.0	Conv. (cfs)		747109.6	342602.1
Length Wtd. (ft)	236.81	Wetted Per. (ft)		397.73	827.08
Min Ch El (ft)	2747.00	Shear (lb/sq ft)		0.45	0.23
Alpha	1.50	Stream Power (lb/ft s)		2.70	0.60
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	39.54	57.45	73.91
C & E Loss (ft)	0.06	Cum SA (acres)	8.08	5.69	11.59

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2761.38	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.33	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2761.05	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2758.16	Flow Area (sq ft)		3292.21	3290.06
E.G. Slope (ft/ft)	0.000678	Area (sq ft)	1659.39	3292.21	3290.06
Q Total (cfs)	24490.00	Flow (cfs)		17368.72	7121.28
Top Width (ft)	1887.12	Top Width (ft)	668.87	395.12	823.13
Vel Total (ft/s)	3.72	Avg. Vel. (ft/s)		5.28	2.16
Max Chl Dpth (ft)	14.05	Hydr. Depth (ft)		8.33	4.00
Conv. Total (cfs)	940834.8	Conv. (cfs)		667255.9	273578.8
Length Wtd. (ft)	237.09	Wetted Per. (ft)		397.73	823.30
Min Ch El (ft)	2747.00	Shear (lb/sq ft)		0.35	0.17
Alpha	1.52	Stream Power (lb/ft s)		1.85	0.37
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	34.83	54.10	67.09
C & E Loss (ft)	0.05	Cum SA (acres)	7.92	5.69	11.56

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

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2762.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.47	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2762.15	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2759.15	Flow Area (sq ft)		3727.07	4199.83
E.G. Slope (ft/ft)	0.000858	Area (sq ft)	2395.69	3727.07	4199.83
Q Total (cfs)	36000.00	Flow (cfs)		24031.56	11968.43
Top Width (ft)	1894.30	Top Width (ft)	669.15	395.12	830.03
Vel Total (ft/s)	4.54	Avg. Vel. (ft/s)		6.45	2.85
Max Chl Dpth (ft)	15.15	Hydr. Depth (ft)		9.43	5.06
Conv. Total (cfs)	1229175.0	Conv. (cfs)		820527.6	408647.2
Length Wtd. (ft)	236.59	Wetted Per. (ft)		397.73	830.29
Min Ch El (ft)	2747.00	Shear (lb/sq ft)		0.50	0.27
Alpha	1.48	Stream Power (lb/ft s)		3.24	0.77
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	43.77	60.40	79.93
C & E Loss (ft)	0.07	Cum SA (acres)	8.23	5.69	11.62

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2755.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.030	
W.S. Elev (ft)	2755.53	Reach Len. (ft)	257.93	242.39	227.54
Crit W.S. (ft)	2750.51	Flow Area (sq ft)		1240.05	
E.G. Slope (ft/ft)	0.000035	Area (sq ft)		1240.05	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	266.48	Top Width (ft)		266.48	
Vel Total (ft/s)	0.81	Avg. Vel. (ft/s)		0.81	
Max Chl Dpth (ft)	8.53	Hydr. Depth (ft)		4.65	
Conv. Total (cfs)	170169.8	Conv. (cfs)		170169.8	
Length Wtd. (ft)	241.97	Wetted Per. (ft)		268.90	
Min Ch El (ft)	2747.00	Shear (lb/sq ft)		0.01	
Alpha	1.00	Stream Power (lb/ft s)		0.01	
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	2.91	23.06	8.49
C & E Loss (ft)	0.00	Cum SA (acres)	2.20	5.15	6.73

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2756.03	Element	Left OB	Channel	Right OB

* Vel Head (ft)	* 0.23	* Wt. n-Val.	*	* 0.030	*	*	
* W.S. Elev (ft)	* 2755.80	* Reach Len. (ft)	* 257.93	* 242.39	*	227.54	*
* Crit W.S. (ft)	* 2752.40	* Flow Area (sq ft)	*	* 1313.07	*	*	
* E.G. Slope (ft/ft)	*0.000749	* Area (sq ft)	*	* 1313.07	*	*	
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*	*	
* Top Width (ft)	* 276.29	* Top Width (ft)	*	* 276.29	*	*	
* Vel Total (ft/s)	* 3.81	* Avg. Vel. (ft/s)	*	* 3.81	*	*	
* Max Chl Dpth (ft)	* 8.80	* Hydr. Depth (ft)	*	* 4.75	*	*	
* Conv. Total (cfs)	*182754.5	* Conv. (cfs)	*	*182754.5	*	*	
* Length Wtd. (ft)	* 241.84	* Wetted Per. (ft)	*	* 278.76	*	*	
* Min Ch El (ft)	* 2747.00	* Shear (lb/sq ft)	*	* 0.22	*	*	
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.84	*	*	
* Frctn Loss (ft)	* 0.16	* Cum Volume (acre-ft)	* 3.34	* 24.06	*	9.72	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 2.52	* 5.22	*	6.99	*

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

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2759.34	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.13	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2759.21	* Reach Len. (ft)	* 257.93	* 242.39	* 227.54 *
* Crit W.S. (ft)	* 2754.01	* Flow Area (sq ft)	*	* 2564.09	* 1784.37 *
* E.G. Slope (ft/ft)	*0.000343	* Area (sq ft)	* 635.48	* 2564.09	* 1784.37 *
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	* 8148.63	* 1851.37 *
* Top Width (ft)	* 1606.59	* Top Width (ft)	* 403.87	* 395.12	* 807.60 *
* Vel Total (ft/s)	* 2.30	* Avg. Vel. (ft/s)	*	* 3.18	* 1.04 *
* Max Chl Dpth (ft)	* 12.21	* Hydr. Depth (ft)	*	* 6.49	* 2.21 *
* Conv. Total (cfs)	*539864.6	* Conv. (cfs)	*	*439915.6	* 99949.1 *
* Length Wtd. (ft)	* 238.36	* Wetted Per. (ft)	*	* 397.73	* 807.64 *
* Min Ch El (ft)	* 2747.00	* Shear (lb/sq ft)	*	* 0.14	* 0.05 *
* Alpha	* 1.59	* Stream Power (lb/ft s)	*	* 0.44	* 0.05 *
* Frctn Loss (ft)	* 0.05	* Cum Volume (acre-ft)	* 21.30	* 43.58	* 45.81 *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 6.61	* 5.69	* 11.45 *

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 110

INPUT
Description:
ation Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600.38	2767	-579.98	2766	-400.38	2765	-181.14	2758	-81.76	2757
-57.48	2756	-47.61	2755	0	2755	227.2	2756	237.17	2756
274.46	2755	312.01	2754	358.58	2754	379.63	2754	383.11	2753
386.65	2752	390.19	2751	392.73	2750	392.74	2750	395.22	2749
397.63	2748	410.68	2747	426.46	2747	431.11	2748	435.76	2749
446.04	2750	470.07	2751	481.43	2751	501.92	2750.75	563.14	2750
587.96	2750	594.62	2751	602.49	2752	613.17	2753	626.03	2753.97
626.5	2754	890.32	2755	967.13	2755	1086.65	2755	1302.26	2756
1331.06	2755.75	1340.58	2755.75	1426.39	2755.75	1446.33	2755.75	1459.98	2755.75
1515.86	2756.75	1570.65	2757.75	1587.84	2758.75	1592.77	2759.75	1597.63	2760.75
1602.74	2761.75	1607.53	2762.75	1611.47	2763.75	1613.74	2764.75	1616.01	2765.75
1618.28	2766.75	1620.53	2767.75	1622.77	2768.75	1624.98	2769.75	1627.19	2770.75
1629.4	2771.75	1631.62	2772.75	1633.89	2773.75	1636.29	2774.75	1638.58	2775.75
1640.84	2782.75	1643.09	2783.75	1645.32	2784.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600.38	.045	227.2	.03	626.5	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
227.2	626.5	308.04	322.72	332.25	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-600.38	227.2	2770	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2761.86	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.21	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2761.65	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25 *
* Crit W.S. (ft)	* 2757.33	* Flow Area (sq ft)	*	* 3875.50	* 6066.50 *
* E.G. Slope (ft/ft)	*0.000401	* Area (sq ft)	* 2520.51	* 3875.50	* 6066.50 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*17441.77	*13558.23 *
* Top Width (ft)	* 1897.68	* Top Width (ft)	* 522.65	* 399.30	* 975.73 *
* Vel Total (ft/s)	* 3.12	* Avg. Vel. (ft/s)	*	* 4.50	* 2.23 *
* Max Chl Dpth (ft)	* 14.65	* Hydr. Depth (ft)	*	* 9.71	* 6.22 *
* Conv. Total (cfs)	*1548288.0	* Conv. (cfs)	*	*871124.9	*677162.5 *
* Length Wtd. (ft)	* 325.99	* Wetted Per. (ft)	*	* 400.88	* 976.07 *
* Min Ch El (ft)	* 2747.00	* Shear (lb/sq ft)	*	* 0.24	* 0.16 *
* Alpha	* 1.40	* Stream Power (lb/ft s)	*	* 1.09	* 0.35 *
* Frctn Loss (ft)	* 0.08	* Cum Volume (acre-ft)	* 26.00	* 36.86	* 48.21 *
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 4.56	* 3.48	* 6.88 *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2761.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2761.06	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2756.82	Flow Area (sq ft)		3640.17	5492.34
E.G. Slope (ft/ft)	0.000324	Area (sq ft)	2217.92	3640.17	5492.34
Q Total (cfs)	24490.00	Flow (cfs)		14134.38	10355.62
Top Width (ft)	1876.20	Top Width (ft)	504.19	399.30	972.72
Vel Total (ft/s)	2.68	Avg. Vel. (ft/s)		3.88	1.89
Max Chl Dpth (ft)	14.06	Hydr. Depth (ft)		9.12	5.65
Conv. Total (cfs)	1359719.0	Conv. (cfs)		784760.6	574958.3
Length Wtd. (ft)	325.89	Wetted Per. (ft)		400.88	973.00
Min Ch El (ft)	2747.00	Shear (lb/sq ft)		0.18	0.11
Alpha	1.42	Stream Power (lb/ft s)		0.71	0.22
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	23.35	34.81	44.15
C & E Loss (ft)	0.03	Cum SA (acres)	4.44	3.48	6.87

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2762.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2762.17	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2757.67	Flow Area (sq ft)		4082.85	6573.85
E.G. Slope (ft/ft)	0.000437	Area (sq ft)	2796.14	4082.85	6573.85
Q Total (cfs)	36000.00	Flow (cfs)		19853.13	16146.87
Top Width (ft)	1916.46	Top Width (ft)	538.91	399.30	978.25
Vel Total (ft/s)	3.38	Avg. Vel. (ft/s)		4.86	2.46
Max Chl Dpth (ft)	15.17	Hydr. Depth (ft)		10.23	6.72
Conv. Total (cfs)	1722980.0	Conv. (cfs)		950182.1	772798.3
Length Wtd. (ft)	326.06	Wetted Per. (ft)		400.88	978.64
Min Ch El (ft)	2747.00	Shear (lb/sq ft)		0.28	0.18
Alpha	1.38	Stream Power (lb/ft s)		1.35	0.45
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	28.40	38.67	51.79
C & E Loss (ft)	0.04	Cum SA (acres)	4.65	3.48	6.90

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2755.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2755.53	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2750.51	Flow Area (sq ft)		1440.47	405.67
E.G. Slope (ft/ft)	0.000029	Area (sq ft)	58.41	1440.47	405.67
Q Total (cfs)	1000.00	Flow (cfs)		942.92	57.08
Top Width (ft)	1119.14	Top Width (ft)	173.09	371.78	574.27
Vel Total (ft/s)	0.54	Avg. Vel. (ft/s)		0.65	0.14
Max Chl Dpth (ft)	8.53	Hydr. Depth (ft)		3.87	0.71
Conv. Total (cfs)	186135.5	Conv. (cfs)		175510.8	10624.8
Length Wtd. (ft)	323.59	Wetted Per. (ft)		373.35	574.27
Min Ch El (ft)	2747.00	Shear (lb/sq ft)		0.01	0.00
Alpha	1.38	Stream Power (lb/ft s)		0.00	0.00
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	2.74	15.61	7.43
C & E Loss (ft)	0.00	Cum SA (acres)	1.68	3.38	5.23

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2755.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2755.70	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2752.48	Flow Area (sq ft)		1504.92	507.56
E.G. Slope (ft/ft)	0.000616	Area (sq ft)	91.66	1504.92	507.56
Q Total (cfs)	5000.00	Flow (cfs)		4632.57	367.43
Top Width (ft)	1203.35	Top Width (ft)	213.84	378.19	611.33
Vel Total (ft/s)	2.48	Avg. Vel. (ft/s)		3.08	0.72
Max Chl Dpth (ft)	8.70	Hydr. Depth (ft)		3.98	0.83
Conv. Total (cfs)	201466.8	Conv. (cfs)		186662.0	14804.8
Length Wtd. (ft)	323.71	Wetted Per. (ft)		379.76	611.33
Min Ch El (ft)	2747.00	Shear (lb/sq ft)		0.15	0.03
Alpha	1.43	Stream Power (lb/ft s)		0.47	0.02
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	3.07	16.22	8.40
C & E Loss (ft)	0.03	Cum SA (acres)	1.88	3.40	5.39

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

SS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2759.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2759.21	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2754.31	Flow Area (sq ft)		2901.23	3700.71
E.G. Slope (ft/ft)	0.000143	Area (sq ft)	1338.51	2901.23	3700.71

* Q Total (cfs)	*10000.00	* Flow (cfs)	*	* 6421.19	* 3578.81	*
* Top Width (ft)	* 1809.14	* Top Width (ft)	* 446.23	* 399.30	* 963.61	*
* Vel Total (ft/s)	* 1.51	* Avg. Vel. (ft/s)	*	* 2.21	* 0.97	*
* Max Chl Dpth (ft)	* 12.21	* Hydr. Depth (ft)	*	* 7.27	* 3.84	*
* Conv. Total (cfs)	*837316.5	* Conv. (cfs)	*	*537656.8	*299659.7	*
* Length Wtd. (ft)	* 325.48	* Wetted Per. (ft)	*	* 400.88	* 963.71	*
* Min Ch El (ft)	* 2747.00	* Shear (lb/sq ft)	*	* 0.06	* 0.03	*
* Alpha	* 1.52	* Stream Power (lb/ft s)	*	* 0.14	* 0.03	*
* Frctn Loss (ft)	* 0.02	* Cum Volume (acre-ft)	* 15.46	* 28.37	* 31.48	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 4.09	* 3.48	* 6.82	*

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

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 100

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-1079.5	2765	-908.05	2764	-796.29	2763	-637.85	2756	-590.66	2756
-582.71	2756	-429.48	2756	-343.01	2756	-257.47	2755	-240.37	2754
-236.92	2753	-233.51	2752	-230.22	2751	-227.02	2750	-223.93	2749
-185.04	2749	-174.13	2750	-169.65	2751	-165.16	2752	-160.66	2753
-156.1	2754	-123.66	2754	-99.38	2754	0	2754	48.99	2753
69.53	2753	69.54	2753	92.94	2753	92.95	2753	136.19	2752
136.2	2752	181.29	2751	186.69	2751	207.37	2752	220.09	2752
222.63	2751	222.64	2751	225.18	2750	227.72	2749	227.73	2749
230.27	2748	232.22	2747.36	233.31	2747	236.48	2746	271.72	2746
275.17	2747	279.24	2748	328.16	2749	339.63	2750	339.64	2750
380.46	2750	380.47	2750	390.22	2749.86	451.75	2749	486.38	2748
497.38	2748	501.1	2749	504.87	2750	504.88	2750	507.69	2751
539.73	2752	571.48	2753	643.34	2754	716.38	2754	890.83	2753
890.84	2753	1036.2	2753	1036.21	2753	1095.21	2754	1202.49	2754
1202.5	2754	1304.69	2754	1327.57	2755	1346.89	2756	1361.89	2757
1372.87	2764	1372.88	2764	1398.46	2765				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-1079.5	.045	0	.03	539.73	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	539.73	.1	.3

effective Flow num= 1

Sta L	Sta R	Elev	Permanent
-1079.5	-156.1	2764	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2761.75	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.10	* Wt. n-Val.	* 0.045	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2761.65	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 2755.15	* Flow Area (sq ft)	* 1194.15	* 6075.56	* 6574.14 *
* E.G. Slope (ft/ft)	*0.000151	* Area (sq ft)	* 4833.86	* 6075.56	* 6574.14 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	* 1881.07	*18528.07	*10590.87 *
* Top Width (ft)	* 2134.92	* Top Width (ft)	* 765.73	* 539.73	* 829.45 *
* Vel Total (ft/s)	* 2.24	* Avg. Vel. (ft/s)	* 1.58	* 3.05	* 1.61 *
* Max Chl Dpth (ft)	* 15.65	* Hydr. Depth (ft)	* 7.65	* 11.26	* 7.93 *
* Conv. Total (cfs)	*2522919.0	* Conv. (cfs)	*153089.5	*1507897.0	*861932.2 *
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 830.93 *
* Min Ch El (ft)	* 2746.00	* Shear (lb/sq ft)	* 0.07	* 0.11	* 0.07 *
* Alpha	* 1.32	* Stream Power (lb/ft s)	* 0.11	* 0.32	* 0.12 *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

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

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2761.13	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.07	* Wt. n-Val.	* 0.045	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2761.06	* Reach Len. (ft)	*	*	*
* Crit W.S. (ft)	* 2754.72	* Flow Area (sq ft)	* 1102.08	* 5757.20	* 6085.17 *
* E.G. Slope (ft/ft)	*0.000116	* Area (sq ft)	* 4386.14	* 5757.20	* 6085.17 *
* Q Total (cfs)	*24490.00	* Flow (cfs)	* 1444.32	*14866.55	* 8179.14 *
* Top Width (ft)	* 2120.64	* Top Width (ft)	* 752.38	* 539.73	* 828.53 *
* Vel Total (ft/s)	* 1.89	* Avg. Vel. (ft/s)	* 1.31	* 2.58	* 1.34 *
* Max Chl Dpth (ft)	* 15.06	* Hydr. Depth (ft)	* 7.06	* 10.67	* 7.34 *
* Conv. Total (cfs)	*2270872.0	* Conv. (cfs)	*133926.4	*1378523.0	*758422.8 *
* Length Wtd. (ft)	*	* Wetted Per. (ft)	* 156.10	* 541.65	* 829.83 *
* Min Ch El (ft)	* 2746.00	* Shear (lb/sq ft)	* 0.05	* 0.08	* 0.05 *
* Alpha	* 1.33	* Stream Power (lb/ft s)	* 0.07	* 0.20	* 0.07 *
* Frctn Loss (ft)	*	* Cum Volume (acre-ft)	*	*	*
* C & E Loss (ft)	*	* Cum SA (acres)	*	*	*

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

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2762.29	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.12	* Wt. n-Val.	* 0.045	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2762.17	* Reach Len. (ft)	*	*	*

Crit W.S. (ft)	2755.52	Flow Area (sq ft)	1275.33	6356.23	7005.69
E.G. Slope (ft/ft)	0.000171	Area (sq ft)	5235.12	6356.23	7005.69
Q Total (cfs)	36000.00	Flow (cfs)	2232.88	21250.92	12516.20
Top Width (ft)	2147.50	Top Width (ft)	777.50	539.73	830.27
Vel Total (ft/s)	2.46	Avg. Vel. (ft/s)	1.75	3.34	1.79
Max Chl Dpth (ft)	16.17	Hydr. Depth (ft)	8.17	11.78	8.44
Conv. Total (cfs)	2754137.0	Conv. (cfs)	170823.9	1625776.0	957537.0
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	831.89
Min Ch El (ft)	2746.00	Shear (lb/sq ft)	0.09	0.13	0.09
Alpha	1.31	Stream Power (lb/ft s)	0.15	0.42	0.16
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2755.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2755.53	Reach Len. (ft)			
Crit W.S. (ft)	2748.79	Flow Area (sq ft)	238.84	2772.48	1542.35
E.G. Slope (ft/ft)	0.000004	Area (sq ft)	717.05	2772.48	1542.35
Q Total (cfs)	1000.00	Flow (cfs)	21.06	820.07	158.87
Top Width (ft)	1640.62	Top Width (ft)	302.81	539.73	798.08
Vel Total (ft/s)	0.22	Avg. Vel. (ft/s)	0.09	0.30	0.10
Max Chl Dpth (ft)	9.53	Hydr. Depth (ft)	1.53	5.14	1.93
Conv. Total (cfs)	497341.9	Conv. (cfs)	10471.7	407857.2	79013.1
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	798.15
Min Ch El (ft)	2746.00	Shear (lb/sq ft)	0.00	0.00	0.00
Alpha	1.53	Stream Power (lb/ft s)	0.00	0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2755.75	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2755.72	Reach Len. (ft)			
Crit W.S. (ft)	2750.80	Flow Area (sq ft)	268.49	2874.99	1694.29
E.G. Slope (ft/ft)	0.000086	Area (sq ft)	776.11	2874.99	1694.29
Q Total (cfs)	5000.00	Flow (cfs)	118.25	4025.82	855.93
Top Width (ft)	1660.54	Top Width (ft)	319.06	539.73	801.75
Vel Total (ft/s)	1.03	Avg. Vel. (ft/s)	0.44	1.40	0.51
Max Chl Dpth (ft)	9.72	Hydr. Depth (ft)	1.72	5.33	2.11
Conv. Total (cfs)	538152.6	Conv. (cfs)	12726.8	433301.2	92124.6
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	801.82
Min Ch El (ft)	2746.00	Shear (lb/sq ft)	0.01	0.03	0.01
Alpha	1.52	Stream Power (lb/ft s)	0.00	0.04	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2759.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2759.21	Reach Len. (ft)			
Crit W.S. (ft)	2752.21	Flow Area (sq ft)	813.28	4758.65	4554.99
E.G. Slope (ft/ft)	0.000041	Area (sq ft)	3032.89	4758.65	4554.99
Q Total (cfs)	10000.00	Flow (cfs)	519.49	6459.56	3020.94
Top Width (ft)	2075.86	Top Width (ft)	710.51	539.73	825.63
Vel Total (ft/s)	0.99	Avg. Vel. (ft/s)	0.64	1.36	0.66
Max Chl Dpth (ft)	13.21	Hydr. Depth (ft)	5.21	8.82	5.52
Conv. Total (cfs)	1553570.0	Conv. (cfs)	80706.7	1003539.0	469324.7
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	826.39
Min Ch El (ft)	2746.00	Shear (lb/sq ft)	0.01	0.02	0.01
Alpha	1.38	Stream Power (lb/ft s)	0.01	0.03	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

SUMMARY OF MANNING'S N VALUES

River:River #1

Reach	River Sta.	n1	n2	n3
Reach #1	180	.045	.03	.045
Reach #1	170	.045	.03	.045
Reach #1	160	.045	.03	.045
Reach #1	150	.045	.03	.045
Reach #1	149.*	.045	.03	.045
Reach #1	148.*	.045	.03	.045
Reach #1	147.*	.045	.03	.045
Reach #1	146.*	.045	.03	.045
Reach #1	145.*	.045	.03	.045
Reach #1	144.*	.045	.03	.045
Reach #1	143.*	.045	.03	.045
Reach #1	142.*	.045	.03	.045
Reach #1	141.*	.045	.03	.045
Reach #1	140.*	.045	.03	.045

*Reach #1	* 139	* .045*	.03*	.045*
*Reach #1	* 130	* .045*	.03*	.045*
*Reach #1	* 120	* .045*	.03*	.045*
*Reach #1	* 115	* .045*	.03*	.045*
*Reach #1	* 110	* .045*	.03*	.045*
*Reach #1	* 100	* .045*	.03*	.045*

SUMMARY OF REACH LENGTHS

River: River #1

Reach	River Sta.	Left	Channel	Right
*Reach #1	* 180	* 44.45*	181.54*	256.85*
*Reach #1	* 170	* 130.15*	130.15*	130.15*
*Reach #1	* 160	* 203.69*	188.86*	197*
*Reach #1	* 150	* 23.86*	18.79*	11.8*
*Reach #1	* 149.*	* 23.86*	18.79*	11.8*
*Reach #1	* 148.*	* 23.86*	18.79*	11.8*
*Reach #1	* 147.*	* 23.86*	18.79*	11.8*
*Reach #1	* 146.*	* 23.86*	18.79*	11.8*
*Reach #1	* 145.*	* 23.86*	18.79*	11.8*
*Reach #1	* 144.*	* 23.86*	18.79*	11.8*
*Reach #1	* 143.*	* 23.86*	18.79*	11.8*
*Reach #1	* 142.*	* 23.86*	18.79*	11.8*
*Reach #1	* 141.*	* 23.86*	18.79*	11.8*
*Reach #1	* 140.*	* 23.86*	18.79*	11.8*
*Reach #1	* 139	* 172.75*	171.78*	164.65*
*Reach #1	* 130	* 295.76*	287.33*	274.51*
*Reach #1	* 120	* 158.39*	153.64*	149.14*
*Reach #1	* 115	* 257.93*	242.39*	227.54*
*Reach #1	* 110	* 308.04*	322.72*	332.25*
*Reach #1	* 100	* *	*	*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River #1

Reach	River Sta.	Contr.	Expan.
*Reach #1	* 180	* .1*	.3*
*Reach #1	* 170	* .1*	.3*
*Reach #1	* 160	* .1*	.3*
*Reach #1	* 150	* .1*	.3*
*Reach #1	* 149.*	* .1*	.3*
*Reach #1	* 148.*	* .1*	.3*
*Reach #1	* 147.*	* .1*	.3*
*Reach #1	* 146.*	* .1*	.3*
*Reach #1	* 145.*	* .1*	.3*
*Reach #1	* 144.*	* .1*	.3*
*Reach #1	* 143.*	* .1*	.3*
*Reach #1	* 142.*	* .1*	.3*
*Reach #1	* 141.*	* .1*	.3*
*Reach #1	* 140.*	* .1*	.3*
*Reach #1	* 139	* .1*	.3*
*Reach #1	* 130	* .1*	.3*
*Reach #1	* 120	* .1*	.3*
*Reach #1	* 115	* .1*	.3*
*Reach #1	* 110	* .1*	.3*
*Reach #1	* 100	* .1*	.3*

Profile Outp[illegible]ble - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #1	180	PF 1	31000.00	2759.08	2775.13	2769.76	2775.99	0.000962	7.44	4166.17	379.51	0.40
Reach #1	180	PF 2	24490.00	2759.08	2773.22	2768.85	2774.00	0.001096	7.10	3447.07	371.67	0.41
Reach #1	180	PF 3	36000.00	2759.08	2776.50	2770.43	2777.42	0.000892	7.67	4713.35	450.20	0.39
Reach #1	180	PF 4	1000.00	2759.08	2762.80	2762.13	2763.10	0.004290	4.40	227.08	140.27	0.61
Reach #1	180	PF 5	5000.00	2759.08	2765.84	2764.60	2766.37	0.003189	5.84	856.67	279.32	0.59
Reach #1	180	PF 6	10000.00	2759.08	2768.18	2766.24	2768.77	0.002022	6.13	1630.48	349.86	0.50
Reach #1	170	PF 1	31000.00	2758.49	2773.49	2770.35	2775.57	0.003402	11.58	2676.74	248.09	0.62
Reach #1	170	PF 2	24490.00	2758.49	2771.71	2769.11	2773.56	0.003581	10.92	2241.82	241.93	0.63
Reach #1	170	PF 3	36000.00	2758.49	2774.76	2771.24	2777.00	0.003299	12.03	2994.62	252.63	0.61
Reach #1	170	PF 4	1000.00	2758.49	2761.84	2761.35	2762.22	0.005401	4.93	203.00	119.52	0.67
Reach #1	170	PF 5	5000.00	2758.49	2764.72	2763.92	2765.61	0.005075	7.57	660.60	181.90	0.70
Reach #1	170	PF 6	10000.00	2758.49	2766.91	2765.78	2768.16	0.004905	8.95	1117.67	226.59	0.71
Reach #1	160	PF 1	31000.00	2757.67	2771.67	2769.83	2774.92	0.005009	14.46	2143.16	196.67	0.77
Reach #1	160	PF 2	24490.00	2757.67	2770.34	2768.41	2772.97	0.004500	13.00	1883.39	193.18	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.60	2770.85	2776.32	0.005364	15.47	2327.25	199.04	0.80
Reach #1	160	PF 4	1000.00	2757.67	2761.59	2760.46	2761.77	0.001922	3.41	293.37	143.78	0.42
Reach #1	160	PF 5	5000.00	2757.67	2764.42	2762.91	2765.07	0.002752	6.44	775.80	180.92	0.55
Reach #1	160	PF 6	10000.00	2757.67	2766.44	2764.67	2767.62	0.003300	8.73	1145.67	186.02	0.62
Reach #1	150	PF 1	31000.00	2757.36	2770.81	2769.32	2774.06	0.004221	14.46	2143.28	212.96	0.80
Reach #1	150	PF 2	24490.00	2757.36	2769.43	2767.97	2772.14	0.004114	13.21	1853.82	208.31	0.78
Reach #1	150	PF 3	36000.00	2757.36	2771.72	2770.31	2775.40	0.004348	15.39	2339.88	216.41	0.82
Reach #1	150	PF 4	1000.00	2757.36	2761.08	2760.15	2761.33	0.002820	3.96	252.50	133.45	0.51
Reach #1	150	PF 5	5000.00	2757.36	2763.65	2762.71	2764.44	0.003824	7.15	699.46	190.67	0.66
Reach #1	150	PF 6	10000.00	2757.36	2765.59	2764.36	2766.93	0.003828	9.31	1074.28	196.14	0.70
Reach #1	149.*	PF 1	31000.00	2757.24	2770.46	2769.35	2773.95	0.004726	14.99	2068.13	214.10	0.85
Reach #1	149.*	PF 2	24490.00	2757.24	2769.11	2768.00	2772.04	0.004623	13.73	1784.08	208.51	0.83
Reach #1	149.*	PF 3	36000.00	2757.24	2771.40	2770.36	2775.30	0.004754	15.85	2272.86	224.11	0.86
Reach #1	149.*	PF 4	1000.00	2757.24	2761.00	2760.12	2761.27	0.003214	4.15	240.74	131.19	0.54
Reach #1	149.*	PF 5	5000.00	2757.24	2763.51	2762.68	2764.36	0.004215	7.43	673.19	187.37	0.69
Reach #1	149.*	PF 6	10000.00	2757.24	2765.38	2764.36	2766.84	0.004290	9.70	1031.39	194.23	0.74
Reach #1	148.*	PF 1	31000.00	2757.13	2770.02	2769.39	2773.81	0.005431	15.64	1982.41	215.47	0.91
Reach #1	148.*	PF 2	24490.00	2757.13	2768.79	2768.02	2771.93	0.005184	14.22	1722.12	209.44	0.87
Reach #1	148.*	PF 3	36000.00	2757.13	2771.16	2770.34	2775.20	0.005027	16.14	2238.64	232.57	0.89
Reach #1	148.*	PF 4	1000.00	2757.13	2760.90	2760.11	2761.20	0.003837	4.39	227.75	130.90	0.59
Reach #1	148.*	PF 5	5000.00	2757.13	2763.34	2762.66	2764.27	0.004768	7.77	643.83	184.58	0.73
Reach #1	148.*	PF 6	10000.00	2757.13	2765.14	2764.34	2766.74	0.004921	10.15	985.55	193.12	0.79
Reach #1	147.*	PF 1	31000.00	2757.01	2769.59	2769.33	2773.68	0.006135	16.25	1909.75	222.39	0.96
Reach #1	147.*	PF 2	24490.00	2757.01	2768.54	2767.99	2771.82	0.005621	14.54	1684.75	211.69	0.91
Reach #1	147.*	PF 3	36000.00	2757.01	2771.07	2770.31	2775.10	0.004984	16.11	2252.60	239.16	0.89
Reach #1	147.*	PF 4	1000.00	2757.01	2760.78	2760.07	2761.11	0.004593	4.62	216.35	132.11	0.64
Reach #1	147.*	PF 5	5000.00	2757.01	2763.15	2762.58	2764.17	0.005401	8.11	616.73	182.60	0.78
Reach #1	147.*	PF 6	10000.00	2757.01	2764.89	2764.33	2766.63	0.005658	10.59	944.08	193.38	0.84
Reach #1	146.*	PF 1	31000.00	2756.89	2769.27	2769.27	2773.55	0.006578	16.60	1874.51	229.50	1.00
Reach #1	146.*	PF 2	24490.00	2756.89	2767.91	2767.91	2771.67	0.007013	15.54	1575.60	212.57	1.01
Reach #1	146.*	PF 3	36000.00	2756.89	2771.09	2770.19	2774.96	0.004698	15.81	2368.49	499.82	0.87
Reach #1	146.*	PF 4	1000.00	2756.89	2760.65	2760.08	2761.02	0.005412	4.88	204.77	130.48	0.69
Reach #1	146.*	PF 5	5000.00	2756.89	2762.94	2762.54	2764.06	0.006231	8.49	589.06	181.73	0.83
Reach #1	146.*	PF 6	10000.00	2756.89	2764.63	2764.27	2766.51	0.006513	11.00	908.85	196.11	0.90
Reach #1	145.*	PF 1	31000.00	2756.77	2768.80	2769.10	2773.39	0.007389	17.20	1813.38	229.19	1.05
Reach #1	145.*	PF 2	24490.00	2756.77	2767.60	2767.82	2771.51	0.007592	15.89	1542.43	218.64	1.04
Reach #1	145.*	PF 3	36000.00	2756.77	2771.65	2771.65	2774.61	0.003423	14.14	3183.96	924.32	0.75
Reach #1	145.*	PF 4	1000.00	2756.77	2760.49	2760.07	2760.91	0.006284	5.16	193.97	127.62	0.74
Reach #1	145.*	PF 5	5000.00	2756.77	2762.73	2762.45	2763.93	0.007058	8.79	568.55	183.01	0.88
Reach #1	145.*	PF 6	10000.00	2756.77	2764.40	2764.15	2766.37	0.007013	11.26	887.87	195.70	0.93
Reach #1	144.*	PF 1	31000.00	2756.66	2768.34	2769.48	2773.21	0.008168	17.72	1763.51	230.10	1.10
Reach #1	144.*	PF 2	24490.00	2756.66	2767.62	2767.63	2771.30	0.006860	15.39	1599.35	226.85	1.00
Reach #1	144.*	PF 3	36000.00	2756.66	2769.63	2771.29	2774.36	0.006682	17.54	2208.91	486.90	1.02
Reach #1	144.*	PF 4	1000.00	2756.66	2760.32	2760.00	2760.78	0.007410	5.44	183.94	126.60	0.79
Reach #1	144.*	PF 5	5000.00	2756.66	2762.34	2762.34	2763.76	0.009536	9.56	522.79	186.31	1.01
Reach #1	144.*	PF 6	10000.00	2756.66	2764.00	2764.00	2766.20	0.008338	11.90	840.44	194.34	1.01
Reach #1	143.*	PF 1	31000.00	2756.54	2769.10	2769.47	2772.71	0.005376	15.42	2244.12	496.33	0.91
Reach #1	143.*	PF 2	24490.00	2756.54	2766.88	2767.33	2771.10	0.008643	16.50	1493.02	226.34	1.11
Reach #1	143.*	PF 3	36000.00	2756.54	2768.77	2770.83	2774.15	0.008315	18.76	2082.65	479.04	1.13
Reach #1	143.*	PF 4	1000.00	2756.54	2760.10	2759.90	2760.62	0.009166	5.82	171.80	125.33	0.88

Reach #1	143.*	PF 5	5000.00	2756.54	2762.03	2762.14	2763.56	0.010805	9.92	504.01	186.70	1.06
Reach #1	143.*	PF 6	10000.00	2756.54	2763.63	2763.82	2766.01	0.009527	12.40	806.48	193.72	1.07
Reach #1	142.*	PF 1	31000.00	2756.42	2767.83	2769.04	2772.48	0.007925	17.44	1933.20	460.92	1.09
Reach #1	142.*	PF 2	24490.00	2756.42	2767.31	2767.42	2770.72	0.006233	14.88	1708.14	366.58	0.95
Reach #1	142.*	PF 3	36000.00	2756.42	2768.02	2770.32	2773.93	0.009831	19.71	2020.70	468.24	1.21
Reach #1	142.*	PF 4	1000.00	2756.42	2759.64	2759.64	2760.41	0.011829	7.02	142.36	94.82	1.01
Reach #1	142.*	PF 5	5000.00	2756.42	2761.67	2761.89	2763.34	0.012368	10.36	482.82	185.39	1.13
Reach #1	142.*	PF 6	10000.00	2756.42	2763.24	2763.60	2765.80	0.010868	12.85	778.45	195.74	1.14
Reach #1	141.*	PF 1	31000.00	2756.30	2766.98	2768.55	2772.25	0.009774	18.60	1832.11	442.29	1.19
Reach #1	141.*	PF 2	24490.00	2756.30	2766.13	2767.42	2770.49	0.009204	16.78	1499.57	320.18	1.14
Reach #1	141.*	PF 3	36000.00	2756.30	2767.27	2769.74	2773.69	0.011439	20.60	1961.12	450.33	1.30
Reach #1	141.*	PF 4	1000.00	2756.30	2759.23	2759.39	2760.13	0.018243	7.61	131.42	107.60	1.21
Reach #1	141.*	PF 5	5000.00	2756.30	2761.30	2761.61	2763.08	0.013814	10.73	466.02	184.06	1.19
Reach #1	141.*	PF 6	10000.00	2756.30	2762.79	2763.34	2765.56	0.012568	13.34	749.37	198.42	1.21
Reach #1	140.*	PF 1	31000.00	2756.19	2766.19	2767.98	2772.00	0.011668	19.59	1758.35	424.00	1.29
Reach #1	140.*	PF 2	24490.00	2756.19	2765.37	2766.94	2770.24	0.011146	17.78	1437.09	328.25	1.24
Reach #1	140.*	PF 3	36000.00	2756.19	2766.54	2769.18	2773.41	0.013174	21.42	1908.12	432.76	1.38
Reach #1	140.*	PF 4	1000.00	2756.19	2758.75	2758.97	2759.74	0.022811	7.99	125.23	112.60	1.33
Reach #1	140.*	PF 5	5000.00	2756.19	2760.89	2761.30	2762.80	0.015410	11.10	450.44	183.13	1.25
Reach #1	140.*	PF 6	10000.00	2756.19	2762.31	2762.99	2765.28	0.014520	13.83	722.98	201.98	1.29
Reach #1	139	PF 1	31000.00	2750.07	2757.49	2761.29	2770.87	0.041964	29.39	1062.54	220.15	2.31
Reach #1	139	PF 2	24490.00	2750.07	2756.58	2760.35	2769.09	0.050404	28.40	864.64	213.33	2.46
Reach #1	139	PF 3	36000.00	2750.07	2758.10	2762.54	2772.29	0.038693	30.31	1222.81	302.93	2.26
Reach #1	139	PF 4	1000.00	2750.07	2755.57	2752.54	2755.60	0.000205	1.53	653.10	202.99	0.15
Reach #1	139	PF 5	5000.00	2750.07	2753.04	2754.95	2761.54	0.103913	23.39	213.74	118.80	3.07
Reach #1	139	PF 6	10000.00	2750.07	2754.24	2756.58	2764.04	0.092924	25.12	398.16	182.77	3.00
Reach #1	130	PF 1	31000.00	2749.25	2758.08	2760.33	2764.61	0.016040	20.74	1669.03	530.80	1.48
Reach #1	130	PF 2	24490.00	2749.25	2761.05	2759.36	2762.17	0.002241	9.20	3403.30	1132.71	0.58
Reach #1	130	PF 3	36000.00	2749.25	2758.41	2761.00	2765.97	0.017730	22.47	1845.30	542.46	1.57
Reach #1	130	PF 4	1000.00	2749.25	2755.55	2751.85	2755.58	0.000086	1.14	877.61	220.49	0.10
Reach #1	130	PF 5	5000.00	2749.25	2756.21	2753.98	2756.58	0.001329	4.88	1023.69	226.27	0.40
Reach #1	130	PF 6	10000.00	2749.25	2759.31	2755.60	2759.70	0.000850	5.21	2336.95	624.40	0.35
Reach #1	120	PF 1	31000.00	2748.00	2761.70	2759.45	2762.24	0.001237	6.82	6272.85	1667.32	0.43
Reach #1	120	PF 2	24490.00	2748.00	2761.10	2758.98	2761.54	0.001077	6.04	5595.32	1638.74	0.40
Reach #1	120	PF 3	36000.00	2748.00	2762.22	2759.83	2762.82	0.001277	7.24	6864.50	1688.92	0.44
Reach #1	120	PF 4	1000.00	2748.00	2755.54	2751.40	2755.55	0.000060	1.00	995.15	232.39	0.09
Reach #1	120	PF 5	5000.00	2748.00	2755.87	2753.51	2756.21	0.001202	4.66	1073.19	238.03	0.39
Reach #1	120	PF 6	10000.00	2748.00	2759.23	2755.02	2759.43	0.000653	3.85	3483.05	1412.57	0.29
Reach #1	115	PF 1	31000.00	2747.00	2761.63	2758.74	2762.05	0.000809	6.03	7295.69	1891.00	0.36
Reach #1	115	PF 2	24490.00	2747.00	2761.05	2758.16	2761.38	0.000678	5.28	6582.27	1887.12	0.32
Reach #1	115	PF 3	36000.00	2747.00	2762.15	2759.15	2762.62	0.000858	6.45	7926.90	1894.30	0.37
Reach #1	115	PF 4	1000.00	2747.00	2755.53	2750.51	2755.54	0.000035	0.81	1240.05	266.48	0.07
Reach #1	115	PF 5	5000.00	2747.00	2755.80	2752.40	2756.03	0.000749	3.81	1313.07	276.29	0.31
Reach #1	115	PF 6	10000.00	2747.00	2759.21	2754.01	2759.34	0.000343	3.18	4348.46	1606.59	0.22
Reach #1	110	PF 1	31000.00	2747.00	2761.65	2757.33	2761.86	0.000401	4.50	9942.01	1897.68	0.25
Reach #1	110	PF 2	24490.00	2747.00	2761.06	2756.82	2761.22	0.000324	3.88	9132.51	1876.20	0.23
Reach #1	110	PF 3	36000.00	2747.00	2762.17	2757.67	2762.41	0.000437	4.86	10656.70	1916.46	0.27
Reach #1	110	PF 4	1000.00	2747.00	2755.53	2750.51	2755.54	0.000029	0.65	1846.13	1119.14	0.06
Reach #1	110	PF 5	5000.00	2747.00	2755.70	2752.48	2755.84	0.000616	3.08	2012.47	1203.35	0.27
Reach #1	110	PF 6	10000.00	2747.00	2759.21	2754.31	2759.26	0.000143	2.21	6601.94	1809.14	0.14
Reach #1	100	PF 1	31000.00	2746.00	2761.65	2755.15	2761.75	0.000151	3.05	13843.85	2134.92	0.16
Reach #1	100	PF 2	24490.00	2746.00	2761.06	2754.72	2761.13	0.000116	2.58	12944.44	2120.64	0.14
Reach #1	100	PF 3	36000.00	2746.00	2762.17	2755.52	2762.29	0.000171	3.34	14637.24	2147.50	0.17
Reach #1	100	PF 4	1000.00	2746.00	2755.53	2748.79	2755.53	0.000004	0.30	4553.67	1640.62	0.02
Reach #1	100	PF 5	5000.00	2746.00	2755.72	2750.80	2755.75	0.000086	1.40	4837.77	1660.54	0.11
Reach #1	100	PF 6	10000.00	2746.00	2759.21	2752.21	2759.23	0.000041	1.36	10126.91	2075.86	0.08

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Plan 46

River: River #1 Reach: Reach #1 RS: 180 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 6
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 4
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 5
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 6
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 1
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 3
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 5
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 6
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 149.* Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 149.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 148.* Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 148.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 147.* Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 147.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 146.* Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 146.* Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 146.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 145.* Profile: PF 1
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 145.* Profile: PF 2
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 145.* Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 145.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 144.* Profile: PF 3
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.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 144.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 144.* Profile: PF 5
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.
River: River #1 Reach: Reach #1 RS: 144.* Profile: PF 6

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    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.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 1
    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.
iver: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 2
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 3
    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.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 4
    Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 5
    Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 6
    Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 1
    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.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 2
    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.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 3
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 4
    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:Divided flow computed for this cross-section.
    Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
            water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
            program defaulted to critical depth.
River: River #1  Reach: Reach #1     RS: 141.*     Profile: PF 1
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 141.*     Profile: PF 2
    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.
River: River #1  Reach: Reach #1     RS: 141.*     Profile: PF 4
    Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 140.*     Profile: PF 1
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 140.*     Profile: PF 2
    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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 1
    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.
ver: River #1  Reach: Reach #1     RS: 139     Profile: PF 2
    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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 3
    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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 4
    Warning:The conveyance ratio (upstream 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:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 5
    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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 6
    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.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 1
    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.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 2
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
ver: River #1  Reach: Reach #1     RS: 130     Profile: PF 3
    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.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
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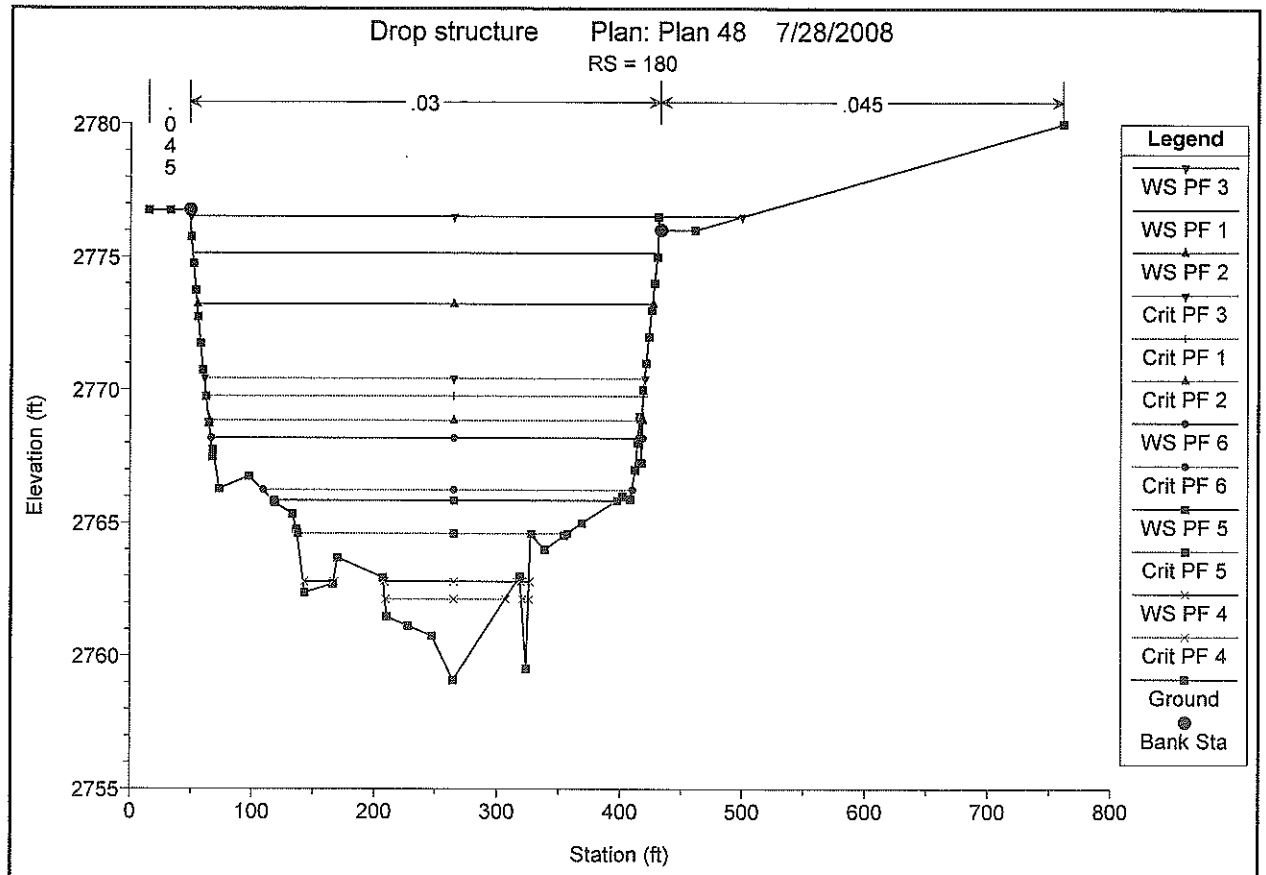
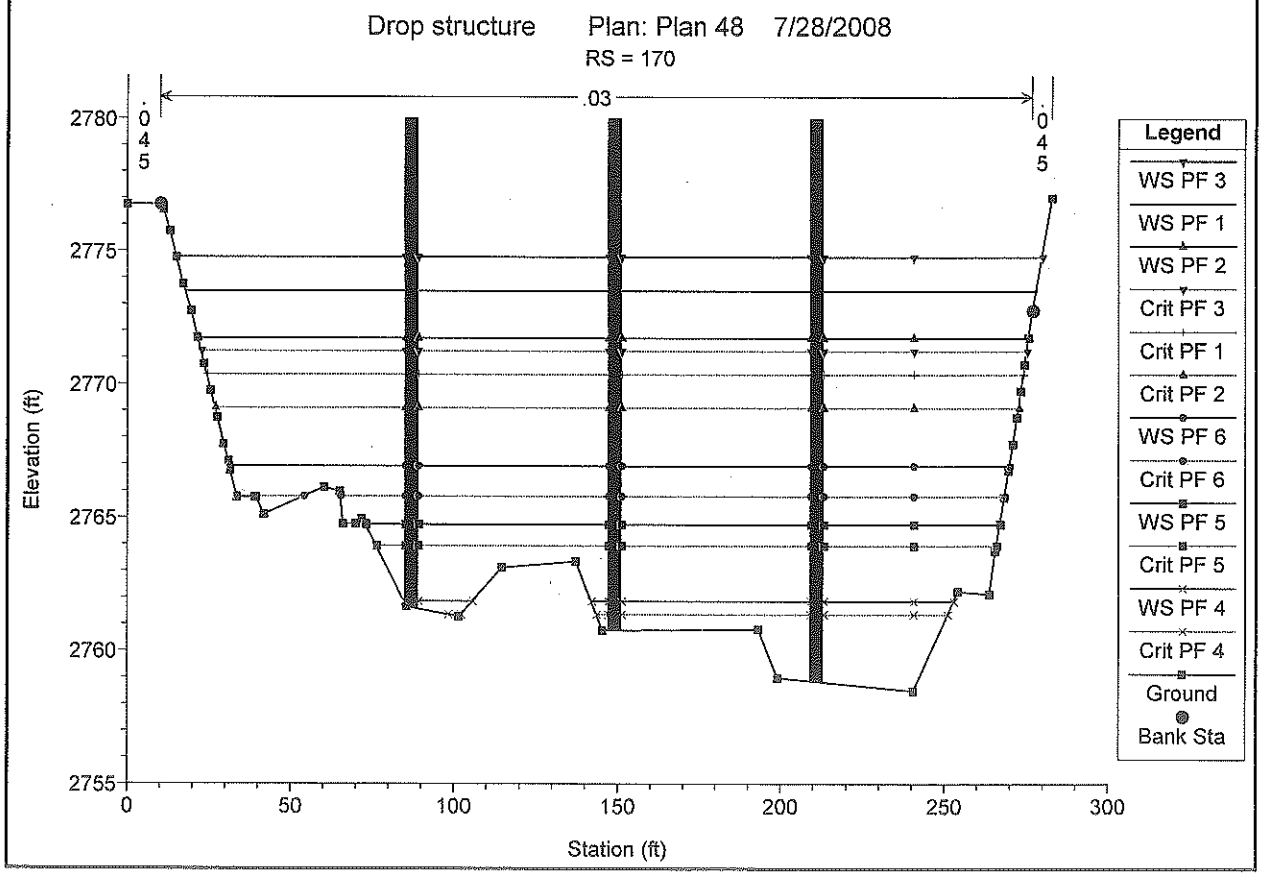
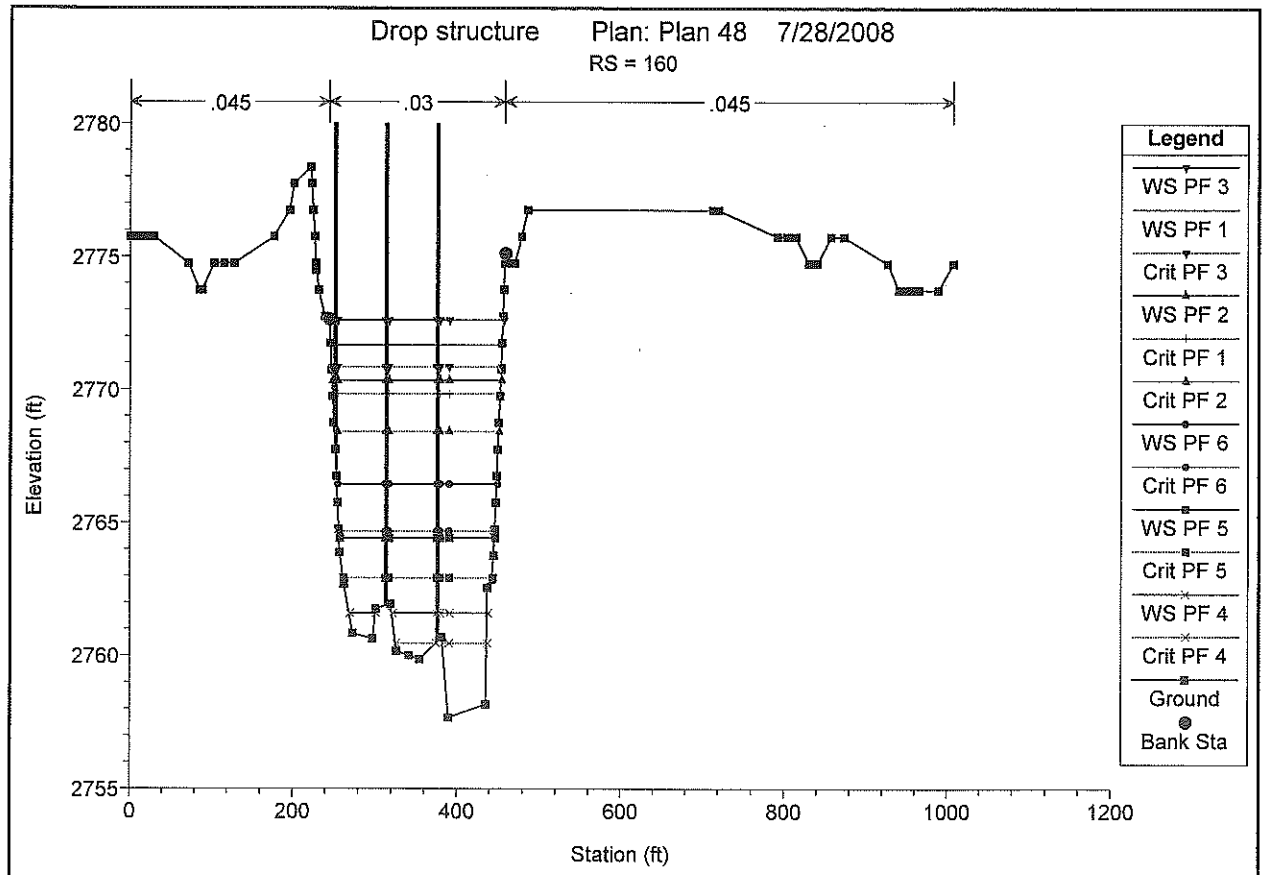
used.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 4
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 5
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 130 Profile: PF 6
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 1
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 2
Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 3
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 4
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 5
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 120 Profile: PF 6
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 2
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 3
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 4
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 5
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 115 Profile: PF 6
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 1
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 2
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 3
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 4
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 5
Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 110 Profile: PF 6
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 1
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 2
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 3
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 4
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 5
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

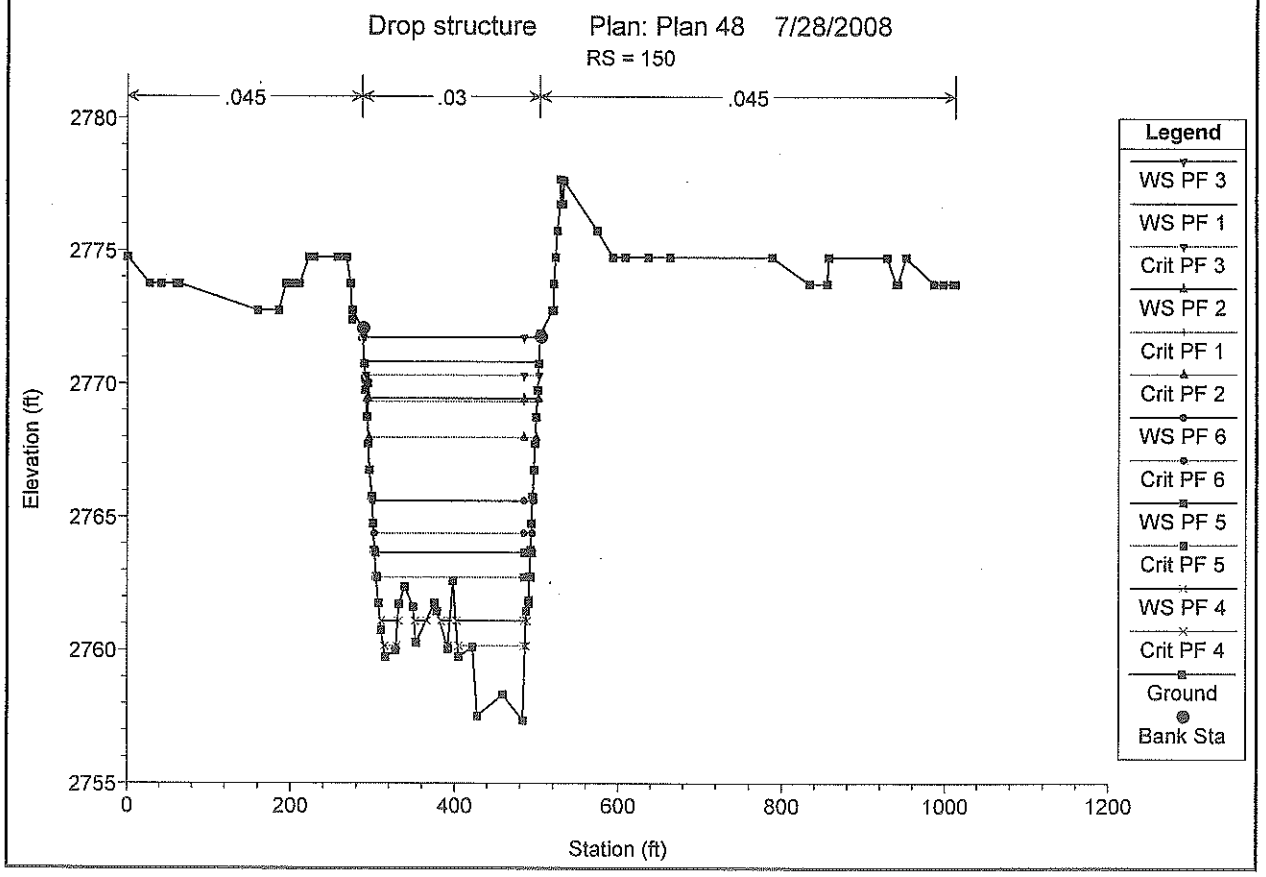
River: River #1 Reach: Reach #1 RS: 100 Profile: PF 6

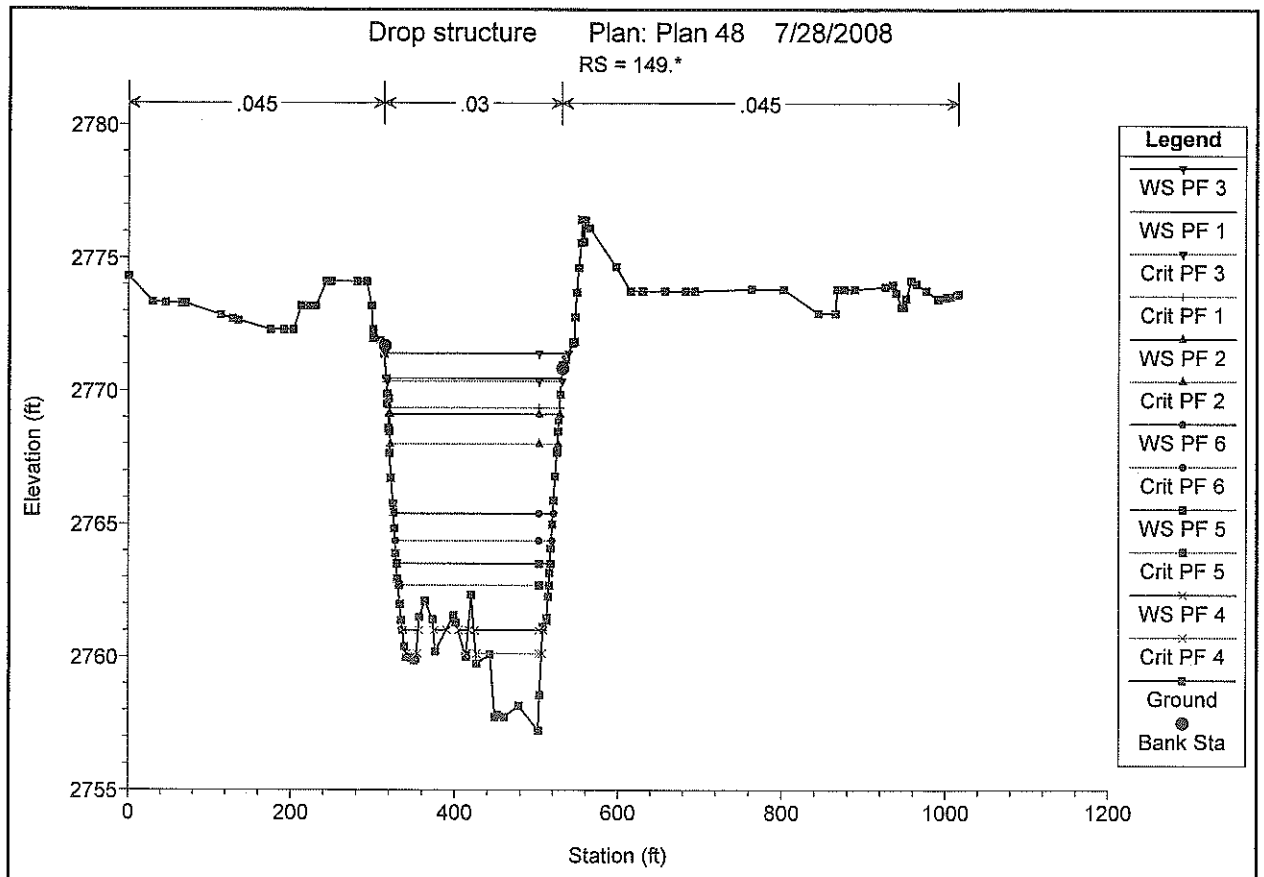
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

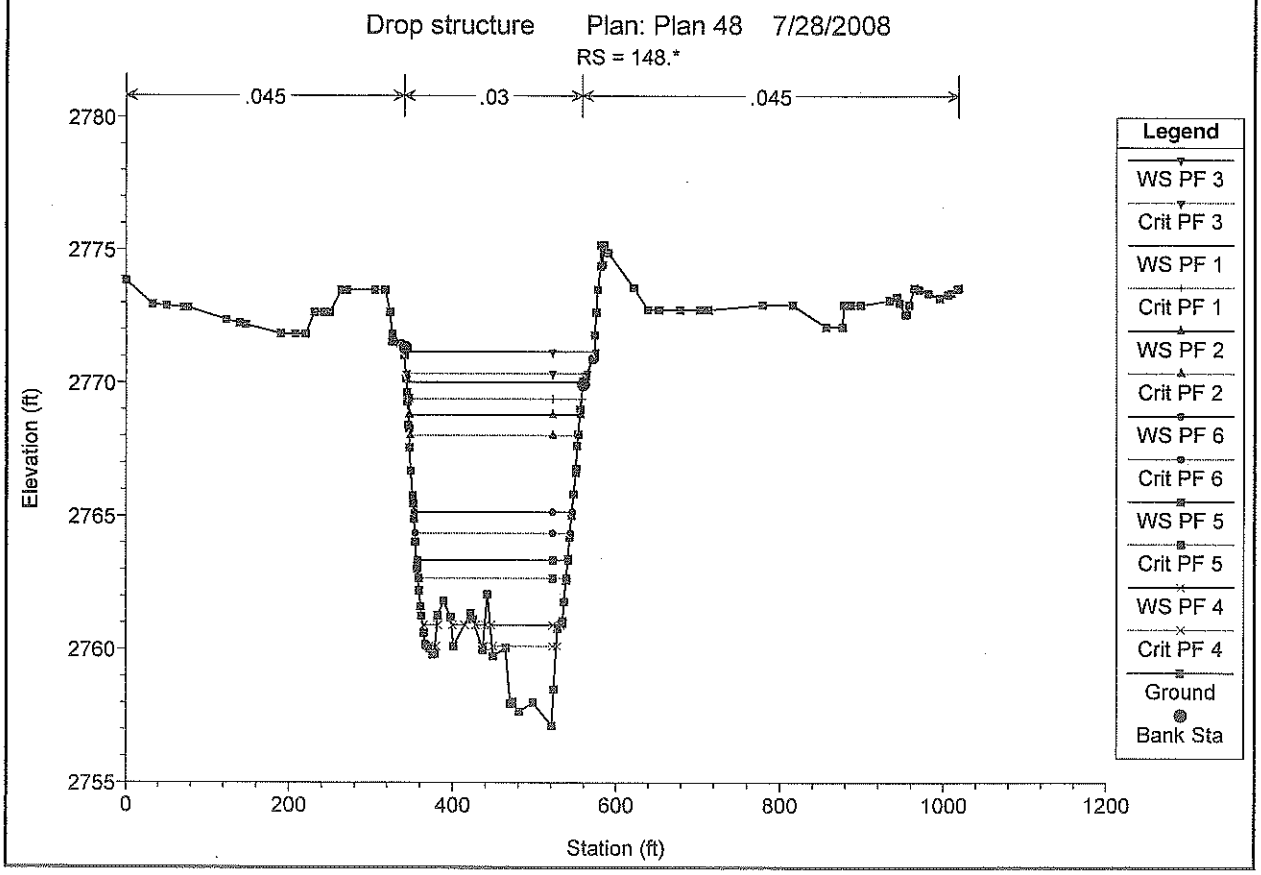

Drop structure Plan: Plan 48 7/28/2008
RS = 180
.03
.045
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

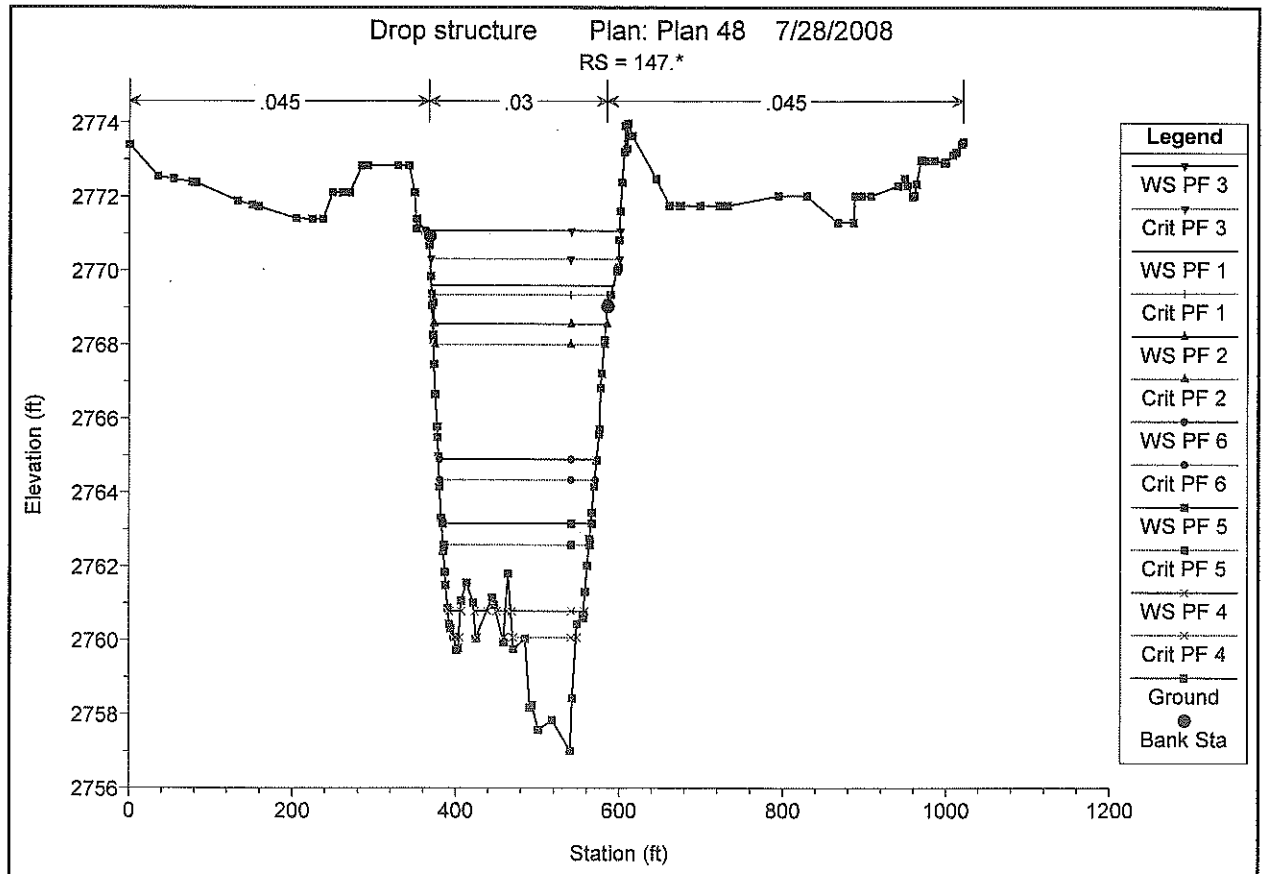

Drop structure Plan: Plan 48 7/28/2008
RS = 170
.03
.045
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

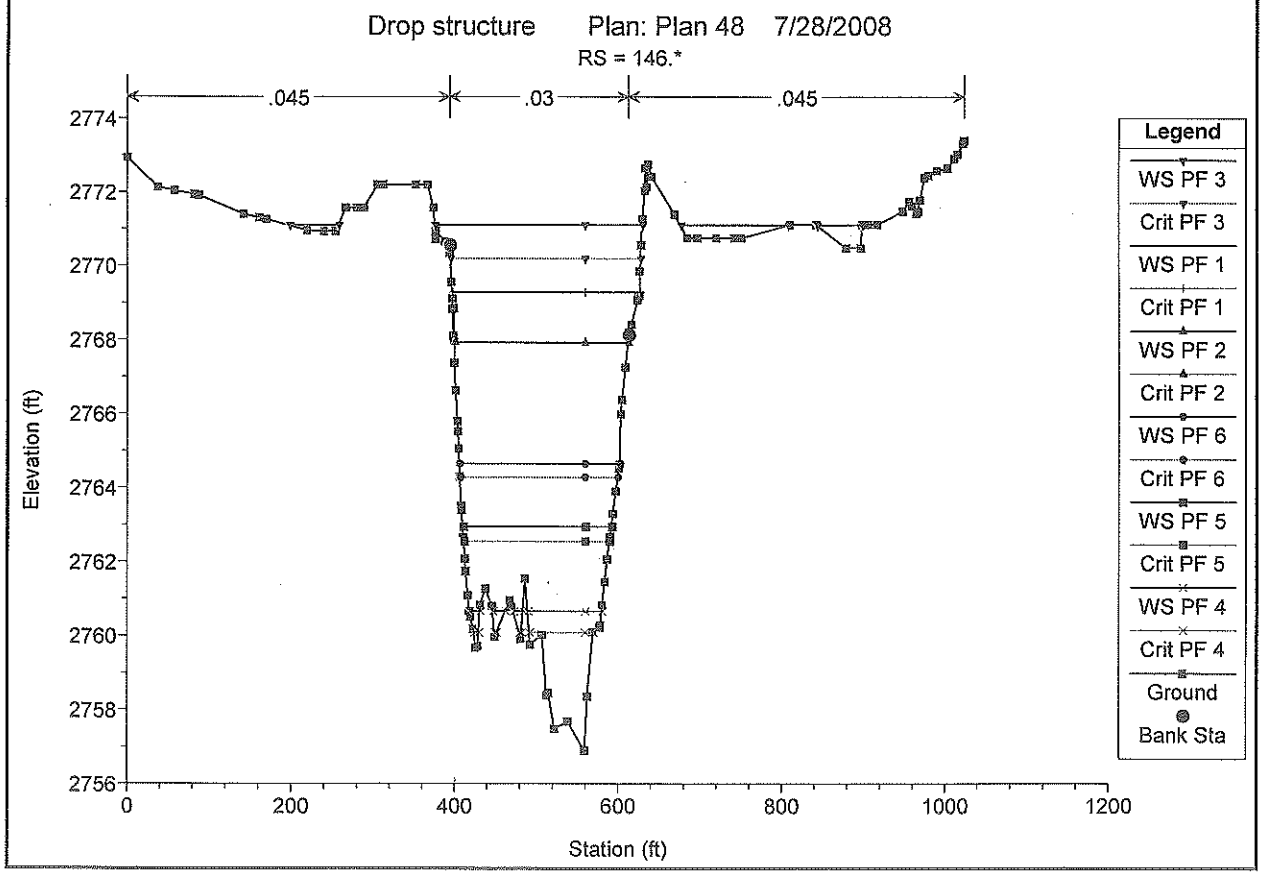

Drop structure Plan: Plan 48 7/28/2008
RS = 160
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

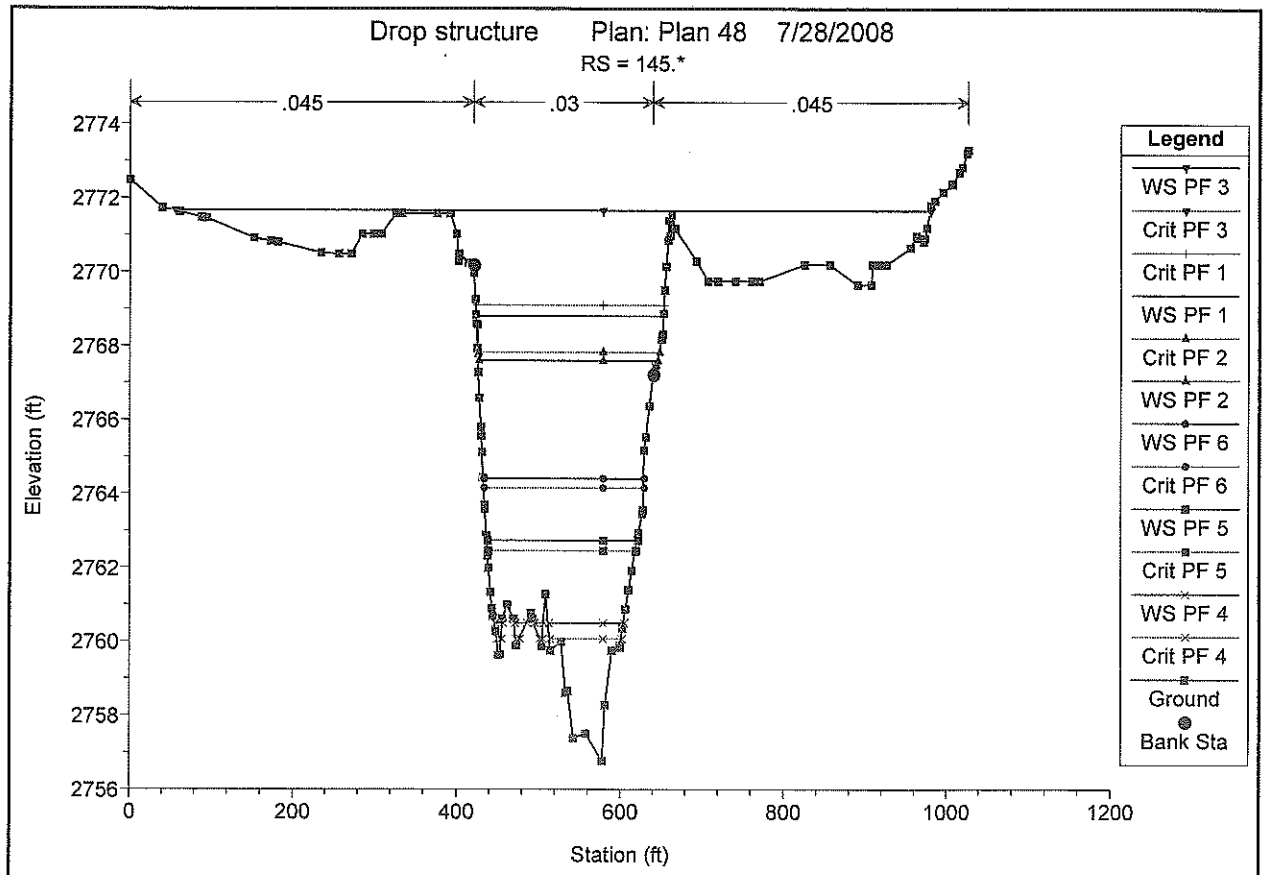

Drop structure Plan: Plan 48 7/28/2008
RS = 150
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

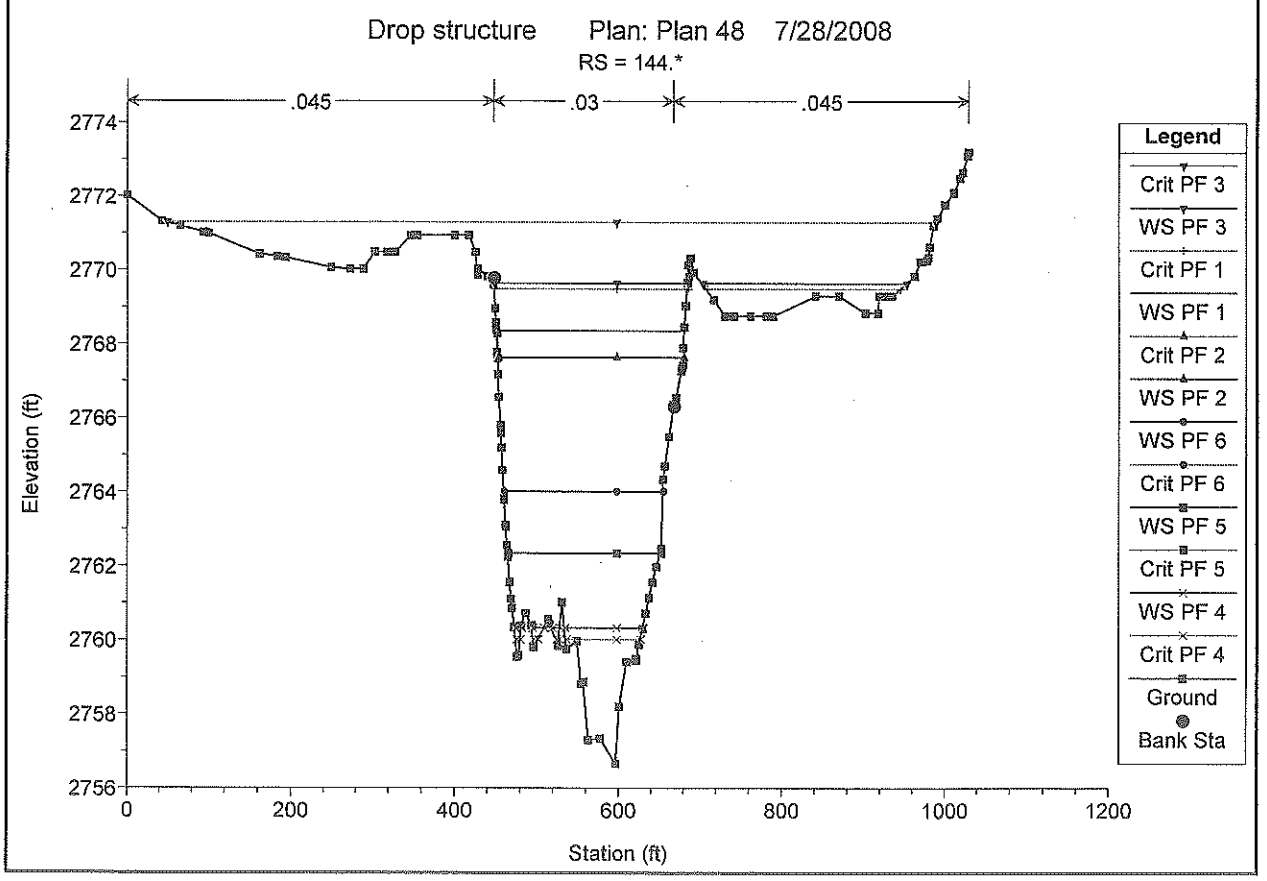

Drop structure Plan: Plan 48 7/28/2008
RS = 149.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

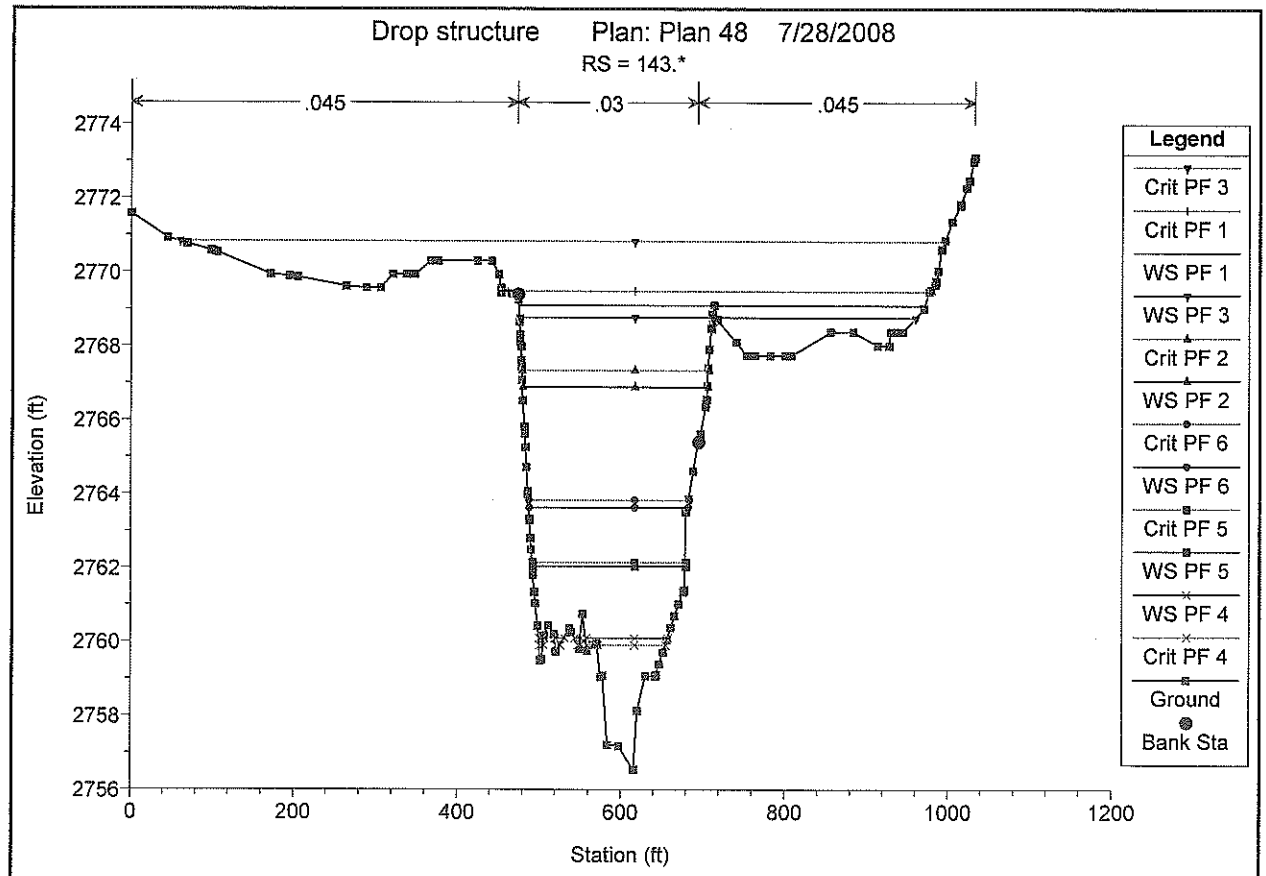

Drop structure Plan: Plan 48 7/28/2008
RS = 148.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

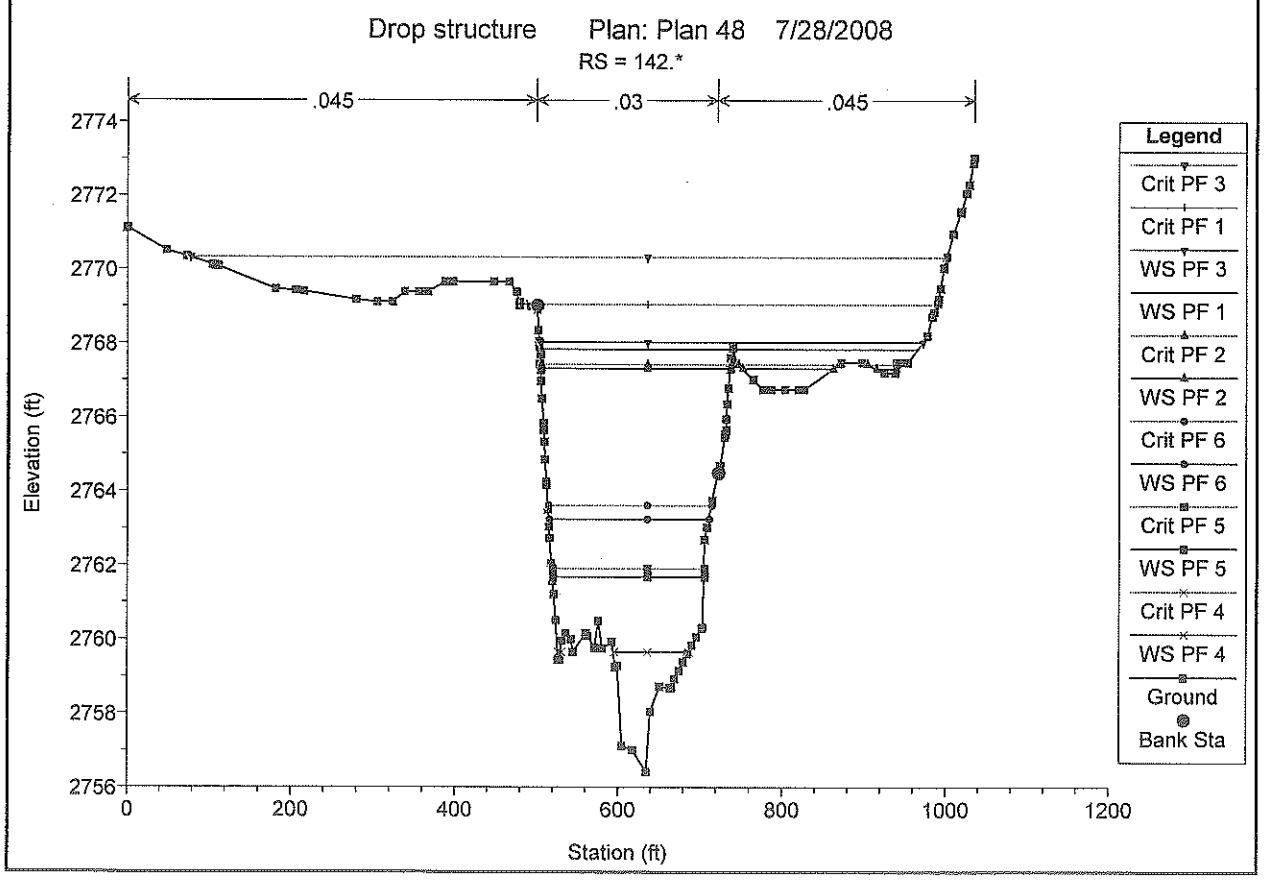

Drop structure Plan: Plan 48 7/28/2008
RS = 147.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

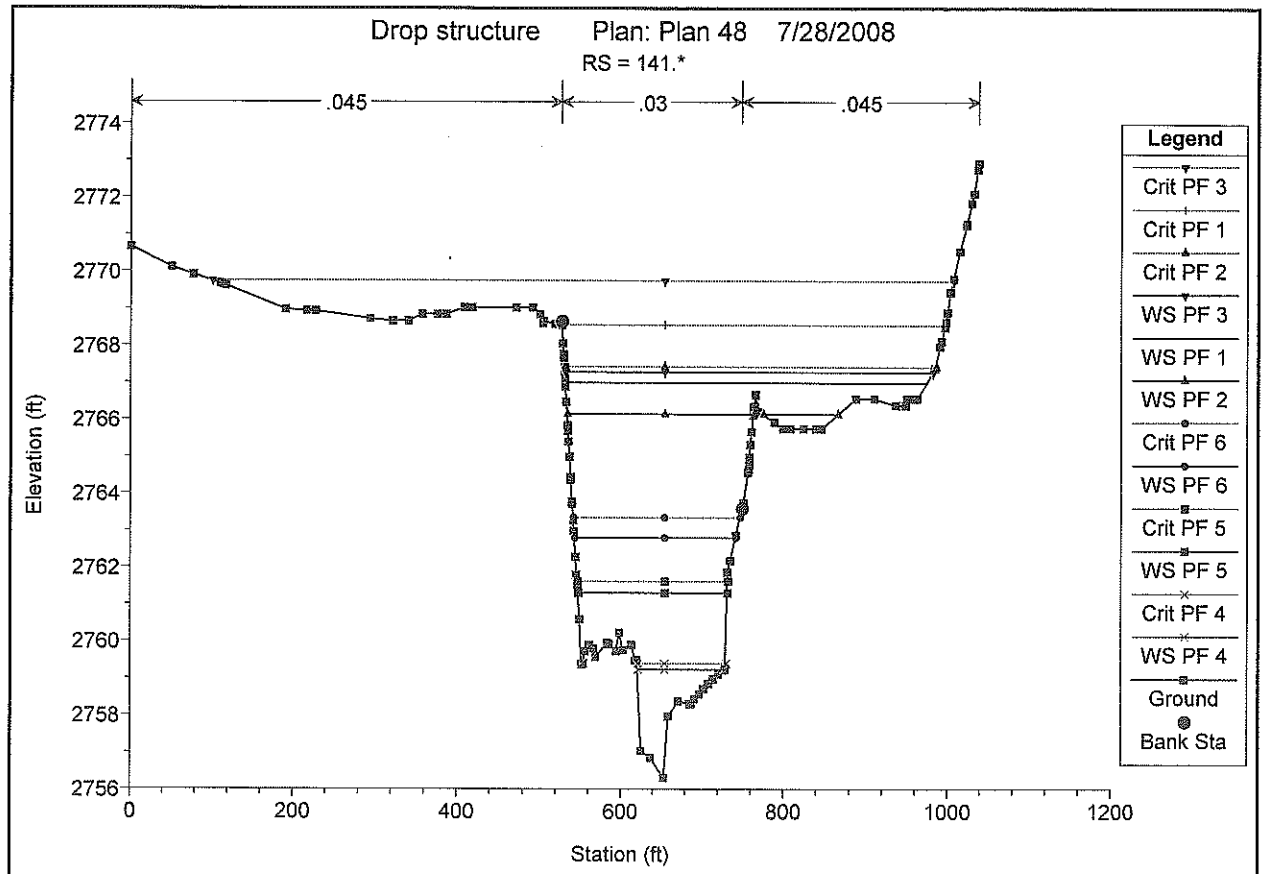

Drop structure Plan: Plan 48 7/28/2008
RS = 146.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

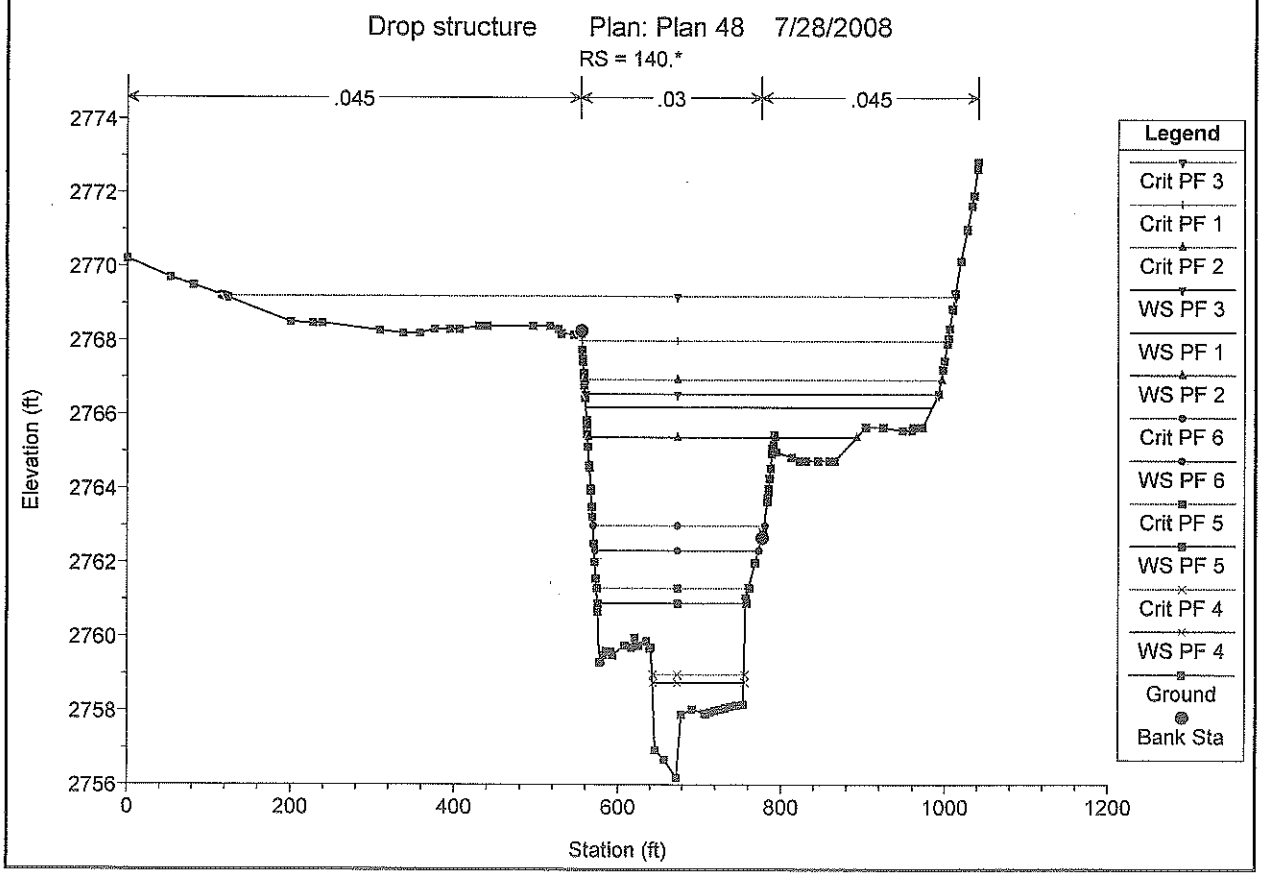

Drop structure Plan: Plan 48 7/28/2008
RS = 145.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

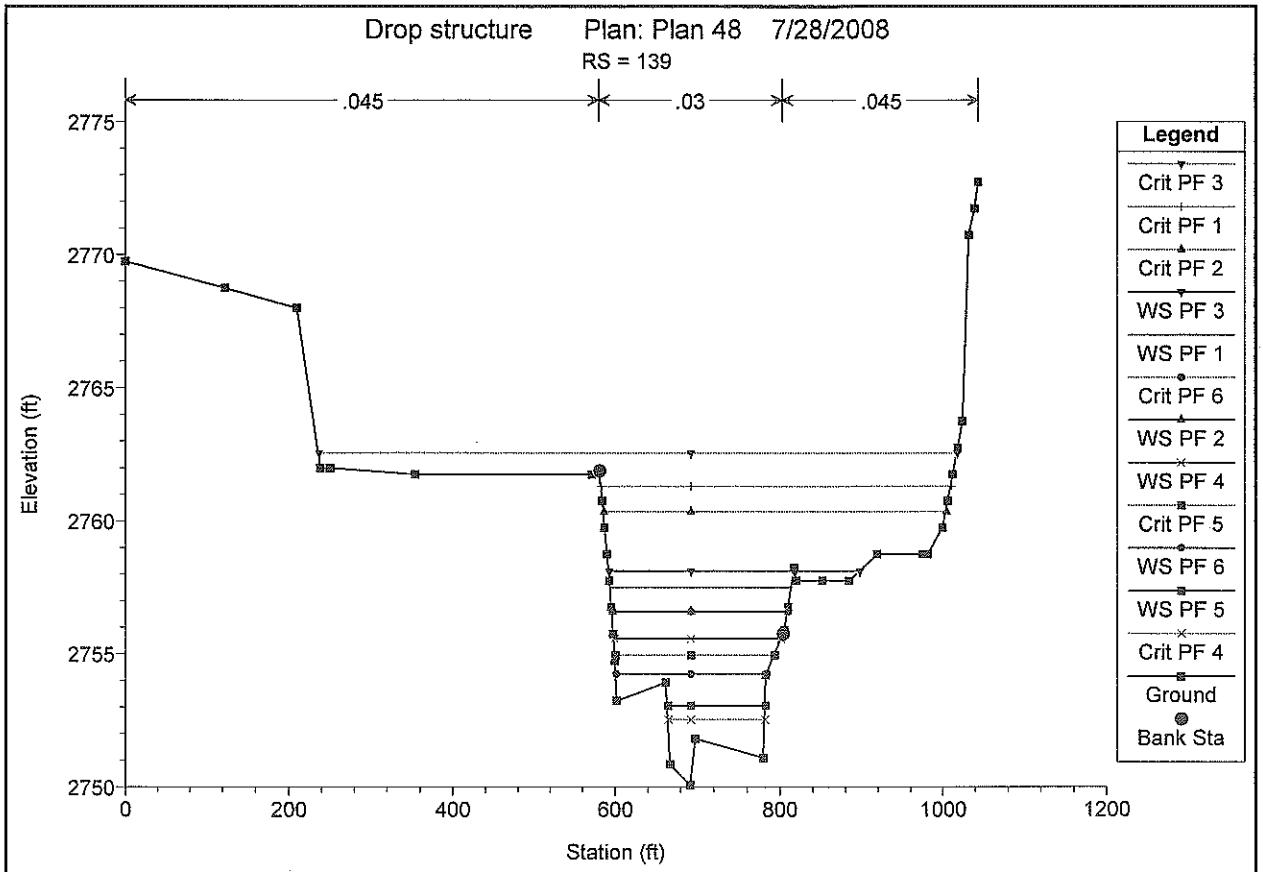

Drop structure Plan: Plan 48 7/28/2008
RS = 144.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
WS PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

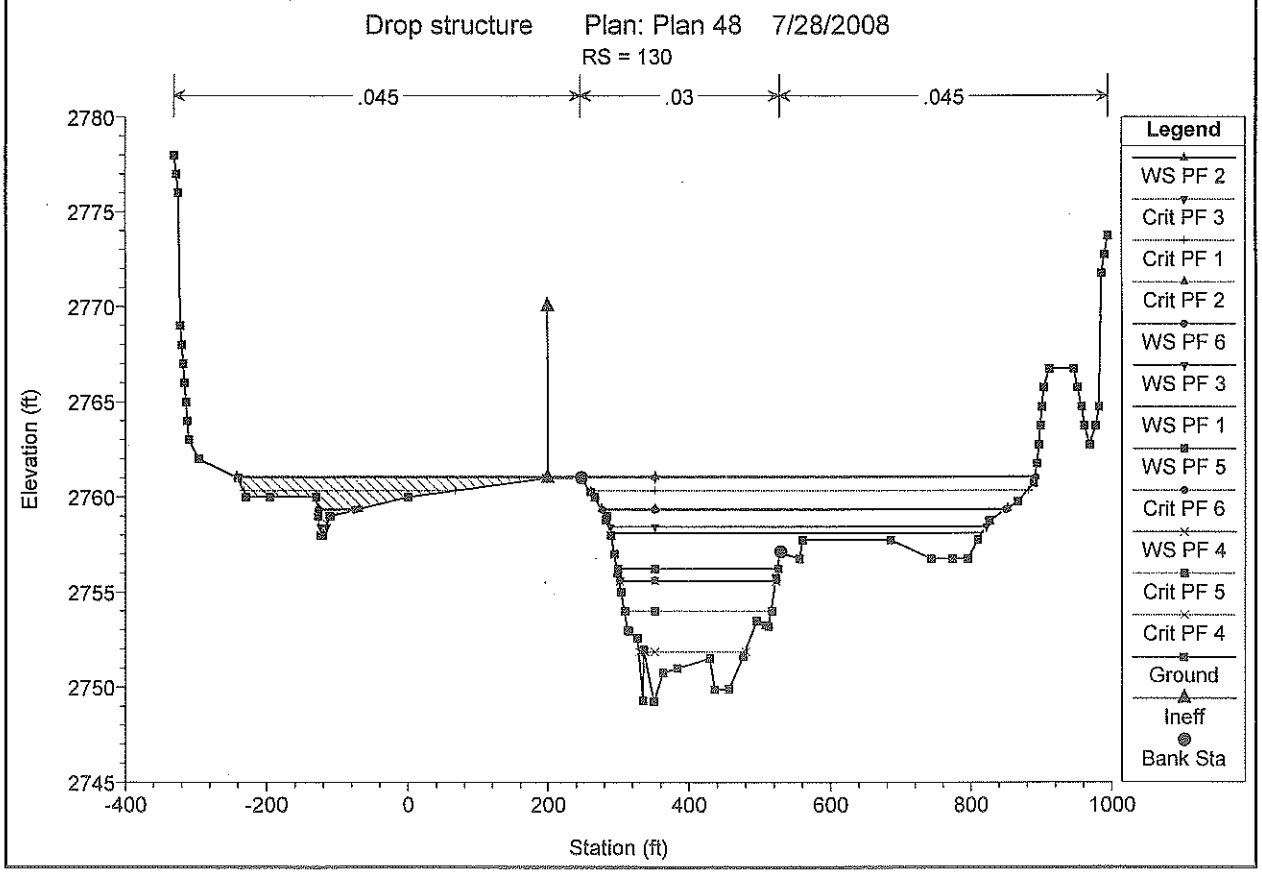

Drop structure Plan: Plan 48 7/28/2008
RS = 143.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 1
WS PF 3
Crit PF 2
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

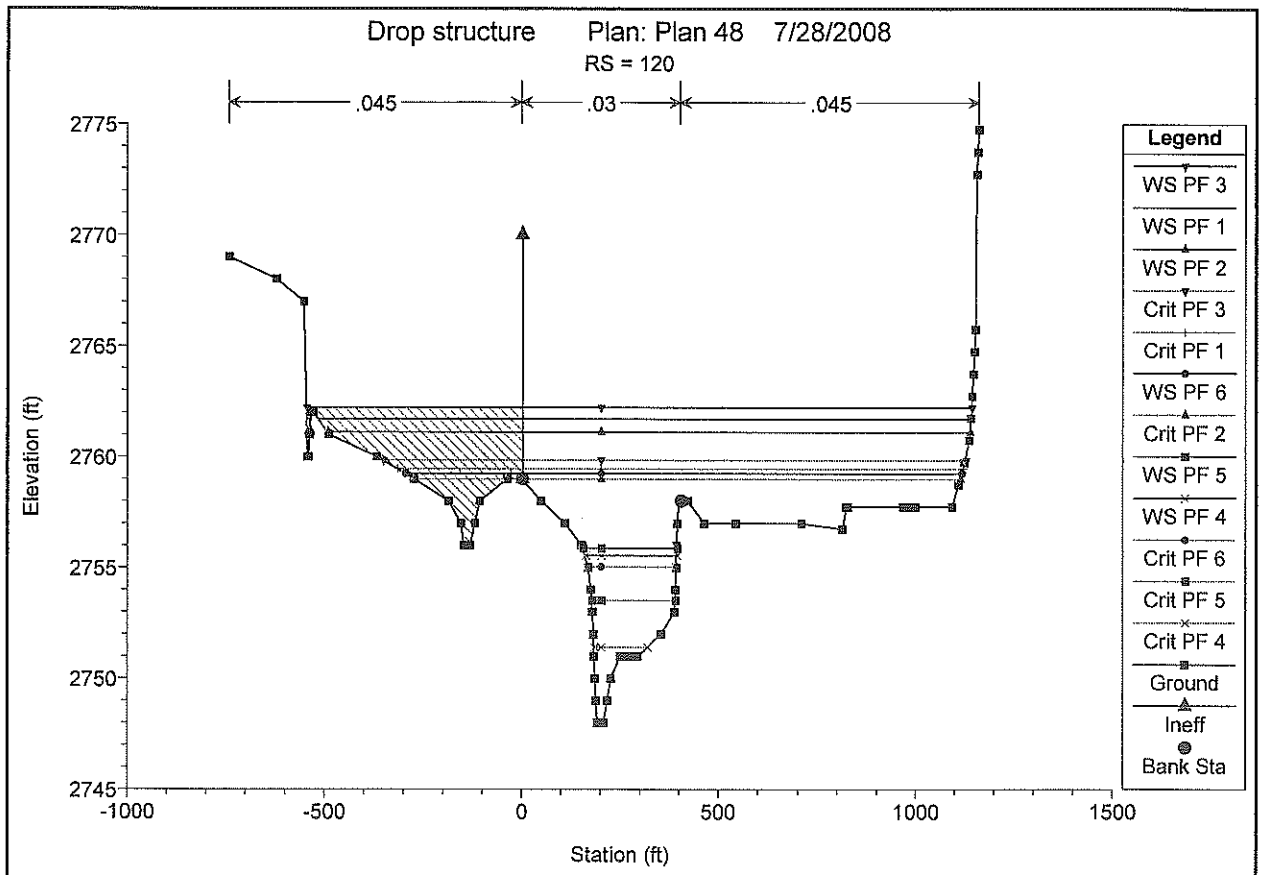

Drop structure Plan: Plan 48 7/28/2008
RS = 142.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
Crit PF 2
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

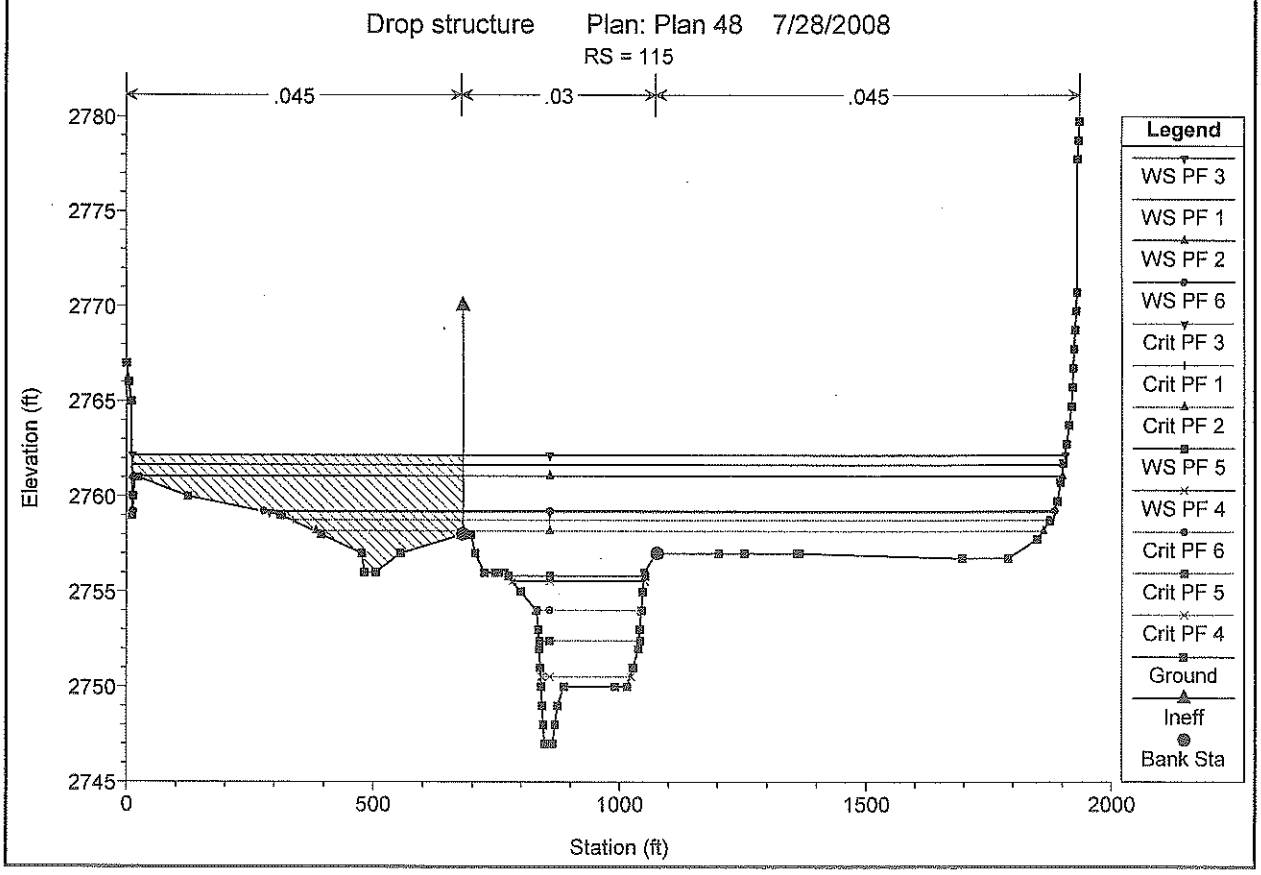

Drop structure Plan: Plan 48 7/28/2008
RS = 141.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

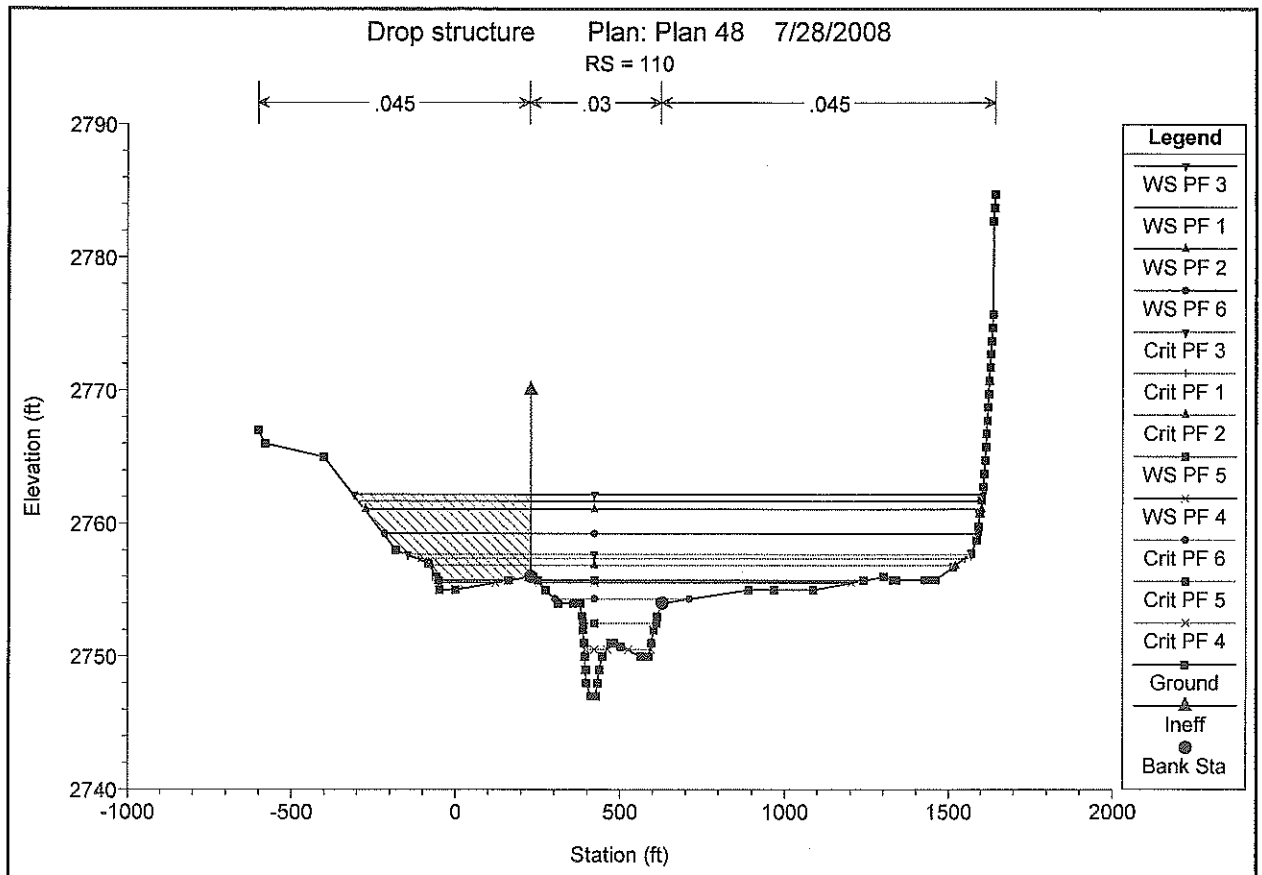

Drop structure Plan: Plan 48 7/28/2008
RS = 140.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

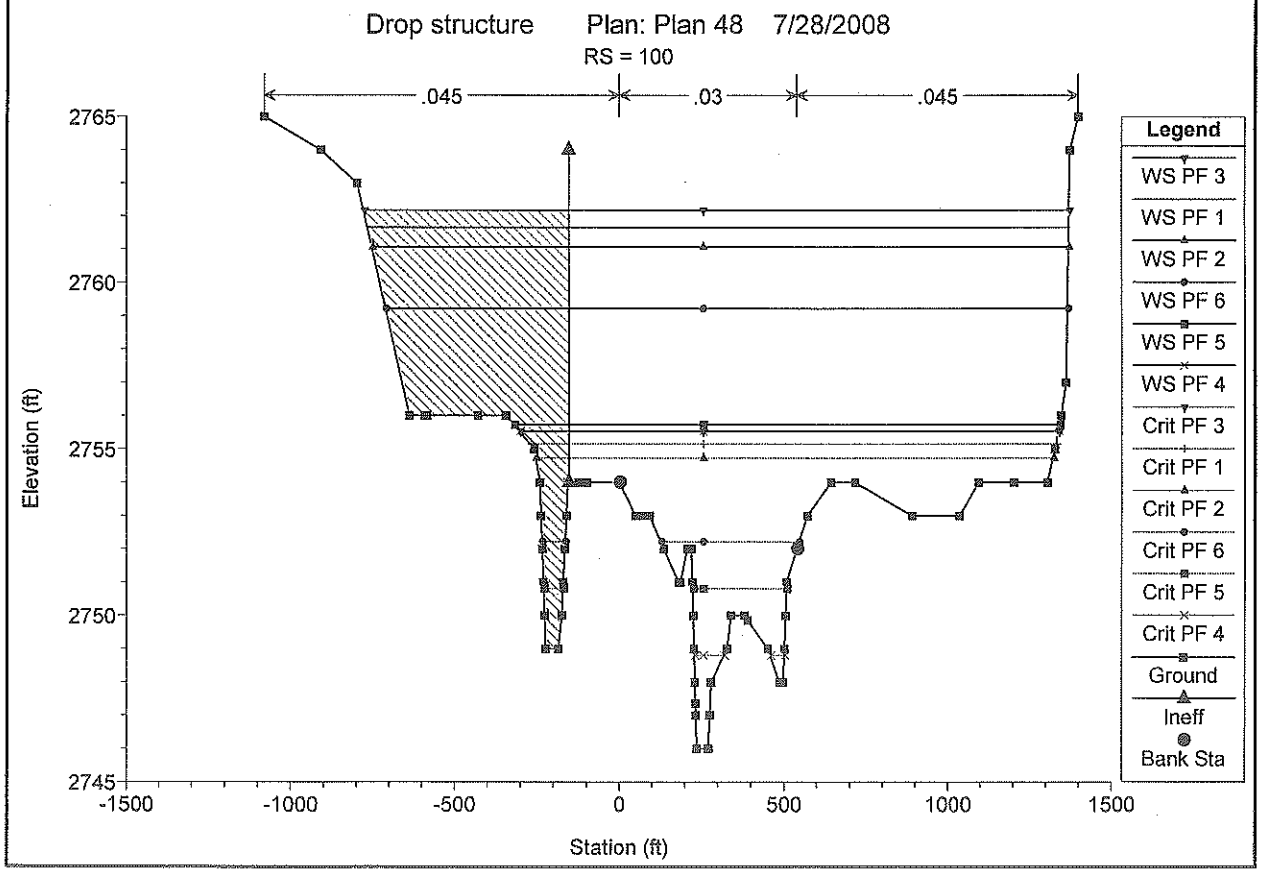

Drop structure Plan: Plan 48 7/28/2008
RS = 139
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
Crit PF 6
WS PF 2
WS PF 4
Crit PF 5
WS PF 6
WS PF 5
Crit PF 4
Ground
Bank Sta

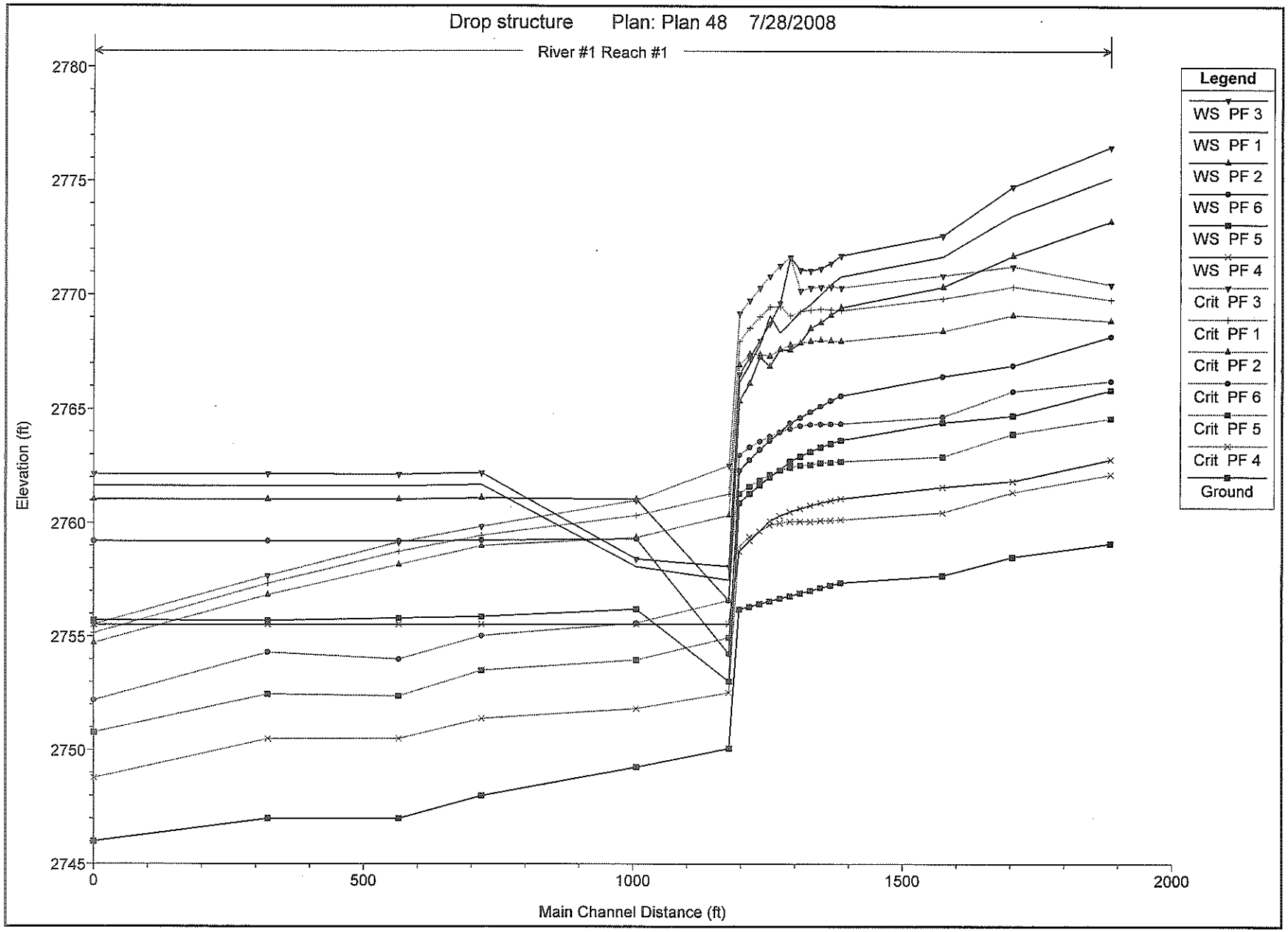

Drop structure Plan: Plan 48 7/28/2008
RS = 130
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 6
WS PF 3
WS PF 1
WS PF 5
Crit PF 6
WS PF 4
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 48 7/28/2008
RS = 120
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
WS PF 6
Crit PF 2
WS PF 5
WS PF 4
Crit PF 6
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 48 7/28/2008
RS = 115
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
WS PF 6
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 5
WS PF 4
Crit PF 6
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 48 7/28/2008
RS = 110
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
WS PF 6
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 5
WS PF 4
Crit PF 6
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 48 7/28/2008
RS = 100
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
WS PF 6
WS PF 5
WS PF 4
Crit PF 3
Crit PF 1
Crit PF 2
Crit PF 6
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 48 7/28/2008
River #1 Reach #1
Elevation (ft)
2780
2775
2770
2765
2760
2755
2750
2745
0
500
1000
1500
2000
Main Channel Distance (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
WS PF 6
WS PF 5
WS PF 4
Crit PF 3
Crit PF 1
Crit PF 2
Crit PF 6
Crit PF 5
Crit PF 4
Ground

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X     X    X   X
XXXXXXX  XXXX     X       XXX XXXX      XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
```

****

PROJECT DATA
Project Title: Drop structure
Project File : Drop_6ft.prj
Run Date and Time: 7/28/2008 9:31:24 AM

Project in English units

****

PLAN DATA

Plan Title: Plan 49
Plan File : g:\bill s\houghton\hec-ras\Drop_6ft.p49

Geometry Title: alternative 1 - Pier Drop 4 ft
Geometry File : g:\bill s\houghton\hec-ras\Drop_6ft.g13

Flow Title : Flow Profiles
Flow File : g:\bill s\houghton\hec-ras\Drop_6ft.f02

Plan Summary Information:
Number of: Cross Sections = 20 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

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

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

****

FLOW DATA

Flow Title: Flow Profiles
Flow File : g:\bill s\houghton\hec-ras\Drop_6ft.f02

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2	PF 3	PF 4	PF 5	PF 6
River #1	Reach #1	180	31000	24490	36000	1000	5000	10000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River #1	Reach #1	PF 1	Known WS = 2773.55	Known WS = 2761.65
River #1	Reach #1	PF 2	Known WS = 2771.75	Known WS = 2761.06
River #1	Reach #1	PF 3	Known WS = 2774.82	Known WS = 2762.17
River #1	Reach #1	PF 4	Known WS = 2761.91	Known WS = 2755.53
River #1	Reach #1	PF 5	Known WS = 2763.98	Known WS = 2755.72
River #1	Reach #1	PF 6	Known WS = 2765.3	Known WS = 2759.21

****

GEOMETRY DATA

Geometry Title: alternative 1 - Pier Drop 4 ft
Geometry File : g:\bill s\houghton\hec-ras\Drop_6ft.g13

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 180

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
15.05	2776.75	32.58	2776.75	48.65	2776.75	49.95	2775.75	51.72	2774.75
53.59	2773.75	55.5	2772.75	57.44	2771.75	59.59	2770.75	62.1	2769.75
64.56	2768.76	64.56	2768.75	67.13	2767.47	67.71	2767.75	72.88	2766.28
97.35	2766.75	119.19	2765.75	133.29	2765.33	136.67	2764.75	143.41	2762.38

166.6	2762.71	170.36	2763.69	207.2	2762.94	207.2	2762.93	210.09	2761.47
227.57	2761.13	247.23	2760.75	264.13	2759.08	318.52	2763	323.83	2759.53
323.83	2759.52	327.41	2764.6	338.72	2764	354.33	2764.52	369.01	2765
401.74	2766	408.05	2765.89	412.18	2767	414.21	2768	416.27	2769
417.18	2767.25	417.18	2767.26	418.65	2770	421.02	2771	423.39	2772
425.77	2773	428.14	2774	430.51	2775	431.09	2776.49	433.02	2776
461.43	2776	761.43	2780						

anning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
15.05	.045	48.65	.03	433.02	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.65	433.02	44.45	181.54	256.85	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2775.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.		0.030	
W.S. Elev (ft)	2775.13	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2769.76	Flow Area (sq ft)		4166.17	
E.G. Slope (ft/ft)	0.000962	Area (sq ft)		4166.17	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	379.51	Top Width (ft)		379.51	
Vel Total (ft/s)	7.44	Avg. Vel. (ft/s)		7.44	
Max Chl Dpth (ft)	16.05	Hydr. Depth (ft)		10.98	
Conv. Total (cfs)	999369.6	Conv. (cfs)		999369.6	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		390.90	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.64	
Alpha	1.00	Stream Power (lb/ft s)		4.76	
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	28.81	112.80	64.96
C & E Loss (ft)	0.12	Cum SA (acres)	10.00	14.00	18.31

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 #PF 2

E.G. Elev (ft)	2774.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.78	Wt. n-Val.		0.030	
W.S. Elev (ft)	2773.22	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2768.85	Flow Area (sq ft)		3447.07	
E.G. Slope (ft/ft)	0.001096	Area (sq ft)		3447.07	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	371.67	Top Width (ft)		371.67	
Vel Total (ft/s)	7.10	Avg. Vel. (ft/s)		7.10	
Max Chl Dpth (ft)	14.14	Hydr. Depth (ft)		9.27	
Conv. Total (cfs)	739866.1	Conv. (cfs)		739866.1	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		382.13	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)		4.38	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	23.20	100.99	54.29
C & E Loss (ft)	0.11	Cum SA (acres)	8.88	13.91	17.84

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 #PF 3

E.G. Elev (ft)	2777.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2776.50	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2770.43	Flow Area (sq ft)		4689.56	23.79
E.G. Slope (ft/ft)	0.000892	Area (sq ft)		4689.56	23.79
Q Total (cfs)	36000.00	Flow (cfs)		35988.14	11.86
Top Width (ft)	450.20	Top Width (ft)		384.05	66.15
Vel Total (ft/s)	7.64	Avg. Vel. (ft/s)		7.67	0.50
Max Chl Dpth (ft)	17.42	Hydr. Depth (ft)		12.21	0.36
Conv. Total (cfs)	1205476.0	Conv. (cfs)		1205079.0	397.3
Length Wtd. (ft)	181.56	Wetted Per. (ft)		396.84	66.15
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.66	0.02
Alpha	1.01	Stream Power (lb/ft s)		5.05	0.01
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	34.35	122.12	74.33
C & E Loss (ft)	0.13	Cum SA (acres)	11.23	14.05	18.87

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 #PF 4

E.G. Elev (ft)	2763.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.80	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2762.13	Flow Area (sq ft)		227.08	
E.G. Slope (ft/ft)	0.004290	Area (sq ft)		227.08	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	140.27	Top Width (ft)		140.27	
Vel Total (ft/s)	4.40	Avg. Vel. (ft/s)		4.40	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		1.62	
Conv. Total (cfs)	15268.4	Conv. (cfs)		15268.4	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		143.57	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)		1.87	
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.99	24.23	0.58
C & E Loss (ft)	0.01	Cum SA (acres)	0.28	8.88	1.29

```
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Profile #PF 5
*****************************************************************************************
* E.G. Elev (ft)          * 2766.37  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.53  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 2765.84  * Reach Len. (ft)         *   44.45  *   181.54 *   256.85 *
* Crit W.S. (ft)          * 2764.60  * Flow Area (sq ft)       *          *   856.67 *          *
* E.G. Slope (ft/ft)      *0.003189  * Area (sq ft)            *          *   856.67 *          *
* Q Total (cfs)           * 5000.00  * Flow (cfs)              *          *  5000.00 *          *
* Top Width (ft)          *  279.32  * Top Width (ft)          *          *   279.32 *          *
* Vel Total (ft/s)        *    5.84  * Avg. Vel. (ft/s)         *          *     5.84 *          *
* Max Chl Dpth (ft)       *    6.76  * Hydr. Depth (ft)         *          *     3.07 *          *
* Conv. Total (cfs)       * 88535.0  * Conv. (cfs)              *          *  88535.0 *          *
* Length Wtd. (ft)        *  181.54  * Wetted Per. (ft)         *          *   284.23 *          *
* Min Ch El (ft)          * 2759.08  * Shear (lb/sq ft)         *          *     0.60 *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)   *          *     3.50 *          *
* Frctn Loss (ft)         *    0.72  * Cum Volume (acre-ft)     *    1.05  *    36.62 *    0.85 *
* C & E Loss (ft)         *    0.04  * Cum SA (acres)           *    0.29  *    10.24 *    1.51 *
*****************************************************************************************

CROSS SECTION OUTPUT  Profile #PF 6
*****************************************************************************************
* E.G. Elev (ft)          * 2768.77  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.58  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 2768.18  * Reach Len. (ft)         *   44.45  *   181.54 *   256.85 *
* Crit W.S. (ft)          * 2766.24  * Flow Area (sq ft)       *          *  1630.48 *          *
* E.G. Slope (ft/ft)      *0.002022  * Area (sq ft)            *          *  1630.48 *          *
* Q Total (cfs)           *10000.00  * Flow (cfs)              *          *10000.00 *          *
* Top Width (ft)          *  349.86  * Top Width (ft)          *          *   349.86 *          *
* Vel Total (ft/s)        *    6.13  * Avg. Vel. (ft/s)         *          *     6.13 *          *
* Max Chl Dpth (ft)       *    9.10  * Hydr. Depth (ft)         *          *     4.66 *          *
* Conv. Total (cfs)       *222397.3  * Conv. (cfs)              *          *222397.3 *          *
* Length Wtd. (ft)        *  181.54  * Wetted Per. (ft)         *          *   356.78 *          *
* Min Ch El (ft)          * 2759.08  * Shear (lb/sq ft)         *          *     0.58 *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)   *          *     3.54 *          *
* Frctn Loss (ft)         *    0.54  * Cum Volume (acre-ft)     *    9.85  *    69.14 *   25.01 *
* C & E Loss (ft)         *    0.07  * Cum SA (acres)           *    5.37  *    13.02 *   15.44 *
*****************************************************************************************

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

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 170

INPUT
Description:
Station Elevation Data     num=      45
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 2776.75  10.041 2776.75  11.208 2776.56  13.039 2775.75  14.984 2774.75
  17.041 2773.75  19.445 2772.75  21.468 2771.75  23.419 2770.75  25.484 2769.75
  27.471 2768.75  29.409 2767.75  30.901 2767.12  31.424 2766.75  33.545 2765.75
  38.947 2765.75  39.428 2765.75  41.868 2765.12  60.352 2766.13  65.082 2765.97
  66.072 2764.75   69.89 2764.75  71.743 2764.93  72.768 2764.75  85.567 2761.65
 101.392 2761.27 114.672 2763.12 137.165 2763.34 145.296 2760.76  193.16  2760.8
 199.171 2758.99 240.331 2758.49 254.092 2762.23 263.715 2762.13 265.413 2763.75
 266.813 2764.75 268.199 2765.75 269.584 2766.75 270.801 2767.75 271.974 2768.75
 273.155 2769.75 274.336 2770.75 275.524 2771.75 276.705 2772.75 282.843    2777

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
***********************************************
       0    .045  10.041     .03 276.705    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        10.041 276.705            130.15  130.15  130.15             .1       .3
Blocked Obstructions      num=       3
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*****************************************************************************
      85      89    2780     147     151    2780     209     213    2780
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 2775.57  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    2.08  * Wt. n-Val.              *          *    0.030 *    0.045 *
* W.S. Elev (ft)          * 2773.49  * Reach Len. (ft)         *  130.15  *   130.15 *  130.15 *
* Crit W.S. (ft)          * 2770.35  * Flow Area (sq ft)       *          *  2676.35 *    0.39 *
* E.G. Slope (ft/ft)      *0.003402  * Area (sq ft)            *          *  2676.35 *    0.39 *
* Q Total (cfs)           *31000.00  * Flow (cfs)              *          *30999.66 *    0.34 *
* Top Width (ft)          *  248.09  * Top Width (ft)          *          *   247.03 *    1.06 *
* Vel Total (ft/s)        *   11.58  * Avg. Vel. (ft/s)         *          *    11.58 *    0.87 *
* Max Chl Dpth (ft)       *   15.00  * Hydr. Depth (ft)         *          *    10.83 *    0.37 *
* Conv. Total (cfs)       *531513.9  * Conv. (cfs)              *          *531508.1 *     5.8 *
* Length Wtd. (ft)        *  130.15  * Wetted Per. (ft)         *          *   333.35 *    1.29 *
* Min Ch El (ft)          * 2758.49  * Shear (lb/sq ft)         *          *     1.71 *    0.06 *
* Alpha                   *    1.00  * Stream Power (lb/ft s)   *          *    19.75 *    0.06 *
* Frctn Loss (ft)         *    0.53  * Cum Volume (acre-ft)     *   28.81  *    98.55 *   64.95 *
* C & E Loss (ft)         *    0.12  * Cum SA (acres)           *   10.00  *    12.69 *   18.31 *
*****************************************************************************************

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.
```

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2773.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.85	Wt. n-Val.		0.030	
W.S. Elev (ft)	2771.71	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2769.11	Flow Area (sq ft)		2241.82	
E.G. Slope (ft/ft)	0.003581	Area (sq ft)		2241.82	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	241.93	Top Width (ft)		241.93	
Vel Total (ft/s)	10.92	Avg. Vel. (ft/s)		10.92	
Max Chl Dpth (ft)	13.22	Hydr. Depth (ft)		9.27	
Conv. Total (cfs)	409256.4	Conv. (cfs)		409256.4	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		316.82	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.58	
Alpha	1.00	Stream Power (lb/ft s)		17.28	
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	23.20	89.14	54.29
C & E Loss (ft)	0.08	Cum SA (acres)	8.88	12.63	17.84

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.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2777.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.25	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2774.76	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2771.24	Flow Area (sq ft)		2991.72	2.90
E.G. Slope (ft/ft)	0.003299	Area (sq ft)		2991.72	2.90
Q Total (cfs)	36000.00	Flow (cfs)		35995.16	4.84
Top Width (ft)	252.63	Top Width (ft)		249.73	2.90
Vel Total (ft/s)	12.02	Avg. Vel. (ft/s)		12.03	1.67
Max Chl Dpth (ft)	16.27	Hydr. Depth (ft)		11.98	1.00
Conv. Total (cfs)	626805.7	Conv. (cfs)		626721.4	84.3
Length Wtd. (ft)	130.15	Wetted Per. (ft)		343.95	3.52
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.79	0.17
Alpha	1.00	Stream Power (lb/ft s)		21.55	0.28
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	34.35	106.11	74.25
C & E Loss (ft)	0.15	Cum SA (acres)	11.23	12.73	18.67

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.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2762.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.84	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2761.35	Flow Area (sq ft)		203.00	
E.G. Slope (ft/ft)	0.005401	Area (sq ft)		203.00	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	119.52	Top Width (ft)		119.52	
Vel Total (ft/s)	4.93	Avg. Vel. (ft/s)		4.93	
Max Chl Dpth (ft)	3.35	Hydr. Depth (ft)		1.70	
Conv. Total (cfs)	13607.4	Conv. (cfs)		13607.4	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		128.95	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		0.53	
Alpha	1.00	Stream Power (lb/ft s)		2.61	
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	0.99	23.33	0.58
C & E Loss (ft)	0.06	Cum SA (acres)	0.28	8.34	1.29

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 #PF 5

E.G. Elev (ft)	2765.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.030	
W.S. Elev (ft)	2764.72	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2763.92	Flow Area (sq ft)		660.60	
E.G. Slope (ft/ft)	0.005075	Area (sq ft)		660.60	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	181.90	Top Width (ft)		181.90	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	6.23	Hydr. Depth (ft)		3.63	
Conv. Total (cfs)	70183.8	Conv. (cfs)		70183.8	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		210.28	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.00	
Alpha	1.00	Stream Power (lb/ft s)		7.53	
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	1.05	33.46	0.85
C & E Loss (ft)	0.07	Cum SA (acres)	0.29	9.28	1.51

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2768.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.24	Wt. n-Val.		0.030	
W.S. Elev (ft)	2766.91	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2765.78	Flow Area (sq ft)		1117.67	
E.G. Slope (ft/ft)	0.004905	Area (sq ft)		1117.67	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	226.59	Top Width (ft)		226.59	
Vel Total (ft/s)	8.95	Avg. Vel. (ft/s)		8.95	
Max Chl Dpth (ft)	8.42	Hydr. Depth (ft)		4.93	
Conv. Total (cfs)	142789.4	Conv. (cfs)		142789.4	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		269.80	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.27	
Alpha	1.00	Stream Power (lb/ft s)		11.35	

```
* Frctn Loss (ft)        *    0.52  * Cum Volume (acre-ft)   *    9.85  *   63.42  *   25.01  *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)         *    5.37  *   11.82  *   15.44  *
*****************************************************************************************
```

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 160

INPUT
Description:
Station Elevation Data num= 84

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 2775.75   5.607 2775.75   12.07 2775.75  19.049 2775.75  29.317 2775.75
  71.828 2774.75  85.786 2773.75  89.067 2773.75 103.188 2774.75 115.831 2774.75
 128.085 2774.75 176.975 2775.75 196.024 2776.75 201.271 2777.75 222.357 2778.36
 223.106 2777.75 224.726 2776.75 226.578 2775.75 228.113 2774.48 228.466 2774.75
 231.408 2773.75 239.405 2772.75  244.73 2772.63 245.868 2771.75 247.233 2770.75
 248.605 2769.75 250.054 2768.75 251.681 2767.76 251.681 2767.75 253.342 2766.75
 254.813 2765.75 256.164 2764.75 257.132 2763.88 262.209  2762.7 273.085 2760.84
  297.19 2760.63 301.164 2761.77 319.273 2761.94 326.146 2760.17 341.547 2760.01
 354.324 2759.87 381.194 2760.68  389.17 2757.67 435.231 2758.17 436.985 2762.55
 442.317 2762.86 444.608 2763.75 445.477 2764.44  445.88 2764.75 447.146 2765.75
 448.419 2766.75 449.692 2767.75 450.979 2768.75 452.237 2769.75 453.482 2770.75
 453.482 2770.76  454.74 2771.75 455.985 2772.75 457.201 2773.75 457.201 2773.76
  458.12  2775.1 458.403 2774.75 466.584 2774.75 469.887 2774.75 478.704 2775.75
 485.853 2776.75 713.195 2776.75 716.745 2776.75 720.132 2776.75 792.165 2775.75
  803.98 2775.75 814.743 2775.75 830.143 2774.75 840.806 2774.75 857.466 2775.75
 873.256 2775.75 926.755 2774.75 940.777 2773.75 941.237 2773.75 945.579 2773.75
 955.669 2773.75  965.18 2773.75 989.002 2773.751007.684 2774.75
```

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val
*************************************************
       0    .045  244.73     .03  458.12    .045
```

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

```
        244.73  458.12            203.69  188.86     197            .1       .3
```

Blocked Obstructions num= 3

```
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*******************************************************************************
     250     254    2780     312     316    2780     374     378    2780
```

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

```
*****************************************************************************************
* E.G. Elev (ft)          * 2774.92  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    3.25  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 2771.67  * Reach Len. (ft)        *  203.69  *   188.86 *   197.00 *
* Crit W.S. (ft)          * 2769.83  * Flow Area (sq ft)      *          *  2143.16 *          *
* E.G. Slope (ft/ft)      *0.005009  * Area (sq ft)           *          *  2143.16 *          *
* Q Total (cfs)           *31000.00  * Flow (cfs)             *          *  31000.00 *          *
* Top Width (ft)          *  196.67  * Top Width (ft)         *          *   196.67 *          *
* Vel Total (ft/s)        *   14.46  * Avg. Vel. (ft/s)       *          *    14.46 *          *
* Max Chl Dpth (ft)       *   14.00  * Hydr. Depth (ft)       *          *    10.90 *          *
* Conv. Total (cfs)       *438025.0  * Conv. (cfs)            *          *  438025.0 *          *
* Length Wtd. (ft)        *  188.86  * Wetted Per. (ft)       *          *   255.68 *          *
* Min Ch El (ft)          * 2757.67  * Shear (lb/sq ft)       *          *     2.62 *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *    37.91 *          *
* Frctn Loss (ft)         *    0.87  * Cum Volume (acre-ft)   *   28.81  *    91.35 *    64.95 *
* C & E Loss (ft)         *    0.00  * Cum SA (acres)         *   10.00  *    12.03 *    18.31 *
*****************************************************************************************
```

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 2

```
*****************************************************************************************
* E.G. Elev (ft)          * 2772.97  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    2.63  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 2770.34  * Reach Len. (ft)        *  203.69  *   188.86 *   197.00 *
* Crit W.S. (ft)          * 2768.41  * Flow Area (sq ft)      *          *  1883.39 *          *
* E.G. Slope (ft/ft)      *0.004500  * Area (sq ft)           *          *  1883.39 *          *
* Q Total (cfs)           *24490.00  * Flow (cfs)             *          *  24490.00 *          *
* Top Width (ft)          *  193.18  * Top Width (ft)         *          *   193.18 *          *
* Vel Total (ft/s)        *   13.00  * Avg. Vel. (ft/s)       *          *    13.00 *          *
* Max Chl Dpth (ft)       *   12.67  * Hydr. Depth (ft)       *          *     9.75 *          *
* Conv. Total (cfs)       *365056.1  * Conv. (cfs)            *          *  365056.1 *          *
* Length Wtd. (ft)        *  188.86  * Wetted Per. (ft)       *          *   243.29 *          *
* Min Ch El (ft)          * 2757.67  * Shear (lb/sq ft)       *          *     2.18 *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *    28.28 *          *
* Frctn Loss (ft)         *    0.81  * Cum Volume (acre-ft)   *   23.20  *    82.98 *    54.29 *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)         *    8.88  *    11.98 *    17.84 *
*****************************************************************************************
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Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

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*****************************************************************************************
* E.G. Elev (ft)          * 2776.32  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    3.72  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 2772.60  * Reach Len. (ft)        *  203.69  *   188.86 *   197.00 *
* Crit W.S. (ft)          * 2770.85  * Flow Area (sq ft)      *          *   2327.25 *          *
* E.G. Slope (ft/ft)      *0.005364  * Area (sq ft)           *          *   2327.25 *          *
* Q Total (cfs)           *36000.00  * Flow (cfs)             *          *  36000.00 *          *
* Top Width (ft)          *  199.04  * Top Width (ft)         *          *   199.04 *          *
* Vel Total (ft/s)        *   15.47  * Avg. Vel. (ft/s)       *          *    15.47 *          *
* Max Chl Dpth (ft)       *   14.93  * Hydr. Depth (ft)       *          *    11.69 *          *
* Conv. Total (cfs)       *491555.4  * Conv. (cfs)            *          *  491555.4 *          *
* Length Wtd. (ft)        *  188.86  * Wetted Per. (ft)       *          *   264.28 *          *
* Min Ch El (ft)          * 2757.67  * Shear (lb/sq ft)       *          *     2.95 *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *    45.61 *          *
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* Frctn Loss (ft)	* 0.91	* Cum Volume (acre-ft)	* 34.35	* 98.17	* 74.25 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 11.23	* 12.06	* 18.67 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	* 2761.77	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.18	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2761.59	* Reach Len. (ft)	* 203.69	* 188.86	* 197.00 *
* Crit W.S. (ft)	* 2760.46	* Flow Area (sq ft)	*	* 293.37	* *
* E.G. Slope (ft/ft)	*0.001922	* Area (sq ft)	*	* 293.37	* *
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	* *
* Top Width (ft)	* 143.78	* Top Width (ft)	*	* 143.78	* *
* Vel Total (ft/s)	* 3.41	* Avg. Vel. (ft/s)	*	* 3.41	* *
* Max Chl Dpth (ft)	* 3.92	* Hydr. Depth (ft)	*	* 2.04	* *
* Conv. Total (cfs)	* 22810.8	* Conv. (cfs)	*	* 22810.8	* *
* Length Wtd. (ft)	* 188.86	* Wetted Per. (ft)	*	* 149.16	* *
* Min Ch El (ft)	* 2757.67	* Shear (lb/sq ft)	*	* 0.24	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.80	* *
* Frctn Loss (ft)	* 0.44	* Cum Volume (acre-ft)	* 0.99	* 22.59	* 0.58 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.28	* 7.95	* 1.29 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2765.07	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.64	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2764.42	* Reach Len. (ft)	* 203.69	* 188.86	* 197.00 *
* Crit W.S. (ft)	* 2762.91	* Flow Area (sq ft)	*	* 775.80	* *
* E.G. Slope (ft/ft)	*0.002752	* Area (sq ft)	*	* 775.80	* *
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	* *
* Top Width (ft)	* 180.92	* Top Width (ft)	*	* 180.92	* *
* Vel Total (ft/s)	* 6.44	* Avg. Vel. (ft/s)	*	* 6.44	* *
* Max Chl Dpth (ft)	* 6.75	* Hydr. Depth (ft)	*	* 4.29	* *
* Conv. Total (cfs)	* 95311.4	* Conv. (cfs)	*	* 95311.4	* *
* Length Wtd. (ft)	* 188.86	* Wetted Per. (ft)	*	* 198.59	* *
* Min Ch El (ft)	* 2757.67	* Shear (lb/sq ft)	*	* 0.67	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 4.33	* *
* Frctn Loss (ft)	* 0.61	* Cum Volume (acre-ft)	* 1.05	* 31.31	* 0.85 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.29	* 8.73	* 1.51 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2767.62	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.18	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2766.44	* Reach Len. (ft)	* 203.69	* 188.86	* 197.00 *
* Crit W.S. (ft)	* 2764.67	* Flow Area (sq ft)	*	* 1145.67	* *
* E.G. Slope (ft/ft)	*0.003300	* Area (sq ft)	*	* 1145.67	* *
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	* *
* Top Width (ft)	* 186.02	* Top Width (ft)	*	* 186.02	* *
* Vel Total (ft/s)	* 8.73	* Avg. Vel. (ft/s)	*	* 8.73	* *
* Max Chl Dpth (ft)	* 8.77	* Hydr. Depth (ft)	*	* 6.16	* *
* Conv. Total (cfs)	*174087.6	* Conv. (cfs)	*	*174087.6	* *
* Length Wtd. (ft)	* 188.86	* Wetted Per. (ft)	*	* 213.21	* *
* Min Ch El (ft)	* 2757.67	* Shear (lb/sq ft)	*	* 1.11	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 9.66	* *
* Frctn Loss (ft)	* 0.67	* Cum Volume (acre-ft)	* 9.85	* 60.04	* 25.01 *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 5.37	* 11.20	* 15.44 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 150

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.75	27.415	2773.75	42.03	2773.75	59.892	2773.75	62.416	2773.75
64.078	2773.75	160.259	2772.75	185.715	2772.75	194.744	2773.75	204.594	2773.75
210.718	2773.75	222.774	2774.75	228.183	2774.75	257.019	2774.75	267.81	2774.75
273.007	2773.75	274.803	2772.4	275.015	2772.75	287.29	2772.06	287.545	2771.75
289.737	2770.75	290.925	2770.17	291.165	2769.75	292.615	2768.75	292.615	2768.76
293.301	2770.01	294.086	2767.76	294.086	2767.75	295.641	2766.75	298.583	2765.75
300.223	2764.76	300.223	2764.75	301.687	2763.75	304.049	2762.75	306.828	2761.76
307.153	2761.75	310.201	2760.75	315.32	2759.75	327.928	2759.98	331.711	2761.72
339.341	2762.38	348.858	2761.61	352.302	2760.28	375.078	2761.75	377.814	2761.46
391.136	2760.05	397.352	2762.59	404.677	2759.75	421.315	2760.11	427.849	2757.53
458.495	2758.34	483.223	2757.36	487.119	2761.47	490.188	2761.75	490.492	2761.76
490.492	2761.77	490.584	2761.86	491.482	2762.75	491.482	2762.76	492.726	2763.75
492.726	2763.76	493.964	2764.75	495.201	2765.75	496.467	2766.75	497.853	2767.75
499.401	2768.75	500.936	2769.75	500.936	2769.76	502.477	2770.75	504.047	2771.75
504.294	2771.9	518.734	2772.75	520.388	2772.75	520.388	2772.76	520.685	2773.75
522.75	2774.75	525.055	2775.75	528.562	2776.75	529.291	2777.69	531.794	2776.75
533.505	2777.63	573.768	2775.75	592.796	2774.75	608.727	2774.75	636.672	2774.75
653.471	2774.75	788.445	2774.75	833.707	2773.75	855.161	2773.75	857.438	2774.75
928.516	2774.75	939.879	2773.75	942.008	2773.75	951.829	2774.75	952.204	2774.75
986.569	2773.75	998.018	2773.75	1010.809	2773.75	1012.796	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	287.29	.03	504.047	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
287.29	504.047	23.86	18.79	11.8	.1	.3

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2774.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.25	Wt. n-Val.		0.030	
W.S. Elev (ft)	2770.81	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.32	Flow Area (sq ft)		2143.28	
E.G. Slope (ft/ft)	0.004221	Area (sq ft)		2143.28	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	212.96	Top Width (ft)		212.96	
Vel Total (ft/s)	14.46	Avg. Vel. (ft/s)		14.46	
Max Chl Dpth (ft)	13.45	Hydr. Depth (ft)		10.06	
Conv. Total (cfs)	477138.7	Conv. (cfs)		477138.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		224.93	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		2.51	
Alpha	1.00	Stream Power (lb/ft s)		36.32	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	28.81	82.05	64.95
C & E Loss (ft)	0.02	Cum SA (acres)	10.00	11.14	18.31

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2772.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.030	
W.S. Elev (ft)	2769.43	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.97	Flow Area (sq ft)		1853.82	
E.G. Slope (ft/ft)	0.004114	Area (sq ft)		1853.82	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	208.31	Top Width (ft)		208.31	
Vel Total (ft/s)	13.21	Avg. Vel. (ft/s)		13.21	
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		8.90	
Conv. Total (cfs)	381810.9	Conv. (cfs)		381810.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		218.63	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		2.18	
Alpha	1.00	Stream Power (lb/ft s)		28.77	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	23.20	74.88	54.29
C & E Loss (ft)	0.02	Cum SA (acres)	8.88	11.11	17.84

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2775.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.68	Wt. n-Val.		0.030	
W.S. Elev (ft)	2771.72	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.31	Flow Area (sq ft)		2339.88	
E.G. Slope (ft/ft)	0.004348	Area (sq ft)		2339.88	
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	216.41	Top Width (ft)		216.41	
Vel Total (ft/s)	15.39	Avg. Vel. (ft/s)		15.39	
Max Chl Dpth (ft)	14.36	Hydr. Depth (ft)		10.81	
Conv. Total (cfs)	545981.9	Conv. (cfs)		545981.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		228.84	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		2.78	
Alpha	1.00	Stream Power (lb/ft s)		42.70	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	34.35	88.05	74.25
C & E Loss (ft)	0.02	Cum SA (acres)	11.23	11.16	18.67

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.08	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.15	Flow Area (sq ft)		252.50	
E.G. Slope (ft/ft)	0.002820	Area (sq ft)		252.50	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	133.45	Top Width (ft)		133.45	
Vel Total (ft/s)	3.96	Avg. Vel. (ft/s)		3.96	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		1.89	
Conv. Total (cfs)	18832.1	Conv. (cfs)		18832.1	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		136.65	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		1.29	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.99	21.41	0.58
C & E Loss (ft)	0.00	Cum SA (acres)	0.28	7.34	1.29

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2764.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.65	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.71	Flow Area (sq ft)		699.46	
E.G. Slope (ft/ft)	0.003824	Area (sq ft)		699.46	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	190.67	Top Width (ft)		190.67	
Vel Total (ft/s)	7.15	Avg. Vel. (ft/s)		7.15	
Max Chl Dpth (ft)	6.29	Hydr. Depth (ft)		3.67	
Conv. Total (cfs)	80856.3	Conv. (cfs)		80856.3	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		196.18	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		0.85	
Alpha	1.00	Stream Power (lb/ft s)		6.08	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	1.05	28.11	0.85
C & E Loss (ft)	0.01	Cum SA (acres)	0.29	7.93	1.51

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2766.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	
W.S. Elev (ft)	2765.59	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2764.36	Flow Area (sq ft)		1074.28	
E.G. Slope (ft/ft)	0.003828	Area (sq ft)		1074.28	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	196.14	Top Width (ft)		196.14	
Vel Total (ft/s)	9.31	Avg. Vel. (ft/s)		9.31	
Max Chl Dpth (ft)	8.23	Hydr. Depth (ft)		5.48	
Conv. Total (cfs)	161634.2	Conv. (cfs)		161634.2	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		202.91	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		1.27	
Alpha	1.00	Stream Power (lb/ft s)		11.78	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	9.85	55.22	25.01
C & E Loss (ft)	0.01	Cum SA (acres)	5.37	10.38	15.44

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 149.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.3	29.96	2773.35	45.93	2773.32	65.45	2773.3	66.42	2773.3
68.21	2773.29	70.02	2773.29	113.61	2772.85	129	2772.72	135.41	2772.66
135.68	2772.66	175.13	2772.3	191.43	2772.3	202.95	2772.3	212.82	2773.2
223.58	2773.2	230.27	2773.2	243.45	2774.11	249.36	2774.11	280.87	2774.11
292.66	2774.11	298.34	2773.2	300.3	2771.98	300.54	2772.3	309.22	2771.89
313.95	2771.68	314.19	2771.39	316.3	2770.45	317.44	2769.9	317.67	2769.52
319.06	2768.59	319.72	2769.72	320.18	2768.47	320.48	2767.66	321.97	2766.72
324.8	2765.76	325.36	2765.43	326.37	2764.83	327.78	2763.89	330.04	2762.94
330.36	2762.82	332.71	2761.98	333.03	2761.97	334.84	2761.37	335.95	2761
338.91	2760.38	340.87	2759.98	342.81	2759.97	346.73	2759.94	350.3	2759.87
352.98	2759.91	356.61	2761.5	363.94	2762.1	373.08	2761.41	376.39	2760.2
398.26	2761.55	400.89	2761.29	413.68	2760.01	419.65	2762.33	426.68	2759.75
442.66	2760.09	448.94	2757.75	451.9	2757.82	460.15	2757.75	478.37	2758.17
502.12	2757.24	503.84	2758.58	507.57	2761.13	511.86	2761.37	512.29	2761.38
512.42	2761.47	513.68	2762.27	515.42	2763.17	517.15	2764.08	518.88	2764.98
520.65	2765.89	522.59	2766.79	524.76	2767.69	525.17	2767.87	525.93	2768.47
526.91	2768.91	529.06	2769.87	531.26	2770.84	531.49	2770.98	535.29	2771.2
544.25	2771.79	545.24	2771.85	546.82	2771.86	547.1	2772.78	549.07	2773.7
551.26	2774.63	554.6	2775.57	555.29	2776.43	557.68	2775.6	559.31	2776.41
559.52	2776.4	564.95	2776.12	597.64	2774.66	615.75	2773.75	629.96	2773.75
630.92	2773.75	657.53	2773.75	683.04	2773.75	694.29	2773.75	763.59	2773.84
802.02	2773.84	845.12	2772.93	865.54	2772.93	867.71	2773.84	876.27	2773.84
889.18	2773.84	926.02	2773.93	935.38	2774	939.17	2773.7	946.2	2773.17
948.23	2773.18	951.28	2773.5	957.58	2774.16	957.93	2774.16	963.78	2774.04
976.17	2773.79	990.65	2773.47	991.29	2773.48	1001.55	2773.54	1006.1	2773.57
1013.73	2773.64	1015.62	2773.66						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	313.95	.03	531.26	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
313.95	531.26	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.49	Wt. n-Val.		0.030	
W.S. Elev (ft)	2770.46	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.35	Flow Area (sq ft)		2068.13	
E.G. Slope (ft/ft)	0.004726	Area (sq ft)		2068.13	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	214.10	Top Width (ft)		214.10	
Vel Total (ft/s)	14.99	Avg. Vel. (ft/s)		14.99	
Max Chl Dpth (ft)	13.22	Hydr. Depth (ft)		9.66	
Conv. Total (cfs)	450943.7	Conv. (cfs)		450943.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		223.91	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		2.73	
Alpha	1.00	Stream Power (lb/ft s)		40.85	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	28.81	81.15	64.95
C & E Loss (ft)	0.03	Cum SA (acres)	10.00	11.05	18.31

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2772.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.93	Wt. n-Val.		0.030	
W.S. Elev (ft)	2769.11	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2768.00	Flow Area (sq ft)		1784.08	
E.G. Slope (ft/ft)	0.004623	Area (sq ft)		1784.08	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	208.51	Top Width (ft)		208.51	
Vel Total (ft/s)	13.73	Avg. Vel. (ft/s)		13.73	
Max Chl Dpth (ft)	11.87	Hydr. Depth (ft)		8.56	
Conv. Total (cfs)	360198.3	Conv. (cfs)		360198.3	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		216.79	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		2.38	
Alpha	1.00	Stream Power (lb/ft s)		32.60	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	23.20	74.09	54.29
C & E Loss (ft)	0.02	Cum SA (acres)	8.88	11.02	17.84

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2775.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2771.40	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.36	Flow Area (sq ft)		2271.29	1.58
E.G. Slope (ft/ft)	0.004754	Area (sq ft)		2271.29	1.58
Q Total (cfs)	36000.00	Flow (cfs)		35998.68	1.32
Top Width (ft)	224.11	Top Width (ft)		217.08	7.03
Vel Total (ft/s)	15.84	Avg. Vel. (ft/s)		15.85	0.84
Max Chl Dpth (ft)	14.16	Hydr. Depth (ft)		10.46	0.22
Conv. Total (cfs)	522134.9	Conv. (cfs)		522115.7	19.2
Length Wtd. (ft)	18.79	Wetted Per. (ft)		227.16	7.08
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		2.97	0.07
Alpha	1.00	Stream Power (lb/ft s)		47.03	0.06
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	34.35	87.05	74.25
C & E Loss (ft)	0.01	Cum SA (acres)	11.23	11.07	18.67

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.00	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.12	Flow Area (sq ft)		240.74	
E.G. Slope (ft/ft)	0.003214	Area (sq ft)		240.74	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	131.19	Top Width (ft)		131.19	
Vel Total (ft/s)	4.15	Avg. Vel. (ft/s)		4.15	
Max Chl Dpth (ft)	3.76	Hydr. Depth (ft)		1.84	
Conv. Total (cfs)	17638.4	Conv. (cfs)		17638.4	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		133.81	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		0.36	
Alpha	1.00	Stream Power (lb/ft s)		1.50	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	0.99	21.30	0.58
C & E Loss (ft)	0.00	Cum SA (acres)	0.28	7.29	1.29

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2764.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.51	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.68	Flow Area (sq ft)		673.19	
E.G. Slope (ft/ft)	0.004215	Area (sq ft)		673.19	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	187.37	Top Width (ft)		187.37	
Vel Total (ft/s)	7.43	Avg. Vel. (ft/s)		7.43	
Max Chl Dpth (ft)	6.27	Hydr. Depth (ft)		3.59	
Conv. Total (cfs)	77010.0	Conv. (cfs)		77010.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		191.79	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		0.92	
Alpha	1.00	Stream Power (lb/ft s)		6.86	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	1.05	27.82	0.85
C & E Loss (ft)	0.01	Cum SA (acres)	0.29	7.85	1.51

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2766.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.46	Wt. n-Val.		0.030	
W.S. Elev (ft)	2765.38	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2764.36	Flow Area (sq ft)		1031.39	
E.G. Slope (ft/ft)	0.004290	Area (sq ft)		1031.39	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	194.23	Top Width (ft)		194.23	
Vel Total (ft/s)	9.70	Avg. Vel. (ft/s)		9.70	
Max Chl Dpth (ft)	8.14	Hydr. Depth (ft)		5.31	
Conv. Total (cfs)	152675.8	Conv. (cfs)		152675.8	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		199.62	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		1.38	
Alpha	1.00	Stream Power (lb/ft s)		13.42	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	9.85	54.77	25.01
C & E Loss (ft)	0.01	Cum SA (acres)	5.37	10.29	15.44

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 148.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2773.84	32.5	2772.94	49.83	2772.9	71.01	2772.84	72.06	2772.84
74	2772.84	75.97	2772.83	123.25	2772.37	139.96	2772.25	146.91	2772.2
147.2	2772.19	190	2771.85	207.69	2771.84	220.18	2771.84	230.89	2772.66
242.57	2772.66	249.83	2772.66	264.12	2773.48	270.53	2773.48	304.72	2773.48
317.51	2773.48	323.68	2772.66	325.81	2771.55	326.06	2771.84	335.48	2771.48
340.61	2771.3	340.84	2771.04	342.86	2770.15	343.96	2769.64	344.18	2769.29
345.51	2768.42	346.14	2769.43	346.58	2768.3	346.87	2767.57	348.3	2766.69
351.01	2765.77	351.55	2765.46	352.52	2764.9	353.87	2764.03	356.04	2763.13
356.35	2763.02	358.6	2762.21	358.9	2762.19	360.64	2761.61	361.7	2761.25
364.54	2760.62	366.42	2760.2	368.28	2760.14	372.03	2760.02	375.46	2759.8
378.03	2759.85	381.51	2761.28	388.53	2761.83	397.3	2761.21	400.47	2760.12
421.44	2761.35	423.96	2761.12	436.22	2759.98	441.95	2762.07	448.69	2759.75
464.01	2760.06	470.03	2757.96	472.87	2758.03	480.77	2757.66	498.24	2758.01
521.01	2757.13	523.23	2758.51	528.02	2760.78	533.54	2760.99	534.09	2760.99
534.25	2761.07	535.87	2761.79	538.11	2762.6	540.33	2763.41	542.56	2764.21
544.84	2765.02	547.33	2765.83	550.11	2766.63	550.65	2766.79	551.62	2767.65
552.87	2768.07	555.65	2769	558.47	2769.93	558.69	2770.06	562.3	2770.27

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570.81 2770.88  571.75 2770.95  573.25 2770.98  573.51  2771.8  575.38 2772.65
577.47 2773.51  580.64 2774.39   581.3 2775.17  583.56 2774.44  585.11 2775.19
 585.3 2775.19  590.47 2774.88  621.51 2773.57  638.71 2772.75  652.21 2772.75
653.12 2772.75  678.38 2772.75  702.61 2772.75  713.29 2772.75  779.11 2772.93
 815.6 2772.93  856.53 2772.11  875.92 2772.11  877.98 2772.93  886.12 2772.93
898.38 2772.93  933.36 2773.11  942.25 2773.24  945.85 2773.01  952.52 2772.58
954.45 2772.61  957.34 2772.93  963.33 2773.57  963.66 2773.57  969.22 2773.51
980.98 2773.38  994.73  2773.2  995.34  2773.2 1005.09 2773.33  1009.4 2773.39
1016.65 2773.53 1018.45 2773.57

Manning's n Values          num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
       0    .045  340.61     .03  558.47    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right      Coeff Contr.   Expan.
        340.61  558.47             23.86   18.79    11.8              .1       .3

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 2773.81  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    3.80  * Wt. n-Val.              *          *    0.030 *   0.045  *
* W.S. Elev (ft)          * 2770.02  * Reach Len. (ft)        *   23.86  *   18.79  *   11.80  *
* Crit W.S. (ft)          * 2769.39  * Flow Area (sq ft)      *          * 1982.40  *    0.01  *
* E.G. Slope (ft/ft)      *0.005431  * Area (sq ft)           *          * 1982.40  *    0.01  *
* Q Total (cfs)           *31000.00  * Flow (cfs)             *          *31000.00  *    0.00  *
* Top Width (ft)          *  215.47  * Top Width (ft)         *          *  215.32  *    0.14  *
* Vel Total (ft/s)        *   15.64  * Avg. Vel. (ft/s)       *          *   15.64  *    0.27  *
* Max Chl Dpth (ft)       *   12.89  * Hydr. Depth (ft)       *          *    9.21  *    0.04  *
* Conv. Total (cfs)       *420668.8  * Conv. (cfs)            *          *420668.8  *     0.0  *
* Length Wtd. (ft)        *   18.79  * Wetted Per. (ft)       *          *  223.55  *    0.17  *
* Min Ch El (ft)          * 2757.13  * Shear (lb/sq ft)       *          *    3.01  *    0.01  *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *   47.01  *    0.00  *
* Frctn Loss (ft)         *    0.11  * Cum Volume (acre-ft)   *   28.81  *   80.27  *   64.95  *
* C & E Loss (ft)         *    0.03  * Cum SA (acres)         *   10.00  *   10.96  *   18.31  *
*****************************************************************************************

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)          * 2771.93  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    3.14  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 2768.79  * Reach Len. (ft)        *   23.86  *   18.79  *   11.80  *
* Crit W.S. (ft)          * 2768.02  * Flow Area (sq ft)      *          * 1722.12  *          *
* E.G. Slope (ft/ft)      *0.005184  * Area (sq ft)           *          * 1722.12  *          *
* Q Total (cfs)           *24490.00  * Flow (cfs)             *          *24490.00  *          *
* Top Width (ft)          *  209.44  * Top Width (ft)         *          *  209.44  *          *
* Vel Total (ft/s)        *   14.22  * Avg. Vel. (ft/s)       *          *   14.22  *          *
* Max Chl Dpth (ft)       *   11.66  * Hydr. Depth (ft)       *          *    8.22  *          *
* Conv. Total (cfs)       *340133.7  * Conv. (cfs)            *          *340133.7  *          *
* Length Wtd. (ft)        *   18.79  * Wetted Per. (ft)       *          *  216.27  *          *
* Min Ch El (ft)          * 2757.13  * Shear (lb/sq ft)       *          *    2.58  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *   36.65  *          *
* Frctn Loss (ft)         *    0.10  * Cum Volume (acre-ft)   *   23.20  *   73.33  *   54.29  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)         *    8.88  *   10.93  *   17.84  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)          * 2775.20  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    4.04  * Wt. n-Val.              *          *    0.030 *   0.045  *
* W.S. Elev (ft)          * 2771.16  * Reach Len. (ft)        *   23.86  *   18.79  *   11.80  *
* Crit W.S. (ft)          * 2770.34  * Flow Area (sq ft)      *          * 2229.34  *    9.29  *
* E.G. Slope (ft/ft)      *0.005027  * Area (sq ft)           *          * 2229.34  *    9.29  *
* Q Total (cfs)           *36000.00  * Flow (cfs)             *          *35984.21  *   15.79  *
* Top Width (ft)          *  232.57  * Top Width (ft)         *          *  217.73  *   14.84  *
* Vel Total (ft/s)        *   16.08  * Avg. Vel. (ft/s)       *          *   16.14  *    1.70  *
* Max Chl Dpth (ft)       *   14.03  * Hydr. Depth (ft)       *          *   10.24  *    0.63  *
* Conv. Total (cfs)       *507756.3  * Conv. (cfs)            *          *507533.7  *   222.7  *
* Length Wtd. (ft)        *   18.78  * Wetted Per. (ft)       *          *  226.23  *   15.03  *
* Min Ch El (ft)          * 2757.13  * Shear (lb/sq ft)       *          *    3.09  *    0.19  *
* Alpha                   *    1.01  * Stream Power (lb/ft s) *          *   49.92  *    0.33  *
* Frctn Loss (ft)         *    0.09  * Cum Volume (acre-ft)   *   34.35  *   86.08  *   74.25  *
* C & E Loss (ft)         *    0.01  * Cum SA (acres)         *   11.23  *   10.97  *   18.66  *
*****************************************************************************************

CROSS SECTION OUTPUT  Profile #PF 4
*****************************************************************************************
* E.G. Elev (ft)          * 2761.20  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.30  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 2760.90  * Reach Len. (ft)        *   23.86  *   18.79  *   11.80  *
* Crit W.S. (ft)          * 2760.11  * Flow Area (sq ft)      *          *  227.75  *          *
* E.G. Slope (ft/ft)      *0.003837  * Area (sq ft)           *          *  227.75  *          *
* Q Total (cfs)           * 1000.00  * Flow (cfs)             *          * 1000.00  *          *
* Top Width (ft)          *  130.90  * Top Width (ft)         *          *  130.90  *          *
* Vel Total (ft/s)        *    4.39  * Avg. Vel. (ft/s)       *          *    4.39  *          *
* Max Chl Dpth (ft)       *    3.77  * Hydr. Depth (ft)       *          *    1.74  *          *
* Conv. Total (cfs)       * 16143.0  * Conv. (cfs)            *          * 16143.0  *          *
* Length Wtd. (ft)        *   18.79  * Wetted Per. (ft)       *          *  133.04  *          *
* Min Ch El (ft)          * 2757.13  * Shear (lb/sq ft)       *          *    0.41  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *    1.80  *          *
* Frctn Loss (ft)         *    0.08  * Cum Volume (acre-ft)   *    0.99  *   21.20  *    0.58  *
* C & E Loss (ft)         *    0.00  * Cum SA (acres)         *    0.28  *    7.23  *    1.29  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Profile #PF 5
*****************************************************************************************
* E.G. Elev (ft)          * 2764.27  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.94  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 2763.34  * Reach Len. (ft)        *   23.86  *   18.79  *   11.80  *
* Crit W.S. (ft)          * 2762.66  * Flow Area (sq ft)      *          *  643.83  *          *
* E.G. Slope (ft/ft)      *0.004768  * Area (sq ft)           *          *  643.83  *          *
```

Q Total (cfs)	5000.00	Flow (cfs)		5000.00			
Top Width (ft)	184.58	Top Width (ft)		184.58			
Vel Total (ft/s)	7.77	Avg. Vel. (ft/s)		7.77			
Max Chl Dpth (ft)	6.21	Hydr. Depth (ft)		3.49			
Conv. Total (cfs)	72409.7	Conv. (cfs)		72409.7			
Length Wtd. (ft)	18.79	Wetted Per. (ft)		188.17			
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		1.02			
Alpha	1.00	Stream Power (lb/ft s)		7.91			
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	1.05	27.53		0.85	
C & E Loss (ft)	0.01	Cum SA (acres)	0.29	7.77		1.51	

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2766.74	Element			
Vel Head (ft)	1.60	Wt. n-Val.		0.030	
W.S. Elev (ft)	2765.14	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2764.34	Flow Area (sq ft)		985.55	
E.G. Slope (ft/ft)	0.004921	Area (sq ft)		985.55	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	193.12	Top Width (ft)		193.12	
Vel Total (ft/s)	10.15	Avg. Vel. (ft/s)		10.15	
Max Chl Dpth (ft)	8.01	Hydr. Depth (ft)		5.10	
Conv. Total (cfs)	142557.6	Conv. (cfs)		142557.6	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		197.48	
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		1.53	
Alpha	1.00	Stream Power (lb/ft s)		15.56	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	9.85	54.34	25.01
C & E Loss (ft)	0.01	Cum SA (acres)	5.37	10.21	15.44

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 147.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2773.39	35.05	2772.54	53.73	2772.47	76.57	2772.39	77.71	2772.39
79.79	2772.38	81.92	2772.37	132.9	2771.86	150.91	2771.77	158.41	2771.73
158.73	2771.73	204.87	2771.41	223.94	2771.39	237.42	2771.39	248.96	2772.11
261.55	2772.11	269.38	2772.11	284.79	2772.84	291.71	2772.84	328.57	2772.84
342.37	2772.84	349.01	2772.11	351.31	2771.13	351.58	2771.39	361.73	2771.06
367.27	2770.92	367.49	2770.68	369.43	2769.85	370.47	2769.37	370.68	2769.05
371.96	2768.26	372.57	2769.14	372.99	2768.12	373.26	2767.47	374.63	2766.66
377.22	2765.78	377.74	2765.49	378.67	2764.97	379.96	2764.16	382.04	2763.31
382.33	2763.21	384.48	2762.43	384.77	2762.41	386.44	2761.84	387.46	2761.49
390.17	2760.86	391.97	2760.43	393.75	2760.32	397.34	2760.1	400.62	2759.74
403.08	2759.78	406.41	2761.06	413.13	2761.55	421.52	2761.01	424.55	2760.04
444.62	2761.15	447.03	2760.95	458.77	2759.94	464.25	2761.8	470.7	2759.75
485.36	2760.04	491.12	2758.18	493.84	2758.24	501.4	2757.57	518.12	2757.84
539.91	2757.01	542.62	2758.43	548.47	2760.44	555.22	2760.6	555.89	2760.61
556.09	2760.68	558.06	2761.31	560.8	2762.02	563.52	2762.74	566.24	2763.45
569.02	2764.16	572.07	2764.87	575.47	2765.57	576.12	2765.71	577.32	2766.82
578.84	2767.22	582.23	2768.12	585.68	2769.02	585.89	2769.13	589.31	2769.34
597.37	2769.98	598.26	2770.05	599.67	2770.09	599.93	2770.83	601.7	2771.61
603.67	2772.39	606.67	2773.21	607.3	2773.91	609.44	2773.29	610.91	2773.97
611.09	2773.97	615.98	2773.64	645.38	2772.48	661.67	2771.75	674.45	2771.75
675.31	2771.75	699.24	2771.75	722.18	2771.75	732.3	2771.75	794.62	2772.02
829.18	2772.02	867.94	2771.3	886.31	2771.3	888.26	2772.02	895.96	2772.02
907.57	2772.02	940.69	2772.3	949.11	2772.49	952.52	2772.31	958.84	2772
960.66	2772.04	963.41	2772.35	969.07	2772.98	969.39	2772.99	974.65	2772.98
985.79	2772.98	998.82	2772.92	999.39	2772.93	1008.62	2773.12	1012.71	2773.2
1019.57	2773.42	1021.27	2773.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	367.27	.03	585.68	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
367.27	585.68	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2773.68	Element			
Vel Head (ft)	4.10	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2769.59	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.33	Flow Area (sq ft)		1908.07	1.68
E.G. Slope (ft/ft)	0.006135	Area (sq ft)		1908.07	1.68
Q Total (cfs)	31000.00	Flow (cfs)		30998.28	1.72
Top Width (ft)	222.39	Top Width (ft)		215.68	6.71
Vel Total (ft/s)	16.23	Avg. Vel. (ft/s)		16.25	1.02
Max Chl Dpth (ft)	12.57	Hydr. Depth (ft)		8.85	0.25
Conv. Total (cfs)	395784.1	Conv. (cfs)		395762.1	22.0
Length Wtd. (ft)	18.79	Wetted Per. (ft)		222.66	6.76
Min Ch El (ft)	2757.01	Shear (lb/sq ft)		3.28	0.10
Alpha	1.00	Stream Power (lb/ft s)		53.32	0.10
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	28.81	79.43	64.95
C & E Loss (ft)	0.02	Cum SA (acres)	10.00	10.86	18.31

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2771.82	Element			
Vel Head (ft)	3.28	Wt. n-Val.		0.030	
W.S. Elev (ft)	2768.54	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.99	Flow Area (sq ft)		1684.75	
E.G. Slope (ft/ft)	0.005621	Area (sq ft)		1684.75	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	211.69	Top Width (ft)		211.69	

* Vel Total (ft/s)	* 14.54	* Avg. Vel. (ft/s)	*	* 14.54	*
* Max Chl Dpth (ft)	* 11.53	* Hydr. Depth (ft)	*	* 7.96	*
* Conv. Total (cfs)	*326645.9	* Conv. (cfs)	*	*326645.9	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 217.54	*
* Min Ch El (ft)	* 2757.01	* Shear (lb/sq ft)	*	* 2.72	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 39.51	*
* Frctn Loss (ft)	* 0.12	* Cum Volume (acre-ft)	* 23.20	* 72.60	* 54.29 *
C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 8.88	* 10.84	* 17.84 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
* E.G. Elev (ft)	* 2775.10	* Element	*		
* Vel Head (ft)	* 4.02	* Wt. n-Val.	* 0.045	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2771.07	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2770.31	* Flow Area (sq ft)	* 0.46	* 2231.46	* 20.68 *
* E.G. Slope (ft/ft)	*0.004984	* Area (sq ft)	* 0.46	* 2231.46	* 20.68 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	* 0.20	*35941.22	* 58.58 *
* Top Width (ft)	* 239.16	* Top Width (ft)	* 5.95	* 218.41	* 14.80 *
* Vel Total (ft/s)	* 15.98	* Avg. Vel. (ft/s)	* 0.43	* 16.11	* 2.83 *
* Max Chl Dpth (ft)	* 14.06	* Hydr. Depth (ft)	* 0.08	* 10.22	* 1.40 *
* Conv. Total (cfs)	*509925.8	* Conv. (cfs)	* 2.8	*509093.3	* 829.7 *
* Length Wtd. (ft)	* 18.77	* Wetted Per. (ft)	* 5.95	* 225.73	* 15.44 *
* Min Ch El (ft)	* 2757.01	* Shear (lb/sq ft)	* 0.02	* 3.08	* 0.42 *
* Alpha	* 1.01	* Stream Power (lb/ft s)	* 0.01	* 49.54	* 1.18 *
* Frctn Loss (ft)	* 0.09	* Cum Volume (acre-ft)	* 34.35	* 85.12	* 74.24 *
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 11.23	* 10.88	* 18.66 *

CROSS SECTION OUTPUT Profile #PF 4

			Left OB	Channel	Right OB
* E.G. Elev (ft)	* 2761.11	* Element	*		
* Vel Head (ft)	* 0.33	* Wt. n-Val.	*	* 0.030	*
* W.S. Elev (ft)	* 2760.78	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2760.07	* Flow Area (sq ft)	*	* 216.35	*
* E.G. Slope (ft/ft)	*0.004593	* Area (sq ft)	*	* 216.35	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	*
* Top Width (ft)	* 132.11	* Top Width (ft)	*	* 132.11	*
* Vel Total (ft/s)	* 4.62	* Avg. Vel. (ft/s)	*	* 4.62	*
* Max Chl Dpth (ft)	* 3.77	* Hydr. Depth (ft)	*	* 1.64	*
* Conv. Total (cfs)	* 14754.9	* Conv. (cfs)	*	* 14754.9	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 133.90	*
* Min Ch El (ft)	* 2757.01	* Shear (lb/sq ft)	*	* 0.46	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.14	*
* Frctn Loss (ft)	* 0.09	* Cum Volume (acre-ft)	* 0.99	* 21.11	* 0.58 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 0.28	* 7.17	* 1.29 *

Warning: Divided flow computed for this cross-section.

OSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	* 2764.17	* Element	*		
* Vel Head (ft)	* 1.02	* Wt. n-Val.	*	* 0.030	*
* W.S. Elev (ft)	* 2763.15	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2762.58	* Flow Area (sq ft)	*	* 616.73	*
* E.G. Slope (ft/ft)	*0.005401	* Area (sq ft)	*	* 616.73	*
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*
* Top Width (ft)	* 182.60	* Top Width (ft)	*	* 182.60	*
* Vel Total (ft/s)	* 8.11	* Avg. Vel. (ft/s)	*	* 8.11	*
* Max Chl Dpth (ft)	* 6.14	* Hydr. Depth (ft)	*	* 3.38	*
* Conv. Total (cfs)	* 68035.1	* Conv. (cfs)	*	* 68035.1	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 185.55	*
* Min Ch El (ft)	* 2757.01	* Shear (lb/sq ft)	*	* 1.12	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 9.09	*
* Frctn Loss (ft)	* 0.11	* Cum Volume (acre-ft)	* 1.05	* 27.26	* 0.85 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.29	* 7.69	* 1.51 *

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
* E.G. Elev (ft)	* 2766.63	* Element	*		
* Vel Head (ft)	* 1.74	* Wt. n-Val.	*	* 0.030	*
* W.S. Elev (ft)	* 2764.89	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2764.33	* Flow Area (sq ft)	*	* 944.08	*
* E.G. Slope (ft/ft)	*0.005658	* Area (sq ft)	*	* 944.08	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*
* Top Width (ft)	* 193.38	* Top Width (ft)	*	* 193.38	*
* Vel Total (ft/s)	* 10.59	* Avg. Vel. (ft/s)	*	* 10.59	*
* Max Chl Dpth (ft)	* 7.88	* Hydr. Depth (ft)	*	* 4.88	*
* Conv. Total (cfs)	*132943.8	* Conv. (cfs)	*	*132943.8	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 196.94	*
* Min Ch El (ft)	* 2757.01	* Shear (lb/sq ft)	*	* 1.69	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 17.94	*
* Frctn Loss (ft)	* 0.11	* Cum Volume (acre-ft)	* 9.85	* 53.92	* 25.01 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 5.37	* 10.13	* 15.44 *

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 146.*

INPUT
scription:
ation Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2772.93	37.59	2772.13	57.63	2772.04	82.12	2771.94	83.35	2771.93
85.58	2771.92	87.86	2771.91	142.55	2771.4	161.87	2771.3	169.91	2771.26
170.25	2771.26	219.75	2770.96	240.2	2770.93	254.65	2770.93	267.03	2771.57
280.54	2771.57	288.93	2771.57	305.47	2772.2	312.88	2772.2	352.42	2772.2

367.22	2772.2	374.35	2771.57	376.81	2770.71	377.1	2770.93	387.99	2770.65		
393.93	2770.54	394.14	2770.32	395.99	2769.55	396.99	2769.11	397.19	2768.82		
398.41	2768.1	398.99	2768.85	399.39	2767.95	399.65	2767.37	400.96	2766.62		
403.43	2765.79	403.93	2765.52	404.81	2765.05	406.04	2764.3	408.03	2763.5		
408.31	2763.4	410.37	2762.66	410.64	2762.62	412.24	2762.08	413.21	2761.74		
415.8	2761.09	417.52	2760.66	419.22	2760.5	422.65	2760.18	425.78	2759.68		
428.13	2759.72	431.31	2760.83	437.73	2761.27	445.74	2760.8	448.64	2759.97		
467.8	2760.95	470.1	2760.78	481.31	2759.91	486.54	2761.54	492.71	2759.75		
506.71	2760.02	512.21	2758.39	514.8	2758.45	522.02	2757.48	537.99	2757.68		
558.8	2756.89	562	2758.35	568.92	2760.1	576.89	2760.22	577.68	2760.22		
577.92	2760.28	580.25	2760.83	583.49	2761.45	586.7	2762.06	589.92	2762.68		
593.2	2763.29	596.8	2763.91	600.83	2764.52	601.6	2764.63	603.01	2765.99		
604.81	2766.38	608.82	2767.25	612.9	2768.11	613.1	2768.21	616.31	2768.41		
623.92	2769.07	624.77	2769.15	626.1	2769.2	626.34	2769.85	628.01	2770.56		
629.88	2771.27	632.71	2772.03	633.3	2772.65	635.32	2772.14	636.71	2772.75		
636.88	2772.75	641.5	2772.41	669.25	2771.39	684.63	2770.75	696.69	2770.75		
697.5	2770.75	720.09	2770.75	741.75	2770.75	751.3	2770.75	810.14	2771.11		
842.76	2771.11	879.35	2770.48	896.69	2770.48	898.53	2771.11	905.8	2771.11		
916.76	2771.11	948.03	2771.48	955.98	2771.74	959.2	2771.62	965.16	2771.42		
966.88	2771.48	969.47	2771.78	974.82	2772.39	975.12	2772.4	980.09	2772.45		
990.6	2772.58	1002.9	2772.64	1003.45	2772.66	1012.15	2772.91	1016.01	2773.02		
1022.49	2773.31	1024.1	2773.39								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	393.93	.03	612.9	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
393.93	612.9	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.28	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2769.27	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.27	Flow Area (sq ft)		1866.91	7.60
E.G. Slope (ft/ft)	0.006578	Area (sq ft)		1866.91	7.60
Q Total (cfs)	31000.00	Flow (cfs)		30986.00	14.00
Top Width (ft)	229.50	Top Width (ft)		216.27	13.23
Vel Total (ft/s)	16.54	Avg. Vel. (ft/s)		16.60	1.84
Max Chl Dpth (ft)	12.38	Hydr. Depth (ft)		8.63	0.57
Conv. Total (cfs)	382215.9	Conv. (cfs)		382043.3	172.6
Length Wtd. (ft)	18.78	Wetted Per. (ft)		222.30	13.34
Min Ch El (ft)	2756.89	Shear (lb/sq ft)		3.45	0.23
Alpha	1.01	Stream Power (lb/ft s)		57.24	0.43
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	28.81	78.62	64.95
C & E Loss (ft)	0.06	Cum SA (acres)	10.00	10.77	18.30

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2771.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.75	Wt. n-Val.		0.030	
W.S. Elev (ft)	2767.91	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.91	Flow Area (sq ft)		1575.60	
E.G. Slope (ft/ft)	0.007013	Area (sq ft)		1575.60	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	212.57	Top Width (ft)		212.57	
Vel Total (ft/s)	15.54	Avg. Vel. (ft/s)		15.54	
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		7.41	
Conv. Total (cfs)	292429.9	Conv. (cfs)		292429.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		217.22	
Min Ch El (ft)	2756.89	Shear (lb/sq ft)		3.18	
Alpha	1.00	Stream Power (lb/ft s)		49.37	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	23.20	71.90	54.29
C & E Loss (ft)	0.02	Cum SA (acres)	8.88	10.74	17.84

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: 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 #PF 3

E.G. Elev (ft)	2774.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.86	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2771.09	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.19	Flow Area (sq ft)	13.73	2264.69	90.08
E.G. Slope (ft/ft)	0.004698	Area (sq ft)	13.73	2264.69	90.08
Q Total (cfs)	36000.00	Flow (cfs)	11.41	35809.57	179.02
Top Width (ft)	499.82	Top Width (ft)	78.40	218.97	202.45
Vel Total (ft/s)	15.20	Avg. Vel. (ft/s)	0.83	15.81	1.99
Max Chl Dpth (ft)	14.20	Hydr. Depth (ft)	0.18	10.34	0.44
Conv. Total (cfs)	525219.0	Conv. (cfs)	166.4	522440.8	2611.8
Length Wtd. (ft)	18.66	Wetted Per. (ft)	78.55	225.31	203.32
Min Ch El (ft)	2756.89	Shear (lb/sq ft)	0.05	2.95	0.13
Alpha	1.08	Stream Power (lb/ft s)	0.04	46.62	0.26
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	34.35	84.15	74.23
C & E Loss (ft)	0.27	Cum SA (acres)	11.21	10.79	18.63

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.65	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.08	Flow Area (sq ft)		204.77	

* E.G. Slope (ft/ft)	*0.005412	* Area (sq ft)	*		* 204.77	*	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*		* 1000.00	*	*
* Top Width (ft)	* 130.48	* Top Width (ft)	*		* 130.48	*	*
* Vel Total (ft/s)	* 4.88	* Avg. Vel. (ft/s)	*		* 4.88	*	*
* Max Chl Dpth (ft)	* 3.76	* Hydr. Depth (ft)	*		* 1.57	*	*
* Conv. Total (cfs)	* 13592.8	* Conv. (cfs)	*		* 13592.8	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*		* 131.98	*	*
* Min Ch El (ft)	* 2756.89	* Shear (lb/sq ft)	*		* 0.52	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 2.56	*	*
* Frctn Loss (ft)	* 0.11	* Cum Volume (acre-ft)	*	0.99	* 21.01	*	0.58 *
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	0.28	* 7.12	*	1.29 *

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2764.06	* Element	*	Left OB	* Channel	*	Right OB *
* Vel Head (ft)	* 1.12	* Wt. n-Val.	*		* 0.030	*	*
* W.S. Elev (ft)	* 2762.94	* Reach Len. (ft)	*	23.86	* 18.79	*	11.80 *
* Crit W.S. (ft)	* 2762.54	* Flow Area (sq ft)	*		* 589.06	*	*
* E.G. Slope (ft/ft)	*0.006231	* Area (sq ft)	*		* 589.06	*	*
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*		* 5000.00	*	*
* Top Width (ft)	* 181.73	* Top Width (ft)	*		* 181.73	*	*
* Vel Total (ft/s)	* 8.49	* Avg. Vel. (ft/s)	*		* 8.49	*	*
* Max Chl Dpth (ft)	* 6.05	* Hydr. Depth (ft)	*		* 3.24	*	*
* Conv. Total (cfs)	* 63342.5	* Conv. (cfs)	*		* 63342.5	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*		* 184.15	*	*
* Min Ch El (ft)	* 2756.89	* Shear (lb/sq ft)	*		* 1.24	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 10.56	*	*
* Frctn Loss (ft)	* 0.12	* Cum Volume (acre-ft)	*	1.05	* 27.00	*	0.85 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	0.29	* 7.61	*	1.51 *

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2766.51	* Element	*	Left OB	* Channel	*	Right OB *
* Vel Head (ft)	* 1.88	* Wt. n-Val.	*		* 0.030	*	*
* W.S. Elev (ft)	* 2764.63	* Reach Len. (ft)	*	23.86	* 18.79	*	11.80 *
* Crit W.S. (ft)	* 2764.27	* Flow Area (sq ft)	*		* 908.85	*	*
* E.G. Slope (ft/ft)	*0.006513	* Area (sq ft)	*		* 908.85	*	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*		*10000.00	*	*
* Top Width (ft)	* 196.11	* Top Width (ft)	*		* 196.11	*	*
* Vel Total (ft/s)	* 11.00	* Avg. Vel. (ft/s)	*		* 11.00	*	*
* Max Chl Dpth (ft)	* 7.74	* Hydr. Depth (ft)	*		* 4.63	*	*
* Conv. Total (cfs)	*123907.9	* Conv. (cfs)	*		*123907.9	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*		* 199.02	*	*
* Min Ch El (ft)	* 2756.89	* Shear (lb/sq ft)	*		* 1.86	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 20.43	*	*
* Frctn Loss (ft)	* 0.13	* Cum Volume (acre-ft)	*	9.85	* 53.52	*	25.01 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	5.37	* 10.04	*	15.44 *

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 145.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2772.48	40.14	2771.73	61.53	2771.62	87.68	2771.48	88.99	2771.48
91.38	2771.46	93.81	2771.45	152.2	2770.91	172.82	2770.83	181.41	2770.8
181.77	2770.8	234.62	2770.51	256.45	2770.48	271.89	2770.48	285.1	2771.02
299.52	2771.02	308.49	2771.02	326.14	2771.57	334.06	2771.57	376.27	2771.57
392.07	2771.57	399.68	2771.02	402.31	2770.29	402.62	2770.48	414.25	2770.23
420.59	2770.16	420.79	2769.97	422.55	2769.25	423.5	2768.84	423.7	2768.59
424.86	2767.93	425.41	2768.57	425.79	2767.78	426.04	2767.28	427.29	2766.59
429.65	2765.8	430.11	2765.56	430.96	2765.12	432.13	2764.44	434.03	2763.69
434.29	2763.59	436.26	2762.88	436.52	2762.84	438.03	2762.32	438.96	2761.99
441.43	2761.33	443.07	2760.89	444.69	2760.68	447.96	2760.27	450.94	2759.62
453.17	2759.65	456.21	2760.61	462.33	2760.99	469.96	2760.6	472.72	2759.89
490.98	2760.76	493.17	2760.6	503.86	2759.87	508.84	2761.28	514.71	2759.75
528.05	2760	533.29	2758.61	535.77	2758.66	542.65	2757.39	557.87	2757.51
577.69	2756.77	581.39	2758.28	589.37	2759.75	598.57	2759.84	599.48	2759.84
599.76	2759.89	602.45	2760.36	606.18	2760.87	609.89	2761.39	613.59	2761.91
617.39	2762.43	621.54	2762.94	626.18	2763.46	627.07	2763.56	628.7	2765.17
630.78	2765.54	635.4	2766.37	640.11	2767.2	640.3	2767.29	643.32	2767.48
650.48	2768.17	651.27	2768.25	652.53	2768.32	652.76	2768.88	654.33	2769.51
656.08	2770.15	658.75	2770.85	659.3	2771.39	661.2	2770.98	662.51	2771.53
662.67	2771.54	667.02	2771.17	693.12	2770.3	707.59	2769.75	718.93	2769.75
719.7	2769.75	740.95	2769.75	761.32	2769.75	770.31	2769.75	825.65	2770.2
856.34	2770.2	890.76	2769.66	907.07	2769.66	908.8	2770.2	915.64	2770.2
925.95	2770.2	955.37	2770.66	962.84	2770.98	965.87	2770.92	971.48	2770.83
973.1	2770.91	975.54	2771.2	980.57	2771.8	980.86	2771.81	985.53	2771.93
995.42	2772.17	1006.98	2772.37	1007.5	2772.39	1015.69	2772.7	1019.32	2772.84
1025.41	2773.21	1026.93	2773.3						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	420.59	.03	640.11	.045

Bnk Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
420.59	640.11	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2773.39	* Element	*	Left OB	* Channel	*	Right OB *
* Vel Head (ft)	* 4.59	* Wt. n-Val.	*		* 0.030	*	0.045 *
* W.S. Elev (ft)	* 2768.80	* Reach Len. (ft)	*	23.86	* 18.79	*	11.80 *
* Crit W.S. (ft)	* 2769.10	* Flow Area (sq ft)	*		* 1800.68	*	12.70 *

E.G. Slope (ft/ft)	0.007389	Area (sq ft)		1800.68	12.70	
Q Total (cfs)	31000.00	Flow (cfs)		30964.50	35.50	
Top Width (ft)	229.19	Top Width (ft)		216.58	12.62	
Vel Total (ft/s)	17.10	Avg. Vel. (ft/s)		17.20	2.79	
Max Chl Dpth (ft)	12.03	Hydr. Depth (ft)		8.31	1.01	
Conv. Total (cfs)	360642.4	Conv. (cfs)		360229.4	413.0	
Length Wtd. (ft)	18.78	Wetted Per. (ft)		221.84	13.00	
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		3.74	0.45	
Alpha	1.01	Stream Power (lb/ft s)		64.39	1.26	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	28.81	77.83	64.95	
C & E Loss (ft)	0.03	Cum SA (acres)	10.00	10.68	18.30	

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2771.51	Element			
Vel Head (ft)	3.92	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.60	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.82	Flow Area (sq ft)		1541.65	0.77
E.G. Slope (ft/ft)	0.007592	Area (sq ft)		1541.65	0.77
Q Total (cfs)	24490.00	Flow (cfs)		24489.31	0.69
Top Width (ft)	218.64	Top Width (ft)		214.23	4.42
Vel Total (ft/s)	15.88	Avg. Vel. (ft/s)		15.89	0.90
Max Chl Dpth (ft)	10.83	Hydr. Depth (ft)		7.20	0.18
Conv. Total (cfs)	281071.7	Conv. (cfs)		281063.7	8.0
Length Wtd. (ft)	18.79	Wetted Per. (ft)		218.31	4.45
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		3.35	0.08
Alpha	1.00	Stream Power (lb/ft s)		53.17	0.07
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	23.20	71.22	54.29
C & E Loss (ft)	0.02	Cum SA (acres)	8.88	10.65	17.84

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	2774.61	Element			
Vel Head (ft)	2.96	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2771.65	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2771.65	Flow Area (sq ft)	220.16	2425.33	538.47
E.G. Slope (ft/ft)	0.003423	Area (sq ft)	220.16	2425.33	538.47
Q Total (cfs)	36000.00	Flow (cfs)	303.20	34284.95	1411.86
Top Width (ft)	924.32	Top Width (ft)	365.57	219.52	339.23
Vel Total (ft/s)	11.31	Avg. Vel. (ft/s)	1.38	14.14	2.62
Max Chl Dpth (ft)	14.88	Hydr. Depth (ft)	0.60	11.05	1.59
Conv. Total (cfs)	615327.1	Conv. (cfs)	5182.4	586012.6	24132.0
Length Wtd. (ft)	18.63	Wetted Per. (ft)	365.77	225.10	340.56
Min Ch El (ft)	2756.77	Shear (lb/sq ft)	0.13	2.30	0.34
Alpha	1.49	Stream Power (lb/ft s)	0.18	32.55	0.89
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	34.28	83.14	74.14
C & E Loss (ft)	0.04	Cum SA (acres)	11.08	10.69	18.56

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 4

			Left OB	Channel	Right OB
E.G. Elev (ft)	2760.91	Element			
Vel Head (ft)	0.41	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.49	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.07	Flow Area (sq ft)		193.97	
E.G. Slope (ft/ft)	0.006284	Area (sq ft)		193.97	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	127.62	Top Width (ft)		127.62	
Vel Total (ft/s)	5.16	Avg. Vel. (ft/s)		5.16	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		1.52	
Conv. Total (cfs)	12615.0	Conv. (cfs)		12615.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		128.93	
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		3.04	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.99	20.93	0.58
C & E Loss (ft)	0.00	Cum SA (acres)	0.28	7.06	1.29

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2763.93	Element			
Vel Head (ft)	1.20	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.73	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.45	Flow Area (sq ft)		568.55	
E.G. Slope (ft/ft)	0.007058	Area (sq ft)		568.55	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	183.01	Top Width (ft)		183.01	
Vel Total (ft/s)	8.79	Avg. Vel. (ft/s)		8.79	
Max Chl Dpth (ft)	5.96	Hydr. Depth (ft)		3.11	
Conv. Total (cfs)	59516.9	Conv. (cfs)		59516.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		185.04	
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		1.35	
Alpha	1.00	Stream Power (lb/ft s)		11.91	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	1.05	26.75	0.85
C & E Loss (ft)	0.02	Cum SA (acres)	0.29	7.53	1.51

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2766.37	Element			
Vel Head (ft)	1.97	Wt. n-Val.		0.030	

* W.S. Elev (ft)	* 2764.40	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2764.15	* Flow Area (sq ft)	*	* 887.87	*	*
* E.G. Slope (ft/ft)	*0.007013	* Area (sq ft)	*	* 887.87	*	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*	*
* Top Width (ft)	* 195.70	* Top Width (ft)	*	* 195.70	*	*
* Vel Total (ft/s)	* 11.26	* Avg. Vel. (ft/s)	*	* 11.26	*	*
* Max Chl Dpth (ft)	* 7.63	* Hydr. Depth (ft)	*	* 4.54	*	*
* Conv. Total (cfs)	*119414.4	* Conv. (cfs)	*	*119414.4	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 198.43	*	*
* Min Ch El (ft)	* 2756.77	* Shear (lb/sq ft)	*	* 1.96	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 22.06	*	*
* Frctn Loss (ft)	* 0.14	* Cum Volume (acre-ft)	* 9.85	* 53.13	* 25.01	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 5.37	* 9.96	* 15.44	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 144.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2772.02	42.68	2771.32	65.43	2771.19	93.24	2771.03	94.63	2771.02
97.17	2771.01	99.76	2770.99	161.84	2770.43	183.78	2770.36	192.91	2770.33
193.29	2770.33	249.49	2770.06	272.71	2770.02	289.12	2770.02	303.18	2770.48
318.51	2770.48	328.04	2770.48	346.81	2770.93	355.23	2770.93	400.12	2770.93
416.92	2770.93	425.01	2770.48	427.81	2769.86	428.14	2770.02	440.51	2769.82
447.25	2769.77	447.44	2769.61	449.12	2768.95	450.02	2768.57	450.2	2768.36
451.31	2767.77	451.83	2768.28	452.2	2767.61	452.43	2767.18	453.62	2766.56
455.86	2765.81	456.3	2765.59	457.11	2765.19	458.22	2764.58	460.02	2763.88
460.28	2763.79	462.14	2763.1	462.39	2763.06	463.83	2762.56	464.71	2762.24
467.06	2761.57	468.61	2761.11	470.16	2760.86	473.26	2760.35	476.1	2759.55
478.22	2759.59	481.11	2760.39	486.92	2760.72	494.18	2760.4	496.8	2759.81
514.16	2760.56	516.25	2760.43	526.4	2759.84	531.14	2761.02	536.72	2759.75
549.4	2759.97	554.38	2758.82	556.74	2758.87	563.28	2757.3	577.74	2757.34
596.59	2756.66	600.78	2758.2	609.82	2759.41	620.25	2759.46	621.28	2759.45
621.59	2759.5	624.64	2759.88	628.87	2760.3	633.07	2760.72	637.27	2761.14
641.57	2761.57	646.28	2761.98	651.54	2762.4	652.55	2762.48	654.39	2764.34
656.75	2764.7	661.99	2765.49	667.32	2766.3	667.5	2766.37	670.33	2766.55
677.04	2767.27	677.78	2767.35	678.96	2767.43	679.17	2767.9	680.64	2768.46
682.29	2769.03	684.78	2769.66	685.3	2770.13	687.09	2769.83	688.31	2770.32
688.46	2770.32	692.53	2769.93	716.99	2769.2	730.54	2768.75	741.18	2768.75
741.89	2768.75	761.8	2768.75	780.89	2768.75	789.31	2768.75	841.17	2769.3
869.92	2769.3	902.17	2768.84	917.45	2768.84	919.07	2769.3	925.48	2769.3
935.14	2769.3	962.7	2769.84	969.71	2770.23	972.55	2770.23	977.81	2770.25
979.32	2770.34	981.6	2770.63	986.32	2771.21	986.59	2771.22	990.96	2771.4
1000.23	2771.77	1011.07	2772.09	1011.55	2772.11	1019.22	2772.49	1022.62	2772.66
1028.34	2773.1	1029.75	2773.2						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	447.25	.03	667.32	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
447.25	667.32	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2773.21	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.87	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2768.34	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2769.48	* Flow Area (sq ft)	*	* 1745.92	* 17.59	*
* E.G. Slope (ft/ft)	*0.008168	* Area (sq ft)	*	* 1745.92	* 17.59	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30937.25	* 62.75	*
* Top Width (ft)	* 230.10	* Top Width (ft)	*	* 217.09	* 13.01	*
* Vel Total (ft/s)	* 17.58	* Avg. Vel. (ft/s)	*	* 17.72	* 3.57	*
* Max Chl Dpth (ft)	* 11.68	* Hydr. Depth (ft)	*	* 8.04	* 1.35	*
* Conv. Total (cfs)	*343001.2	* Conv. (cfs)	*	*342306.9	* 694.2	*
* Length Wtd. (ft)	* 18.70	* Wetted Per. (ft)	*	* 221.69	* 13.46	*
* Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)	*	* 4.02	* 0.67	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*	* 71.16	* 2.38	*
* Frctn Loss (ft)	* 0.15	* Cum Volume (acre-ft)	* 28.81	* 77.06	* 64.95	*
* C & E Loss (ft)	* 0.03	* Cum SA (acres)	* 10.00	* 10.58	* 18.30	*

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2771.30	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 3.67	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2767.62	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2767.63	* Flow Area (sq ft)	*	* 1590.52	* 8.83	*
* E.G. Slope (ft/ft)	*0.006860	* Area (sq ft)	*	* 1590.52	* 8.83	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24470.24	* 19.76	*
* Top Width (ft)	* 226.85	* Top Width (ft)	*	* 215.13	* 11.73	*
* Vel Total (ft/s)	* 15.31	* Avg. Vel. (ft/s)	*	* 15.39	* 2.24	*
* Max Chl Dpth (ft)	* 10.96	* Hydr. Depth (ft)	*	* 7.39	* 0.75	*
* Conv. Total (cfs)	*295691.4	* Conv. (cfs)	*	*295452.9	* 238.5	*
* Length Wtd. (ft)	* 18.78	* Wetted Per. (ft)	*	* 218.99	* 11.92	*
* Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)	*	* 3.11	* 0.32	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*	* 47.85	* 0.71	*
* Frctn Loss (ft)	* 0.14	* Cum Volume (acre-ft)	* 23.20	* 70.55	* 54.29	*
C & E Loss (ft)	* 0.07	* Cum SA (acres)	* 8.88	* 10.56	* 17.84	*

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2774.36	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.72	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2769.63	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2771.29	* Flow Area (sq ft)	*	* 2027.60	* 181.31	*

E.G. Slope (ft/ft)	0.006682	Area (sq ft)		2027.60	181.31	
Q Total (cfs)	36000.00	Flow (cfs)		35568.54	431.46	
Top Width (ft)	486.90	Top Width (ft)		219.91	266.99	
Vel Total (ft/s)	16.30	Avg. Vel. (ft/s)		17.54	2.38	
Max Chl Dpth (ft)	12.97	Hydr. Depth (ft)		9.22	0.68	
Conv. Total (cfs)	440409.0	Conv. (cfs)		435130.7	5278.3	
Length Wtd. (ft)	18.70	Wetted Per. (ft)		224.82	267.72	
Min Ch El (ft)	2756.66	Shear (lb/sq ft)		3.76	0.28	
Alpha	1.14	Stream Power (lb/ft s)		66.00	0.67	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	34.22	82.18	74.04	
C & E Loss (ft)	0.18	Cum SA (acres)	10.98	10.60	18.47	

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.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 4

			Left OB	Channel	Right OB
E.G. Elev (ft)	2760.78	Element			
Vel Head (ft)	0.46	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.32	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.00	Flow Area (sq ft)		183.94	
E.G. Slope (ft/ft)	0.007410	Area (sq ft)		183.94	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	126.60	Top Width (ft)		126.60	
Vel Total (ft/s)	5.44	Avg. Vel. (ft/s)		5.44	
Max Chl Dpth (ft)	3.66	Hydr. Depth (ft)		1.45	
Conv. Total (cfs)	11617.2	Conv. (cfs)		11617.2	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		127.75	
Min Ch El (ft)	2756.66	Shear (lb/sq ft)		0.67	
Alpha	1.00	Stream Power (lb/ft s)		3.62	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.99	20.85	0.58
C & E Loss (ft)	0.01	Cum SA (acres)	0.28	7.01	1.29

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2763.76	Element			
Vel Head (ft)	1.42	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.34	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.34	Flow Area (sq ft)		522.79	
E.G. Slope (ft/ft)	0.009536	Area (sq ft)		522.79	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	186.31	Top Width (ft)		186.31	
Vel Total (ft/s)	9.56	Avg. Vel. (ft/s)		9.56	
Max Chl Dpth (ft)	5.68	Hydr. Depth (ft)		2.81	
Conv. Total (cfs)	51203.3	Conv. (cfs)		51203.3	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		188.01	
Min Ch El (ft)	2756.66	Shear (lb/sq ft)		1.66	
Alpha	1.00	Stream Power (lb/ft s)		15.83	
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	1.05	26.52	0.85
C & E Loss (ft)	0.00	Cum SA (acres)	0.29	7.45	1.51

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 #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2766.20	Element			
Vel Head (ft)	2.20	Wt. n-Val.		0.030	
W.S. Elev (ft)	2764.00	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2764.00	Flow Area (sq ft)		840.44	
E.G. Slope (ft/ft)	0.008338	Area (sq ft)		840.44	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	194.34	Top Width (ft)		194.34	
Vel Total (ft/s)	11.90	Avg. Vel. (ft/s)		11.90	
Max Chl Dpth (ft)	7.34	Hydr. Depth (ft)		4.32	
Conv. Total (cfs)	109511.6	Conv. (cfs)		109511.6	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		196.96	
Min Ch El (ft)	2756.66	Shear (lb/sq ft)		2.22	
Alpha	1.00	Stream Power (lb/ft s)		26.43	
Frctn Loss (ft)	0.16	Cum Volume (acre-ft)	9.85	52.76	25.01
C & E Loss (ft)	0.01	Cum SA (acres)	5.37	9.87	15.44

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

RIVER: River #1
REACH: Reach #1 RS: 143.*

PUT
scription:
station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2771.57	45.22	2770.92	69.33	2770.76	98.8	2770.58	100.27	2770.57
102.96	2770.55	105.7	2770.53	171.49	2769.94	194.73	2769.89	204.4	2769.86
204.81	2769.86	264.36	2769.61	288.97	2769.57	306.35	2769.57	321.25	2769.93

337.5	2769.93	347.6	2769.93	367.49	2770.3	376.41	2770.3	423.98	2770.3		
441.78	2770.3	450.35	2769.93	453.31	2769.44	453.66	2769.57	466.77	2769.41		
473.91	2769.39	474.09	2769.25	475.68	2768.65	476.54	2768.31	476.71	2768.13		
477.76	2767.61	478.25	2767.99	478.6	2767.44	478.82	2767.08	479.94	2766.53		
482.07	2765.82	482.49	2765.62	483.25	2765.26	484.31	2764.72	486.02	2764.06		
486.26	2763.98	488.03	2763.33	488.26	2763.28	489.63	2762.8	490.46	2762.49		
492.69	2761.8	494.16	2761.34	495.62	2761.04	498.57	2760.43	501.26	2759.49		
503.27	2759.52	506.01	2760.17	511.52	2760.44	518.4	2760.2	520.88	2759.73		
537.34	2760.36	539.32	2760.26	548.94	2759.8	553.44	2760.75	558.73	2759.75		
570.75	2759.95	575.47	2759.04	577.7	2759.08	583.9	2757.21	597.62	2757.18		
615.48	2756.54	620.16	2758.13	630.27	2759.07	641.92	2759.07	643.08	2759.07		
643.43	2759.1	646.83	2759.4	651.56	2759.72	656.26	2760.05	660.95	2760.38		
665.76	2760.7	671.02	2761.02	676.9	2761.34	678.02	2761.4	680.08	2763.51		
682.72	2763.86	688.57	2764.62	694.53	2765.39	694.7	2765.45	697.34	2765.62		
703.6	2766.36	704.29	2766.45	705.39	2766.55	705.59	2766.93	706.96	2767.41		
708.49	2767.91	710.82	2768.48	711.31	2768.87	712.97	2768.67	714.11	2769.1		
714.25	2769.11	718.05	2768.7	740.86	2768.11	753.5	2767.75	763.42	2767.75		
764.09	2767.75	782.66	2767.75	800.46	2767.75	808.31	2767.75	856.68	2768.39		
883.5	2768.39	913.58	2768.02	927.83	2768.02	929.35	2768.39	935.32	2768.39		
944.33	2768.39	970.04	2769.02	976.58	2769.48	979.22	2769.53	984.13	2769.67		
985.54	2769.77	987.67	2770.05	992.07	2770.62	992.32	2770.63	996.4	2770.87		
1005.04	2771.37	1015.15	2771.81	1015.6	2771.84	1022.76	2772.28	1025.93	2772.48		
1031.26	2772.99	1032.58	2773.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	473.91	.03	694.53	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
473.91	694.53	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2772.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.61	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2769.10	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.47	Flow Area (sq ft)		1963.96	280.16
E.G. Slope (ft/ft)	0.005376	Area (sq ft)		1963.96	280.16
Q Total (cfs)	31000.00	Flow (cfs)		30285.18	714.82
Top Width (ft)	496.33	Top Width (ft)		220.03	276.29
Vel Total (ft/s)	13.81	Avg. Vel. (ft/s)		15.42	2.55
Max Chl Dpth (ft)	12.56	Hydr. Depth (ft)		8.93	1.01
Conv. Total (cfs)	422808.7	Conv. (cfs)		413059.3	9749.4
Length Wtd. (ft)	18.65	Wetted Per. (ft)		224.45	277.14
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		2.94	0.34
Alpha	1.22	Stream Power (lb/ft s)		45.28	0.87
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	28.81	76.26	64.91
C & E Loss (ft)	0.38	Cum SA (acres)	10.00	10.49	18.26

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.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2771.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.22	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.88	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.33	Flow Area (sq ft)		1482.85	10.17
E.G. Slope (ft/ft)	0.008643	Area (sq ft)		1482.85	10.17
Q Total (cfs)	24490.00	Flow (cfs)		24460.91	29.09
Top Width (ft)	226.34	Top Width (ft)		215.31	11.03
Vel Total (ft/s)	16.40	Avg. Vel. (ft/s)		16.50	2.86
Max Chl Dpth (ft)	10.34	Hydr. Depth (ft)		6.89	0.92
Conv. Total (cfs)	263420.8	Conv. (cfs)		263107.8	312.9
Length Wtd. (ft)	18.76	Wetted Per. (ft)		218.70	11.31
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		3.66	0.49
Alpha	1.01	Stream Power (lb/ft s)		60.35	1.39
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	23.20	69.89	54.29
C & E Loss (ft)	0.05	Cum SA (acres)	8.88	10.47	17.84

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2774.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.38	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2768.77	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.83	Flow Area (sq ft)		1891.42	191.23
E.G. Slope (ft/ft)	0.008315	Area (sq ft)		1891.42	191.23
Q Total (cfs)	36000.00	Flow (cfs)		35474.81	525.19
Top Width (ft)	479.04	Top Width (ft)		219.16	259.88
Vel Total (ft/s)	17.29	Avg. Vel. (ft/s)		18.76	2.75
Max Chl Dpth (ft)	12.23	Hydr. Depth (ft)		8.63	0.74
Conv. Total (cfs)	394788.2	Conv. (cfs)		389028.8	5759.4
Length Wtd. (ft)	18.67	Wetted Per. (ft)		223.52	260.61
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		4.39	0.38
Alpha	1.16	Stream Power (lb/ft s)		82.39	1.05
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	34.22	81.33	73.99
C & E Loss (ft)	0.07	Cum SA (acres)	10.98	10.50	18.40

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.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2760.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.10	Reach Len. (ft)	23.86	18.79	11.80

Crit W.S. (ft)	2759.90	Flow Area (sq ft)		171.80		
E.G. Slope (ft/ft)	0.009166	Area (sq ft)		171.80		
Q Total (cfs)	1000.00	Flow (cfs)		1000.00		
Top Width (ft)	125.33	Top Width (ft)		125.33		
Vel Total (ft/s)	5.82	Avg. Vel. (ft/s)		5.82		
Max Chl Dpth (ft)	3.56	Hydr. Depth (ft)		1.37		
Conv. Total (cfs)	10444.9	Conv. (cfs)		10444.9		
Length Wtd. (ft)	18.79	Wetted Per. (ft)		126.33		
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		0.78		
Alpha	1.00	Stream Power (lb/ft s)		4.53		
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	0.99	20.77		0.58
C & E Loss (ft)	0.02	Cum SA (acres)	0.28	6.95		1.29

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2763.56	Element			
Vel Head (ft)	1.53	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.03	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.14	Flow Area (sq ft)		504.01	
E.G. Slope (ft/ft)	0.010805	Area (sq ft)		504.01	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	186.70	Top Width (ft)		186.70	
Vel Total (ft/s)	9.92	Avg. Vel. (ft/s)		9.92	
Max Chl Dpth (ft)	5.49	Hydr. Depth (ft)		2.70	
Conv. Total (cfs)	48102.3	Conv. (cfs)		48102.3	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		188.43	
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		1.80	
Alpha	1.00	Stream Power (lb/ft s)		17.90	
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	1.05	26.29	0.85
C & E Loss (ft)	0.01	Cum SA (acres)	0.29	7.37	1.51

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2766.01	Element			
Vel Head (ft)	2.39	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.63	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2763.82	Flow Area (sq ft)		806.48	
E.G. Slope (ft/ft)	0.009527	Area (sq ft)		806.48	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	193.72	Top Width (ft)		193.72	
Vel Total (ft/s)	12.40	Avg. Vel. (ft/s)		12.40	
Max Chl Dpth (ft)	7.08	Hydr. Depth (ft)		4.16	
Conv. Total (cfs)	102449.7	Conv. (cfs)		102449.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		196.35	
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		2.44	
Alpha	1.00	Stream Power (lb/ft s)		30.29	
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	9.85	52.40	25.01
C & E Loss (ft)	0.02	Cum SA (acres)	5.37	9.79	15.44

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 142.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2771.11	47.77	2770.51	73.23	2770.34	104.35	2770.12	105.91	2770.11
108.75	2770.09	111.65	2770.07	181.14	2769.46	205.69	2769.42	215.9	2769.4
216.33	2769.4	279.23	2769.17	305.22	2769.11	323.59	2769.11	339.32	2769.39
356.48	2769.39	367.15	2769.39	388.16	2769.66	397.58	2769.66	447.83	2769.66
466.63	2769.66	475.68	2769.39	478.81	2769.02	479.18	2769.11	493.03	2768.99
500.57	2769.01	500.74	2768.9	502.24	2768.35	503.05	2768.04	503.22	2767.9
504.21	2767.44	504.68	2767.7	505	2767.27	505.21	2766.98	506.27	2766.5
508.28	2765.83	508.68	2765.65	509.4	2765.33	510.4	2764.85	512.02	2764.25
512.24	2764.17	513.91	2763.55	514.13	2763.5	515.43	2763.04	516.22	2762.73
518.32	2762.04	519.71	2761.57	521.09	2761.21	523.88	2760.51	526.42	2759.43
528.32	2759.45	530.91	2759.95	536.12	2760.16	542.62	2760	544.97	2759.65
560.52	2760.16	562.39	2760.09	571.49	2759.77	575.73	2760.49	580.74	2759.75
592.1	2759.93	596.56	2759.25	598.67	2759.29	604.53	2757.12	617.49	2757.01
634.38	2756.42	639.55	2758.05	650.72	2758.72	663.6	2758.69	664.87	2758.68
665.26	2758.71	669.03	2758.92	674.25	2759.15	679.44	2759.38	684.63	2759.61
689.94	2759.84	695.76	2760.06	702.25	2760.28	703.5	2760.32	705.77	2762.69
708.69	2763.02	715.16	2763.74	721.74	2764.48	721.9	2764.52	724.35	2764.68
730.16	2765.46	730.8	2765.55	731.82	2765.66	732	2765.95	733.27	2766.36
734.7	2766.79	736.86	2767.3	737.31	2767.61	738.85	2767.52	739.91	2767.88
740.04	2767.89	743.56	2767.46	764.73	2767.02	776.46	2766.75	785.66	2766.75
786.28	2766.75	803.51	2766.75	820.03	2766.75	827.32	2766.75	872.2	2767.48
897.08	2767.48	924.99	2767.2	938.22	2767.2	939.62	2767.48	945.17	2767.48
953.53	2767.48	977.38	2768.2	983.44	2768.72	985.9	2768.84	990.45	2769.08
991.76	2769.2	993.73	2769.48	997.81	2770.03	998.05	2770.05	1001.83	2770.34
1009.85	2770.96	1019.23	2771.54	1019.65	2771.57	1026.29	2772.07	1029.23	2772.3
1034.18	2772.88	1035.4	2773.02						

nning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	500.57	.03	721.74	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
500.57	721.74	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2772.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.65	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.83	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.04	Flow Area (sq ft)		1749.13	184.06
E.G. Slope (ft/ft)	0.007925	Area (sq ft)		1749.13	184.06
Q Total (cfs)	31000.00	Flow (cfs)		30510.07	489.93
Top Width (ft)	460.92	Top Width (ft)		218.37	242.56
Vel Total (ft/s)	16.04	Avg. Vel. (ft/s)		17.44	2.66
Max Chl Dpth (ft)	11.41	Hydr. Depth (ft)		8.01	0.76
Conv. Total (cfs)	348222.8	Conv. (cfs)		342719.4	5503.4
Length Wtd. (ft)	18.67	Wetted Per. (ft)		222.31	243.20
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		3.89	0.37
Alpha	1.16	Stream Power (lb/ft s)		67.90	1.00
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	28.81	75.46	64.84
C & E Loss (ft)	0.10	Cum SA (acres)	10.00	10.39	18.19

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.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2770.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.41	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.31	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.42	Flow Area (sq ft)		1635.29	72.85
E.G. Slope (ft/ft)	0.006233	Area (sq ft)		1635.29	72.85
Q Total (cfs)	24490.00	Flow (cfs)		24328.30	161.70
Top Width (ft)	366.58	Top Width (ft)		216.77	149.82
Vel Total (ft/s)	14.34	Avg. Vel. (ft/s)		14.88	2.22
Max Chl Dpth (ft)	10.89	Hydr. Depth (ft)		7.54	0.49
Conv. Total (cfs)	310209.6	Conv. (cfs)		308161.3	2048.2
Length Wtd. (ft)	18.75	Wetted Per. (ft)		220.36	150.26
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		2.89	0.19
Alpha	1.07	Stream Power (lb/ft s)		42.96	0.42
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	23.20	69.21	54.28
C & E Loss (ft)	0.24	Cum SA (acres)	8.88	10.37	17.82

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.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2773.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.92	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2768.02	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.32	Flow Area (sq ft)		1790.27	230.43
E.G. Slope (ft/ft)	0.009831	Area (sq ft)		1790.27	230.43
Q Total (cfs)	36000.00	Flow (cfs)		35285.93	714.07
Top Width (ft)	468.24	Top Width (ft)		218.66	249.57
Vel Total (ft/s)	17.82	Avg. Vel. (ft/s)		19.71	3.10
Max Chl Dpth (ft)	11.60	Hydr. Depth (ft)		8.19	0.92
Conv. Total (cfs)	363082.7	Conv. (cfs)		355880.9	7201.8
Length Wtd. (ft)	18.62	Wetted Per. (ft)		222.66	250.23
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		4.93	0.57
Alpha	1.20	Stream Power (lb/ft s)		97.26	1.75
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	34.22	80.54	73.94
C & E Loss (ft)	0.05	Cum SA (acres)	10.98	10.41	18.33

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2760.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.77	Wt. n-Val.		0.030	
W.S. Elev (ft)	2759.64	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2759.64	Flow Area (sq ft)		142.36	
E.G. Slope (ft/ft)	0.011829	Area (sq ft)		142.36	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	94.82	Top Width (ft)		94.82	
Vel Total (ft/s)	7.02	Avg. Vel. (ft/s)		7.02	
Max Chl Dpth (ft)	3.22	Hydr. Depth (ft)		1.50	
Conv. Total (cfs)	9194.4	Conv. (cfs)		9194.4	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		95.61	
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		1.10	
Alpha	1.00	Stream Power (lb/ft s)		7.72	
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	0.99	20.70	0.58
C & E Loss (ft)	0.02	Cum SA (acres)	0.28	6.90	1.29

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2763.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.67	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.67	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2761.89	Flow Area (sq ft)		482.82	
E.G. Slope (ft/ft)	0.012368	Area (sq ft)		482.82	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	185.39	Top Width (ft)		185.39	
Vel Total (ft/s)	10.36	Avg. Vel. (ft/s)		10.36	
Max Chl Dpth (ft)	5.25	Hydr. Depth (ft)		2.60	

* Conv. Total (cfs)	* 44959.4	* Conv. (cfs)	*		* 44959.4	*		*	
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*		* 187.30	*		*	
* Min Ch El (ft)	* 2756.42	* Shear (lb/sq ft)	*		* 1.99	*		*	
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 20.61	*		*	
* Frctn Loss (ft)	* 0.22	* Cum Volume (acre-ft)	*	1.05	* 26.08	*	0.85	*	
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	0.29	* 7.29	*	1.51	*	

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2765.80	* Element	*	Left OB	* Channel	*	Right OB	*	
* Vel Head (ft)	* 2.56	* Wt. n-Val.	*		* 0.030	*		*	
* W.S. Elev (ft)	* 2763.24	* Reach Len. (ft)	*	23.86	* 18.79	*	11.80	*	
* Crit W.S. (ft)	* 2763.60	* Flow Area (sq ft)	*		* 778.45	*		*	
* E.G. Slope (ft/ft)	*0.010868	* Area (sq ft)	*		* 778.45	*		*	
* Q Total (cfs)	*10000.00	* Flow (cfs)	*		*10000.00	*		*	
* Top Width (ft)	* 195.74	* Top Width (ft)	*		* 195.74	*		*	
* Vel Total (ft/s)	* 12.85	* Avg. Vel. (ft/s)	*		* 12.85	*		*	
* Max Chl Dpth (ft)	* 6.81	* Hydr. Depth (ft)	*		* 3.98	*		*	
* Conv. Total (cfs)	* 95921.6	* Conv. (cfs)	*		* 95921.6	*		*	
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*		* 198.39	*		*	
* Min Ch El (ft)	* 2756.42	* Shear (lb/sq ft)	*		* 2.66	*		*	
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 34.20	*		*	
* Frctn Loss (ft)	* 0.19	* Cum Volume (acre-ft)	*	9.85	* 52.06	*	25.01	*	
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	*	5.37	* 9.71	*	15.44	*	

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 141.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2770.66	50.31	2770.11	77.13	2769.91	109.91	2769.67	111.55	2769.66
114.54	2769.64	117.59	2769.61	190.79	2768.97	216.64	2768.94	227.4	2768.93
227.86	2768.93	294.1	2768.72	321.48	2768.66	340.82	2768.66	357.39	2768.84
375.47	2768.84	386.71	2768.84	408.83	2769.02	418.76	2769.02	471.68	2769.02
491.48	2769.02	501.02	2768.84	504.31	2768.6	504.7	2768.66	519.28	2768.58
527.23	2768.63	527.39	2768.54	528.8	2768.05	529.57	2767.77	529.72	2767.66
530.66	2767.28	531.1	2767.41	531.4	2767.09	531.6	2766.89	532.6	2766.47
534.49	2765.84	534.87	2765.69	535.55	2765.4	536.49	2764.99	538.01	2764.44
538.22	2764.36	539.8	2763.78	540.01	2763.72	541.22	2763.27	541.97	2762.98
543.95	2762.28	545.26	2761.79	546.56	2761.39	549.19	2760.59	551.58	2759.37
553.37	2759.39	555.81	2759.73	560.71	2759.89	566.84	2759.8	569.05	2759.57
583.7	2759.96	585.46	2759.92	594.03	2759.73	598.03	2760.23	602.74	2759.75
613.45	2759.9	617.65	2759.47	619.64	2759.5	625.16	2757.03	637.36	2756.84
653.27	2756.3	658.94	2757.97	671.17	2758.38	685.27	2758.31	686.67	2758.3
687.09	2758.31	691.22	2758.44	696.94	2758.57	702.63	2758.71	708.31	2758.84
714.13	2758.97	720.49	2759.1	727.61	2759.22	728.97	2759.25	731.47	2761.86
734.66	2762.17	741.74	2762.87	748.96	2763.57	749.1	2763.6	751.36	2763.75
756.71	2764.56	757.31	2764.65	758.25	2764.77	758.42	2764.98	759.59	2765.32
760.9	2765.67	762.89	2766.12	763.31	2766.35	764.73	2766.37	765.71	2766.66
765.83	2766.67	769.08	2766.22	788.6	2765.93	799.42	2765.75	807.9	2765.75
808.48	2765.75	824.37	2765.75	839.6	2765.75	846.32	2765.75	887.71	2766.57
910.66	2766.57	936.4	2766.39	948.6	2766.39	949.89	2766.57	955.01	2766.57
962.72	2766.57	984.72	2767.39	990.31	2767.97	992.57	2768.14	996.77	2768.5
997.98	2768.64	999.8	2768.9	1003.56	2769.44	1003.78	2769.46	1007.27	2769.81
1014.67	2770.56	1023.32	2771.26	1023.7	2771.3	1029.83	2771.86	1032.54	2772.11
1037.1	2772.77	1038.23	2772.93						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	527.23	.03	748.96	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
527.23	748.96	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2772.25	* Element	*	Left OB	* Channel	*	Right OB	*	
* Vel Head (ft)	* 5.27	* Wt. n-Val.	*		* 0.030	*	0.045	*	
* W.S. Elev (ft)	* 2766.98	* Reach Len. (ft)	*	23.86	* 18.79	*	11.80	*	
* Crit W.S. (ft)	* 2768.55	* Flow Area (sq ft)	*		* 1635.54	*	196.56	*	
* E.G. Slope (ft/ft)	*0.009774	* Area (sq ft)	*		* 1635.54	*	196.56	*	
* Q Total (cfs)	*31000.00	* Flow (cfs)	*		*30414.16	*	585.84	*	
* Top Width (ft)	* 442.29	* Top Width (ft)	*		* 217.45	*	224.84	*	
* Vel Total (ft/s)	* 16.92	* Avg. Vel. (ft/s)	*		* 18.60	*	2.98	*	
* Max Chl Dpth (ft)	* 10.68	* Hydr. Depth (ft)	*		* 7.52	*	0.87	*	
* Conv. Total (cfs)	*313560.3	* Conv. (cfs)	*		*307634.6	*	5925.7	*	
* Length Wtd. (ft)	* 18.63	* Wetted Per. (ft)	*		* 221.01	*	225.33	*	
* Min Ch El (ft)	* 2756.30	* Shear (lb/sq ft)	*		* 4.52	*	0.53	*	
* Alpha	* 1.19	* Stream Power (lb/ft s)	*		* 83.97	*	1.59	*	
* Frctn Loss (ft)	* 0.16	* Cum Volume (acre-ft)	*	28.81	* 74.73	*	64.79	*	
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	*	10.00	* 10.30	*	18.12	*	

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

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2770.49	* Element	*	Left OB	* Channel	*	Right OB	*	
* Vel Head (ft)	* 4.35	* Wt. n-Val.	*		* 0.030	*	0.045	*	
* W.S. Elev (ft)	* 2766.13	* Reach Len. (ft)	*	23.86	* 18.79	*	11.80	*	
* Crit W.S. (ft)	* 2767.42	* Flow Area (sq ft)	*		* 1451.79	*	47.78	*	
* E.G. Slope (ft/ft)	*0.009204	* Area (sq ft)	*		* 1451.79	*	47.78	*	
* Q Total (cfs)	*24490.00	* Flow (cfs)	*		*24364.44	*	125.56	*	
* Top Width (ft)	* 320.18	* Top Width (ft)	*		* 215.35	*	104.82	*	
* Vel Total (ft/s)	* 16.33	* Avg. Vel. (ft/s)	*		* 16.78	*	2.63	*	

* Max Chl Dpth (ft)	*	9.83	* Hydr. Depth (ft)	*		*	6.74	*	0.46	*
* Conv. Total (cfs)	*	255273.5	* Conv. (cfs)	*		*	253964.7	*	1308.8	*
* Length Wtd. (ft)	*	18.74	* Wetted Per. (ft)	*		*	218.73	*	105.16	*
* Min Ch El (ft)	*	2756.30	* Shear (lb/sq ft)	*		*	3.81	*	0.26	*
* Alpha	*	1.05	* Stream Power (lb/ft s)	*		*	64.00	*	0.69	*
* Frctn Loss (ft)	*	0.14	* Cum Volume (acre-ft)	*	23.20	*	68.55	*	54.26	*
* C & E Loss (ft)	*	0.09	* Cum SA (acres)	*	8.88	*	10.28	*	17.78	*

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.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	*	2773.69	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	6.41	* Wt. n-Val.	*		*	0.030	*	0.045	*
* W.S. Elev (ft)	*	2767.27	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	*	2769.74	* Flow Area (sq ft)	*		*	1698.44	*	262.68	*
* E.G. Slope (ft/ft)	*	0.011439	* Area (sq ft)	*		*	1698.44	*	262.68	*
* Q Total (cfs)	*	36000.00	* Flow (cfs)	*		*	34995.41	*	1004.58	*
* Top Width (ft)	*	450.33	* Top Width (ft)	*		*	217.73	*	232.60	*
* Vel Total (ft/s)	*	18.36	* Avg. Vel. (ft/s)	*		*	20.60	*	3.82	*
* Max Chl Dpth (ft)	*	10.97	* Hydr. Depth (ft)	*		*	7.80	*	1.13	*
* Conv. Total (cfs)	*	336601.5	* Conv. (cfs)	*		*	327208.6	*	9392.9	*
* Length Wtd. (ft)	*	18.56	* Wetted Per. (ft)	*		*	221.41	*	233.09	*
* Min Ch El (ft)	*	2756.30	* Shear (lb/sq ft)	*		*	5.48	*	0.80	*
* Alpha	*	1.23	* Stream Power (lb/ft s)	*		*	112.87	*	3.08	*
* Frctn Loss (ft)	*	0.20	* Cum Volume (acre-ft)	*	34.22	*	79.79	*	73.87	*
* C & E Loss (ft)	*	0.05	* Cum SA (acres)	*	10.98	*	10.31	*	18.27	*

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	*	2760.13	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.90	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2759.23	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	*	2759.39	* Flow Area (sq ft)	*		*	131.42	*		*
* E.G. Slope (ft/ft)	*	0.018243	* Area (sq ft)	*		*	131.42	*		*
* Q Total (cfs)	*	1000.00	* Flow (cfs)	*		*	1000.00	*		*
* Top Width (ft)	*	107.60	* Top Width (ft)	*		*	107.60	*		*
* Vel Total (ft/s)	*	7.61	* Avg. Vel. (ft/s)	*		*	7.61	*		*
* Max Chl Dpth (ft)	*	2.93	* Hydr. Depth (ft)	*		*	1.22	*		*
* Conv. Total (cfs)	*	7403.8	* Conv. (cfs)	*		*	7403.8	*		*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	108.34	*		*
* Min Ch El (ft)	*	2756.30	* Shear (lb/sq ft)	*		*	1.38	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	10.51	*		*
* Frctn Loss (ft)	*	0.27	* Cum Volume (acre-ft)	*	0.99	*	20.64	*	0.58	*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	0.28	*	6.86	*	1.29	*

ote: Program found supercritical flow starting at this cross section.

OSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	*	2763.08	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	1.79	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2761.30	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	*	2761.61	* Flow Area (sq ft)	*		*	465.84	*		*
* E.G. Slope (ft/ft)	*	0.013831	* Area (sq ft)	*		*	465.84	*		*
* Q Total (cfs)	*	5000.00	* Flow (cfs)	*		*	5000.00	*		*
* Top Width (ft)	*	184.06	* Top Width (ft)	*		*	184.06	*		*
* Vel Total (ft/s)	*	10.73	* Avg. Vel. (ft/s)	*		*	10.73	*		*
* Max Chl Dpth (ft)	*	4.99	* Hydr. Depth (ft)	*		*	2.53	*		*
* Conv. Total (cfs)	*	42515.0	* Conv. (cfs)	*		*	42515.0	*		*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	186.25	*		*
* Min Ch El (ft)	*	2756.30	* Shear (lb/sq ft)	*		*	2.16	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	23.18	*		*
* Frctn Loss (ft)	*	0.25	* Cum Volume (acre-ft)	*	1.05	*	25.88	*	0.85	*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	0.29	*	7.21	*	1.51	*

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	*	2765.56	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	2.77	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2762.79	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	*	2763.34	* Flow Area (sq ft)	*		*	749.37	*		*
* E.G. Slope (ft/ft)	*	0.012568	* Area (sq ft)	*		*	749.37	*		*
* Q Total (cfs)	*	10000.00	* Flow (cfs)	*		*	10000.00	*		*
* Top Width (ft)	*	198.42	* Top Width (ft)	*		*	198.42	*		*
* Vel Total (ft/s)	*	13.34	* Avg. Vel. (ft/s)	*		*	13.34	*		*
* Max Chl Dpth (ft)	*	6.49	* Hydr. Depth (ft)	*		*	3.78	*		*
* Conv. Total (cfs)	*	89199.4	* Conv. (cfs)	*		*	89199.4	*		*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	201.15	*		*
* Min Ch El (ft)	*	2756.30	* Shear (lb/sq ft)	*		*	2.92	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	39.01	*		*
* Frctn Loss (ft)	*	0.22	* Cum Volume (acre-ft)	*	9.85	*	51.73	*	25.01	*
* C & E Loss (ft)	*	0.02	* Cum SA (acres)	*	5.37	*	9.62	*	15.44	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 140.*

UT
scription:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2770.2	52.86	2769.7	81.03	2769.49	115.47	2769.22	117.19	2769.2
120.34	2769.18	123.54	2769.15	200.43	2768.49	227.6	2768.47	238.9	2768.47
239.38	2768.47	308.98	2768.27	337.73	2768.2	358.06	2768.2	375.46	2768.3

394.45	2768.3	406.26	2768.3	429.5	2768.39	439.93	2768.39	495.53	2768.39
516.33	2768.39	526.35	2768.3	529.82	2768.17	530.22	2768.2	545.54	2768.16
553.89	2768.25	554.04	2768.18	555.37	2767.75	556.08	2767.51	556.23	2767.43
557.1	2767.11	557.52	2767.12	557.81	2766.92	557.99	2766.79	558.93	2766.44
560.71	2765.85	561.06	2765.72	561.7	2765.48	562.58	2765.13	564.01	2764.63
564.21	2764.56	565.68	2764	565.88	2763.94	567.02	2763.51	567.72	2763.23
569.58	2762.51	570.81	2762.02	572.03	2761.57	574.49	2760.67	576.74	2759.3
578.42	2759.32	580.7	2759.5	585.31	2759.61	591.06	2759.59	593.13	2759.49
606.88	2759.76	608.54	2759.75	616.58	2759.7	620.33	2759.97	624.75	2759.75
634.79	2759.88	638.74	2759.68	640.6	2759.71	645.78	2756.94	657.24	2756.68
672.17	2756.19	678.32	2757.9	691.62	2758.04	706.95	2757.93	708.47	2757.92
708.93	2757.92	713.41	2757.96	719.63	2758	725.81	2758.04	731.99	2758.07
738.31	2758.11	745.23	2758.14	752.96	2758.16	754.45	2758.17	757.16	2761.04
760.63	2761.33	768.33	2761.99	776.17	2762.66	776.3	2762.68	778.37	2762.82
783.27	2763.65	783.81	2763.75	784.68	2763.89	784.83	2764	785.91	2764.27
787.11	2764.55	788.93	2764.94	789.31	2765.09	790.61	2765.21	791.51	2765.44
791.62	2765.46	794.59	2764.99	812.47	2764.84	822.38	2764.75	830.15	2764.75
830.67	2764.75	845.22	2764.75	859.17	2764.75	865.33	2764.75	903.23	2765.66
924.24	2765.66	947.81	2765.57	958.98	2765.57	960.17	2765.66	964.85	2765.66
971.91	2765.66	992.05	2766.57	997.17	2767.22	999.25	2767.45	1003.09	2767.91
1004.2	2768.07	1005.86	2768.33	1009.31	2768.84	1009.51	2768.87	1012.7	2769.28
1019.48	2770.15	1027.4	2770.98	1027.75	2771.02	1033.36	2771.65	1035.84	2771.93
1040.02	2772.66	1041.05	2772.84						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	553.89	.03	776.17	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
553.89	776.17	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2772.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.81	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.19	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.98	Flow Area (sq ft)		1542.21	216.14
E.G. Slope (ft/ft)	0.011668	Area (sq ft)		1542.21	216.14
Q Total (cfs)	31000.00	Flow (cfs)		30208.78	791.22
Top Width (ft)	424.00	Top Width (ft)		216.49	207.51
Vel Total (ft/s)	17.63	Avg. Vel. (ft/s)		19.59	3.66
Max Chl Dpth (ft)	10.00	Hydr. Depth (ft)		7.12	1.04
Conv. Total (cfs)	286981.8	Conv. (cfs)		279657.1	7324.7
Length Wtd. (ft)	18.69	Wetted Per. (ft)		220.16	207.88
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		5.10	0.76
Alpha	1.20	Stream Power (lb/ft s)		99.96	2.77
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	28.81	74.05	64.73
C & E Loss (ft)	0.05	Cum SA (acres)	10.00	10.21	18.07

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2770.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.87	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.37	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2766.94	Flow Area (sq ft)		1365.33	71.76
E.G. Slope (ft/ft)	0.011146	Area (sq ft)		1365.33	71.76
Q Total (cfs)	24490.00	Flow (cfs)		24279.86	210.15
Top Width (ft)	328.25	Top Width (ft)		214.19	114.05
Vel Total (ft/s)	17.04	Avg. Vel. (ft/s)		17.78	2.93
Max Chl Dpth (ft)	9.18	Hydr. Depth (ft)		6.37	0.63
Conv. Total (cfs)	231964.1	Conv. (cfs)		229973.7	1990.5
Length Wtd. (ft)	18.76	Wetted Per. (ft)		217.72	114.38
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		4.36	0.44
Alpha	1.08	Stream Power (lb/ft s)		77.60	1.28
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	23.20	67.94	54.25
C & E Loss (ft)	0.05	Cum SA (acres)	8.88	10.19	17.75

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.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2773.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	6.87	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.54	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.18	Flow Area (sq ft)		1618.08	290.04
E.G. Slope (ft/ft)	0.013174	Area (sq ft)		1618.08	290.04
Q Total (cfs)	36000.00	Flow (cfs)		34660.52	1339.49
Top Width (ft)	432.76	Top Width (ft)		217.51	215.25
Vel Total (ft/s)	18.87	Avg. Vel. (ft/s)		21.42	4.62
Max Chl Dpth (ft)	10.35	Hydr. Depth (ft)		7.44	1.35
Conv. Total (cfs)	313644.7	Conv. (cfs)		301974.7	11670.1
Length Wtd. (ft)	18.62	Wetted Per. (ft)		221.24	215.62
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		6.02	1.11
Alpha	1.24	Stream Power (lb/ft s)		128.86	5.11
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	34.22	79.07	73.80
C & E Loss (ft)	0.05	Cum SA (acres)	10.98	10.22	18.21

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2759.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.99	Wt. n-Val.		0.030	
W.S. Elev (ft)	2758.75	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2758.97	Flow Area (sq ft)		125.23	
E.G. Slope (ft/ft)	0.022811	Area (sq ft)		125.23	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	112.60	Top Width (ft)		112.60	

Vel Total (ft/s)	7.99	Avg. Vel. (ft/s)		7.99		
Max Chl Dpth (ft)	2.56	Hydr. Depth (ft)		1.11		
Conv. Total (cfs)	6621.0	Conv. (cfs)		6621.0		
Length Wtd. (ft)	18.79	Wetted Per. (ft)		113.54		
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		1.57		
Alpha	1.00	Stream Power (lb/ft s)		12.54		
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)	0.99	20.59	0.58	
C & E Loss (ft)	0.01	Cum SA (acres)	0.28	6.81	1.29	

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2762.80	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.91	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.89	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2761.30	Flow Area (sq ft)		450.39	
E.G. Slope (ft/ft)	0.015415	Area (sq ft)		450.39	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	183.12	Top Width (ft)		183.12	
Vel Total (ft/s)	11.10	Avg. Vel. (ft/s)		11.10	
Max Chl Dpth (ft)	4.70	Hydr. Depth (ft)		2.46	
Conv. Total (cfs)	40271.2	Conv. (cfs)		40271.2	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		185.70	
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		2.33	
Alpha	1.00	Stream Power (lb/ft s)		25.91	
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	1.05	25.68	0.85
C & E Loss (ft)	0.01	Cum SA (acres)	0.29	7.13	1.51

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2765.28	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.97	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.31	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.99	Flow Area (sq ft)		722.98	
E.G. Slope (ft/ft)	0.014520	Area (sq ft)		722.98	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	201.98	Top Width (ft)		201.98	
Vel Total (ft/s)	13.83	Avg. Vel. (ft/s)		13.83	
Max Chl Dpth (ft)	6.12	Hydr. Depth (ft)		3.58	
Conv. Total (cfs)	82988.7	Conv. (cfs)		82988.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		204.93	
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		3.20	
Alpha	1.00	Stream Power (lb/ft s)		44.23	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	9.85	51.41	25.01
C & E Loss (ft)	0.02	Cum SA (acres)	5.37	9.53	15.44

CROSS SECTION

VER: River #1
CH: Reach #1 RS: 139

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2769.75	122.83	2768.75	210.08	2768	238.55	2764	250.4	2764
250.9	2764	353.99	2763.75	571.8	2763.75	580.55	2763.87	584.21	2762.75
587.25	2761.75	590.19	2760.75	592.82	2759.75	595.21	2758.75	597.5	2757.75
599.8	2756.75	601.9	2755.24	661.57	2755.92	666.41	2752.85	691.06	2752.07
697.71	2753.82	779.92	2753.09	782.85	2756.21	803.38	2757.75	805.38	2757.89
809.83	2758.75	817.41	2760.24	820.11	2759.75	852.39	2759.75	884.33	2759.75
918.74	2760.75	974.69	2760.75	981.1	2760.75	999.39	2761.75	1005.92	2762.75
1011.93	2763.75	1018.14	2764.75	1024.29	2765.75	1031.8	2770.75	1039.15	2771.75
1043.88	2772.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	580.55	.03	803.38	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
580.55	803.38	172.75	171.78	164.65	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2771.13	Element	Left OB	Channel	Right OB
Vel Head (ft)	11.18	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2759.94	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2763.29	Flow Area (sq ft)		1148.19	28.30
E.G. Slope (ft/ft)	0.031528	Area (sq ft)		1148.19	28.30
Q Total (cfs)	31000.00	Flow (cfs)		30875.80	124.20
Top Width (ft)	295.55	Top Width (ft)		211.07	84.48
Vel Total (ft/s)	26.35	Avg. Vel. (ft/s)		26.89	4.39
Max Chl Dpth (ft)	7.87	Hydr. Depth (ft)		5.44	0.33
Conv. Total (cfs)	174587.2	Conv. (cfs)		173887.8	699.5
Length Wtd. (ft)	171.64	Wetted Per. (ft)		214.75	84.71
Min Ch El (ft)	2752.07	Shear (lb/sq ft)		10.52	0.66
Alpha	1.04	Stream Power (lb/ft s)		282.99	2.89
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)	28.81	73.47	64.70
C & E Loss (ft)	0.54	Cum SA (acres)	10.00	10.12	18.03

rning: Divided flow computed for this cross-section.
ning: 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 #PF 2

E.G. Elev (ft)	2769.35	Element	Left OB	Channel	Right OB

* Vel Head (ft)	* 10.37	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2758.98	* Reach Len. (ft)	* 172.75	* 171.78	* 164.65	*
* Crit W.S. (ft)	* 2762.35	* Flow Area (sq ft)	*	* 946.31	* 5.41	*
* E.G. Slope (ft/ft)	*0.037115	* Area (sq ft)	*	* 946.31	* 5.41	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24462.92	* 27.08	*
* Top Width (ft)	* 216.35	* Top Width (ft)	*	* 208.72	* 7.63	*
* Vel Total (ft/s)	* 25.73	* Avg. Vel. (ft/s)	*	* 25.85	* 5.01	*
* Max Chl Dpth (ft)	* 6.91	* Hydr. Depth (ft)	*	* 4.53	* 0.71	*
* Conv. Total (cfs)	*127120.9	* Conv. (cfs)	*	*126980.3	* 140.6	*
* Length Wtd. (ft)	* 171.73	* Wetted Per. (ft)	*	* 212.22	* 7.74	*
* Min Ch El (ft)	* 2752.07	* Shear (lb/sq ft)	*	* 10.33	* 1.62	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*	* 267.09	* 8.11	*
* Frctn Loss (ft)	* 0.35	* Cum Volume (acre-ft)	* 23.20	* 67.44	* 54.24	*
* C & E Loss (ft)	* 0.55	* Cum SA (acres)	* 8.88	* 10.10	* 17.74	*

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 #PF 3

* E.G. Elev (ft)	* 2772.54	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 12.01	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2760.53	* Reach Len. (ft)	* 172.75	* 171.78	* 164.65	*
* Crit W.S. (ft)	* 2764.55	* Flow Area (sq ft)	*	* 1272.16	* 85.00	*
* E.G. Slope (ft/ft)	*0.030061	* Area (sq ft)	*	* 1272.16	* 85.00	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*35585.28	* 414.72	*
* Top Width (ft)	* 320.37	* Top Width (ft)	*	* 212.61	* 107.76	*
* Vel Total (ft/s)	* 26.53	* Avg. Vel. (ft/s)	*	* 27.97	* 4.88	*
* Max Chl Dpth (ft)	* 8.46	* Hydr. Depth (ft)	*	* 5.98	* 0.79	*
* Conv. Total (cfs)	*207636.0	* Conv. (cfs)	*	*205244.0	* 2392.0	*
* Length Wtd. (ft)	* 171.56	* Wetted Per. (ft)	*	* 216.40	* 108.04	*
* Min Ch El (ft)	* 2752.07	* Shear (lb/sq ft)	*	* 11.03	* 1.48	*
* Alpha	* 1.10	* Stream Power (lb/ft s)	*	* 308.61	* 7.20	*
* Frctn Loss (ft)	* 0.36	* Cum Volume (acre-ft)	* 34.22	* 78.45	* 73.74	*
* C & E Loss (ft)	* 0.51	* Cum SA (acres)	* 10.98	* 10.13	* 18.16	*

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 #PF 4

* E.G. Elev (ft)	* 2758.34	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.64	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2753.71	* Reach Len. (ft)	* 172.75	* 171.78	* 164.65	*
* Crit W.S. (ft)	* 2754.54	* Flow Area (sq ft)	*	* 57.87	*	*
* E.G. Slope (ft/ft)	*0.262034	* Area (sq ft)	*	* 57.87	*	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	*	*
* Top Width (ft)	* 102.11	* Top Width (ft)	*	* 102.11	*	*
* Vel Total (ft/s)	* 17.28	* Avg. Vel. (ft/s)	*	* 17.28	*	*
* Max Chl Dpth (ft)	* 1.64	* Hydr. Depth (ft)	*	* 0.57	*	*
* Conv. Total (cfs)	* 1953.5	* Conv. (cfs)	*	* 1953.5	*	*
* Length Wtd. (ft)	* 171.78	* Wetted Per. (ft)	*	* 102.85	*	*
* Min Ch El (ft)	* 2752.07	* Shear (lb/sq ft)	*	* 9.20	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 159.06	*	*
* Frctn Loss (ft)	* 1.02	* Cum Volume (acre-ft)	* 0.99	* 20.55	* 0.58	*
* C & E Loss (ft)	* 0.36	* Cum SA (acres)	* 0.28	* 6.77	* 1.29	*

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 #PF 5

* E.G. Elev (ft)	* 2761.81	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 6.51	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2755.30	* Reach Len. (ft)	* 172.75	* 171.78	* 164.65	*
* Crit W.S. (ft)	* 2756.94	* Flow Area (sq ft)	*	* 244.25	*	*
* E.G. Slope (ft/ft)	*0.071063	* Area (sq ft)	*	* 244.25	*	*
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*	*
* Top Width (ft)	* 124.60	* Top Width (ft)	*	* 124.60	*	*
* Vel Total (ft/s)	* 20.47	* Avg. Vel. (ft/s)	*	* 20.47	*	*
* Max Chl Dpth (ft)	* 3.23	* Hydr. Depth (ft)	*	* 1.96	*	*
* Conv. Total (cfs)	* 18756.4	* Conv. (cfs)	*	* 18756.4	*	*
* Length Wtd. (ft)	* 171.78	* Wetted Per. (ft)	*	* 126.53	*	*
* Min Ch El (ft)	* 2752.07	* Shear (lb/sq ft)	*	* 8.56	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 175.32	*	*
* Frctn Loss (ft)	* 0.54	* Cum Volume (acre-ft)	* 1.05	* 25.53	* 0.85	*
* C & E Loss (ft)	* 0.46	* Cum SA (acres)	* 0.29	* 7.06	* 1.51	*

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

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2764.29	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 7.79	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2756.50	* Reach Len. (ft)	* 172.75	* 171.78	* 164.65	*
* Crit W.S. (ft)	* 2758.58	* Flow Area (sq ft)	*	* 446.45	*	*
* E.G. Slope (ft/ft)	*0.065248	* Area (sq ft)	*	* 446.45	*	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*	*

* Top Width (ft)	* 186.62	* Top Width (ft)	*	* 186.62	*	*
* Vel Total (ft/s)	* 22.40	* Avg. Vel. (ft/s)	*	* 22.40	*	*
* Max Chl Dpth (ft)	* 4.43	* Hydr. Depth (ft)	*	* 2.39	*	*
* Conv. Total (cfs)	* 39148.5	* Conv. (cfs)	*	* 39148.5	*	*
* Length Wtd. (ft)	* 171.71	* Wetted Per. (ft)	*	* 189.53	*	*
* Min Ch El (ft)	* 2752.07	* Shear (lb/sq ft)	*	* 9.60	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 214.93	*	*
* Frctn Loss (ft)	* 0.50	* Cum Volume (acre-ft)	* 9.85	* 51.16	* 25.01	*
* C & E Loss (ft)	* 0.48	* Cum SA (acres)	* 5.37	* 9.45	* 15.44	*

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: River #1
REACH: Reach #1 RS: 130

INPUT
Description:
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-329.97	2778	-326.97	2777	-324.12	2776	-321.7	2771	-319.71	2770
-317.71	2769	-315.72	2768	-313.73	2767	-311.73	2766	-309.74	2765
-295.4	2764	-239.67	2763	-228.16	2762	-194.92	2762	-129.95	2762
-127.06	2761	-123.98	2760	-120.22	2760	-110.54	2761	-110.53	2761
-.01	2762	0	2762	197.95	2763	197.96	2763	246.6	2763
261.24	2762.28	267.04	2762	267.05	2762	282.58	2760.8	282.59	2760.8
284.05	2761	284.06	2761	289.71	2760	289.72	2760	294.36	2759
294.37	2759	299.03	2758	299.04	2758	303.71	2757	303.72	2757
308.4	2756	308.41	2756	313.09	2755	313.1	2755	314.9	2754.96
314.91	2754.96	326.53	2754.59	326.54	2754.59	334.76	2751.3	334.76	2751.31
335.91	2754	335.92	2754	350.25	2751.25	350.26	2751.25	362.85	2752.77
362.86	2752.77	383.3	2753	429.42	2753.52	429.43	2753.51	436.01	2751.89
436.02	2751.89	456.36	2751.9	456.37	2751.9	476.41	2753.65	476.42	2753.65
495.5	2755.49	495.51	2755.49	507.59	2755.28	512.02	2755.21	512.03	2755.21
522.41	2757.75	522.42	2757.76	528.15	2759.11	528.16	2759.11	555.77	2758.75
555.78	2758.76	560.43	2759.75	560.44	2759.75	684.75	2759.75	684.76	2759.75
743.07	2758.75	743.08	2758.75	773.59	2758.75	773.6	2758.75	795.48	2758.75
795.94	2758.75	809.75	2759.75	809.76	2759.75	826.38	2760.75	866.79	2761.75
889.01	2762.75	894.02	2763.75	896.67	2764.75	896.67	2764.76	899.25	2765.75
901.38	2766.75	903.52	2767.75	911.41	2768.75	945.7	2768.75	951.33	2767.75
957.1	2766.75	961.49	2765.75	968.66	2764.75	968.68	2764.75	977.22	2765.75
981.89	2766.75	985.39	2771.75	990.06	2772.75	994.39	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
329.97	.045	246.6	.03	528.16	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
246.6	528.16	295.76	287.33	274.51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-329.97	197.95	2770	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2766.09	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 5.73	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2760.37	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2762.38	* Flow Area (sq ft)	*	* 1529.07	* 290.20 *
* E.G. Slope (ft/ft)	*0.013532	* Area (sq ft)	* 2.22	* 1529.07	* 290.20 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*29889.83	* 1110.17 *
* Top Width (ft)	* 540.75	* Top Width (ft)	* 8.42	* 240.51	* 291.82 *
* Vel Total (ft/s)	* 17.04	* Avg. Vel. (ft/s)	*	* 19.55	* 3.83 *
* Max Chl Dpth (ft)	* 9.11	* Hydr. Depth (ft)	*	* 6.36	* 0.99 *
* Conv. Total (cfs)	*266489.4	* Conv. (cfs)	*	*256945.9	* 9543.5 *
* Length Wtd. (ft)	* 285.08	* Wetted Per. (ft)	*	* 244.69	* 292.00 *
* Min Ch El (ft)	* 2751.25	* Shear (lb/sq ft)	*	* 5.28	* 0.84 *
* Alpha	* 1.27	* Stream Power (lb/ft s)	*	* 103.20	* 3.21 *
* Frctn Loss (ft)	* 3.39	* Cum Volume (acre-ft)	* 28.80	* 68.19	* 64.10 *
* C & E Loss (ft)	* 1.64	* Cum SA (acres)	* 9.99	* 9.22	* 17.32 *

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

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2764.35	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 4.46	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2759.88	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2761.36	* Flow Area (sq ft)	*	* 1414.05	* 151.77 *
E.G. Slope (ft/ft)	*0.011289	* Area (sq ft)	*	* 1414.05	* 151.77 *
Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24139.32	* 350.68 *
Top Width (ft)	* 521.73	* Top Width (ft)	*	* 237.90	* 283.83 *
* Vel Total (ft/s)	* 15.64	* Avg. Vel. (ft/s)	*	* 17.07	* 2.31 *
* Max Chl Dpth (ft)	* 8.63	* Hydr. Depth (ft)	*	* 5.94	* 0.53 *
* Conv. Total (cfs)	*230491.7	* Conv. (cfs)	*	*227191.2	* 3300.5 *
* Length Wtd. (ft)	* 285.52	* Wetted Per. (ft)	*	* 242.04	* 283.99 *
* Min Ch El (ft)	* 2751.25	* Shear (lb/sq ft)	*	* 4.12	* 0.38 *
* Alpha	* 1.17	* Stream Power (lb/ft s)	*	* 70.29	* 0.87 *

* Frctn Loss (ft)	* 3.22	* Cum Volume (acre-ft)	* 23.20	* 62.79	* 53.94 *
* C & E Loss (ft)	* 1.77	* Cum SA (acres)	* 8.88	* 9.22	* 17.18 *

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.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2767.38	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 6.71	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2760.67	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2763.00	* Flow Area (sq ft)	*	* 1603.39	* 380.83 *
* E.G. Slope (ft/ft)	*0.015241	* Area (sq ft)	* 5.42	* 1603.39	* 380.83 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*34168.12	* 1831.88 *
* Top Width (ft)	* 551.54	* Top Width (ft)	* 12.35	* 242.25	* 296.94 *
* Vel Total (ft/s)	* 18.14	* Avg. Vel. (ft/s)	*	* 21.31	* 4.81 *
* Max Chl Dpth (ft)	* 9.42	* Hydr. Depth (ft)	*	* 6.62	* 1.28 *
* Conv. Total (cfs)	*291601.5	* Conv. (cfs)	*	*276763.2	* 14838.3 *
* Length Wtd. (ft)	* 284.70	* Wetted Per. (ft)	*	* 246.46	* 297.12 *
* Min Ch El (ft)	* 2751.25	* Shear (lb/sq ft)	*	* 6.19	* 1.22 *
* Alpha	* 1.31	* Stream Power (lb/ft s)	*	* 131.92	* 5.87 *
* Frctn Loss (ft)	* 3.57	* Cum Volume (acre-ft)	* 34.21	* 72.78	* 72.86 *
* C & E Loss (ft)	* 1.59	* Cum SA (acres)	* 10.96	* 9.23	* 17.40 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	* 2755.76	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.07	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2755.69	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2753.86	* Flow Area (sq ft)	*	* 481.65	* *
* E.G. Slope (ft/ft)	*0.000571	* Area (sq ft)	*	* 481.65	* *
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	* *
* Top Width (ft)	* 204.13	* Top Width (ft)	*	* 204.13	* *
* Vel Total (ft/s)	* 2.08	* Avg. Vel. (ft/s)	*	* 2.08	* *
* Max Chl Dpth (ft)	* 4.44	* Hydr. Depth (ft)	*	* 2.36	* *
* Conv. Total (cfs)	* 41834.9	* Conv. (cfs)	*	* 41834.9	* *
* Length Wtd. (ft)	* 287.33	* Wetted Per. (ft)	*	* 207.41	* *
* Min Ch El (ft)	* 2751.25	* Shear (lb/sq ft)	*	* 0.08	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.17	* *
* Frctn Loss (ft)	* 0.13	* Cum Volume (acre-ft)	* 0.99	* 19.48	* 0.58 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.28	* 6.16	* 1.29 *

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2757.99	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.53	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2757.47	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2756.00	* Flow Area (sq ft)	*	* 857.94	* *
* E.G. Slope (ft/ft)	*0.002302	* Area (sq ft)	*	* 857.94	* *
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	* *
* Top Width (ft)	* 219.71	* Top Width (ft)	*	* 219.71	* *
* Vel Total (ft/s)	* 5.83	* Avg. Vel. (ft/s)	*	* 5.83	* *
* Max Chl Dpth (ft)	* 6.22	* Hydr. Depth (ft)	*	* 3.90	* *
* Conv. Total (cfs)	*104213.5	* Conv. (cfs)	*	*104213.5	* *
* Length Wtd. (ft)	* 287.33	* Wetted Per. (ft)	*	* 223.39	* *
* Min Ch El (ft)	* 2751.25	* Shear (lb/sq ft)	*	* 0.55	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 3.22	* *
* Frctn Loss (ft)	* 0.77	* Cum Volume (acre-ft)	* 1.05	* 23.36	* 0.85 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.29	* 6.39	* 1.51 *

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2760.64	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.74	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2759.90	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2757.60	* Flow Area (sq ft)	*	* 1418.29	* 156.83 *
* E.G. Slope (ft/ft)	*0.001862	* Area (sq ft)	*	* 1418.29	* 156.83 *
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	* 9849.69	* 150.31 *
* Top Width (ft)	* 522.11	* Top Width (ft)	*	* 237.98	* 284.12 *
* Vel Total (ft/s)	* 6.35	* Avg. Vel. (ft/s)	*	* 6.94	* 0.96 *
Max Chl Dpth (ft)	* 8.65	* Hydr. Depth (ft)	*	* 5.96	* 0.55 *
Conv. Total (cfs)	*231758.4	* Conv. (cfs)	*	*228274.9	* 3483.5 *
Length Wtd. (ft)	* 287.16	* Wetted Per. (ft)	*	* 242.12	* 284.28 *
* Min Ch El (ft)	* 2751.25	* Shear (lb/sq ft)	*	* 0.68	* 0.06 *
* Alpha	* 1.18	* Stream Power (lb/ft s)	*	* 4.73	* 0.06 *
* Frctn Loss (ft)	* 0.60	* Cum Volume (acre-ft)	* 9.85	* 47.49	* 24.71 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 5.37	* 8.61	* 14.91 *

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

VER: River #1
REACH: Reach #1 RS: 120

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-741.52	2769	-620.87	2768	-551.88	2767	-543.14	2762	-540.36	2762
-537.06	2763	-533.83	2764	-527.7	2764	-488.6	2763	-366.95	2762
-274.11	2761	-186.15	2760	-155.02	2759	-147.68	2758	-131.64	2758
-119.22	2759	-106.8	2760	-35.92	2761	0	2761	50.02	2760
110.9	2759	152.46	2758.03	153.73	2758	168.97	2757	175.86	2756
175.87	2756	179.66	2755	179.67	2755	181.81	2754	183.96	2753
186.11	2752	188.37	2751	192.2	2750	208.49	2750	208.5	2750
217.9	2751	217.91	2751	226.38	2752	226.39	2752	249.43	2753
265.63	2753	283.93	2753	293.22	2753	353.9	2754	388.76	2755
390.5	2756	392.24	2757	392.25	2757	393.98	2758	393.99	2758
396.77	2759	400.02	2760	404.19	2760	422.66	2760	464.57	2759
544.99	2759	709.9	2759	814.02	2758.75	823.72	2759.75	825.7	2759.75
826.66	2759.75	968	2759.75	980.94	2759.75	999.92	2759.75	1093.44	2759.75
1109.22	2760.75	1125.21	2761.75	1136.78	2762.75	1141.28	2763.75	1145.01	2764.75
1148.2	2765.75	1151.41	2766.75	1154.48	2767.75	1157.68	2772.75	1160.12	2773.75
1162.38	2774.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-741.52	.045	0	.03	404.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	404.19	158.39	153.64	149.14	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-741.52	0	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2763.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.26	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2761.90	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2761.45	Flow Area (sq ft)		2429.04	1805.25
E.G. Slope (ft/ft)	0.003757	Area (sq ft)	527.05	2429.04	1805.25
Q Total (cfs)	31000.00	Flow (cfs)		24274.54	6725.46
Top Width (ft)	1484.75	Top Width (ft)	357.79	404.19	722.77
Vel Total (ft/s)	7.32	Avg. Vel. (ft/s)		9.99	3.73
Max Chl Dpth (ft)	11.90	Hydr. Depth (ft)		6.01	2.50
Conv. Total (cfs)	505743.3	Conv. (cfs)		396022.1	109721.2
Length Wtd. (ft)	152.67	Wetted Per. (ft)		406.74	722.90
Min Ch El (ft)	2750.00	Shear (lb/sq ft)		1.40	0.59
Alpha	1.52	Stream Power (lb/ft s)		14.00	2.18
Frctn Loss (ft)	0.46	Cum Volume (acre-ft)	27.00	55.13	57.50
C & E Loss (ft)	0.07	Cum SA (acres)	8.74	7.10	14.12

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2762.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.13	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2761.29	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2760.98	Flow Area (sq ft)		2181.26	1364.81
E.G. Slope (ft/ft)	0.003740	Area (sq ft)	325.16	2181.26	1364.81
Q Total (cfs)	24490.00	Flow (cfs)		20243.88	4246.12
Top Width (ft)	1418.71	Top Width (ft)	300.88	404.19	713.64
Vel Total (ft/s)	6.91	Avg. Vel. (ft/s)		9.28	3.11
Max Chl Dpth (ft)	11.29	Hydr. Depth (ft)		5.40	1.91
Conv. Total (cfs)	400437.2	Conv. (cfs)		331008.7	69428.5
Length Wtd. (ft)	152.86	Wetted Per. (ft)		406.74	713.75
Min Ch El (ft)	2750.00	Shear (lb/sq ft)		1.25	0.45
Alpha	1.53	Stream Power (lb/ft s)		11.62	1.39
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)	22.09	50.93	49.16
C & E Loss (ft)	0.08	Cum SA (acres)	7.86	7.10	14.04

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2763.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.31	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2762.40	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2761.83	Flow Area (sq ft)		2631.83	2169.33
E.G. Slope (ft/ft)	0.003589	Area (sq ft)	722.12	2631.83	2169.33
Q Total (cfs)	36000.00	Flow (cfs)		27118.99	8881.01
Top Width (ft)	1553.57	Top Width (ft)	420.80	404.19	728.58
Vel Total (ft/s)	7.50	Avg. Vel. (ft/s)		10.30	4.09
Max Chl Dpth (ft)	12.40	Hydr. Depth (ft)		6.51	2.98
Conv. Total (cfs)	600877.4	Conv. (cfs)		452644.1	148233.3
Length Wtd. (ft)	152.53	Wetted Per. (ft)		406.74	728.73
Min Ch El (ft)	2750.00	Shear (lb/sq ft)		1.45	0.67
Alpha	1.50	Stream Power (lb/ft s)		14.94	2.73
Frctn Loss (ft)	0.45	Cum Volume (acre-ft)	31.74	58.81	64.83

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* C & E Loss (ft)        *    0.08  * Cum SA (acres)         *    9.49  *    7.10  *   14.17  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.
Note:    Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT  Profile #PF 4
*****************************************************************************************
* E.G. Elev (ft)         * 2755.62  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.05  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)         * 2755.57  * Reach Len. (ft)         *  158.39  *  153.64  *  149.14  *
* Crit W.S. (ft)         * 2753.40  * Flow Area (sq ft)       *          *  562.99  *          *
* E.G. Slope (ft/ft)     *0.000353  * Area (sq ft)            *          *  562.99  *          *
* Q Total (cfs)          * 1000.00  * Flow (cfs)              *          * 1000.00  *          *
* Top Width (ft)         *  212.28  * Top Width (ft)          *          *  212.28  *          *
* Vel Total (ft/s)       *    1.78  * Avg. Vel. (ft/s)         *          *    1.78  *          *
* Max Chl Dpth (ft)      *    5.57  * Hydr. Depth (ft)         *          *    2.65  *          *
* Conv. Total (cfs)      * 53197.3  * Conv. (cfs)              *          * 53197.3  *          *
* Length Wtd. (ft)       *  153.64  * Wetted Per. (ft)         *          *  213.67  *          *
* Min Ch El (ft)         * 2750.00  * Shear (lb/sq ft)         *          *    0.06  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)   *          *    0.10  *          *
* Frctn Loss (ft)        *    0.03  * Cum Volume (acre-ft)     *    0.99  *   16.04  *    0.58  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)           *    0.28  *    4.79  *    1.29  *
*****************************************************************************************

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #PF 5
*****************************************************************************************
* E.G. Elev (ft)         * 2757.21  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.64  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)         * 2756.57  * Reach Len. (ft)         *  158.39  *  153.64  *  149.14  *
* Crit W.S. (ft)         * 2755.51  * Flow Area (sq ft)       *          *  777.16  *          *
* E.G. Slope (ft/ft)     *0.003161  * Area (sq ft)            *          *  777.16  *          *
* Q Total (cfs)          * 5000.00  * Flow (cfs)              *          * 5000.00  *          *
* Top Width (ft)         *  219.54  * Top Width (ft)          *          *  219.54  *          *
* Vel Total (ft/s)       *    6.43  * Avg. Vel. (ft/s)         *          *    6.43  *          *
* Max Chl Dpth (ft)      *    6.57  * Hydr. Depth (ft)         *          *    3.54  *          *
* Conv. Total (cfs)      * 88936.2  * Conv. (cfs)              *          * 88936.2  *          *
* Length Wtd. (ft)       *  153.64  * Wetted Per. (ft)         *          *  221.29  *          *
* Min Ch El (ft)         * 2750.00  * Shear (lb/sq ft)         *          *    0.69  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)   *          *    4.46  *          *
* Frctn Loss (ft)        *    0.34  * Cum Volume (acre-ft)     *    1.05  *   17.96  *    0.85  *
* C & E Loss (ft)        *    0.07  * Cum SA (acres)           *    0.29  *    4.94  *    1.51  *
*****************************************************************************************

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

CROSS SECTION OUTPUT  Profile #PF 6
*****************************************************************************************
* E.G. Elev (ft)         * 2760.03  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.70  * Wt. n-Val.              *          *    0.030 *    0.045 *
* W.S. Elev (ft)         * 2759.33  * Reach Len. (ft)         *  158.39  *  153.64  *  149.14  *
* Crit W.S. (ft)         * 2757.02  * Flow Area (sq ft)       *          * 1466.21  *  133.18  *
* E.G. Slope (ft/ft)     *0.002333  * Area (sq ft)            *   40.23  * 1466.21  *  133.18  *
* Q Total (cfs)          *10000.00  * Flow (cfs)              *          * 9892.33  *  107.67  *
* Top Width (ft)         *  726.51  * Top Width (ft)          *   50.28  *  307.19  *  369.04  *
* Vel Total (ft/s)       *    6.25  * Avg. Vel. (ft/s)         *          *    6.75  *    0.81  *
* Max Chl Dpth (ft)      *    9.33  * Hydr. Depth (ft)         *          *    4.77  *    0.36  *
* Conv. Total (cfs)      *207016.0  * Conv. (cfs)              *          *204787.2  *  2228.9  *
* Length Wtd. (ft)       *  153.59  * Wetted Per. (ft)         *          *  309.63  *  369.07  *
* Min Ch El (ft)         * 2750.00  * Shear (lb/sq ft)         *          *    0.69  *    0.05  *
* Alpha                  *    1.15  * Stream Power (lb/ft s)   *          *    4.65  *    0.04  *
* Frctn Loss (ft)        *    0.29  * Cum Volume (acre-ft)     *    9.72  *   37.97  *   23.79  *
* C & E Loss (ft)        *    0.07  * Cum SA (acres)           *    5.20  *    6.81  *   12.85  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 115

INPUT
Description:
Station Elevation Data     num=      68
     Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
*****************************************************************************
       0     2767     4.83     2766     9.61     2765    11.16     2761    13.74     2762
   16.32     2763    24.15     2763   124.55     2762   311.87  2761.02   314.97     2761
   395.1     2760   477.26     2759   482.56     2758   505.65     2758   555.24     2759
   679.5     2760   697.39     2760   706.13     2759   725.14     2758   747.88     2758
  765.91     2758   799.67     2757   831.73     2756   835.05     2755   837.03     2754
  839.03     2753   841.23     2752   843.42     2751   845.62     2750   847.82     2749
  863.85     2749   869.22     2750   874.61     2751   887.51     2752   990.68     2752
 1015.46     2752  1026.66     2753  1037.87     2754  1040.87     2755  1043.78     2756
 1046.68     2757  1049.37     2758  1074.62     2759  1080.06     2759  1202.38     2759
   54.26     2759  1359.68     2759  1365.58     2759  1696.27  2758.75  1789.59  2758.75
   48.13  2759.75   1874.7  2760.73  1875.36  2760.75  1890.38  2761.75  1895.84  2762.75
 1902.22  2763.75  1908.29  2764.75  1913.86  2765.75  1918.72  2766.75  1920.54  2767.75
 1922.37  2768.75   1924.2  2769.75  1926.03  2770.75   1927.8  2771.75  1929.57  2772.75
 1931.38  2777.75   1933.2  2778.75  1935.07  2779.75

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

```
**********************************************
       0    .045   679.5     .03 1074.62    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
         679.5 1074.62            257.93  242.39  227.54            .1        .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   679.5    2770       F

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 2762.62  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.01  * Wt. n-Val.              *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2761.61  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)          * 2760.74  * Flow Area (sq ft)       *          * 2724.51  * 2113.50  *
* E.G. Slope (ft/ft)      *0.002511  * Area (sq ft)            *  815.46  * 2724.51  * 2113.50  *
* Q Total (cfs)           *31000.00  * Flow (cfs)              *          *24391.92  * 6608.08  *
* Top Width (ft)          * 1691.52  * Top Width (ft)          *  482.71  *  395.12  *  813.70  *
* Vel Total (ft/s)        *    6.41  * Avg. Vel. (ft/s)        *          *    8.95  *    3.13  *
* Max Chl Dpth (ft)       *   12.61  * Hydr. Depth (ft)        *          *    6.90  *    2.60  *
* Conv. Total (cfs)       *618600.8  * Conv. (cfs)             *          *486737.5  *131863.3  *
* Length Wtd. (ft)        *  238.01  * Wetted Per. (ft)        *          *  397.73  *  813.75  *
* Min Ch El (ft)          * 2749.00  * Shear (lb/sq ft)        *          *    1.07  *    0.41  *
* Alpha                   *    1.59  * Stream Power (lb/ft s)  *          *    9.62  *    1.27  *
* Frctn Loss (ft)         *    0.37  * Cum Volume (acre-ft)    *   24.56  *   46.04  *   50.79  *
* C & E Loss (ft)         *    0.17  * Cum SA (acres)          *    7.22  *    5.69  *   11.49  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)          * 2761.90  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.87  * Wt. n-Val.              *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2761.03  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)          * 2760.16  * Flow Area (sq ft)       *          * 2493.28  * 1639.89  *
* E.G. Slope (ft/ft)      *0.002334  * Area (sq ft)            *  566.22  * 2493.28  * 1639.89  *
* Q Total (cfs)           *24490.00  * Flow (cfs)              *          *20285.49  * 4204.51  *
* Top Width (ft)          * 1569.14  * Top Width (ft)          *  369.11  *  395.12  *  804.91  *
* Vel Total (ft/s)        *    5.93  * Avg. Vel. (ft/s)        *          *    8.14  *    2.56  *
* Max Chl Dpth (ft)       *   12.03  * Hydr. Depth (ft)        *          *    6.31  *    2.04  *
* Conv. Total (cfs)       *506878.3  * Conv. (cfs)             *          *419856.0  * 87022.3  *
* Length Wtd. (ft)        *  238.51  * Wetted Per. (ft)        *          *  397.73  *  804.94  *
* Min Ch El (ft)          * 2749.00  * Shear (lb/sq ft)        *          *    0.91  *    0.30  *
* Alpha                   *    1.59  * Stream Power (lb/ft s)  *          *    7.43  *    0.76  *
* Frctn Loss (ft)         *    0.34  * Cum Volume (acre-ft)    *   20.47  *   42.69  *   44.02  *
* C & E Loss (ft)         *    0.16  * Cum SA (acres)          *    6.64  *    5.69  *   11.44  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)          * 2763.19  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.06  * Wt. n-Val.              *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2762.13  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)          * 2761.15  * Flow Area (sq ft)       *          * 2929.31  * 2536.57  *
* E.G. Slope (ft/ft)      *0.002450  * Area (sq ft)            * 1090.95  * 2929.31  * 2536.57  *
* Q Total (cfs)           *36000.00  * Flow (cfs)              *          *27183.99  * 8816.01  *
* Top Width (ft)          * 1784.40  * Top Width (ft)          *  571.44  *  395.12  *  817.84  *
* Vel Total (ft/s)        *    6.59  * Avg. Vel. (ft/s)        *          *    9.28  *    3.48  *
* Max Chl Dpth (ft)       *   13.13  * Hydr. Depth (ft)        *          *    7.41  *    3.10  *
* Conv. Total (cfs)       *727351.8  * Conv. (cfs)             *          *549231.1  *178120.6  *
* Length Wtd. (ft)        *  237.63  * Wetted Per. (ft)        *          *  397.73  *  817.93  *
* Min Ch El (ft)          * 2749.00  * Shear (lb/sq ft)        *          *    1.13  *    0.47  *
* Alpha                   *    1.57  * Stream Power (lb/ft s)  *          *   10.45  *    1.65  *
* Frctn Loss (ft)         *    0.37  * Cum Volume (acre-ft)    *   28.44  *   49.00  *   56.77  *
* C & E Loss (ft)         *    0.18  * Cum SA (acres)          *    7.69  *    5.69  *   11.52  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #PF 4
*****************************************************************************************
* E.G. Elev (ft)          * 2755.59  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.03  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)          * 2755.56  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)          * 2752.51  * Flow Area (sq ft)       *          *  781.10  *          *
* E.G. Slope (ft/ft)      *0.000117  * Area (sq ft)            *          *  781.10  *          *
* Q Total (cfs)           * 1000.00  * Flow (cfs)              *          * 1000.00  *          *
* Top Width (ft)          *  209.32  * Top Width (ft)          *          *  209.32  *          *
* Vel Total (ft/s)        *    1.28  * Avg. Vel. (ft/s)        *          *    1.28  *          *
* Max Chl Dpth (ft)       *    6.56  * Hydr. Depth (ft)        *          *    3.73  *          *
* Conv. Total (cfs)       * 92490.4  * Conv. (cfs)             *          * 92490.4  *          *
* Length Wtd. (ft)        *  242.39  * Wetted Per. (ft)        *          *  211.31  *          *
* Min Ch El (ft)          * 2749.00  * Shear (lb/sq ft)        *          *    0.03  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s)  *          *    0.03  *          *
```

```
* Frctn Loss (ft)        *    0.03  * Cum Volume (acre-ft)   *    0.99  *   13.67  *    0.58  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    0.28  *    4.05  *    1.29  *
*****************************************************************************************
```

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

CROSS SECTION OUTPUT Profile #PF 5

```
*****************************************************************************************
* E.G. Elev (ft)         * 2756.80  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.42  * Wt. n-Val.              *          *    0.030  *          *
* W.S. Elev (ft)         * 2756.38  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)         * 2754.40  * Flow Area (sq ft)       *          *  956.18  *          *
* E.G. Slope (ft/ft)     *0.001643  * Area (sq ft)            *          *  956.18  *          *
* Q Total (cfs)          * 5000.00  * Flow (cfs)              *          * 5000.00  *          *
* Top Width (ft)         *  225.29  * Top Width (ft)           *          *  225.29  *          *
* Vel Total (ft/s)       *    5.23  * Avg. Vel. (ft/s)         *          *    5.23  *          *
* Max Chl Dpth (ft)      *    7.38  * Hydr. Depth (ft)         *          *    4.24  *          *
* Conv. Total (cfs)      *123348.0  * Conv. (cfs)              *          *123348.0  *          *
* Length Wtd. (ft)       *  242.39  * Wetted Per. (ft)         *          *  227.49  *          *
* Min Ch El (ft)         * 2749.00  * Shear (lb/sq ft)         *          *    0.43  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s)   *          *    2.25  *          *
* Frctn Loss (ft)        *    0.49  * Cum Volume (acre-ft)     *    1.05  *   14.91  *    0.85  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)           *    0.29  *    4.15  *    1.51  *
*****************************************************************************************
```

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

CROSS SECTION OUTPUT Profile #PF 6

```
*****************************************************************************************
* E.G. Elev (ft)         * 2759.68  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.47  * Wt. n-Val.              *          *    0.030  *   0.045  *
* W.S. Elev (ft)         * 2759.21  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)         * 2756.01  * Flow Area (sq ft)       *          * 1792.15  *  221.16  *
* E.G. Slope (ft/ft)     *0.001525  * Area (sq ft)            *   71.49  * 1792.15  *  221.16  *
* Q Total (cfs)          *10000.00  * Flow (cfs)              *          * 9872.74  *  127.26  *
* Top Width (ft)         * 1233.61  * Top Width (ft)           *  121.37  *  370.33  *  741.91  *
* Vel Total (ft/s)       *    4.97  * Avg. Vel. (ft/s)         *          *    5.51  *    0.58  *
* Max Chl Dpth (ft)      *   10.21  * Hydr. Depth (ft)         *          *    4.84  *    0.30  *
* Conv. Total (cfs)      *256057.7  * Conv. (cfs)              *          *252799.0  *  3258.7  *
* Length Wtd. (ft)       *  240.60  * Wetted Per. (ft)         *          *  372.89  *  741.91  *
* Min Ch El (ft)         * 2749.00  * Shear (lb/sq ft)         *          *    0.46  *    0.03  *
* Alpha                  *    1.21  * Stream Power (lb/ft s)   *          *    2.52  *    0.02  *
* Frctn Loss (ft)        *    0.22  * Cum Volume (acre-ft)     *    9.51  *   32.23  *   23.19  *
* C & E Loss (ft)        *    0.09  * Cum SA (acres)           *    4.89  *    5.62  *   10.95  *
*****************************************************************************************
```

Warning: Divided flow computed for this cross-section.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 110

INPUT
Description:
Station Elevation Data num= 68

```
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 -600.38    2767 -579.98    2766 -400.38    2765 -181.14    2760  -81.76    2759
  -57.48    2758  -47.61    2757       0    2757   227.2    2758  237.17    2758
  274.46    2757  312.01    2756  358.58    2756  379.63    2756  383.11    2755
  386.65    2754  390.19    2753  392.73    2752  392.74    2752  395.22    2751
  397.63    2750  410.68    2749  426.46    2749  431.11    2750  435.76    2751
  446.04    2752  470.07    2753  481.43    2753  501.92 2752.75  563.14    2752
  587.96    2752  594.62    2753  602.49    2754  613.17    2755  626.03 2755.97
   626.5    2756  890.32    2757  967.13    2757 1086.65    2757 1302.26    2758
 1331.06 2757.75 1340.58 2757.75 1426.39 2757.75 1446.33 2757.75 1459.98 2757.75
 1515.86 2758.75 1570.65 2759.75 1587.84 2760.75 1592.77 2761.75 1597.63 2762.75
 1602.74 2763.75 1607.53 2764.75 1611.47 2765.75 1613.74 2766.75 1616.01 2767.75
 1618.28 2768.75 1620.53 2769.75 1622.77 2770.75 1624.98 2771.75 1627.19 2772.75
  1629.4 2773.75 1631.62 2774.75 1633.89 2775.75 1636.29 2776.75 1638.58 2777.75
 1640.84 2782.75 1643.09 2783.75 1645.32 2784.75
```

Manning's n Values num= 3

```
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
 -600.38    .045   227.2     .03   626.5    .045
```

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

```
          227.2   626.5          308.04  322.72  332.25            .1       .3
```

Ineffective Flow num= 1

```
   Sta L   Sta R    Elev  Permanent
 -600.38   227.2    2770        F
```

CROSS SECTION OUTPUT Profile #PF 1

```
*****************************************************************************************
* E.G. Elev (ft)         * 2762.08  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    0.43  * Wt. n-Val.              *          *    0.030  *   0.045  *
* W.S. Elev (ft)         * 2761.65  * Reach Len. (ft)         *  308.04  *  322.72  *  332.25  *
  Crit W.S. (ft)         * 2759.33  * Flow Area (sq ft)       *          * 3076.71  * 4124.65  *
  E.G. Slope (ft/ft)     *0.001062  * Area (sq ft)            * 1554.67  * 3076.71  * 4124.65  *
  Q Total (cfs)          *31000.00  * Flow (cfs)              *          *19319.65  *11680.35  *
* Top Width (ft)         * 1845.73  * Top Width (ft)           *  480.65  *  399.30  *  965.77  *
* Vel Total (ft/s)       *    4.30  * Avg. Vel. (ft/s)         *          *    6.28  *    2.83  *
* Max Chl Dpth (ft)      *   12.65  * Hydr. Depth (ft)         *          *    7.71  *    4.27  *
* Conv. Total (cfs)      *951422.5  * Conv. (cfs)              *          *592940.2  *358482.3  *
* Length Wtd. (ft)       *  325.60  * Wetted Per. (ft)         *          *  400.88  *  965.92  *
* Min Ch El (ft)         * 2749.00  * Shear (lb/sq ft)         *          *    0.51  *    0.28  *
```

* Alpha	* 1.49	* Stream Power (lb/ft s)	*	* 3.19	* 0.80 *
* Frctn Loss (ft)	* 0.18	* Cum Volume (acre-ft)	* 17.55	* 29.90	* 34.50 *
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 4.36	* 3.48	* 6.84 *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2761.40	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.35	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2761.06	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25 *
* Crit W.S. (ft)	* 2758.82	* Flow Area (sq ft)	*	* 2839.92	* 3552.79 *
* E.G. Slope (ft/ft)	*0.000940	* Area (sq ft)	* 1277.34	* 2839.92	* 3552.79 *
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*15903.90	* 8586.10 *
* Top Width (ft)	* 1816.80	* Top Width (ft)	* 454.65	* 399.30	* 962.85 *
* Vel Total (ft/s)	* 3.83	* Avg. Vel. (ft/s)	*	* 5.60	* 2.42 *
* Max Chl Dpth (ft)	* 12.06	* Hydr. Depth (ft)	*	* 7.11	* 3.69 *
* Conv. Total (cfs)	*798965.5	* Conv. (cfs)	*	*518851.3	*280114.2 *
* Length Wtd. (ft)	* 325.44	* Wetted Per. (ft)	*	* 400.88	* 962.93 *
* Min Ch El (ft)	* 2749.00	* Shear (lb/sq ft)	*	* 0.42	* 0.22 *
* Alpha	* 1.53	* Stream Power (lb/ft s)	*	* 2.33	* 0.52 *
* Frctn Loss (ft)	* 0.15	* Cum Volume (acre-ft)	* 15.01	* 27.85	* 30.45 *
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	* 4.21	* 3.48	* 6.82 *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2762.64	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.47	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2762.17	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25 *
* Crit W.S. (ft)	* 2759.67	* Flow Area (sq ft)	*	* 3284.64	* 4628.24 *
* E.G. Slope (ft/ft)	*0.001081	* Area (sq ft)	* 1810.91	* 3284.64	* 4628.24 *
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*21742.66	*14257.34 *
* Top Width (ft)	* 1871.10	* Top Width (ft)	* 503.49	* 399.30	* 968.31 *
* Vel Total (ft/s)	* 4.55	* Avg. Vel. (ft/s)	*	* 6.62	* 3.08 *
* Max Chl Dpth (ft)	* 13.17	* Hydr. Depth (ft)	*	* 8.23	* 4.78 *
* Conv. Total (cfs)	*1094807.0	* Conv. (cfs)	*	*661222.4	*433584.3 *
* Length Wtd. (ft)	* 325.72	* Wetted Per. (ft)	*	* 400.88	* 968.51 *
* Min Ch El (ft)	* 2749.00	* Shear (lb/sq ft)	*	* 0.55	* 0.32 *
* Alpha	* 1.46	* Stream Power (lb/ft s)	*	* 3.66	* 0.99 *
* Frctn Loss (ft)	* 0.19	* Cum Volume (acre-ft)	* 19.85	* 31.71	* 38.06 *
* C & E Loss (ft)	* 0.08	* Cum SA (acres)	* 4.50	* 3.48	* 6.85 *

..rning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	* 2755.56	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.02	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2755.53	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25 *
* Crit W.S. (ft)	* 2752.51	* Flow Area (sq ft)	*	* 802.32	* *
* E.G. Slope (ft/ft)	*0.000127	* Area (sq ft)	*	* 802.32	* *
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	* *
* Top Width (ft)	* 238.99	* Top Width (ft)	*	* 238.99	* *
* Vel Total (ft/s)	* 1.25	* Avg. Vel. (ft/s)	*	* 1.25	* *
* Max Chl Dpth (ft)	* 6.53	* Hydr. Depth (ft)	*	* 3.36	* *
* Conv. Total (cfs)	* 88735.5	* Conv. (cfs)	*	* 88735.5	* *
* Length Wtd. (ft)	* 322.80	* Wetted Per. (ft)	*	* 240.46	* *
* Min Ch El (ft)	* 2749.00	* Shear (lb/sq ft)	*	* 0.03	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 0.03	* *
* Frctn Loss (ft)	* 0.02	* Cum Volume (acre-ft)	* 0.99	* 9.26	* 0.58 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.28	* 2.80	* 1.29 *

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2756.30	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 0.52	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2755.78	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25 *
* Crit W.S. (ft)	* 2754.48	* Flow Area (sq ft)	*	* 861.52	* *
* E.G. Slope (ft/ft)	*0.002562	* Area (sq ft)	*	* 861.52	* *
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	* *
* Top Width (ft)	* 243.10	* Top Width (ft)	*	* 243.10	* *
* Vel Total (ft/s)	* 5.80	* Avg. Vel. (ft/s)	*	* 5.80	* *
* Max Chl Dpth (ft)	* 6.78	* Hydr. Depth (ft)	*	* 3.54	* *
* Conv. Total (cfs)	* 98779.9	* Conv. (cfs)	*	* 98779.9	* *
* Length Wtd. (ft)	* 322.84	* Wetted Per. (ft)	*	* 244.61	* *
* Min Ch El (ft)	* 2749.00	* Shear (lb/sq ft)	*	* 0.56	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 3.27	* *
Frctn Loss (ft)	* 0.35	* Cum Volume (acre-ft)	* 1.05	* 9.85	* 0.85 *
C & E Loss (ft)	* 0.12	* Cum SA (acres)	* 0.29	* 2.85	* 1.51 *

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

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2759.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2759.20	Reach Len. (ft)	308.04	322.72	332.25
Crit W.S. (ft)	2756.31	Flow Area (sq ft)		2098.34	1793.57
E.G. Slope (ft/ft)	0.000606	Area (sq ft)	526.41	2098.34	1793.57
Q Total (cfs)	10000.00	Flow (cfs)		7714.42	2285.58
Top Width (ft)	1641.99	Top Width (ft)	328.73	399.30	913.96
Vel Total (ft/s)	2.57	Avg. Vel. (ft/s)		3.68	1.27
Max Chl Dpth (ft)	10.20	Hydr. Depth (ft)		5.26	1.96
Conv. Total (cfs)	406155.1	Conv. (cfs)		313325.1	92830.0
Length Wtd. (ft)	324.68	Wetted Per. (ft)		400.88	913.98
Min Ch El (ft)	2749.00	Shear (lb/sq ft)		0.20	0.07
Alpha	1.64	Stream Power (lb/ft s)		0.73	0.09
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	7.74	21.40	17.93
C & E Loss (ft)	0.04	Cum SA (acres)	3.55	3.48	6.62

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 100

INPUT
Description:
Station Elevation Data num= 78

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-1079.5	2765	-908.05	2764	-796.29	2763	-637.85	2758	-590.66	2758
-582.71	2758	-429.48	2758	-343.01	2758	-257.47	2757	-240.37	2756
-236.92	2755	-233.51	2754	-230.22	2753	-227.02	2752	-223.93	2751
-185.04	2751	-174.13	2752	-169.65	2753	-165.16	2754	-160.66	2755
-156.1	2756	-123.66	2756	-99.38	2756	0	2756	48.99	2755
69.53	2755	69.54	2755	92.94	2755	92.95	2755	136.19	2754
136.2	2754	181.29	2753	186.69	2753	207.37	2754	220.09	2754
222.63	2753	222.64	2753	225.18	2752	227.72	2751	227.73	2751
230.27	2750	232.22	2749.36	233.31	2749	236.48	2748	271.72	2748
275.17	2749	279.24	2750	328.16	2751	339.63	2752	339.64	2752
380.46	2752	380.47	2752	390.22	2751.86	451.75	2751	486.38	2750
497.38	2750	501.1	2751	504.87	2752	504.88	2752	507.69	2753
539.73	2754	571.48	2755	643.34	2756	716.38	2756	890.83	2755
890.84	2755	1036.2	2755	1036.21	2755	1095.21	2756	1202.49	2756
1202.5	2756	1304.69	2756	1327.57	2757	1346.89	2758	1361.89	2759
1372.87	2764	1372.88	2764	1398.46	2765				

anning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-1079.5	.045	0	.03	539.73	.045

Bank Sta: Left	Right	Coeff Contr.	Expan.
0	539.73	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-1079.5	-156.1	2764	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2761.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.65	Reach Len. (ft)			
Crit W.S. (ft)	2757.15	Flow Area (sq ft)	881.95	4996.10	4920.57
E.G. Slope (ft/ft)	0.000327	Area (sq ft)	3407.97	4996.10	4920.57
Q Total (cfs)	31000.00	Flow (cfs)	1671.29	19689.97	9638.74
Top Width (ft)	2121.22	Top Width (ft)	753.51	539.73	827.98
Vel Total (ft/s)	2.87	Avg. Vel. (ft/s)	1.89	3.94	1.96
Max Chl Dpth (ft)	13.65	Hydr. Depth (ft)	5.65	9.26	5.94
Conv. Total (cfs)	1713548.0	Conv. (cfs)	92382.0	1088378.0	532788.3
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	828.67
Min Ch El (ft)	2748.00	Shear (lb/sq ft)	0.12	0.19	0.12
Alpha	1.37	Stream Power (lb/ft s)	0.22	0.74	0.24
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2761.19	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.13	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2761.06	Reach Len. (ft)			
Crit W.S. (ft)	2756.72	Flow Area (sq ft)	789.88	4677.74	4432.58
E.G. Slope (ft/ft)	0.000266	Area (sq ft)	2969.03	4677.74	4432.58
Q Total (cfs)	24490.00	Flow (cfs)	1254.83	15919.42	7315.75
Top Width (ft)	2101.23	Top Width (ft)	734.82	539.73	826.68
Vel Total (ft/s)	2.47	Avg. Vel. (ft/s)	1.59	3.40	1.65
Max Chl Dpth (ft)	13.06	Hydr. Depth (ft)	5.06	8.67	5.36
Conv. Total (cfs)	1500318.0	Conv. (cfs)	76873.8	975262.9	448180.9
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	827.25
Min Ch El (ft)	2748.00	Shear (lb/sq ft)	0.08	0.14	0.09
Alpha	1.38	Stream Power (lb/ft s)	0.13	0.49	0.15
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2762.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.20	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2762.17	Reach Len. (ft)			
Crit W.S. (ft)	2757.52	Flow Area (sq ft)	963.12	5276.77	5351.44
E.G. Slope (ft/ft)	0.000355	Area (sq ft)	3804.09	5276.77	5351.44
Q Total (cfs)	36000.00	Flow (cfs)	2015.04	22454.68	11530.28
Top Width (ft)	2138.84	Top Width (ft)	769.99	539.73	829.12
Vel Total (ft/s)	3.11	Avg. Vel. (ft/s)	2.09	4.26	2.15
Max Chl Dpth (ft)	14.17	Hydr. Depth (ft)	6.17	9.78	6.45
Conv. Total (cfs)	1911336.0	Conv. (cfs)	106983.9	1192179.0	612173.1
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	829.92
Min Ch El (ft)	2748.00	Shear (lb/sq ft)	0.14	0.22	0.14
Alpha	1.35	Stream Power (lb/ft s)	0.29	0.92	0.31
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2755.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2755.53	Reach Len. (ft)			
Crit W.S. (ft)	2750.79	Flow Area (sq ft)		1698.43	152.64
E.G. Slope (ft/ft)	0.000028	Area (sq ft)	280.93	1698.43	152.64
Q Total (cfs)	1000.00	Flow (cfs)		984.01	15.99
Top Width (ft)	936.16	Top Width (ft)	80.51	516.71	338.95
Vel Total (ft/s)	0.54	Avg. Vel. (ft/s)		0.58	0.10
Max Chl Dpth (ft)	7.53	Hydr. Depth (ft)		3.29	0.45
Conv. Total (cfs)	188532.9	Conv. (cfs)		185517.6	3015.3
Length Wtd. (ft)		Wetted Per. (ft)		518.62	338.98
Min Ch El (ft)	2748.00	Shear (lb/sq ft)		0.01	0.00
Alpha	1.13	Stream Power (lb/ft s)		0.00	0.00
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2755.83	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.11	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2755.72	Reach Len. (ft)			
Crit W.S. (ft)	2752.80	Flow Area (sq ft)		1797.45	222.53
E.G. Slope (ft/ft)	0.000586	Area (sq ft)	296.37	1797.45	222.53
Q Total (cfs)	5000.00	Flow (cfs)		4878.16	121.84
Top Width (ft)	1004.98	Top Width (ft)	82.03	526.01	396.94
Vel Total (ft/s)	2.48	Avg. Vel. (ft/s)		2.71	0.55
Max Chl Dpth (ft)	7.72	Hydr. Depth (ft)		3.42	0.56
Conv. Total (cfs)	206522.8	Conv. (cfs)		201490.2	5032.6
Length Wtd. (ft)		Wetted Per. (ft)		527.93	396.97
Min Ch El (ft)	2748.00	Shear (lb/sq ft)		0.12	0.02
Alpha	1.17	Stream Power (lb/ft s)		0.34	0.01
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2759.26	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2759.21	Reach Len. (ft)			
Crit W.S. (ft)	2754.21	Flow Area (sq ft)	501.07	3679.19	2906.89
E.G. Slope (ft/ft)	0.000120	Area (sq ft)	1663.78	3679.19	2906.89
Q Total (cfs)	10000.00	Flow (cfs)	394.67	7164.61	2440.72
Top Width (ft)	2038.54	Top Width (ft)	676.19	539.73	822.62
Vel Total (ft/s)	1.41	Avg. Vel. (ft/s)	0.79	1.95	0.84
Max Chl Dpth (ft)	11.21	Hydr. Depth (ft)	3.21	6.82	3.53
Conv. Total (cfs)	912267.2	Conv. (cfs)	36004.1	653604.0	222659.1
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	822.78
Min Ch El (ft)	2748.00	Shear (lb/sq ft)	0.02	0.05	0.03
Alpha	1.46	Stream Power (lb/ft s)	0.02	0.10	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

SUMMARY OF MANNING'S N VALUES

er:River #1

Reach	River Sta.	n1	n2	n3
Reach #1	180	.045	.03	.045
Reach #1	170	.045	.03	.045
Reach #1	160	.045	.03	.045
Reach #1	150	.045	.03	.045

*Reach #1	*	149.*	*	.045*	.03*	.045*
*Reach #1	*	148.*	*	.045*	.03*	.045*
*Reach #1	*	147.*	*	.045*	.03*	.045*
*Reach #1	*	146.*	*	.045*	.03*	.045*
*Reach #1	*	145.*	*	.045*	.03*	.045*
*Reach #1	*	144.*	*	.045*	.03*	.045*
*Reach #1	*	143.*	*	.045*	.03*	.045*
*Reach #1	*	142.*	*	.045*	.03*	.045*
*Reach #1	*	141.*	*	.045*	.03*	.045*
*Reach #1	*	140.*	*	.045*	.03*	.045*
*Reach #1	*	139	*	.045*	.03*	.045*
*Reach #1	*	130	*	.045*	.03*	.045*
*Reach #1	*	120	*	.045*	.03*	.045*
*Reach #1	*	115	*	.045*	.03*	.045*
*Reach #1	*	110	*	.045*	.03*	.045*
*Reach #1	*	100	*	.045*	.03*	.045*

SUMMARY OF REACH LENGTHS

River: River #1

Reach	River Sta.	Left	Channel	Right
*Reach #1	180	44.45*	181.54*	256.85*
*Reach #1	170	130.15*	130.15*	130.15*
*Reach #1	160	203.69*	188.86*	197*
*Reach #1	150	23.86*	18.79*	11.8*
*Reach #1	149.*	23.86*	18.79*	11.8*
*Reach #1	148.*	23.86*	18.79*	11.8*
*Reach #1	147.*	23.86*	18.79*	11.8*
*Reach #1	146.*	23.86*	18.79*	11.8*
*Reach #1	145.*	23.86*	18.79*	11.8*
*Reach #1	144.*	23.86*	18.79*	11.8*
*Reach #1	143.*	23.86*	18.79*	11.8*
*Reach #1	142.*	23.86*	18.79*	11.8*
*Reach #1	141.*	23.86*	18.79*	11.8*
*Reach #1	140.*	23.86*	18.79*	11.8*
*Reach #1	139	172.75*	171.78*	164.65*
*Reach #1	130	295.76*	287.33*	274.51*
*Reach #1	120	158.39*	153.64*	149.14*
*Reach #1	115	257.93*	242.39*	227.54*
*Reach #1	110	308.04*	322.72*	332.25*
*Reach #1	100	*	*	*

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: River #1

Reach	River Sta.	Contr.	Expan.
*Reach #1	180	.1*	.3*
*Reach #1	170	.1*	.3*
*Reach #1	160	.1*	.3*
*Reach #1	150	.1*	.3*
*Reach #1	149.*	.1*	.3*
*Reach #1	148.*	.1*	.3*
*Reach #1	147.*	.1*	.3*
*Reach #1	146.*	.1*	.3*
*Reach #1	145.*	.1*	.3*
*Reach #1	144.*	.1*	.3*
*Reach #1	143.*	.1*	.3*
*Reach #1	142.*	.1*	.3*
*Reach #1	141.*	.1*	.3*
*Reach #1	140.*	.1*	.3*
*Reach #1	139	.1*	.3*
*Reach #1	130	.1*	.3*
*Reach #1	120	.1*	.3*
*Reach #1	115	.1*	.3*
*Reach #1	110	.1*	.3*
*Reach #1	100	.1*	.3*

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #1	180	PF 1	31000.00	2759.08	2775.13	2769.76	2775.99	0.000962	7.44	4166.17	379.51	0.40
Reach #1	180	PF 2	24490.00	2759.08	2773.22	2768.85	2774.00	0.001096	7.10	3447.07	371.67	0.41
Reach #1	180	PF 3	36000.00	2759.08	2776.50	2770.43	2777.42	0.000892	7.67	4713.35	450.20	0.39
Reach #1	180	PF 4	1000.00	2759.08	2762.80	2762.13	2763.10	0.004290	4.40	227.08	140.27	0.61
Reach #1	180	PF 5	5000.00	2759.08	2765.84	2764.60	2766.37	0.003189	5.84	856.67	279.32	0.59
Reach #1	180	PF 6	10000.00	2759.08	2768.18	2766.24	2768.77	0.002022	6.13	1630.48	349.86	0.50
Reach #1	170	PF 1	31000.00	2758.49	2773.49	2770.35	2775.57	0.003402	11.58	2676.74	248.09	0.62
Reach #1	170	PF 2	24490.00	2758.49	2771.71	2769.11	2773.56	0.003581	10.92	2241.82	241.93	0.63
Reach #1	170	PF 3	36000.00	2758.49	2774.76	2771.24	2777.00	0.003299	12.03	2994.62	252.63	0.61
Reach #1	170	PF 4	1000.00	2758.49	2761.84	2761.35	2762.22	0.005401	4.93	203.00	119.52	0.67
Reach #1	170	PF 5	5000.00	2758.49	2764.72	2763.92	2765.61	0.005075	7.57	660.60	181.90	0.70
Reach #1	170	PF 6	10000.00	2758.49	2766.91	2765.78	2768.16	0.004905	8.95	1117.67	226.59	0.71
Reach #1	160	PF 1	31000.00	2757.67	2771.67	2769.83	2774.92	0.005009	14.46	2143.16	196.67	0.77
Reach #1	160	PF 2	24490.00	2757.67	2770.34	2768.41	2772.97	0.004500	13.00	1883.39	193.18	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.60	2770.85	2776.32	0.005364	15.47	2327.25	199.04	0.80
Reach #1	160	PF 4	1000.00	2757.67	2761.59	2760.46	2761.77	0.001922	3.41	293.37	143.78	0.42
Reach #1	160	PF 5	5000.00	2757.67	2764.42	2762.91	2765.07	0.002752	6.44	775.80	180.92	0.55
Reach #1	160	PF 6	10000.00	2757.67	2766.44	2764.67	2767.62	0.003300	8.73	1145.67	186.02	0.62
Reach #1	150	PF 1	31000.00	2757.36	2770.81	2769.32	2774.06	0.004221	14.46	2143.28	212.96	0.80
Reach #1	150	PF 2	24490.00	2757.36	2769.43	2767.97	2772.14	0.004114	13.21	1853.82	208.31	0.78
Reach #1	150	PF 3	36000.00	2757.36	2771.72	2770.31	2775.40	0.004348	15.39	2339.88	216.41	0.82
Reach #1	150	PF 4	1000.00	2757.36	2761.08	2760.15	2761.33	0.002820	3.96	252.50	133.45	0.51
Reach #1	150	PF 5	5000.00	2757.36	2763.65	2762.71	2764.44	0.003824	7.15	699.46	190.67	0.66
Reach #1	150	PF 6	10000.00	2757.36	2765.59	2764.36	2766.93	0.003828	9.31	1074.28	196.14	0.70
Reach #1	149.*	PF 1	31000.00	2757.24	2770.46	2769.35	2773.95	0.004726	14.99	2068.13	214.10	0.85
Reach #1	149.*	PF 2	24490.00	2757.24	2769.11	2768.00	2772.04	0.004623	13.73	1784.08	208.51	0.83
Reach #1	149.*	PF 3	36000.00	2757.24	2771.40	2770.36	2775.30	0.004754	15.85	2272.86	224.11	0.86
Reach #1	149.*	PF 4	1000.00	2757.24	2761.00	2760.12	2761.27	0.003214	4.15	240.74	131.19	0.54
Reach #1	149.*	PF 5	5000.00	2757.24	2763.51	2762.68	2764.36	0.004215	7.43	673.19	187.37	0.69
Reach #1	149.*	PF 6	10000.00	2757.24	2765.38	2764.36	2766.84	0.004290	9.70	1031.39	194.23	0.74
Reach #1	148.*	PF 1	31000.00	2757.13	2770.02	2769.39	2773.81	0.005431	15.64	1982.41	215.47	0.91
Reach #1	148.*	PF 2	24490.00	2757.13	2768.79	2768.02	2771.93	0.005184	14.22	1722.12	209.44	0.87
Reach #1	148.*	PF 3	36000.00	2757.13	2771.16	2770.34	2775.20	0.005027	16.14	2238.64	232.57	0.89
Reach #1	148.*	PF 4	1000.00	2757.13	2760.90	2760.11	2761.20	0.003837	4.39	227.75	130.90	0.59
Reach #1	148.*	PF 5	5000.00	2757.13	2763.34	2762.66	2764.27	0.004768	7.77	643.83	184.58	0.73
Reach #1	148.*	PF 6	10000.00	2757.13	2765.14	2764.34	2766.74	0.004921	10.15	985.55	193.12	0.79
Reach #1	147.*	PF 1	31000.00	2757.01	2769.59	2769.33	2773.68	0.006135	16.25	1909.75	222.39	0.96
Reach #1	147.*	PF 2	24490.00	2757.01	2768.54	2767.99	2771.82	0.005621	14.54	1684.75	211.69	0.91
Reach #1	147.*	PF 3	36000.00	2757.01	2771.07	2770.31	2775.10	0.004984	16.11	2252.60	239.16	0.89
Reach #1	147.*	PF 4	1000.00	2757.01	2760.78	2760.07	2761.11	0.004593	4.62	216.35	132.11	0.64
Reach #1	147.*	PF 5	5000.00	2757.01	2763.15	2762.58	2764.17	0.005401	8.11	616.73	182.60	0.78
Reach #1	147.*	PF 6	10000.00	2757.01	2764.89	2764.33	2766.63	0.005658	10.59	944.08	193.38	0.84
Reach #1	146.*	PF 1	31000.00	2756.89	2769.27	2769.27	2773.55	0.006578	16.60	1874.51	229.50	1.00
Reach #1	146.*	PF 2	24490.00	2756.89	2767.91	2767.91	2771.67	0.007013	15.54	1575.60	212.57	1.01
Reach #1	146.*	PF 3	36000.00	2756.89	2771.09	2770.19	2774.96	0.004698	15.81	2368.49	499.82	0.87
Reach #1	146.*	PF 4	1000.00	2756.89	2760.65	2760.08	2761.02	0.005412	4.88	204.77	130.48	0.69
Reach #1	146.*	PF 5	5000.00	2756.89	2762.94	2762.54	2764.06	0.006231	8.49	589.06	181.73	0.83
Reach #1	146.*	PF 6	10000.00	2756.89	2764.63	2764.27	2766.51	0.006513	11.00	908.85	196.11	0.90
Reach #1	145.*	PF 1	31000.00	2756.77	2768.80	2769.10	2773.39	0.007389	17.20	1813.38	229.19	1.05
Reach #1	145.*	PF 2	24490.00	2756.77	2767.60	2767.82	2771.51	0.007592	15.89	1542.43	218.64	1.04
Reach #1	145.*	PF 3	36000.00	2756.77	2771.65	2771.65	2774.61	0.003423	14.14	3183.96	924.32	0.75
Reach #1	145.*	PF 4	1000.00	2756.77	2760.49	2760.07	2760.91	0.006284	5.16	193.97	127.62	0.74
Reach #1	145.*	PF 5	5000.00	2756.77	2762.73	2762.45	2763.93	0.007058	8.79	568.55	183.01	0.88
Reach #1	145.*	PF 6	10000.00	2756.77	2764.40	2764.15	2766.37	0.007013	11.26	887.87	195.70	0.93
Reach #1	144.*	PF 1	31000.00	2756.66	2768.34	2769.48	2773.21	0.008168	17.72	1763.51	230.10	1.10
Reach #1	144.*	PF 2	24490.00	2756.66	2767.62	2767.63	2771.30	0.006860	15.39	1599.35	226.85	1.00
Reach #1	144.*	PF 3	36000.00	2756.66	2769.63	2771.29	2774.36	0.006682	17.54	2208.91	486.90	1.02
Reach #1	144.*	PF 4	1000.00	2756.66	2760.32	2760.00	2760.78	0.007410	5.44	183.94	126.60	0.79
Reach #1	144.*	PF 5	5000.00	2756.66	2762.34	2762.34	2763.76	0.009536	9.56	522.79	186.31	1.01
Reach #1	144.*	PF 6	10000.00	2756.66	2764.00	2764.00	2766.20	0.008338	11.90	840.44	194.34	1.01
Reach #1	143.*	PF 1	31000.00	2756.54	2769.10	2769.47	2772.71	0.005376	15.42	2244.12	496.33	0.91
Reach #1	143.*	PF 2	24490.00	2756.54	2766.88	2767.33	2771.10	0.008643	16.50	1493.02	226.34	1.11
Reach #1	143.*	PF 3	36000.00	2756.54	2768.77	2770.83	2774.15	0.008315	18.76	2082.65	479.04	1.13
Reach #1	143.*	PF 4	1000.00	2756.54	2760.10	2759.90	2760.62	0.009166	5.82	171.80	125.33	0.88

Reach #1	[illegible].*	PF 5	5000.00	2756.54	2762.03	2762.14	2763.56	[illegible]10805	9.92	504.01	186.70	1.06
Reach #1	143.*	PF 6	10000.00	2756.54	2763.63	2763.82	2766.01	0.009527	12.40	806.48	193.72	1.07
Reach #1	142.*	PF 1	31000.00	2756.42	2767.83	2769.04	2772.48	0.007925	17.44	1933.20	460.92	1.09
Reach #1	142.*	PF 2	24490.00	2756.42	2767.31	2767.42	2770.72	0.006233	14.88	1708.14	366.58	0.95
Reach #1	142.*	PF 3	36000.00	2756.42	2768.02	2770.32	2773.93	0.009831	19.71	2020.70	468.24	1.21
Reach #1	142.*	PF 4	1000.00	2756.42	2759.64	2759.64	2760.41	0.011829	7.02	142.36	94.82	1.01
Reach #1	142.*	PF 5	5000.00	2756.42	2761.67	2761.89	2763.34	0.012368	10.36	482.82	185.39	1.13
Reach #1	142.*	PF 6	10000.00	2756.42	2763.24	2763.60	2765.80	0.010868	12.85	778.45	195.74	1.14
Reach #1	141.*	PF 1	31000.00	2756.30	2766.98	2768.55	2772.25	0.009774	18.60	1832.11	442.29	1.19
Reach #1	141.*	PF 2	24490.00	2756.30	2766.13	2767.42	2770.49	0.009204	16.78	1499.57	320.18	1.14
Reach #1	141.*	PF 3	36000.00	2756.30	2767.27	2769.74	2773.69	0.011439	20.60	1961.12	450.33	1.30
Reach #1	141.*	PF 4	1000.00	2756.30	2759.23	2759.39	2760.13	0.018243	7.61	131.42	107.60	1.21
Reach #1	141.*	PF 5	5000.00	2756.30	2761.30	2761.61	2763.08	0.013831	10.73	465.84	184.06	1.19
Reach #1	141.*	PF 6	10000.00	2756.30	2762.79	2763.34	2765.56	0.012568	13.34	749.37	198.42	1.21
Reach #1	140.*	PF 1	31000.00	2756.19	2766.19	2767.98	2772.00	0.011668	19.59	1758.35	424.00	1.29
Reach #1	140.*	PF 2	24490.00	2756.19	2765.37	2766.94	2770.24	0.011146	17.78	1437.09	328.25	1.24
Reach #1	140.*	PF 3	36000.00	2756.19	2766.54	2769.18	2773.41	0.013174	21.42	1908.12	432.76	1.38
Reach #1	140.*	PF 4	1000.00	2756.19	2758.75	2758.97	2759.74	0.022811	7.99	125.23	112.60	1.33
Reach #1	140.*	PF 5	5000.00	2756.19	2760.89	2761.30	2762.80	0.015415	11.10	450.39	183.12	1.25
Reach #1	140.*	PF 6	10000.00	2756.19	2762.31	2762.99	2765.28	0.014520	13.83	722.98	201.98	1.29
Reach #1	139	PF 1	31000.00	2752.07	2759.94	2763.29	2771.13	0.031528	26.89	1176.49	295.55	2.03
Reach #1	139	PF 2	24490.00	2752.07	2758.98	2762.35	2769.35	0.037115	25.85	951.71	216.35	2.14
Reach #1	139	PF 3	36000.00	2752.07	2760.53	2764.55	2772.54	0.030061	27.97	1357.16	320.37	2.02
Reach #1	139	PF 4	1000.00	2752.07	2753.71	2754.54	2758.34	0.262034	17.28	57.87	102.11	4.05
Reach #1	139	PF 5	5000.00	2752.07	2755.30	2756.94	2761.81	0.071063	20.47	244.25	124.60	2.58
Reach #1	139	PF 6	10000.00	2752.07	2756.50	2758.58	2764.29	0.065248	22.40	446.45	186.62	2.55
Reach #1	130	PF 1	31000.00	2751.25	2760.37	2762.38	2766.09	0.013532	19.55	1819.28	540.75	1.37
Reach #1	130	PF 2	24490.00	2751.25	2759.88	2761.36	2764.35	0.011289	17.07	1565.82	521.73	1.23
Reach #1	130	PF 3	36000.00	2751.25	2760.67	2763.00	2767.38	0.015241	21.31	1984.22	551.54	1.46
Reach #1	130	PF 4	1000.00	2751.25	2755.69	2753.86	2755.76	0.000571	2.08	481.65	204.13	0.24
Reach #1	130	PF 5	5000.00	2751.25	2757.47	2756.00	2757.99	0.002302	5.83	857.94	219.71	0.52
Reach #1	130	PF 6	10000.00	2751.25	2759.90	2757.60	2760.64	0.001862	6.94	1575.12	522.11	0.50
Reach #1	120	PF 1	31000.00	2750.00	2761.90	2761.45	2763.16	0.003757	9.99	4234.29	1484.75	0.72
Reach #1	120	PF 2	24490.00	2750.00	2761.29	2760.98	2762.42	0.003740	9.28	3546.07	1418.71	0.70
Reach #1	120	PF 3	36000.00	2750.00	2762.40	2761.83	2763.71	0.003589	10.30	4801.15	1553.57	0.71
Reach #1	120	PF 4	1000.00	2750.00	2755.57	2753.40	2755.62	0.000353	1.78	562.99	212.28	0.19
Reach #1	120	PF 5	5000.00	2750.00	2756.57	2755.51	2757.21	0.003161	6.43	777.16	219.54	0.60
Reach #1	120	PF 6	10000.00	2750.00	2759.33	2757.02	2760.03	0.002333	6.75	1599.38	726.51	0.54
Reach #1	115	PF 1	31000.00	2749.00	2761.61	2760.74	2762.62	0.002511	8.95	4838.01	1691.52	0.60
Reach #1	115	PF 2	24490.00	2749.00	2761.03	2760.16	2761.90	0.002334	8.14	4133.17	1569.14	0.57
Reach #1	115	PF 3	36000.00	2749.00	2762.13	2761.15	2763.19	0.002450	9.28	5465.87	1784.40	0.60
Reach #1	115	PF 4	1000.00	2749.00	2755.56	2752.51	2755.59	0.000117	1.28	781.10	209.32	0.12
Reach #1	115	PF 5	5000.00	2749.00	2756.38	2754.40	2756.80	0.001643	5.23	956.18	225.29	0.45
Reach #1	115	PF 6	10000.00	2749.00	2759.21	2756.01	2759.68	0.001525	5.51	2013.31	1233.61	0.44
Reach #1	110	PF 1	31000.00	2749.00	2761.65	2759.33	2762.08	0.001062	6.28	7201.35	1845.73	0.40
Reach #1	110	PF 2	24490.00	2749.00	2761.06	2758.82	2761.40	0.000940	5.60	6392.71	1816.80	0.37
Reach #1	110	PF 3	36000.00	2749.00	2762.17	2759.67	2762.64	0.001081	6.62	7912.88	1871.10	0.41
Reach #1	110	PF 4	1000.00	2749.00	2755.53	2752.51	2755.56	0.000127	1.25	802.32	238.99	0.12
Reach #1	110	PF 5	5000.00	2749.00	2755.78	2754.48	2756.30	0.002562	5.80	861.52	243.10	0.54
Reach #1	110	PF 6	10000.00	2749.00	2759.20	2756.31	2759.37	0.000606	3.68	3891.91	1641.99	0.28
Reach #1	100	PF 1	31000.00	2748.00	2761.65	2757.15	2761.83	0.000327	3.94	10798.62	2121.22	0.23
Reach #1	100	PF 2	24490.00	2748.00	2761.06	2756.72	2761.19	0.000266	3.40	9900.19	2101.23	0.20
Reach #1	100	PF 3	36000.00	2748.00	2762.17	2757.52	2762.37	0.000355	4.26	11591.33	2138.84	0.24
Reach #1	100	PF 4	1000.00	2748.00	2755.53	2750.79	2755.54	0.000028	0.58	1851.07	936.16	0.06
Reach #1	100	PF 5	5000.00	2748.00	2755.72	2752.80	2755.83	0.000586	2.71	2019.99	1004.98	0.26
Reach #1	100	PF 6	10000.00	2748.00	2759.21	2754.21	2759.26	0.000120	1.95	7087.15	2038.54	0.13

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Plan 46

River: River #1 Reach: Reach #1 RS: 180 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 180 Profile: PF 6
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 1
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 4
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.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 5
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 170 Profile: PF 6
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 1
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 3
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 5
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 160 Profile: PF 6
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 150 Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 149.* Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 149.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 148.* Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 148.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 147.* Profile: PF 2
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 147.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 146.* Profile: PF 2
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.
River: River #1 Reach: Reach #1 RS: 146.* Profile: PF 3
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.
River: River #1 Reach: Reach #1 RS: 146.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 145.* Profile: PF 1
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 145.* Profile: PF 2
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 145.* Profile: PF 3
Warning:The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
River: River #1 Reach: Reach #1 RS: 145.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 144.* Profile: PF 3
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.
Note: Program found supercritical flow starting at this cross section.
River: River #1 Reach: Reach #1 RS: 144.* Profile: PF 4
Warning:Divided flow computed for this cross-section.
River: River #1 Reach: Reach #1 RS: 144.* Profile: PF 5
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.

```
River: River #1  Reach: Reach #1     RS: 144.*     Profile: PF 6
     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.
 iver: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 1
     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.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 2
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 3
     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.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 5
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 6
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 1
     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.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 3
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 4
     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:Divided flow computed for this cross-section.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
River: River #1  Reach: Reach #1     RS: 141.*     Profile: PF 1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 141.*     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 141.*     Profile: PF 4
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 140.*     Profile: PF 1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 140.*     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 1
     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.
ver: River #1  Reach: Reach #1     RS: 139     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 3
     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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 4
     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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 5
     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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 6
     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.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 1
     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.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 2
     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:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 3
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 4
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 5
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     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 6
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
ver: River #1  Reach: Reach #1     RS: 120     Profile: PF 1
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 2
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 3
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 4
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 5
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 6
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 1
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 3
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
ver: River #1  Reach: Reach #1     RS: 115     Profile: PF 4
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 5
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 6
     Warning:Divided flow computed for this cross-section.
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 1
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 2
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 3
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 4
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 5
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 6
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 1
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
ver: River #1  Reach: Reach #1     RS: 100     Profile: PF 2
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 3
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 4
```

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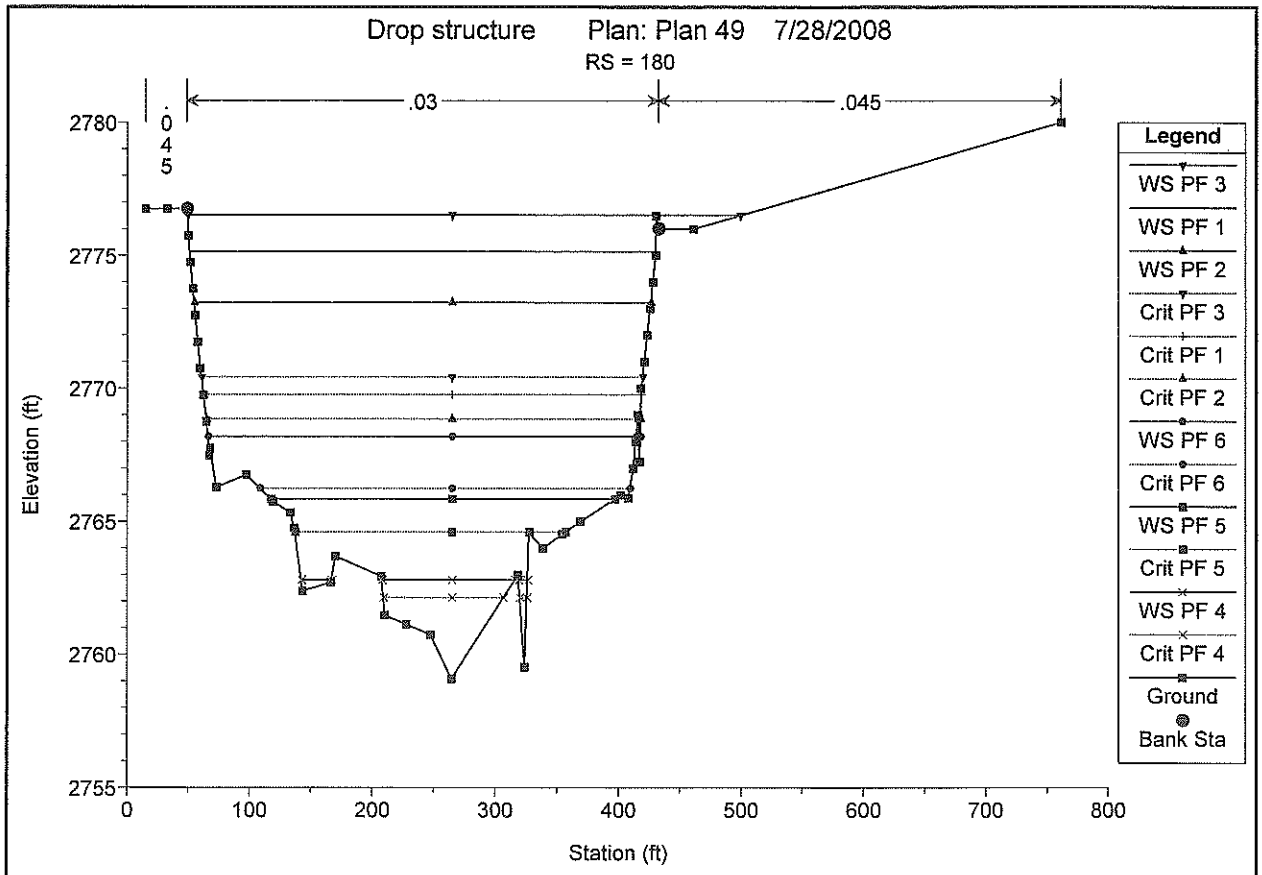
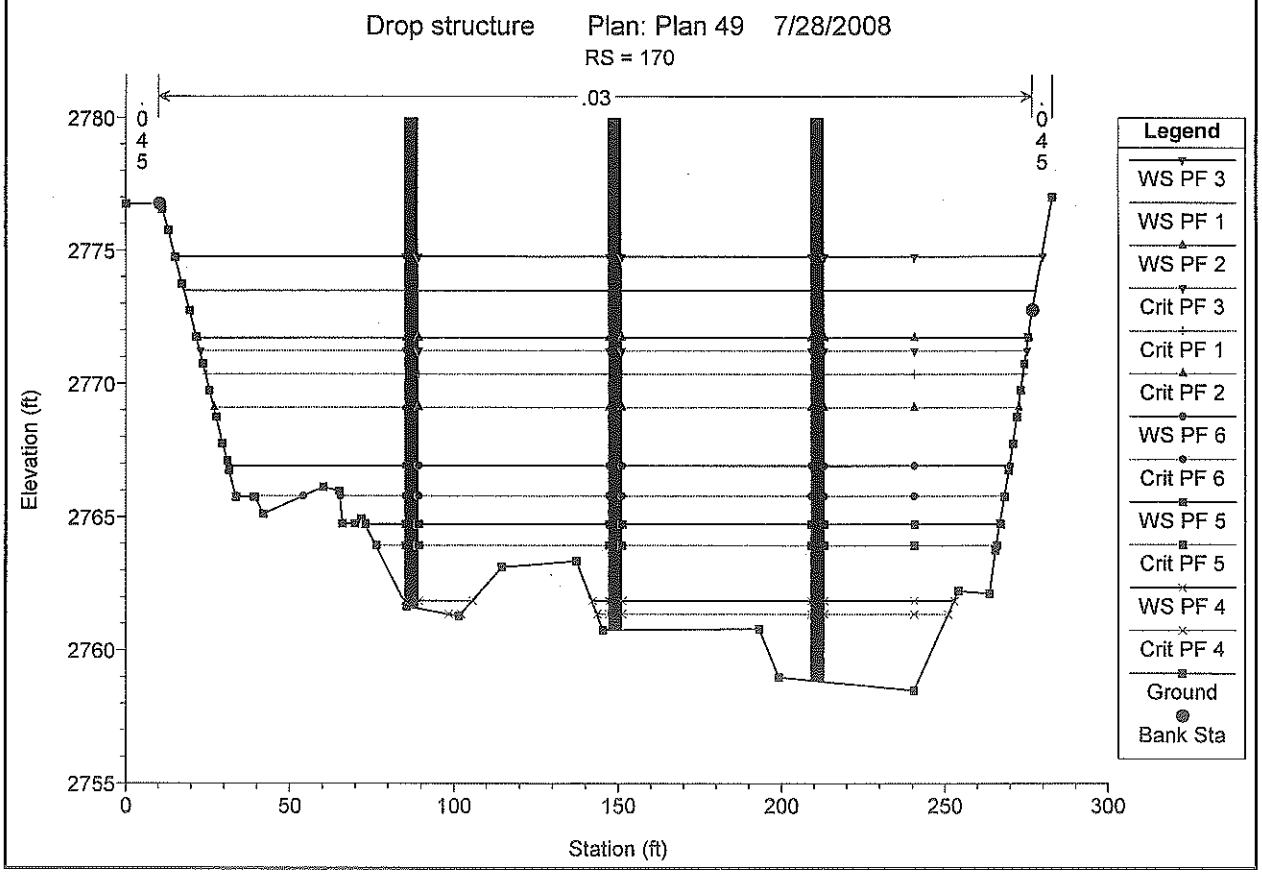
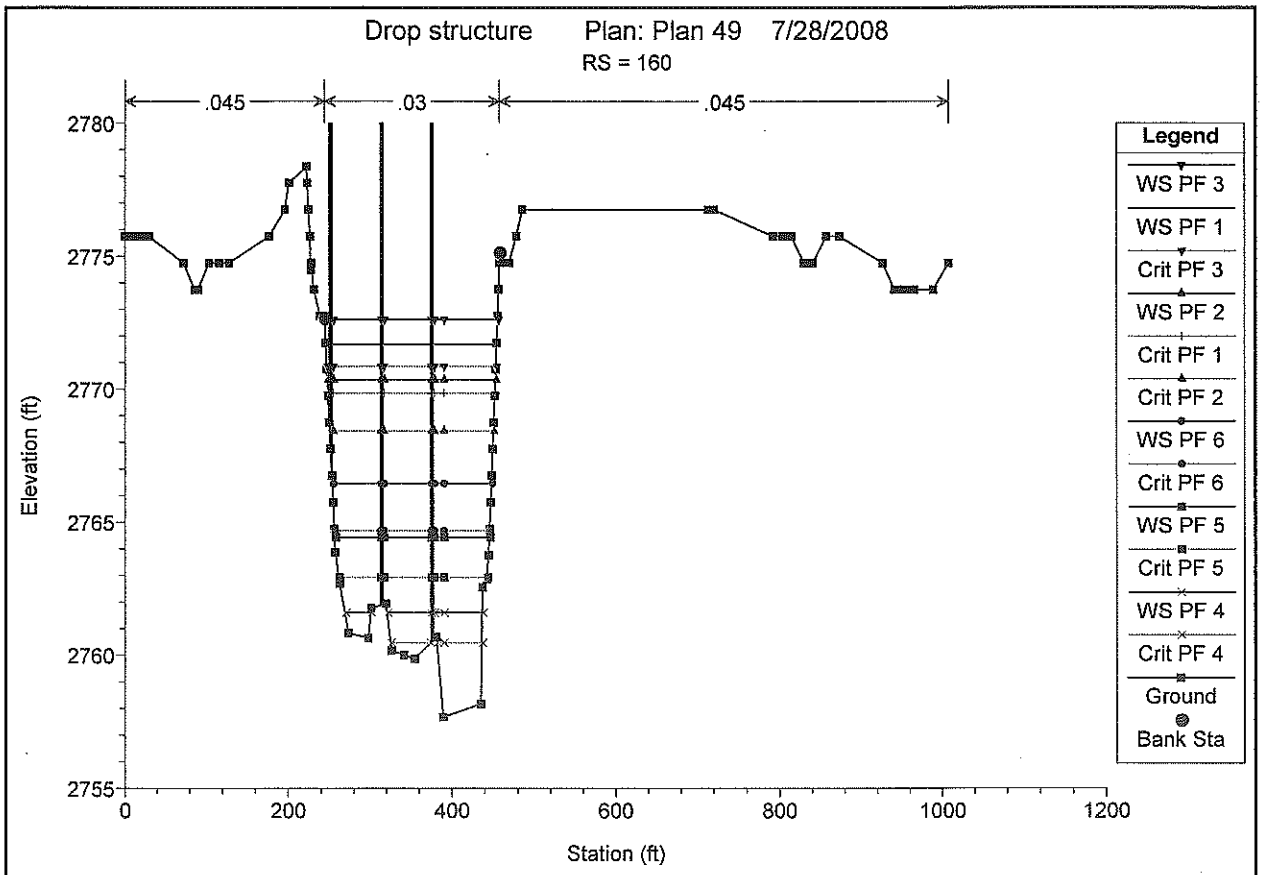
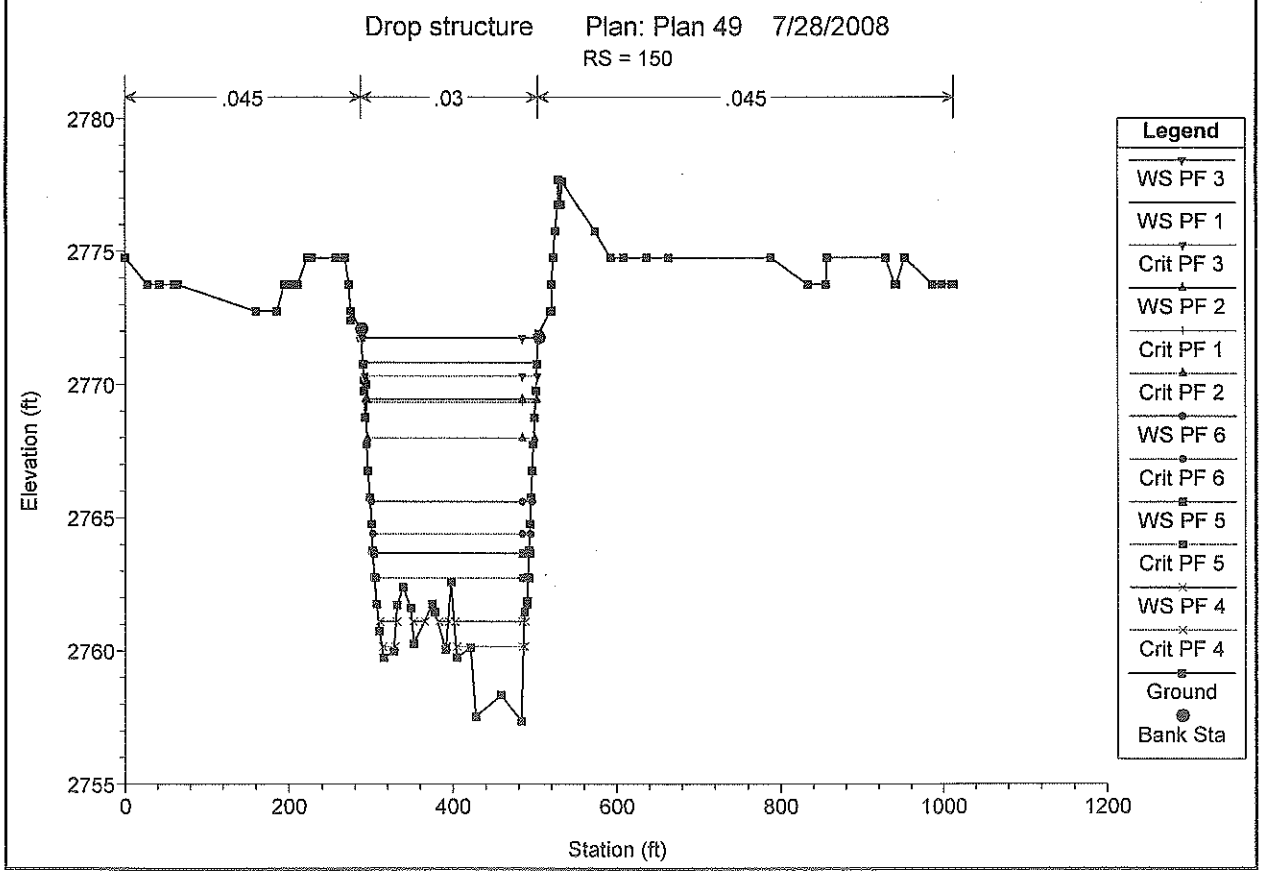
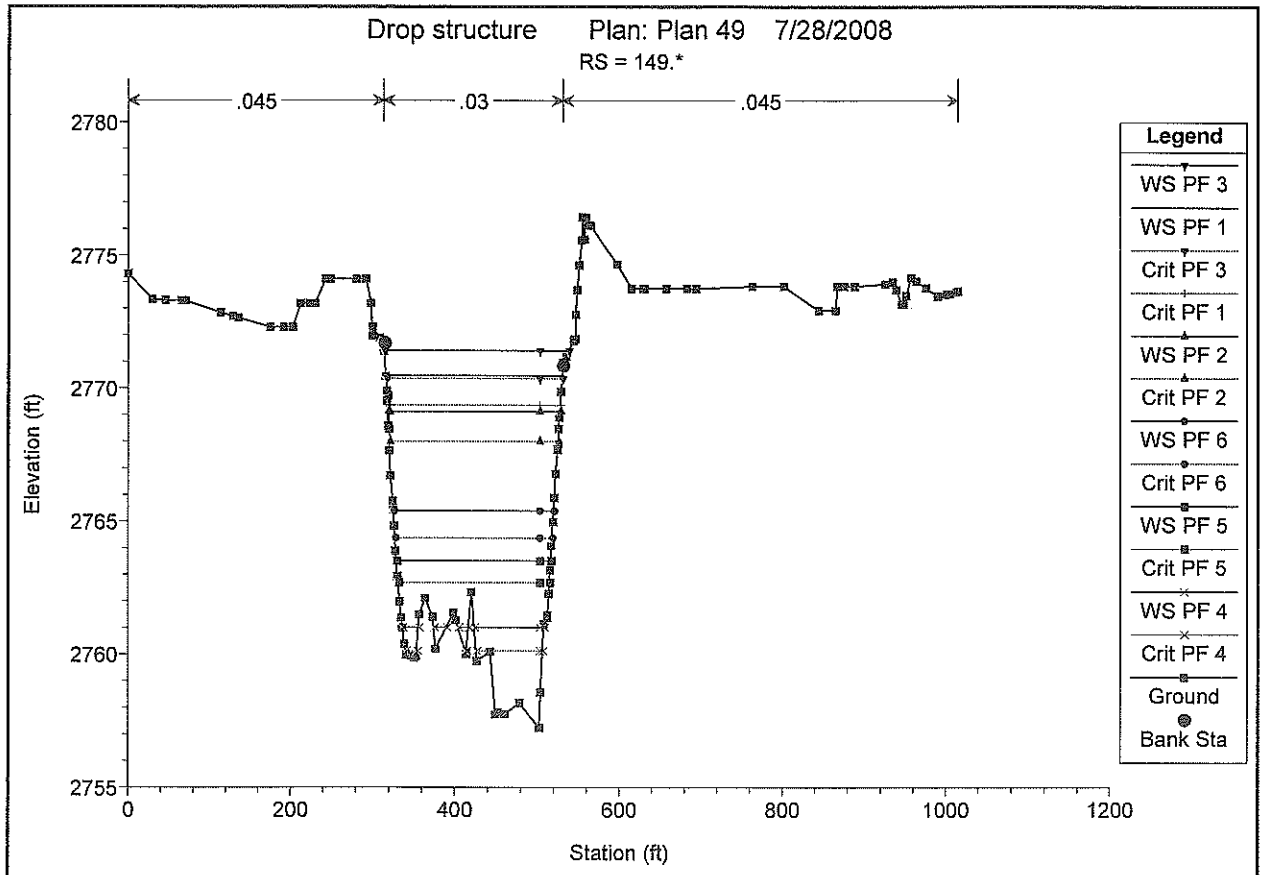
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 5
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
ver: River #1  Reach: Reach #1     RS: 100     Profile: PF 6
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
```

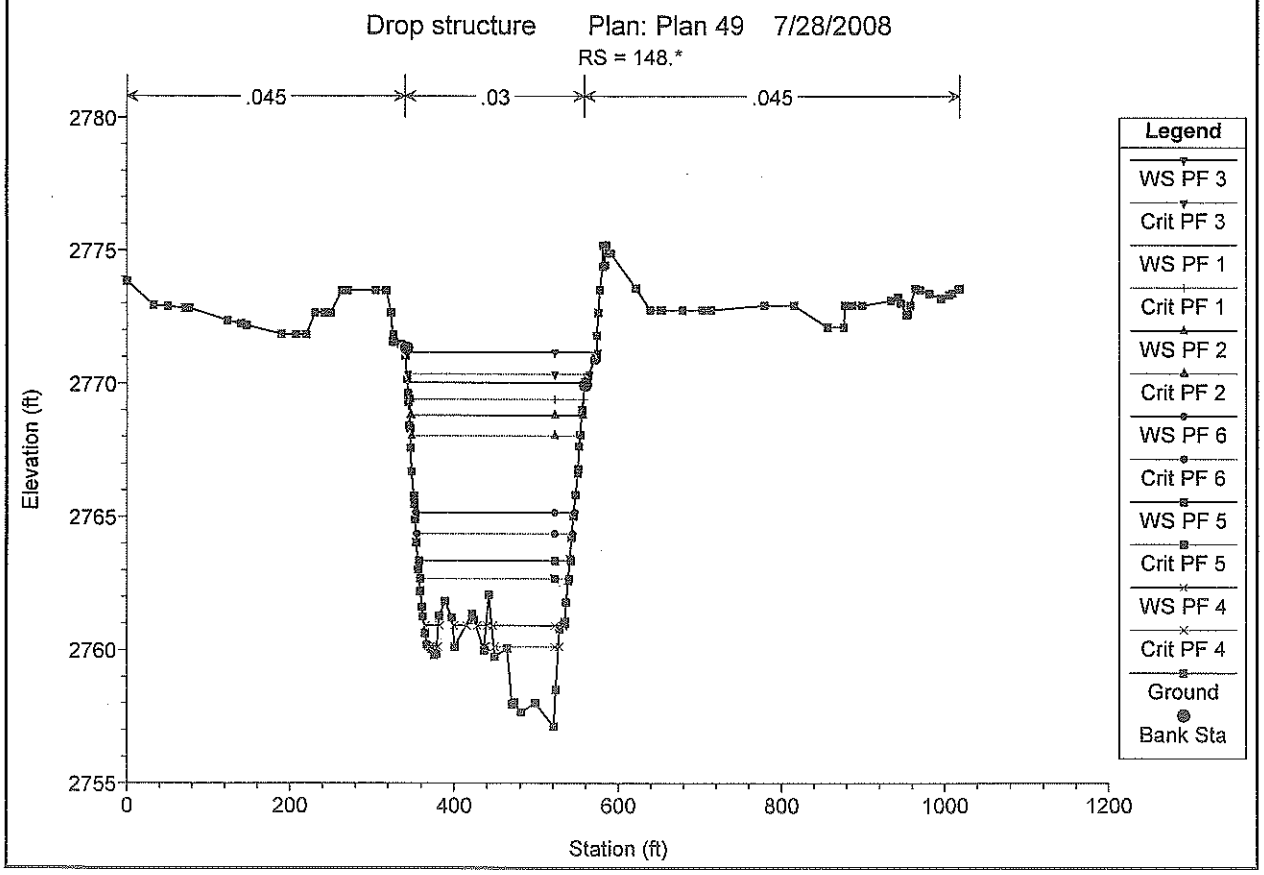

Drop structure Plan: Plan 49 7/28/2008
RS = 180
.03
.045
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

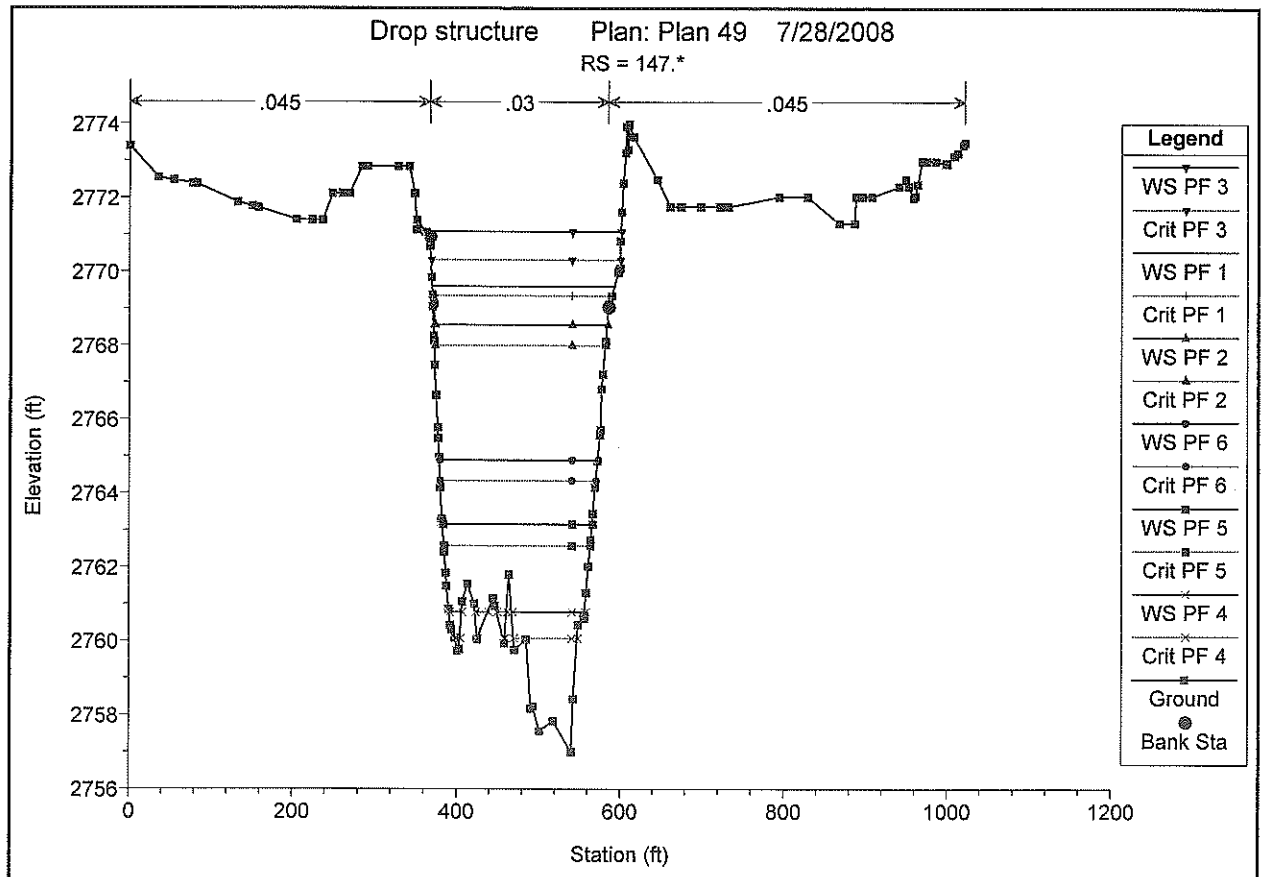

Drop structure Plan: Plan 49 7/28/2008
RS = 170
.03
.045
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

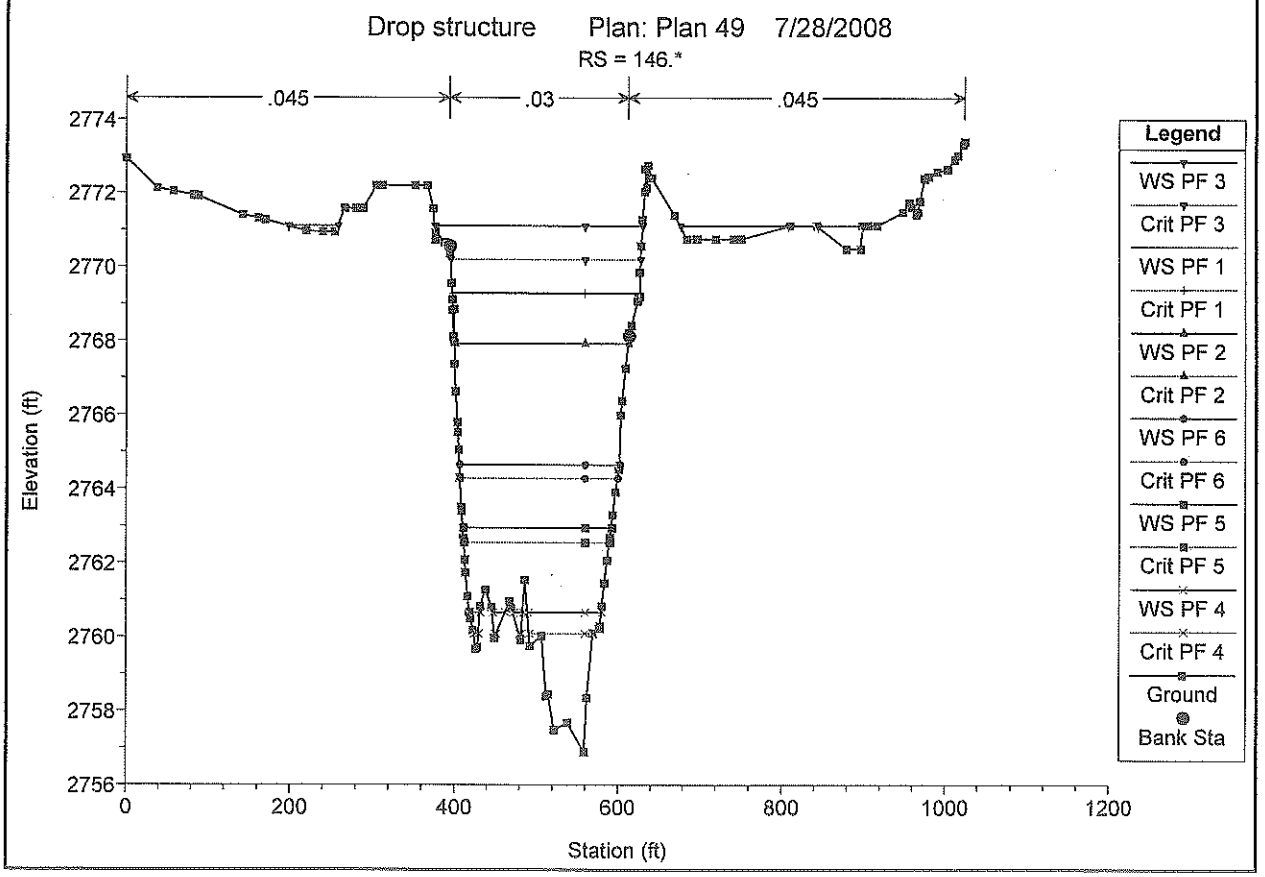

Drop structure Plan: Plan 49 7/28/2008
RS = 160
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

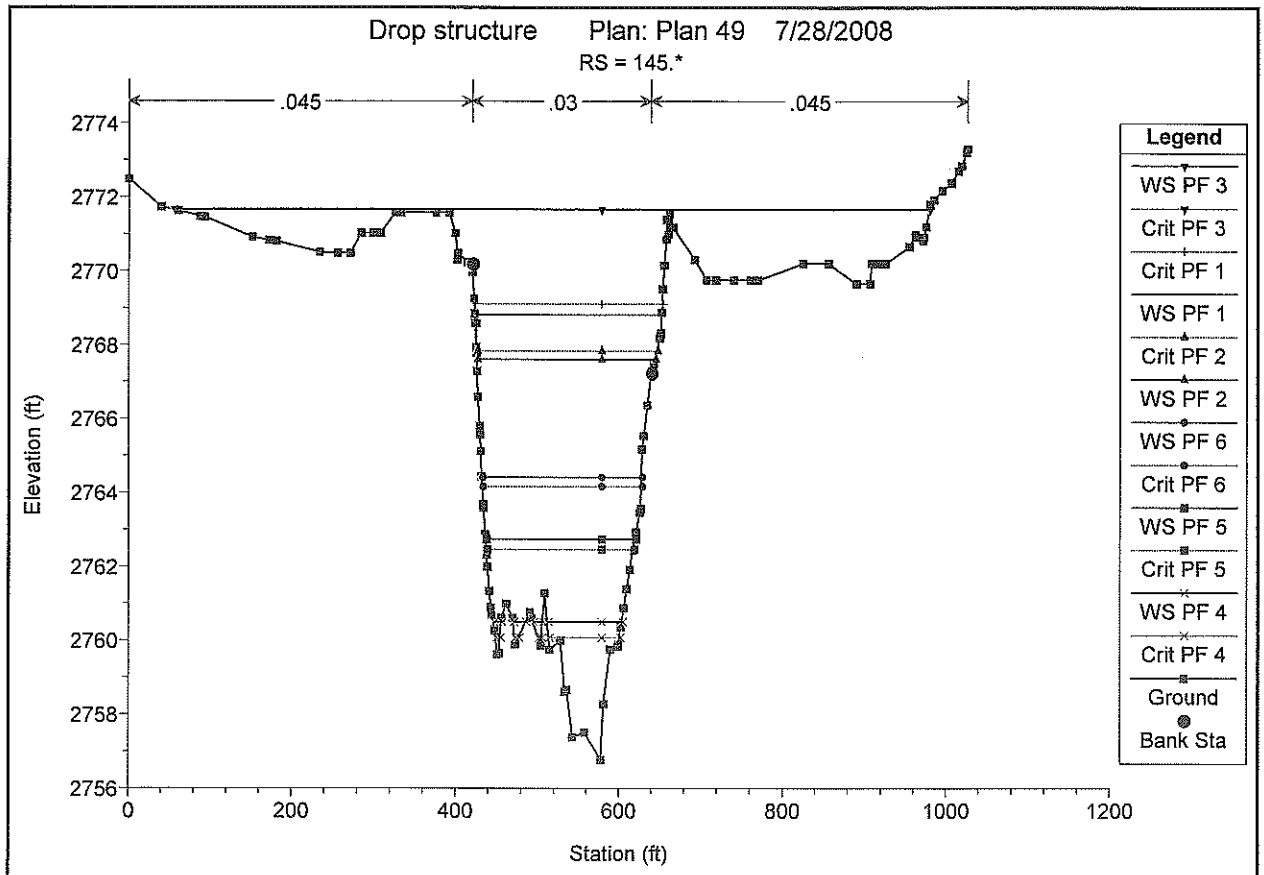

Drop structure Plan: Plan 49 7/28/2008
RS = 150
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

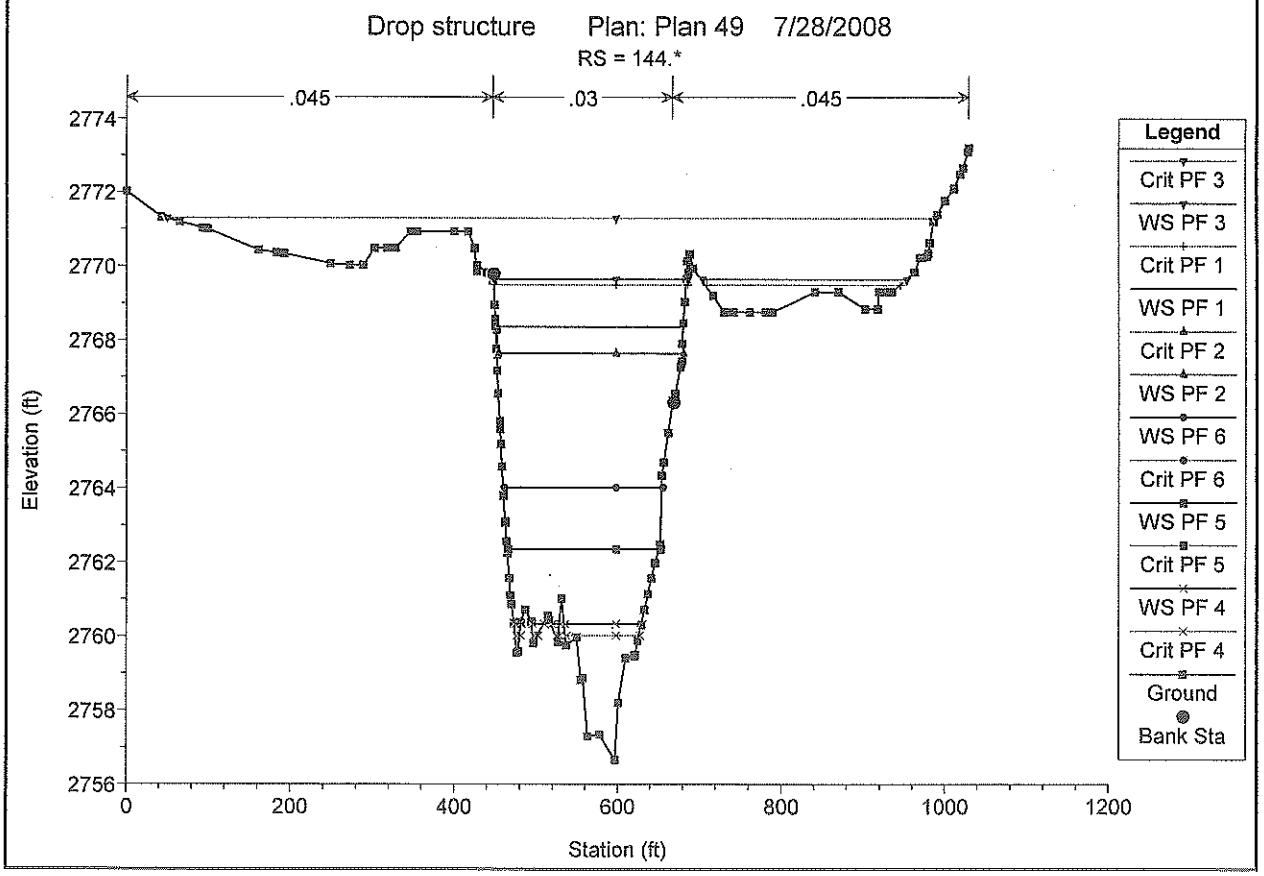

Drop structure Plan: Plan 49 7/28/2008
RS = 149.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

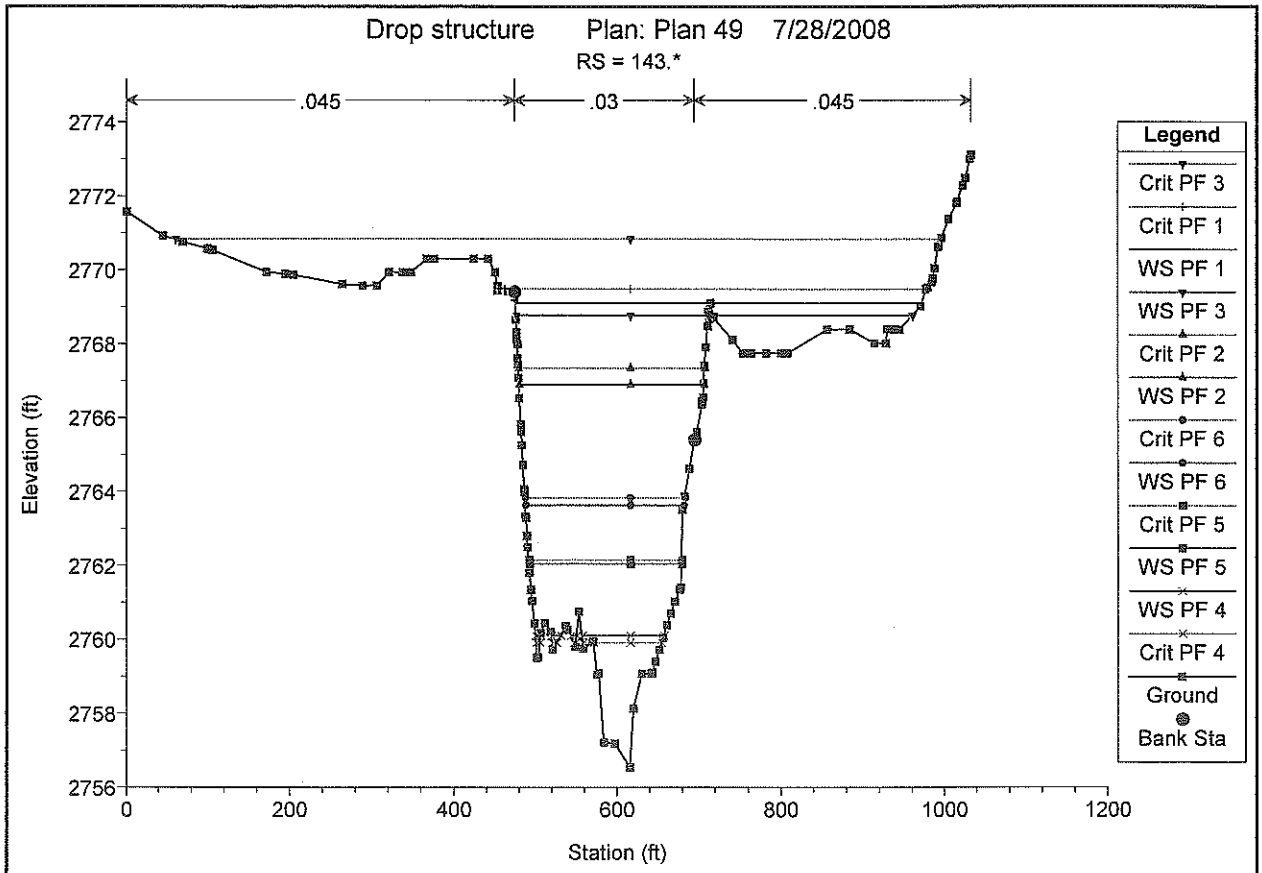

Drop structure Plan: Plan 49 7/28/2008
RS = 148.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

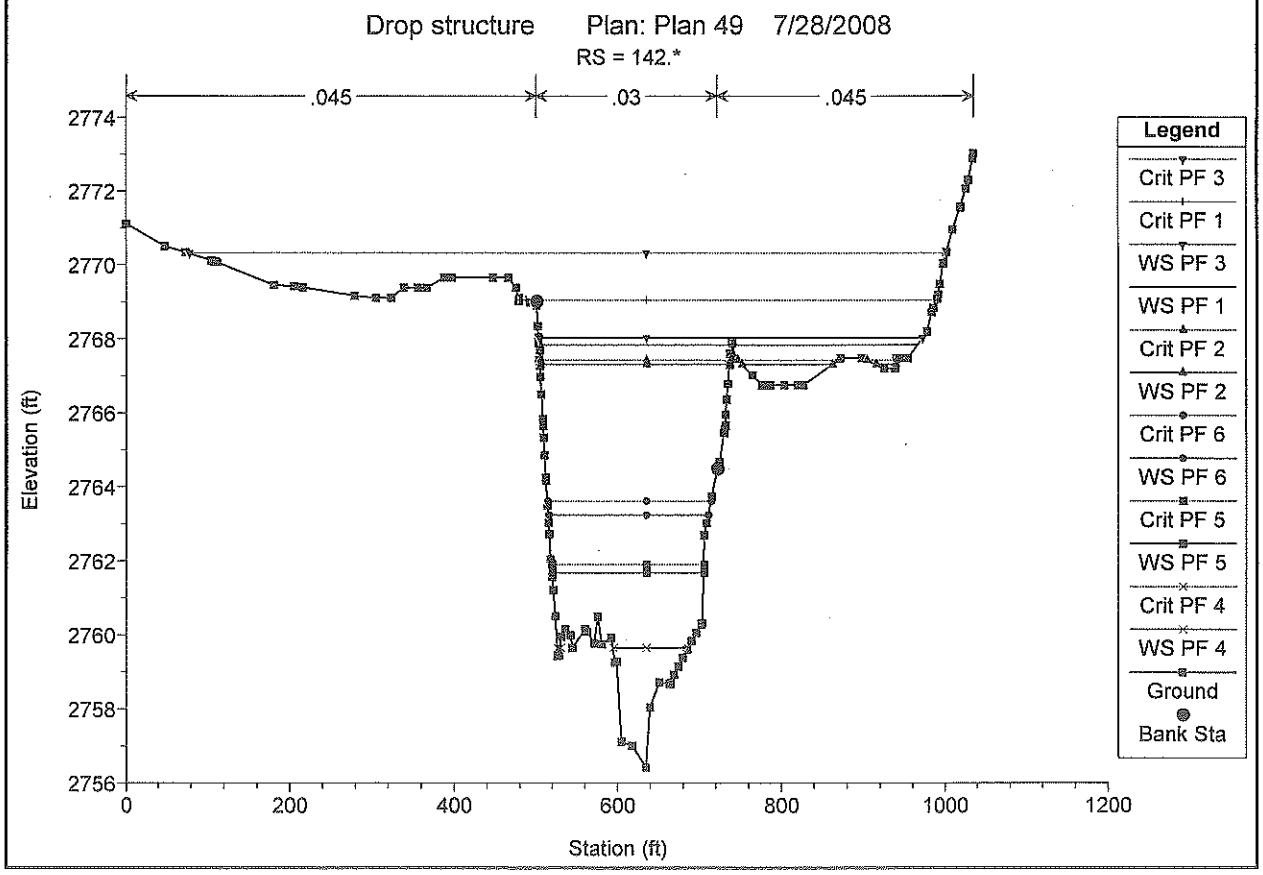

Drop structure Plan: Plan 49 7/28/2008
RS = 147.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

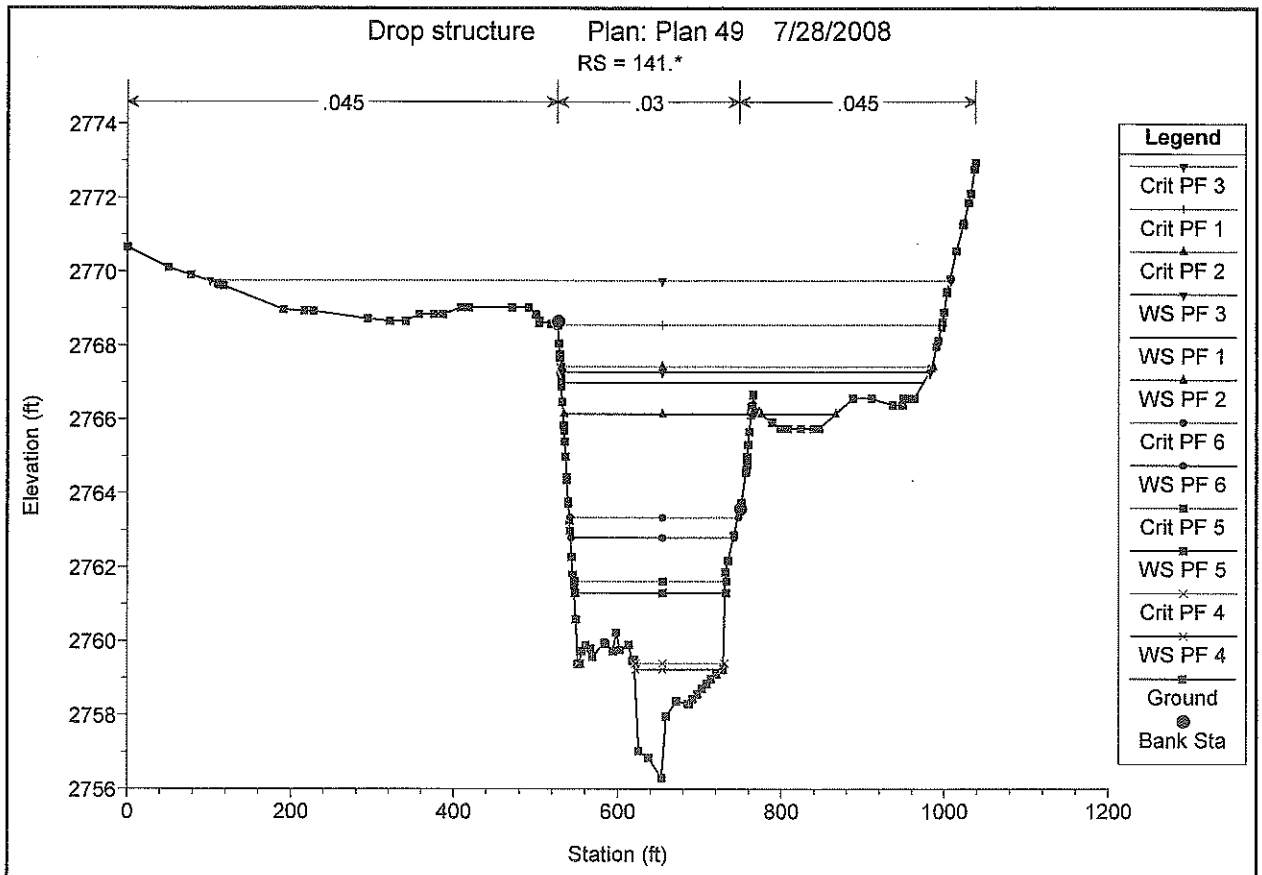

Drop structure Plan: Plan 49 7/28/2008
RS = 146.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

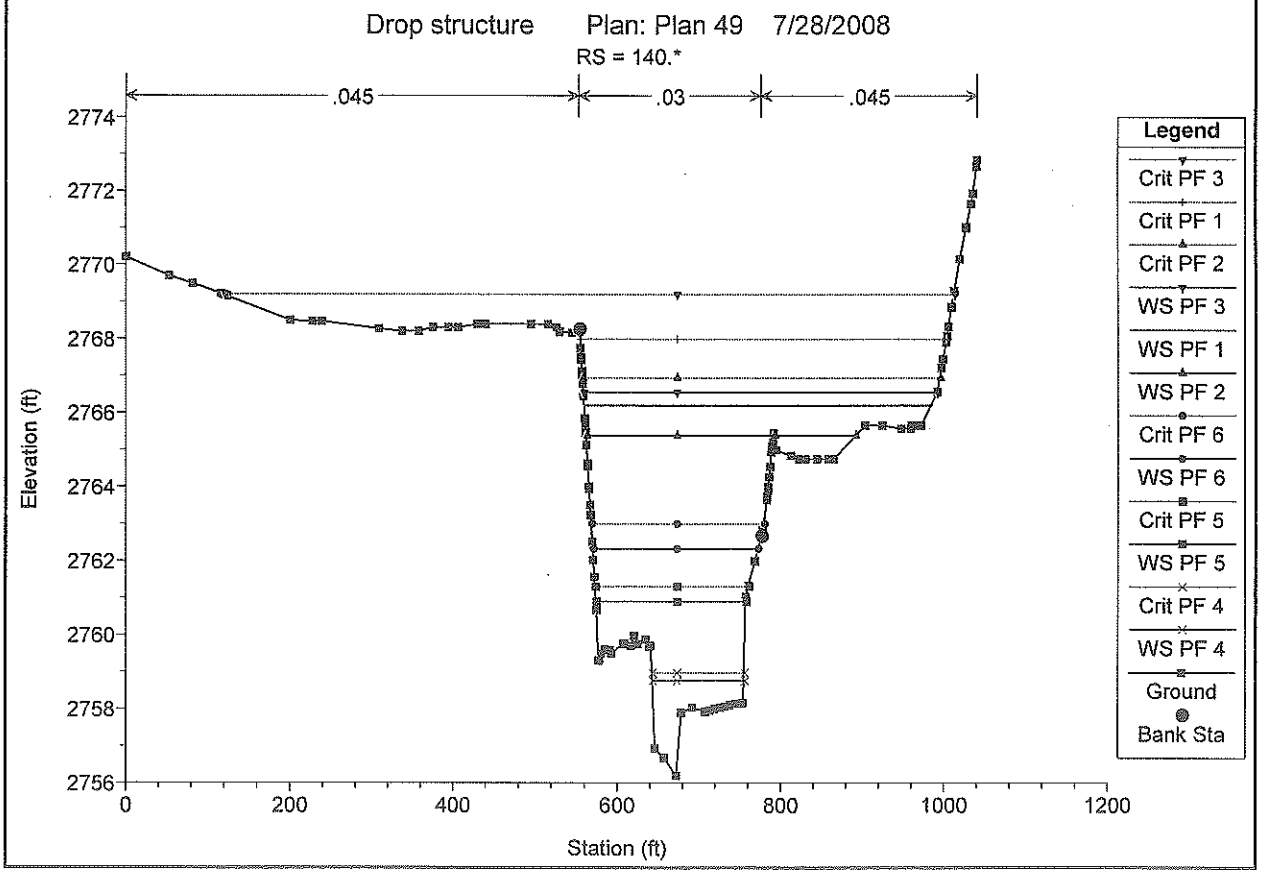

Drop structure Plan: Plan 49 7/28/2008
RS = 145.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

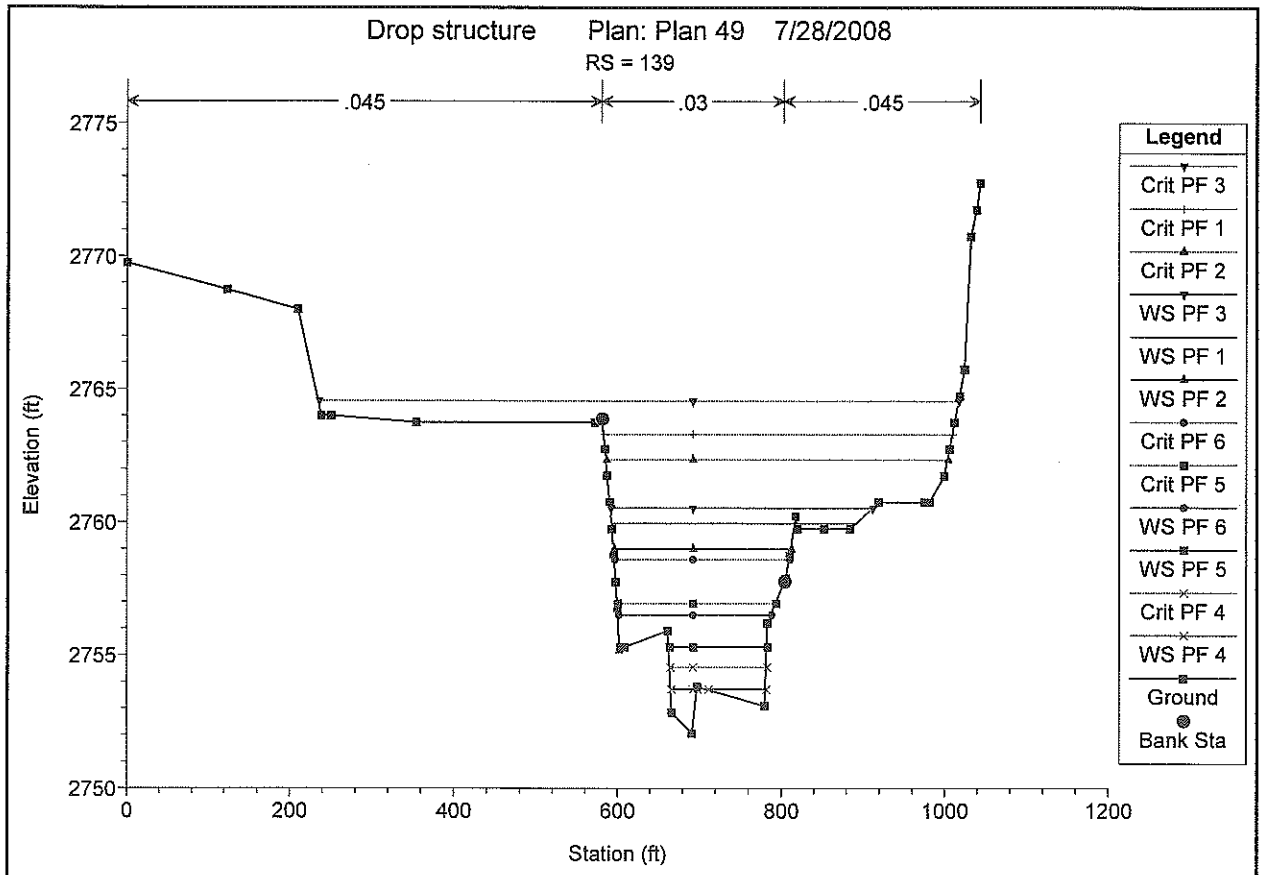

Drop structure Plan: Plan 49 7/28/2008
RS = 144.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
WS PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

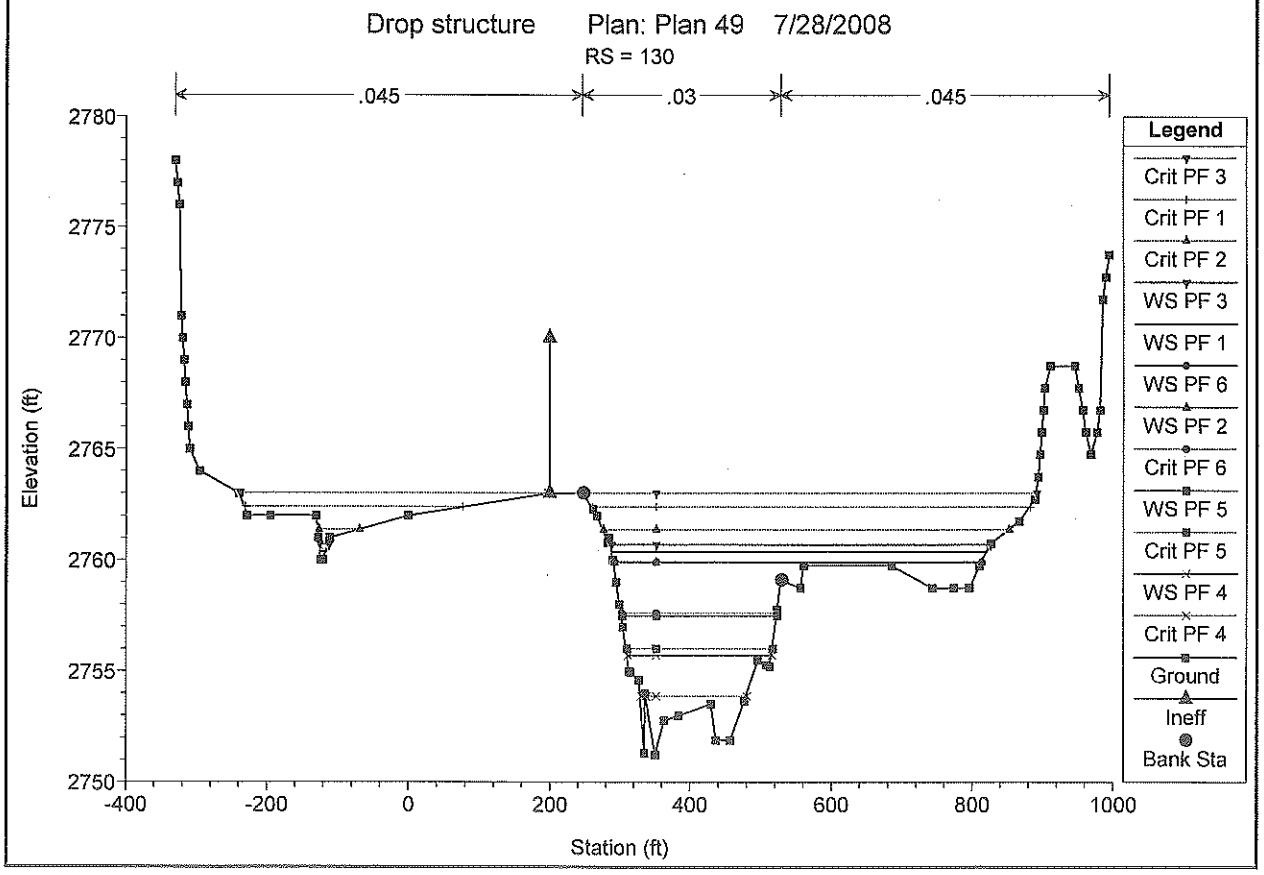

Drop structure Plan: Plan 49 7/28/2008
RS = 143.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 1
WS PF 3
Crit PF 2
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

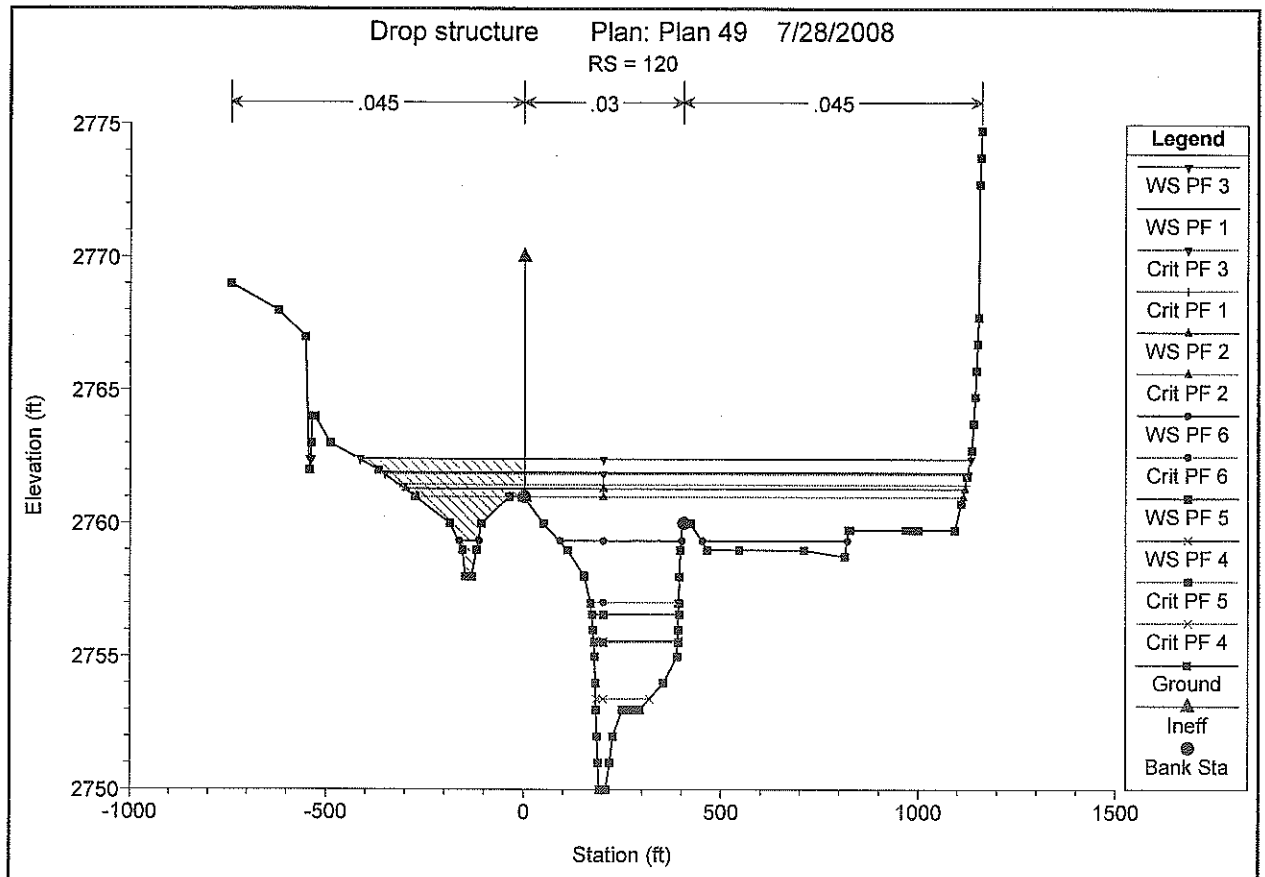

Drop structure Plan: Plan 49 7/28/2008
RS = 142.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
Crit PF 2
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

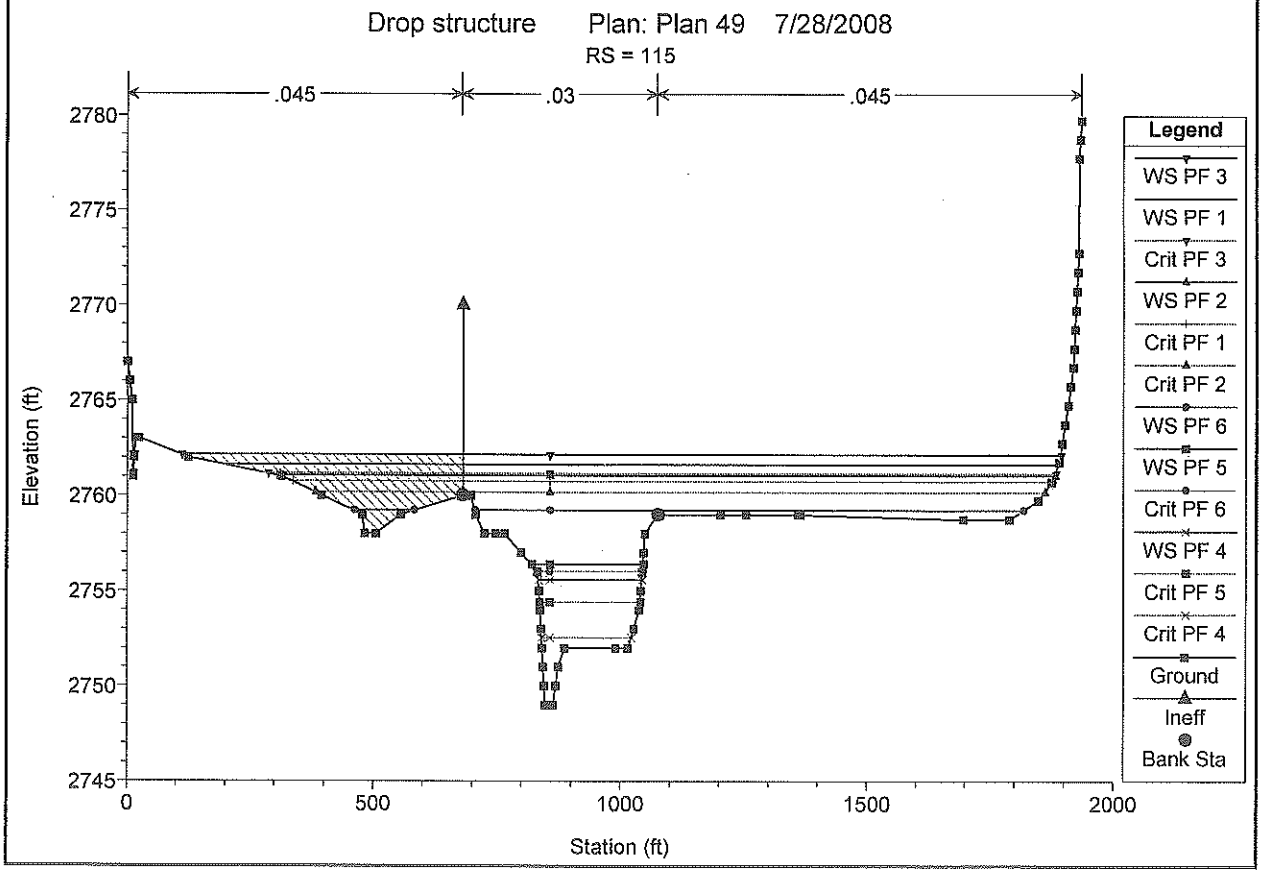

Drop structure Plan: Plan 49 7/28/2008
RS = 141.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

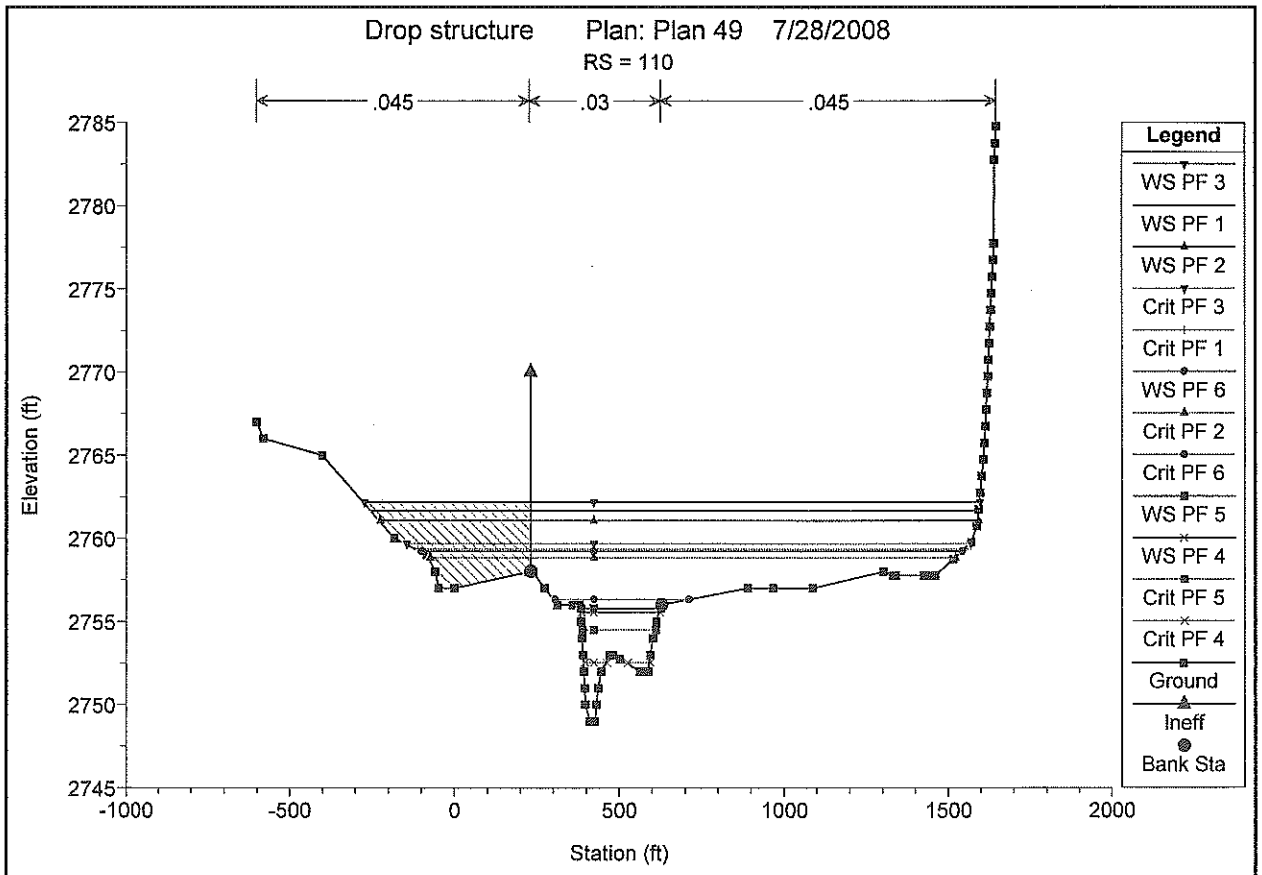

Drop structure Plan: Plan 49 7/28/2008
RS = 140.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

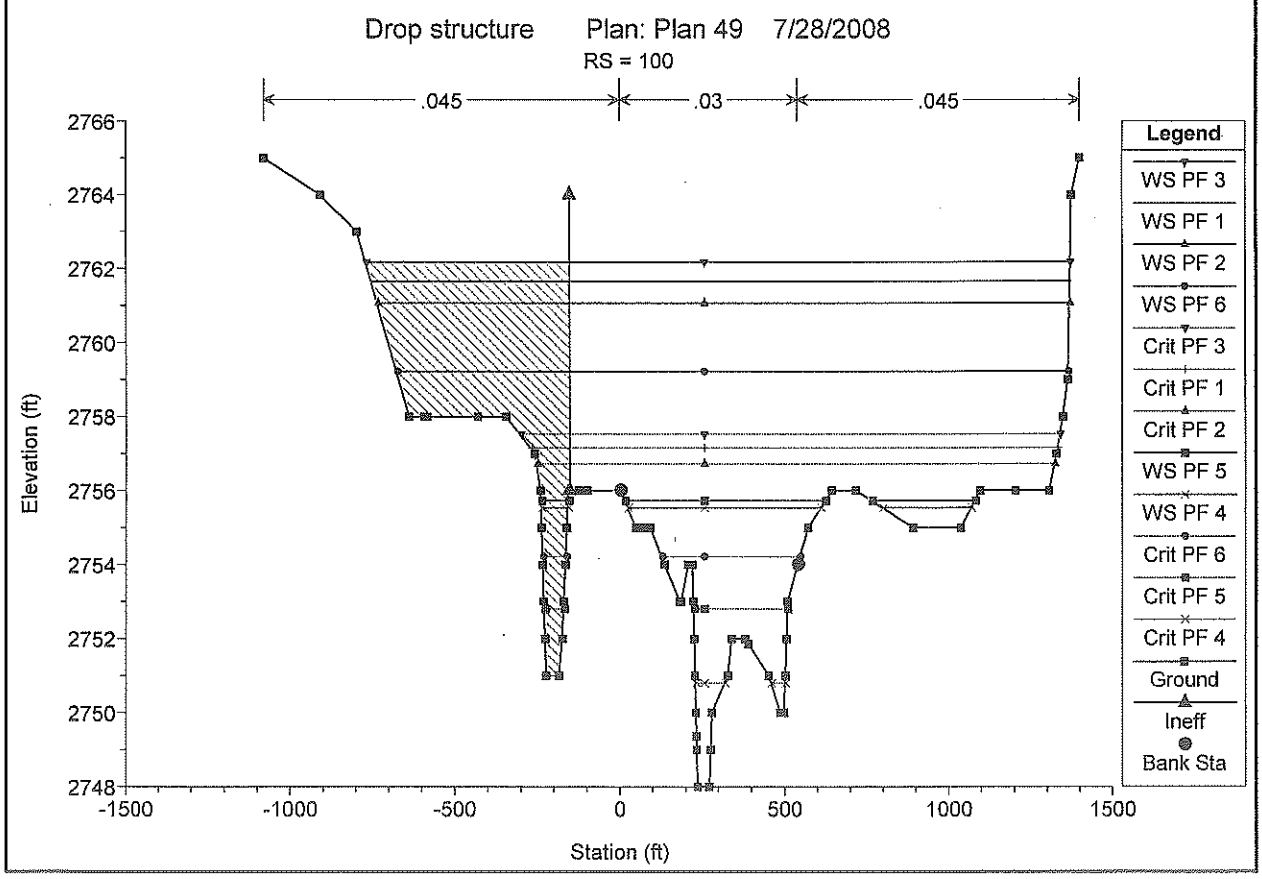

Drop structure Plan: Plan 49 7/28/2008
RS = 139
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Crit PF 6
Crit PF 5
WS PF 6
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

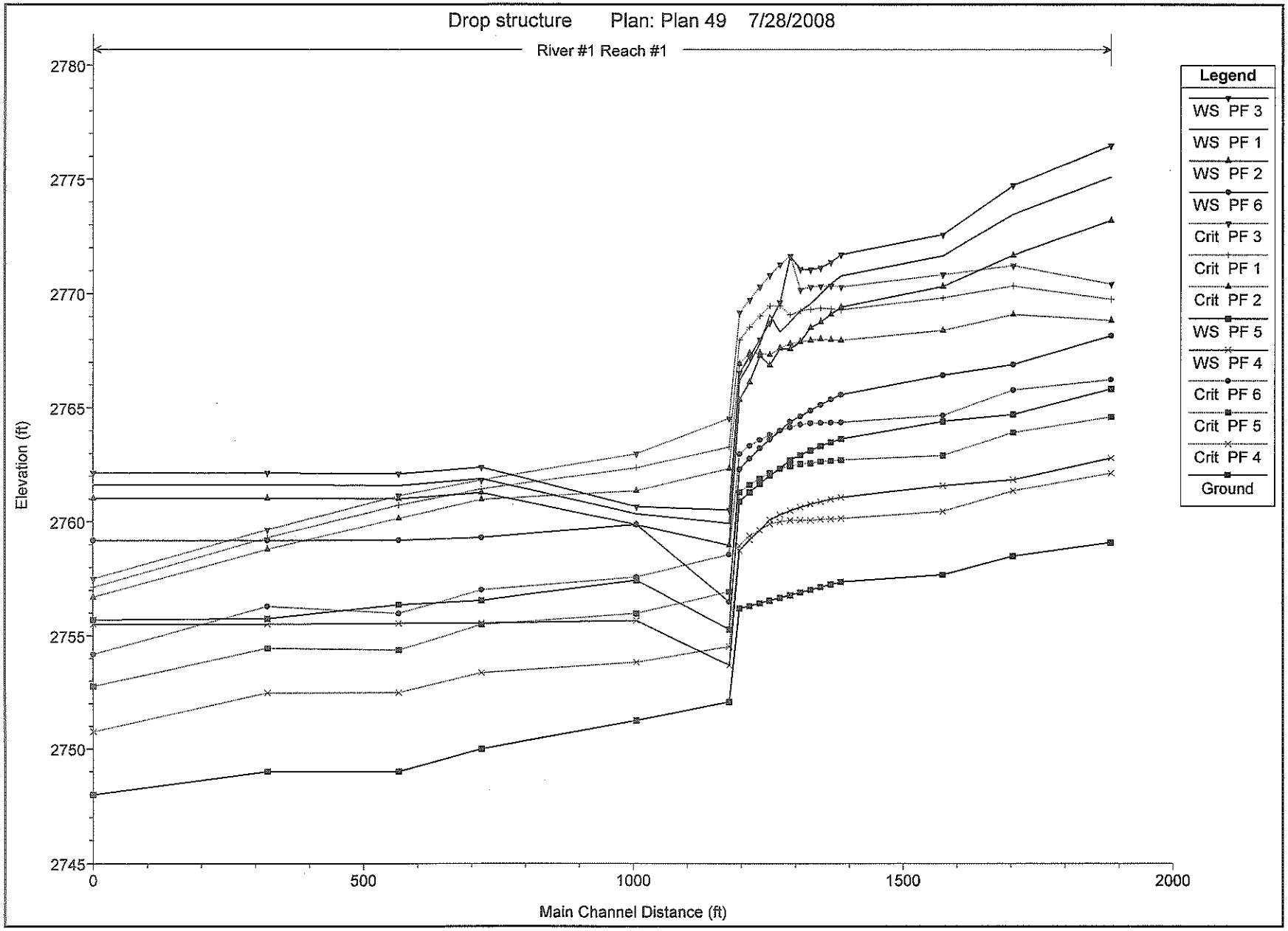

Drop structure Plan: Plan 49 7/28/2008
RS = 130
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 6
WS PF 2
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 49 7/28/2008
RS = 120
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
WS PF 4
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 49 7/28/2008
RS = 115
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
WS PF 6
WS PF 5
Crit PF 6
WS PF 4
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 49 7/28/2008
RS = 110
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
WS PF 6
Crit PF 2
Crit PF 6
WS PF 5
WS PF 4
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 49 7/28/2008
RS = 100
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
WS PF 6
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 5
WS PF 4
Crit PF 6
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 49 7/28/2008
River #1 Reach #1
Elevation (ft)
2780
2775
2770
2765
2760
2755
2750
2745
0
500
1000
1500
2000
Main Channel Distance (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
WS PF 6
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 5
WS PF 4
Crit PF 6
Crit PF 5
Crit PF 4
Ground

```
                    HEC-RAS Version 3.1.3 May 2005
                     U.S. Army Corp of Engineers
                    Hydrologic Engineering Center
                          609 Second Street
                          Davis, California

          X     X  XXXXXX    XXXX        XXXX       XX      XXXX
          X     X  X        X    X       X   X     X  X    X
          X     X  X        X            X   X    X    X   X
          XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
          X     X  X        X            X  X     X    X        X
          X     X  X        X    X       X   X    X    X        X
          X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

****

PROJECT DATA
Project Title: Drop structure
Project File : Drop_6ft.prj
Run Date and Time: 7/28/2008 9:35:14 AM

Project in English units

****

PLAN DATA

Plan Title: Plan 50
Plan File : g:\bill s\houghton\hec-ras\Drop_6ft.p50

Geometry Title: alternative 1 - Pier Drop 2 ft
Geometry File : g:\bill s\houghton\hec-ras\Drop_6ft.g14

Flow Title : Flow Profiles
Flow File : g:\bill s\houghton\hec-ras\Drop_6ft.f02

Plan Summary Information:

Number of:					
Cross Sections	=	20	Multiple Openings	=	0
Culverts	=	0	Inline Structures	=	0
Bridges	=	0	Lateral Structures	=	0

Computational Information

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

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

****

FLOW DATA

Flow Title: Flow Profiles
Flow File : g:\bill s\houghton\hec-ras\Drop_6ft.f02

Flow Data (cfs)

River	Reach	RS	PF 1	PF 2	PF 3	PF 4	PF 5	PF 6
River #1	Reach #1	180	31000	24490	36000	1000	5000	10000

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
River #1	Reach #1	PF 1	Known WS = 2773.55	Known WS = 2761.65
River #1	Reach #1	PF 2	Known WS = 2771.75	Known WS = 2761.06
River #1	Reach #1	PF 3	Known WS = 2774.82	Known WS = 2762.17
River #1	Reach #1	PF 4	Known WS = 2761.91	Known WS = 2755.53
River #1	Reach #1	PF 5	Known WS = 2763.98	Known WS = 2755.72
River #1	Reach #1	PF 6	Known WS = 2765.3	Known WS = 2759.21

****

GEOMETRY DATA

Geometry Title: alternative 1 - Pier Drop 2 ft
Geometry File : g:\bill s\houghton\hec-ras\Drop_6ft.g14

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 180

INPUT
Description:
Station Elevation Data num= 52

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
15.05	2776.75	32.58	2776.75	48.65	2776.75	49.95	2775.75	51.72	2774.75
53.59	2773.75	55.5	2772.75	57.44	2771.75	59.59	2770.75	62.1	2769.75
64.56	2768.76	64.56	2768.75	67.13	2767.47	67.71	2767.75	72.88	2766.28
97.35	2766.75	119.19	2765.75	133.29	2765.33	136.67	2764.75	143.41	2762.38

166.6	2762.71	170.36	2763.69	207.2	2762.94	207.2	2762.93	210.09	2761.47		
227.57	2761.13	247.23	2760.75	264.13	2759.08	318.52	2763	323.83	2759.53		
323.83	2759.52	327.41	2764.6	338.72	2764	354.33	2764.52	369.01	2765		
401.74	2766	409.05	2765.89	412.18	2767	414.21	2768	416.27	2769		
417.18	2767.25	417.18	2767.26	418.65	2770	421.02	2771	423.39	2772		
425.77	2773	428.14	2774	430.51	2775	431.09	2776.49	433.02	2776		
461.43	2776	761.43	2780								

anning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
15.05	.045	48.65	.03	433.02	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
48.65	433.02	44.45	181.54	256.85	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2775.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.		0.030	
W.S. Elev (ft)	2775.13	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2769.76	Flow Area (sq ft)		4166.17	
E.G. Slope (ft/ft)	0.000962	Area (sq ft)		4166.17	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	379.51	Top Width (ft)		379.51	
Vel Total (ft/s)	7.44	Avg. Vel. (ft/s)		7.44	
Max Chl Dpth (ft)	16.05	Hydr. Depth (ft)		10.98	
Conv. Total (cfs)	999369.6	Conv. (cfs)		999369.6	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		390.90	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.64	
Alpha	1.00	Stream Power (lb/ft s)		4.76	
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	15.87	102.08	42.63
C & E Loss (ft)	0.12	Cum SA (acres)	8.40	14.01	18.10

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 #PF 2

E.G. Elev (ft)	2774.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.78	Wt. n-Val.		0.030	
W.S. Elev (ft)	2773.22	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2768.85	Flow Area (sq ft)		3447.07	
E.G. Slope (ft/ft)	0.001096	Area (sq ft)		3447.07	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	371.67	Top Width (ft)		371.67	
Vel Total (ft/s)	7.10	Avg. Vel. (ft/s)		7.10	
Max Chl Dpth (ft)	14.14	Hydr. Depth (ft)		9.27	
Conv. Total (cfs)	739866.1	Conv. (cfs)		739866.1	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		382.13	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.62	
Alpha	1.00	Stream Power (lb/ft s)		4.38	
Frctn Loss (ft)	0.33	Cum Volume (acre-ft)	11.06	90.20	31.84
C & E Loss (ft)	0.11	Cum SA (acres)	7.35	13.92	17.35

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2777.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.91	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2776.50	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2770.43	Flow Area (sq ft)		4689.56	23.79
E.G. Slope (ft/ft)	0.000892	Area (sq ft)		4689.56	23.79
Q Total (cfs)	36000.00	Flow (cfs)		35988.14	11.86
Top Width (ft)	450.20	Top Width (ft)		384.05	66.15
Vel Total (ft/s)	7.64	Avg. Vel. (ft/s)		7.67	0.50
Max Chl Dpth (ft)	17.42	Hydr. Depth (ft)		12.21	0.36
Conv. Total (cfs)	1205476.0	Conv. (cfs)		1205079.0	397.3
Length Wtd. (ft)	181.56	Wetted Per. (ft)		396.84	66.15
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.66	0.02
Alpha	1.01	Stream Power (lb/ft s)		5.05	0.01
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	20.25	111.05	51.39
C & E Loss (ft)	0.13	Cum SA (acres)	9.56	14.09	18.89

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 #PF 4

E.G. Elev (ft)	2763.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.80	Reach Len. (ft)	44.45	181.54	256.85
Crit W.S. (ft)	2762.13	Flow Area (sq ft)		227.08	
E.G. Slope (ft/ft)	0.004290	Area (sq ft)		227.08	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	140.27	Top Width (ft)		140.27	
Vel Total (ft/s)	4.40	Avg. Vel. (ft/s)		4.40	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		1.62	
Conv. Total (cfs)	15268.4	Conv. (cfs)		15268.4	
Length Wtd. (ft)	181.54	Wetted Per. (ft)		143.57	
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.42	
Alpha	1.00	Stream Power (lb/ft s)		1.87	
Frctn Loss (ft)	0.87	Cum Volume (acre-ft)	0.48	14.23	
C & E Loss (ft)	0.01	Cum SA (acres)	0.23	7.65	

****

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2766.37	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.53	Wt. n-Val.		0.030		
W.S. Elev (ft)	2765.84	Reach Len. (ft)	44.45	181.54	256.85	
Crit W.S. (ft)	2764.60	Flow Area (sq ft)		856.67		
E.G. Slope (ft/ft)	0.003189	Area (sq ft)		856.67		
Q Total (cfs)	5000.00	Flow (cfs)		5000.00		
Top Width (ft)	279.32	Top Width (ft)		279.32		
Vel Total (ft/s)	5.84	Avg. Vel. (ft/s)		5.84		
Max Chl Dpth (ft)	6.76	Hydr. Depth (ft)		3.07		
Conv. Total (cfs)	88535.0	Conv. (cfs)		88535.0		
Length Wtd. (ft)	181.54	Wetted Per. (ft)		284.23		
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.60		
Alpha	1.00	Stream Power (lb/ft s)		3.50		
Frctn Loss (ft)	0.72	Cum Volume (acre-ft)	0.52	31.54		
C & E Loss (ft)	0.04	Cum SA (acres)	0.23	9.56		

****

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2768.77	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.58	Wt. n-Val.		0.030		
W.S. Elev (ft)	2768.18	Reach Len. (ft)	44.45	181.54	256.85	
Crit W.S. (ft)	2766.24	Flow Area (sq ft)		1630.48		
E.G. Slope (ft/ft)	0.002022	Area (sq ft)		1630.48		
Q Total (cfs)	10000.00	Flow (cfs)		10000.00		
Top Width (ft)	349.86	Top Width (ft)		349.86		
Vel Total (ft/s)	6.13	Avg. Vel. (ft/s)		6.13		
Max Chl Dpth (ft)	9.10	Hydr. Depth (ft)		4.66		
Conv. Total (cfs)	222397.3	Conv. (cfs)		222397.3		
Length Wtd. (ft)	181.54	Wetted Per. (ft)		356.78		
Min Ch El (ft)	2759.08	Shear (lb/sq ft)		0.58		
Alpha	1.00	Stream Power (lb/ft s)		3.54		
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	2.25	55.86	6.23	
C & E Loss (ft)	0.07	Cum SA (acres)	1.47	12.05	6.71	

****

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 170

INPUT
Description:
Station Elevation Data num= 45

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2776.75	10.041	2776.75	11.208	2776.56	13.039	2775.75	14.984	2774.75
17.041	2773.75	19.445	2772.75	21.468	2771.75	23.419	2770.75	25.484	2769.75
27.471	2768.75	29.409	2767.75	30.901	2767.12	31.424	2766.75	33.545	2765.75
38.947	2765.75	39.428	2765.75	41.868	2765.12	60.352	2766.13	65.082	2765.97
66.072	2764.75	69.89	2764.75	71.743	2764.93	72.768	2764.75	85.567	2761.65
101.392	2761.27	114.672	2763.12	137.165	2763.34	145.296	2760.76	193.16	2760.8
199.171	2758.99	240.331	2758.49	254.092	2762.23	263.715	2762.13	265.413	2763.75
266.813	2764.75	268.199	2765.75	269.584	2766.75	270.801	2767.75	271.974	2768.75
273.155	2769.75	274.336	2770.75	275.524	2771.75	276.705	2772.75	282.843	2777

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	10.041	.03	276.705	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
10.041 276.705 130.15 130.15 130.15 .1 .3
Blocked Obstructions num= 3

Sta L	Sta R	Elev	Sta L	Sta R	Elev	Sta L	Sta R	Elev
85	89	2780	147	151	2780	209	213	2780

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2775.57	Element	Left OB	Channel	Right OB	
Vel Head (ft)	2.08	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2773.49	Reach Len. (ft)	130.15	130.15	130.15	
Crit W.S. (ft)	2770.35	Flow Area (sq ft)		2676.35	0.39	
E.G. Slope (ft/ft)	0.003402	Area (sq ft)		2676.35	0.39	
Q Total (cfs)	31000.00	Flow (cfs)		30999.66	0.34	
Top Width (ft)	248.09	Top Width (ft)		247.03	1.06	
Vel Total (ft/s)	11.58	Avg. Vel. (ft/s)		11.58	0.87	
Max Chl Dpth (ft)	15.00	Hydr. Depth (ft)		10.83	0.37	
Conv. Total (cfs)	531513.9	Conv. (cfs)		531508.1	5.8	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		333.35	1.29	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.71	0.06	
Alpha	1.00	Stream Power (lb/ft s)		19.75	0.06	
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)	15.87	87.83	42.63	
C & E Loss (ft)	0.12	Cum SA (acres)	8.40	12.71	18.10	

****

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.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2773.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.85	Wt. n-Val.		0.030	
W.S. Elev (ft)	2771.71	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2769.11	Flow Area (sq ft)		2241.82	
E.G. Slope (ft/ft)	0.003581	Area (sq ft)		2241.82	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	241.93	Top Width (ft)		241.93	
Vel Total (ft/s)	10.92	Avg. Vel. (ft/s)		10.92	
Max Chl Dpth (ft)	13.22	Hydr. Depth (ft)		9.27	
Conv. Total (cfs)	409256.4	Conv. (cfs)		409256.4	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		316.82	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.58	
Alpha	1.00	Stream Power (lb/ft s)		17.28	
Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	11.06	78.35	31.84
C & E Loss (ft)	0.08	Cum SA (acres)	7.35	12.64	17.35

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.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2777.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.25	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2774.76	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2771.24	Flow Area (sq ft)		2991.72	2.90
E.G. Slope (ft/ft)	0.003299	Area (sq ft)		2991.72	2.90
Q Total (cfs)	36000.00	Flow (cfs)		35995.16	4.84
Top Width (ft)	252.63	Top Width (ft)		249.73	2.90
Vel Total (ft/s)	12.02	Avg. Vel. (ft/s)		12.03	1.67
Max Chl Dpth (ft)	16.27	Hydr. Depth (ft)		11.98	1.00
Conv. Total (cfs)	626805.7	Conv. (cfs)		626721.4	84.3
Length Wtd. (ft)	130.15	Wetted Per. (ft)		343.95	3.52
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.79	0.17
Alpha	1.00	Stream Power (lb/ft s)		21.55	0.28
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	20.25	95.04	51.32
C & E Loss (ft)	0.15	Cum SA (acres)	9.56	12.77	18.69

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.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2762.22	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.38	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.84	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2761.35	Flow Area (sq ft)		203.00	
E.G. Slope (ft/ft)	0.005401	Area (sq ft)		203.00	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	119.52	Top Width (ft)		119.52	
Vel Total (ft/s)	4.93	Avg. Vel. (ft/s)		4.93	
Max Chl Dpth (ft)	3.35	Hydr. Depth (ft)		1.70	
Conv. Total (cfs)	13607.4	Conv. (cfs)		13607.4	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		128.95	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		0.53	
Alpha	1.00	Stream Power (lb/ft s)		2.61	
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	0.48	13.33	
C & E Loss (ft)	0.06	Cum SA (acres)	0.23	7.11	

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 #PF 5

E.G. Elev (ft)	2765.61	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.89	Wt. n-Val.		0.030	
W.S. Elev (ft)	2764.72	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2763.92	Flow Area (sq ft)		660.60	
E.G. Slope (ft/ft)	0.005075	Area (sq ft)		660.60	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	181.90	Top Width (ft)		181.90	
Vel Total (ft/s)	7.57	Avg. Vel. (ft/s)		7.57	
Max Chl Dpth (ft)	6.23	Hydr. Depth (ft)		3.63	
Conv. Total (cfs)	70183.8	Conv. (cfs)		70183.8	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		210.28	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.00	
Alpha	1.00	Stream Power (lb/ft s)		7.53	
Frctn Loss (ft)	0.48	Cum Volume (acre-ft)	0.52	28.38	
C & E Loss (ft)	0.07	Cum SA (acres)	0.23	8.60	

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2768.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.24	Wt. n-Val.		0.030	
W.S. Elev (ft)	2766.91	Reach Len. (ft)	130.15	130.15	130.15
Crit W.S. (ft)	2765.78	Flow Area (sq ft)		1117.67	
E.G. Slope (ft/ft)	0.004905	Area (sq ft)		1117.67	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	226.59	Top Width (ft)		226.59	
Vel Total (ft/s)	8.95	Avg. Vel. (ft/s)		8.95	
Max Chl Dpth (ft)	8.42	Hydr. Depth (ft)		4.93	
Conv. Total (cfs)	142789.4	Conv. (cfs)		142789.4	
Length Wtd. (ft)	130.15	Wetted Per. (ft)		269.80	
Min Ch El (ft)	2758.49	Shear (lb/sq ft)		1.27	
Alpha	1.00	Stream Power (lb/ft s)		11.35	

```
* Frctn Loss (ft)        *    0.52  * Cum Volume (acre-ft)   *    2.25  *   50.13  *    6.23  *
* C & E Loss (ft)        *    0.02  * Cum SA (acres)         *    1.47  *   10.85  *    6.71  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION


RIVER: River #1
REACH: Reach #1           RS: 160

INPUT
Description:
Station Elevation Data    num=      84
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
       0 2775.75   5.607 2775.75   12.07 2775.75  19.049 2775.75  29.317 2775.75
  71.828 2774.75  85.786 2773.75  89.067 2773.75 103.188 2774.75 115.831 2774.75
 128.085 2774.75 176.975 2775.75 196.024 2776.75 201.271 2777.75 222.357 2778.36
 223.106 2777.75 224.726 2776.75 226.578 2775.75 228.113 2774.48 228.466 2774.75
 231.408 2773.75 239.405 2772.75  244.73 2772.63 245.868 2771.75 247.233 2770.75
 248.605 2769.75 250.054 2768.75 251.681 2767.76 251.681 2767.75 253.342 2766.75
 254.813 2765.75 256.164 2764.75 257.132 2763.88 262.209  2762.7 273.085 2760.84
  297.19 2760.63 301.164 2761.77 319.273 2761.94 326.146 2760.17 341.547 2760.01
 354.324 2759.87 381.194 2760.68  389.17 2757.67 435.231 2758.17 436.985 2762.55
 442.317 2762.86 444.608 2763.75 445.477 2764.44  445.88 2764.75 447.146 2765.75
 448.419 2766.75 449.692 2767.75 450.979 2768.75 452.237 2769.75 453.482 2770.75
 453.482 2770.76  454.74 2771.75 455.985 2772.75 457.201 2773.75 457.201 2773.76
  458.12  2775.1 458.403 2774.75 466.584 2774.75 469.887 2774.75 478.704 2775.75
 485.853 2776.75 713.195 2776.75 716.745 2776.75 720.132 2776.75 792.165 2775.75
  803.98 2775.75 814.743 2775.75 830.143 2774.75 840.806 2774.75 857.466 2775.75
 873.256 2775.75 926.755 2774.75 940.777 2773.75 941.237 2773.75 945.579 2773.75
 955.669 2773.75  965.18 2773.75 989.002 2773.751007.684 2774.75

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
*********************************************
       0    .045  244.73     .03  458.12    .045

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
        244.73  458.12            203.69  188.86     197             .1       .3
Blocked Obstructions      num=       3
   Sta L   Sta R    Elev   Sta L   Sta R    Elev   Sta L   Sta R    Elev
*******************************************************************
     250     254    2780     312     316    2780     374     378    2780
Skew Angle = 45

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)         * 2774.92  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.25  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)         * 2771.67  * Reach Len. (ft)        *  203.69  *  188.86  *  197.00  *
* Crit W.S. (ft)         * 2769.83  * Flow Area (sq ft)      *          * 2143.16  *          *
* E.G. Slope (ft/ft)     *0.005009  * Area (sq ft)           *          * 2143.16  *          *
* Q Total (cfs)          *31000.00  * Flow (cfs)             *          *31000.00  *          *
* Top Width (ft)         *  196.67  * Top Width (ft)         *          *  196.67  *          *
* Vel Total (ft/s)       *   14.46  * Avg. Vel. (ft/s)       *          *   14.46  *          *
* Max Chl Dpth (ft)      *   14.00  * Hydr. Depth (ft)       *          *   10.90  *          *
* Conv. Total (cfs)      *438025.0  * Conv. (cfs)            *          *438025.0  *          *
* Length Wtd. (ft)       *  188.86  * Wetted Per. (ft)       *          *  255.68  *          *
* Min Ch El (ft)         * 2757.67  * Shear (lb/sq ft)       *          *    2.62  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   37.91  *          *
* Frctn Loss (ft)        *    0.87  * Cum Volume (acre-ft)   *   15.87  *   80.63  *   42.62  *
* C & E Loss (ft)        *    0.00  * Cum SA (acres)         *    8.40  *   12.04  *   18.10  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)         * 2772.97  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    2.63  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)         * 2770.34  * Reach Len. (ft)        *  203.69  *  188.86  *  197.00  *
* Crit W.S. (ft)         * 2768.41  * Flow Area (sq ft)      *          * 1883.39  *          *
* E.G. Slope (ft/ft)     *0.004500  * Area (sq ft)           *          * 1883.39  *          *
* Q Total (cfs)          *24490.00  * Flow (cfs)             *          *24490.00  *          *
* Top Width (ft)         *  193.18  * Top Width (ft)         *          *  193.18  *          *
* Vel Total (ft/s)       *   13.00  * Avg. Vel. (ft/s)       *          *   13.00  *          *
* Max Chl Dpth (ft)      *   12.67  * Hydr. Depth (ft)       *          *    9.75  *          *
* Conv. Total (cfs)      *365056.1  * Conv. (cfs)            *          *365056.1  *          *
* Length Wtd. (ft)       *  188.86  * Wetted Per. (ft)       *          *  243.29  *          *
* Min Ch El (ft)         * 2757.67  * Shear (lb/sq ft)       *          *    2.18  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   28.28  *          *
* Frctn Loss (ft)        *    0.81  * Cum Volume (acre-ft)   *   11.06  *   72.18  *   31.84  *
* C & E Loss (ft)        *    0.01  * Cum SA (acres)         *    7.35  *   11.99  *   17.35  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)         * 2776.32  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)          *    3.72  * Wt. n-Val.              *          *   0.030  *          *
* W.S. Elev (ft)         * 2772.60  * Reach Len. (ft)        *  203.69  *  188.86  *  197.00  *
* Crit W.S. (ft)         * 2770.85  * Flow Area (sq ft)      *          * 2327.25  *          *
* E.G. Slope (ft/ft)     *0.005364  * Area (sq ft)           *          * 2327.25  *          *
* Q Total (cfs)          *36000.00  * Flow (cfs)             *          *36000.00  *          *
* Top Width (ft)         *  199.04  * Top Width (ft)         *          *  199.04  *          *
* Vel Total (ft/s)       *   15.47  * Avg. Vel. (ft/s)       *          *   15.47  *          *
* Max Chl Dpth (ft)      *   14.93  * Hydr. Depth (ft)       *          *   11.69  *          *
* Conv. Total (cfs)      *491555.4  * Conv. (cfs)            *          *491555.4  *          *
* Length Wtd. (ft)       *  188.86  * Wetted Per. (ft)       *          *  264.28  *          *
* Min Ch El (ft)         * 2757.67  * Shear (lb/sq ft)       *          *    2.95  *          *
* Alpha                  *    1.00  * Stream Power (lb/ft s) *          *   45.61  *          *
```

* Frctn Loss (ft)	*	0.91	* Cum Volume (acre-ft)	*	20.25	*	87.10	*	51.31	*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	9.56	*	12.10	*	18.69	*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	*	2761.77	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.18	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2761.59	* Reach Len. (ft)	*	203.69	*	188.86	*	197.00	*
* Crit W.S. (ft)	*	2760.46	* Flow Area (sq ft)	*		*	293.37	*		*
* E.G. Slope (ft/ft)	*	0.001922	* Area (sq ft)	*		*	293.37	*		*
* Q Total (cfs)	*	1000.00	* Flow (cfs)	*		*	1000.00	*		*
* Top Width (ft)	*	143.78	* Top Width (ft)	*		*	143.78	*		*
* Vel Total (ft/s)	*	3.41	* Avg. Vel. (ft/s)	*		*	3.41	*		*
* Max Chl Dpth (ft)	*	3.92	* Hydr. Depth (ft)	*		*	2.04	*		*
* Conv. Total (cfs)	*	22810.8	* Conv. (cfs)	*		*	22810.8	*		*
* Length Wtd. (ft)	*	188.86	* Wetted Per. (ft)	*		*	149.16	*		*
* Min Ch El (ft)	*	2757.67	* Shear (lb/sq ft)	*		*	0.24	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	0.80	*		*
* Frctn Loss (ft)	*	0.44	* Cum Volume (acre-ft)	*	0.48	*	12.59	*		*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	0.23	*	6.72	*		*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	*	2765.07	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.64	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2764.42	* Reach Len. (ft)	*	203.69	*	188.86	*	197.00	*
* Crit W.S. (ft)	*	2762.91	* Flow Area (sq ft)	*		*	775.80	*		*
* E.G. Slope (ft/ft)	*	0.002752	* Area (sq ft)	*		*	775.80	*		*
* Q Total (cfs)	*	5000.00	* Flow (cfs)	*		*	5000.00	*		*
* Top Width (ft)	*	180.92	* Top Width (ft)	*		*	180.92	*		*
* Vel Total (ft/s)	*	6.44	* Avg. Vel. (ft/s)	*		*	6.44	*		*
* Max Chl Dpth (ft)	*	6.75	* Hydr. Depth (ft)	*		*	4.29	*		*
* Conv. Total (cfs)	*	95311.4	* Conv. (cfs)	*		*	95311.4	*		*
* Length Wtd. (ft)	*	188.86	* Wetted Per. (ft)	*		*	198.59	*		*
* Min Ch El (ft)	*	2757.67	* Shear (lb/sq ft)	*		*	0.67	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	4.33	*		*
* Frctn Loss (ft)	*	0.61	* Cum Volume (acre-ft)	*	0.52	*	26.23	*		*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	0.23	*	8.06	*		*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	*	2767.62	* Element	*	Left OB	*	Channel	*	Right OB	*
Vel Head (ft)	*	1.18	* Wt. n-Val.	*		*	0.030	*		*
W.S. Elev (ft)	*	2766.44	* Reach Len. (ft)	*	203.69	*	188.86	*	197.00	*
Crit W.S. (ft)	*	2764.67	* Flow Area (sq ft)	*		*	1145.67	*		*
* E.G. Slope (ft/ft)	*	0.003300	* Area (sq ft)	*		*	1145.67	*		*
* Q Total (cfs)	*	10000.00	* Flow (cfs)	*		*	10000.00	*		*
* Top Width (ft)	*	186.02	* Top Width (ft)	*		*	186.02	*		*
* Vel Total (ft/s)	*	8.73	* Avg. Vel. (ft/s)	*		*	8.73	*		*
* Max Chl Dpth (ft)	*	8.77	* Hydr. Depth (ft)	*		*	6.16	*		*
* Conv. Total (cfs)	*	174087.6	* Conv. (cfs)	*		*	174087.6	*		*
* Length Wtd. (ft)	*	188.86	* Wetted Per. (ft)	*		*	213.21	*		*
* Min Ch El (ft)	*	2757.67	* Shear (lb/sq ft)	*		*	1.11	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	9.66	*		*
* Frctn Loss (ft)	*	0.67	* Cum Volume (acre-ft)	*	2.25	*	46.75	*	6.23	*
* C & E Loss (ft)	*	0.02	* Cum SA (acres)	*	1.47	*	10.24	*	6.71	*

Warning: Divided flow computed for this cross-section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 150

INPUT
Description:
Station Elevation Data num= 99

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.75	27.415	2773.75	42.03	2773.75	59.892	2773.75	62.416	2773.75
64.078	2773.75	160.259	2772.75	185.715	2772.75	194.744	2773.75	204.594	2773.75
210.718	2773.75	222.774	2774.75	228.183	2774.75	257.019	2774.75	267.81	2774.75
273.007	2773.75	274.803	2772.4	275.015	2772.75	287.29	2772.06	287.545	2771.75
289.737	2770.75	290.925	2770.17	291.165	2769.75	292.615	2768.75	292.615	2768.76
293.301	2770.01	294.086	2767.76	294.086	2767.75	295.641	2766.75	298.583	2765.75
300.223	2764.76	300.223	2764.75	301.687	2763.75	304.049	2762.75	306.828	2761.76
307.153	2761.75	310.201	2760.75	315.32	2759.75	327.928	2759.98	331.711	2761.72
339.341	2762.38	348.858	2761.61	352.302	2760.28	375.078	2761.75	377.814	2761.46
391.136	2760.05	397.352	2762.59	404.677	2759.75	421.315	2760.11	427.849	2757.53
458.495	2758.34	483.223	2757.36	487.119	2761.47	490.188	2761.75	490.492	2761.76
490.492	2761.77	490.584	2761.86	491.482	2762.75	491.482	2762.76	492.726	2763.75
492.726	2763.76	493.964	2764.75	495.201	2765.75	496.467	2766.75	497.853	2767.75
499.401	2768.75	500.936	2769.75	500.936	2769.76	502.477	2770.75	504.047	2771.75
504.294	2771.9	518.734	2772.75	520.388	2772.75	520.388	2772.76	520.685	2773.75
522.75	2774.75	525.055	2775.75	528.562	2776.75	529.291	2777.69	531.794	2776.75
533.505	2777.63	573.768	2775.75	592.796	2774.75	608.727	2774.75	636.672	2774.75
73.471	2774.75	788.445	2774.75	833.707	2773.75	855.161	2773.75	857.438	2774.75
28.516	2774.75	939.879	2773.75	942.008	2773.75	951.829	2774.75	952.204	2774.75
986.569	2773.75	998.018	2773.75	1010.809	2773.75	1012.796	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	287.29	.03	504.047	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
287.29	504.047	23.86	18.79	11.8	.1	.3

Skew Angle = 45

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2774.06	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.25	Wt. n-Val.		0.030	
W.S. Elev (ft)	2770.81	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.32	Flow Area (sq ft)		2143.28	
E.G. Slope (ft/ft)	0.004221	Area (sq ft)		2143.28	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	212.96	Top Width (ft)		212.96	
Vel Total (ft/s)	14.46	Avg. Vel. (ft/s)		14.46	
Max Chl Dpth (ft)	13.45	Hydr. Depth (ft)		10.06	
Conv. Total (cfs)	477138.7	Conv. (cfs)		477138.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		224.93	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		2.51	
Alpha	1.00	Stream Power (lb/ft s)		36.32	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	15.87	71.33	42.62
C & E Loss (ft)	0.02	Cum SA (acres)	8.40	11.16	18.10

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2772.14	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.71	Wt. n-Val.		0.030	
W.S. Elev (ft)	2769.43	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.97	Flow Area (sq ft)		1853.82	
E.G. Slope (ft/ft)	0.004114	Area (sq ft)		1853.82	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	208.31	Top Width (ft)		208.31	
Vel Total (ft/s)	13.21	Avg. Vel. (ft/s)		13.21	
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		8.90	
Conv. Total (cfs)	381810.9	Conv. (cfs)		381810.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		218.63	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		2.18	
Alpha	1.00	Stream Power (lb/ft s)		28.77	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	11.06	64.08	31.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.35	11.12	17.35

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2775.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.68	Wt. n-Val.		0.030	
W.S. Elev (ft)	2771.72	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.31	Flow Area (sq ft)		2339.88	
E.G. Slope (ft/ft)	0.004348	Area (sq ft)		2339.88	
Q Total (cfs)	36000.00	Flow (cfs)		36000.00	
Top Width (ft)	216.41	Top Width (ft)		216.41	
Vel Total (ft/s)	15.39	Avg. Vel. (ft/s)		15.39	
Max Chl Dpth (ft)	14.36	Hydr. Depth (ft)		10.81	
Conv. Total (cfs)	545981.9	Conv. (cfs)		545981.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		228.84	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		2.78	
Alpha	1.00	Stream Power (lb/ft s)		42.70	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	20.25	76.98	51.31
C & E Loss (ft)	0.02	Cum SA (acres)	9.56	11.20	18.69

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.33	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.24	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.08	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.15	Flow Area (sq ft)		252.50	
E.G. Slope (ft/ft)	0.002820	Area (sq ft)		252.50	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	133.45	Top Width (ft)		133.45	
Vel Total (ft/s)	3.96	Avg. Vel. (ft/s)		3.96	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		1.89	
Conv. Total (cfs)	18832.1	Conv. (cfs)		18832.1	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		136.65	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		0.33	
Alpha	1.00	Stream Power (lb/ft s)		1.29	
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	0.48	11.41	
C & E Loss (ft)	0.00	Cum SA (acres)	0.23	6.12	

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2764.44	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.79	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.65	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.71	Flow Area (sq ft)		699.46	
E.G. Slope (ft/ft)	0.003824	Area (sq ft)		699.46	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	190.67	Top Width (ft)		190.67	
Vel Total (ft/s)	7.15	Avg. Vel. (ft/s)		7.15	
Max Chl Dpth (ft)	6.29	Hydr. Depth (ft)		3.67	
Conv. Total (cfs)	80856.3	Conv. (cfs)		80856.3	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		196.18	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		0.85	
Alpha	1.00	Stream Power (lb/ft s)		6.08	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.52	23.04	
C & E Loss (ft)	0.01	Cum SA (acres)	0.23	7.25	

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2766.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	
W.S. Elev (ft)	2765.59	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2764.36	Flow Area (sq ft)		1074.28	
E.G. Slope (ft/ft)	0.003828	Area (sq ft)		1074.28	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	196.14	Top Width (ft)		196.14	
Vel Total (ft/s)	9.31	Avg. Vel. (ft/s)		9.31	
Max Chl Dpth (ft)	8.23	Hydr. Depth (ft)		5.48	
Conv. Total (cfs)	161634.2	Conv. (cfs)		161634.2	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		202.91	
Min Ch El (ft)	2757.36	Shear (lb/sq ft)		1.27	
Alpha	1.00	Stream Power (lb/ft s)		11.78	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	2.25	41.94	6.23
C & E Loss (ft)	0.01	Cum SA (acres)	1.47	9.41	6.71

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 149.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2774.3	29.96	2773.35	45.93	2773.32	65.45	2773.3	66.42	2773.3
68.21	2773.29	70.02	2773.29	113.61	2772.85	129	2772.72	135.41	2772.66
135.68	2772.66	175.13	2772.3	191.43	2772.3	202.95	2772.3	212.82	2773.2
223.58	2773.2	230.27	2773.2	243.45	2774.11	249.36	2774.11	280.87	2774.11
292.66	2774.11	298.34	2773.2	300.3	2771.98	300.54	2772.3	309.22	2771.89
313.95	2771.68	314.19	2771.39	316.3	2770.45	317.44	2769.9	317.67	2769.52
319.06	2768.59	319.72	2769.72	320.18	2768.47	320.48	2767.66	321.97	2766.72
324.8	2765.76	325.36	2765.43	326.37	2764.83	327.78	2763.89	330.04	2762.94
330.36	2762.82	332.71	2761.98	333.03	2761.97	334.84	2761.37	335.95	2761
338.91	2760.38	340.87	2759.98	342.81	2759.97	346.73	2759.94	350.3	2759.87
352.98	2759.91	356.61	2761.5	363.94	2762.1	373.08	2761.41	376.39	2760.2
398.26	2761.55	400.89	2761.29	413.68	2760.01	419.65	2762.33	426.68	2759.75
442.66	2760.09	448.94	2757.75	451.9	2757.82	460.15	2757.75	478.37	2758.17
502.12	2757.24	503.84	2758.58	507.57	2761.13	511.86	2761.37	512.29	2761.38
512.42	2761.47	513.68	2762.27	515.42	2763.17	517.15	2764.08	518.88	2764.98
520.65	2765.89	522.59	2766.79	524.76	2767.69	525.17	2767.87	525.93	2768.47
526.91	2768.91	529.06	2769.87	531.26	2770.84	531.49	2770.98	535.29	2771.2
544.25	2771.79	545.24	2771.85	546.82	2771.86	547.1	2772.78	549.07	2773.7
551.26	2774.63	554.6	2775.57	555.29	2776.43	557.68	2775.6	559.31	2776.41
559.52	2776.4	564.95	2776.12	597.64	2774.66	615.75	2773.75	629.96	2773.75
630.92	2773.75	657.53	2773.75	683.04	2773.75	694.29	2773.75	763.59	2773.84
802.02	2773.84	845.12	2772.93	865.54	2772.93	867.71	2773.84	876.27	2773.84
889.18	2773.84	926.02	2773.93	935.38	2774	939.17	2773.7	946.2	2773.17
948.23	2773.18	951.28	2773.5	957.58	2774.16	957.93	2774.16	963.78	2774.04
976.17	2773.79	990.65	2773.47	991.29	2773.48	1001.55	2773.54	1006.1	2773.57
1013.73	2773.64	1015.62	2773.66						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	313.95	.03	531.26	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
313.95	531.26	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.95	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.49	Wt. n-Val.		0.030	
W.S. Elev (ft)	2770.46	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.35	Flow Area (sq ft)		2068.13	
E.G. Slope (ft/ft)	0.004726	Area (sq ft)		2068.13	
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	
Top Width (ft)	214.10	Top Width (ft)		214.10	
Vel Total (ft/s)	14.99	Avg. Vel. (ft/s)		14.99	
Max Chl Dpth (ft)	13.22	Hydr. Depth (ft)		9.66	
Conv. Total (cfs)	450943.7	Conv. (cfs)		450943.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		223.91	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		2.73	
Alpha	1.00	Stream Power (lb/ft s)		40.85	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	15.87	70.43	42.62
C & E Loss (ft)	0.03	Cum SA (acres)	8.40	11.06	18.10

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2772.04	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.93	Wt. n-Val.		0.030	
W.S. Elev (ft)	2769.11	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2768.00	Flow Area (sq ft)		1784.08	
E.G. Slope (ft/ft)	0.004623	Area (sq ft)		1784.08	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	208.51	Top Width (ft)		208.51	
Vel Total (ft/s)	13.73	Avg. Vel. (ft/s)		13.73	
Max Chl Dpth (ft)	11.87	Hydr. Depth (ft)		8.56	
Conv. Total (cfs)	360198.3	Conv. (cfs)		360198.3	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		216.79	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		2.38	
Alpha	1.00	Stream Power (lb/ft s)		32.60	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	11.06	63.30	31.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.35	11.03	17.35

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2775.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2771.40	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.36	Flow Area (sq ft)		2271.29	1.58
E.G. Slope (ft/ft)	0.004754	Area (sq ft)		2271.29	1.58
Q Total (cfs)	36000.00	Flow (cfs)		35998.68	1.32
Top Width (ft)	224.11	Top Width (ft)		217.08	7.03
Vel Total (ft/s)	15.84	Avg. Vel. (ft/s)		15.85	0.84
Max Chl Dpth (ft)	14.16	Hydr. Depth (ft)		10.46	0.22
Conv. Total (cfs)	522134.9	Conv. (cfs)		522115.7	19.2
Length Wtd. (ft)	18.79	Wetted Per. (ft)		227.16	7.08
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		2.97	0.07
Alpha	1.00	Stream Power (lb/ft s)		47.03	0.06
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	20.25	75.98	51.31
C & E Loss (ft)	0.01	Cum SA (acres)	9.56	11.10	18.69

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.27	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.00	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.12	Flow Area (sq ft)		240.74	
E.G. Slope (ft/ft)	0.003214	Area (sq ft)		240.74	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	131.19	Top Width (ft)		131.19	
Vel Total (ft/s)	4.15	Avg. Vel. (ft/s)		4.15	
Max Chl Dpth (ft)	3.76	Hydr. Depth (ft)		1.84	
Conv. Total (cfs)	17638.4	Conv. (cfs)		17638.4	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		133.81	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		0.36	
Alpha	1.00	Stream Power (lb/ft s)		1.50	
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	0.48	11.30	
C & E Loss (ft)	0.00	Cum SA (acres)	0.23	6.06	

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2764.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.86	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.51	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.68	Flow Area (sq ft)		673.19	
E.G. Slope (ft/ft)	0.004215	Area (sq ft)		673.19	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	187.37	Top Width (ft)		187.37	
Vel Total (ft/s)	7.43	Avg. Vel. (ft/s)		7.43	
Max Chl Dpth (ft)	6.27	Hydr. Depth (ft)		3.59	
Conv. Total (cfs)	77010.0	Conv. (cfs)		77010.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		191.79	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		0.92	
Alpha	1.00	Stream Power (lb/ft s)		6.86	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.52	22.74	
C & E Loss (ft)	0.01	Cum SA (acres)	0.23	7.17	

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2766.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.46	Wt. n-Val.		0.030	
W.S. Elev (ft)	2765.38	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2764.36	Flow Area (sq ft)		1031.39	
E.G. Slope (ft/ft)	0.004290	Area (sq ft)		1031.39	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	194.23	Top Width (ft)		194.23	
Vel Total (ft/s)	9.70	Avg. Vel. (ft/s)		9.70	
Max Chl Dpth (ft)	8.14	Hydr. Depth (ft)		5.31	
Conv. Total (cfs)	152675.8	Conv. (cfs)		152675.8	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		199.62	
Min Ch El (ft)	2757.24	Shear (lb/sq ft)		1.38	
Alpha	1.00	Stream Power (lb/ft s)		13.42	
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	2.25	41.48	6.23
C & E Loss (ft)	0.01	Cum SA (acres)	1.47	9.32	6.71

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 148.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2773.84	32.5	2772.94	49.83	2772.9	71.01	2772.84	72.06	2772.84
74	2772.84	75.97	2772.83	123.25	2772.37	139.96	2772.25	146.91	2772.2
147.2	2772.19	190	2771.85	207.69	2771.84	220.18	2771.84	230.89	2772.66
242.57	2772.66	249.83	2772.66	264.12	2773.48	270.53	2773.48	304.72	2773.48
317.51	2773.48	323.68	2772.66	325.81	2771.55	326.06	2771.84	335.48	2771.48
340.61	2771.3	340.84	2771.04	342.86	2770.15	343.96	2769.64	344.18	2769.29
345.51	2768.42	346.14	2769.43	346.58	2768.3	346.87	2767.57	348.3	2766.69
351.01	2765.77	351.55	2765.46	352.52	2764.9	353.87	2764.03	356.04	2763.13
356.35	2763.02	358.6	2762.21	358.9	2762.19	360.64	2761.61	361.7	2761.25
364.54	2760.62	366.42	2760.2	368.28	2760.14	372.03	2760.02	375.46	2759.8
378.03	2759.85	381.51	2761.28	388.53	2761.83	397.3	2761.21	400.47	2760.12
421.44	2761.35	423.96	2761.12	436.22	2759.98	441.95	2762.07	448.69	2759.75
464.01	2760.06	470.03	2757.96	472.87	2758.03	480.77	2757.66	498.24	2758.01
521.01	2757.13	523.23	2758.51	528.02	2760.78	533.54	2760.99	534.09	2760.99
534.25	2761.07	535.87	2761.79	538.11	2762.6	540.33	2763.41	542.56	2764.21
544.84	2765.02	547.33	2765.83	550.11	2766.63	550.65	2766.79	551.62	2767.65
552.87	2768.07	555.65	2769	558.47	2769.93	558.69	2770.06	562.3	2770.27

570.81	2770.88	571.75	2770.95	573.25	2770.98	573.51	2771.8	575.38	2772.65
577.47	2773.51	580.64	2774.39	581.3	2775.17	583.56	2774.44	585.11	2775.19
585.3	2775.19	590.47	2774.88	621.51	2773.57	638.71	2772.75	652.21	2772.75
653.12	2772.75	678.38	2772.75	702.61	2772.75	713.29	2772.75	779.11	2772.93
815.6	2772.93	856.53	2772.11	875.92	2772.11	877.98	2772.93	886.12	2772.93
898.38	2772.93	933.36	2773.11	942.25	2773.24	945.85	2773.01	952.52	2772.58
954.45	2772.61	957.34	2772.93	963.33	2773.57	963.66	2773.57	969.22	2773.51
980.98	2773.38	994.73	2773.2	995.34	2773.2	1005.09	2773.33	1009.4	2773.39
1016.65	2773.53	1018.45	2773.57						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	340.61	.03	558.47	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
340.61	558.47	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.81	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.80	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2770.02	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.39	Flow Area (sq ft)		1982.40	0.01
E.G. Slope (ft/ft)	0.005431	Area (sq ft)		1982.40	0.01
Q Total (cfs)	31000.00	Flow (cfs)		31000.00	0.00
Top Width (ft)	215.47	Top Width (ft)		215.32	0.14
Vel Total (ft/s)	15.64	Avg. Vel. (ft/s)		15.64	0.27
Max Chl Dpth (ft)	12.89	Hydr. Depth (ft)		9.21	0.04
Conv. Total (cfs)	420668.8	Conv. (cfs)		420668.8	0.0
Length Wtd. (ft)	18.79	Wetted Per. (ft)		223.55	0.17
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		3.01	0.01
Alpha	1.00	Stream Power (lb/ft s)		47.01	0.00
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	15.87	69.55	42.62
C & E Loss (ft)	0.03	Cum SA (acres)	8.40	10.97	18.10

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2771.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.14	Wt. n-Val.		0.030	
W.S. Elev (ft)	2768.79	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2768.02	Flow Area (sq ft)		1722.12	
E.G. Slope (ft/ft)	0.005184	Area (sq ft)		1722.12	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	209.44	Top Width (ft)		209.44	
Vel Total (ft/s)	14.22	Avg. Vel. (ft/s)		14.22	
Max Chl Dpth (ft)	11.66	Hydr. Depth (ft)		8.22	
Conv. Total (cfs)	340133.7	Conv. (cfs)		340133.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		216.27	
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		2.58	
Alpha	1.00	Stream Power (lb/ft s)		36.65	
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	11.06	62.54	31.84
C & E Loss (ft)	0.01	Cum SA (acres)	7.35	10.94	17.35

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2775.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2771.16	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.34	Flow Area (sq ft)		2229.34	9.29
E.G. Slope (ft/ft)	0.005027	Area (sq ft)		2229.34	9.29
Q Total (cfs)	36000.00	Flow (cfs)		35984.21	15.79
Top Width (ft)	232.57	Top Width (ft)		217.73	14.84
Vel Total (ft/s)	16.08	Avg. Vel. (ft/s)		16.14	1.70
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)		10.24	0.63
Conv. Total (cfs)	507756.3	Conv. (cfs)		507533.7	222.7
Length Wtd. (ft)	18.78	Wetted Per. (ft)		226.23	15.03
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		3.09	0.19
Alpha	1.01	Stream Power (lb/ft s)		49.92	0.33
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	20.25	75.01	51.31
C & E Loss (ft)	0.01	Cum SA (acres)	9.56	11.01	18.68

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.30	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.90	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.11	Flow Area (sq ft)		227.75	
E.G. Slope (ft/ft)	0.003837	Area (sq ft)		227.75	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	130.90	Top Width (ft)		130.90	
Vel Total (ft/s)	4.39	Avg. Vel. (ft/s)		4.39	
Max Chl Dpth (ft)	3.77	Hydr. Depth (ft)		1.74	
Conv. Total (cfs)	16143.0	Conv. (cfs)		16143.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		133.04	
Min Ch El (ft)	2757.13	Shear (lb/sq ft)		0.41	
Alpha	1.00	Stream Power (lb/ft s)		1.80	
Frctn Loss (ft)	0.08	Cum Volume (acre-ft)	0.48	11.20	
C & E Loss (ft)	0.00	Cum SA (acres)	0.23	6.00	

rning: Divided flow computed for this cross-section.

OSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2764.27	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.94	Wt. n-Val.		0.030	
W.S. Elev (ft)	2763.34	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.66	Flow Area (sq ft)		643.83	
E.G. Slope (ft/ft)	0.004768	Area (sq ft)		643.83	

* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*	*
* Top Width (ft)	* 184.58	* Top Width (ft)	*	* 184.58	*	*
* Vel Total (ft/s)	* 7.77	* Avg. Vel. (ft/s)	*	* 7.77	*	*
* Max Chl Dpth (ft)	* 6.21	* Hydr. Depth (ft)	*	* 3.49	*	*
* Conv. Total (cfs)	* 72409.7	* Conv. (cfs)	*	* 72409.7	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 188.17	*	*
Min Ch El (ft)	* 2757.13	* Shear (lb/sq ft)	*	* 1.02	*	*
Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 7.91	*	*
Frctn Loss (ft)	* 0.10	* Cum Volume (acre-ft)	* 0.52	* 22.46	*	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.23	* 7.09	*	*

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2766.74	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.60	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2765.14	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2764.34	* Flow Area (sq ft)	*	* 985.55	*	*
* E.G. Slope (ft/ft)	*0.004921	* Area (sq ft)	*	* 985.55	*	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*	*
* Top Width (ft)	* 193.12	* Top Width (ft)	*	* 193.12	*	*
* Vel Total (ft/s)	* 10.15	* Avg. Vel. (ft/s)	*	* 10.15	*	*
* Max Chl Dpth (ft)	* 8.01	* Hydr. Depth (ft)	*	* 5.10	*	*
* Conv. Total (cfs)	*142557.6	* Conv. (cfs)	*	*142557.6	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 197.48	*	*
* Min Ch El (ft)	* 2757.13	* Shear (lb/sq ft)	*	* 1.53	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 15.56	*	*
* Frctn Loss (ft)	* 0.10	* Cum Volume (acre-ft)	* 2.25	* 41.05	* 6.23	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 1.47	* 9.24	* 6.71	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 147.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2773.39	35.05	2772.54	53.73	2772.47	76.57	2772.39	77.71	2772.39
79.79	2772.38	81.92	2772.37	132.9	2771.88	150.91	2771.77	158.41	2771.73
158.73	2771.73	204.87	2771.41	223.94	2771.39	237.42	2771.39	248.96	2772.11
261.55	2772.11	269.38	2772.11	284.79	2772.84	291.71	2772.84	328.57	2772.84
342.37	2772.84	349.01	2772.11	351.31	2771.13	351.58	2771.39	361.73	2771.06
367.27	2770.92	367.49	2770.68	369.43	2769.85	370.47	2769.37	370.68	2769.05
371.96	2768.26	372.57	2769.14	372.99	2768.12	373.26	2767.47	374.63	2766.66
377.22	2765.78	377.74	2765.49	378.67	2764.97	379.96	2764.16	382.04	2763.31
382.33	2763.21	384.48	2762.43	384.77	2762.41	386.44	2761.84	387.46	2761.49
390.17	2760.86	391.97	2760.43	393.75	2760.32	397.34	2760.1	400.62	2759.74
403.08	2759.78	406.41	2761.06	413.13	2761.55	421.52	2761.01	424.55	2760.04
444.62	2761.15	447.03	2760.95	458.77	2759.94	464.25	2761.8	470.7	2759.75
485.36	2760.04	491.12	2758.18	493.84	2758.24	501.4	2757.57	518.12	2757.84
539.91	2757.01	542.62	2758.43	548.47	2760.44	555.22	2760.6	555.89	2760.61
556.09	2760.68	558.06	2761.31	560.8	2762.02	563.52	2762.74	566.24	2763.45
569.02	2764.16	572.07	2764.87	575.47	2765.57	576.12	2765.71	577.32	2766.82
578.84	2767.22	582.23	2768.12	585.68	2769.02	585.89	2769.13	589.31	2769.34
597.37	2769.98	598.26	2770.05	599.67	2770.09	599.93	2770.83	601.7	2771.61
603.67	2772.39	606.67	2773.21	607.3	2773.91	609.44	2773.29	610.91	2773.97
611.09	2773.97	615.98	2773.64	645.38	2772.48	661.67	2771.75	674.45	2771.75
675.31	2771.75	699.24	2771.75	722.18	2771.75	732.3	2771.75	794.62	2772.02
829.18	2772.02	867.94	2771.3	886.31	2771.3	888.26	2772.02	895.96	2772.02
907.57	2772.02	940.69	2772.3	949.11	2772.49	952.52	2772.31	958.84	2772
960.66	2772.04	963.41	2772.35	969.07	2772.98	969.39	2772.99	974.65	2772.98
985.79	2772.98	998.82	2772.92	999.39	2772.93	1008.62	2773.12	1012.71	2773.2
1019.57	2773.42	1021.27	2773.48						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	367.27	.03	585.68	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
367.27	585.68	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2773.68	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.10	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2769.59	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2769.33	* Flow Area (sq ft)	*	* 1908.07	* 1.68	*
* E.G. Slope (ft/ft)	*0.006135	* Area (sq ft)	*	* 1908.07	* 1.68	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30998.28	* 1.72	*
* Top Width (ft)	* 222.39	* Top Width (ft)	*	* 215.68	* 6.71	*
* Vel Total (ft/s)	* 16.23	* Avg. Vel. (ft/s)	*	* 16.25	* 1.02	*
* Max Chl Dpth (ft)	* 12.57	* Hydr. Depth (ft)	*	* 8.85	* 0.25	*
* Conv. Total (cfs)	*395784.1	* Conv. (cfs)	*	*395762.1	* 22.0	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 222.66	* 6.76	*
* Min Ch El (ft)	* 2757.01	* Shear (lb/sq ft)	*	* 3.28	* 0.10	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 53.32	* 0.10	*
* Frctn Loss (ft)	* 0.12	* Cum Volume (acre-ft)	* 15.87	* 68.71	* 42.62	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 8.40	* 10.88	* 18.09	*

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2771.82	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 3.28	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2768.54	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2767.99	* Flow Area (sq ft)	*	* 1684.75	*	*
* E.G. Slope (ft/ft)	*0.005621	* Area (sq ft)	*	* 1684.75	*	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24490.00	*	*
* Top Width (ft)	* 211.69	* Top Width (ft)	*	* 211.69	*	*

* Vel Total (ft/s)	*	14.54	* Avg. Vel. (ft/s)	*		*	14.54	*		*
* Max Chl Dpth (ft)	*	11.53	* Hydr. Depth (ft)	*		*	7.96	*		*
* Conv. Total (cfs)	*	326645.9	* Conv. (cfs)	*		*	326645.9	*		*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	217.54	*		*
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*		*	2.72	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	39.51	*		*
Frctn Loss (ft)	*	0.12	* Cum Volume (acre-ft)	*	11.06	*	61.81	*	31.84	*
C & E Loss (ft)	*	0.05	* Cum SA (acres)	*	7.35	*	10.85	*	17.35	*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	*	2775.10	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	4.02	* Wt. n-Val.	*	0.045	*	0.030	*	0.045	*
* W.S. Elev (ft)	*	2771.07	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	*	2770.31	* Flow Area (sq ft)	*	0.46	*	2231.46	*	20.68	*
* E.G. Slope (ft/ft)	*	0.004984	* Area (sq ft)	*	0.46	*	2231.46	*	20.68	*
* Q Total (cfs)	*	36000.00	* Flow (cfs)	*	0.20	*	35941.22	*	58.58	*
* Top Width (ft)	*	239.16	* Top Width (ft)	*	5.95	*	218.41	*	14.80	*
* Vel Total (ft/s)	*	15.98	* Avg. Vel. (ft/s)	*	0.43	*	16.11	*	2.83	*
* Max Chl Dpth (ft)	*	14.06	* Hydr. Depth (ft)	*	0.08	*	10.22	*	1.40	*
* Conv. Total (cfs)	*	509925.8	* Conv. (cfs)	*	2.8	*	509093.3	*	829.7	*
* Length Wtd. (ft)	*	18.77	* Wetted Per. (ft)	*	5.95	*	225.73	*	15.44	*
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*	0.02	*	3.08	*	0.42	*
* Alpha	*	1.01	* Stream Power (lb/ft s)	*	0.01	*	49.54	*	1.18	*
* Frctn Loss (ft)	*	0.09	* Cum Volume (acre-ft)	*	20.25	*	74.05	*	51.31	*
* C & E Loss (ft)	*	0.05	* Cum SA (acres)	*	9.56	*	10.92	*	18.68	*

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	*	2761.11	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	0.33	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2760.78	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	*	2760.07	* Flow Area (sq ft)	*		*	216.35	*		*
* E.G. Slope (ft/ft)	*	0.004593	* Area (sq ft)	*		*	216.35	*		*
* Q Total (cfs)	*	1000.00	* Flow (cfs)	*		*	1000.00	*		*
* Top Width (ft)	*	132.11	* Top Width (ft)	*		*	132.11	*		*
* Vel Total (ft/s)	*	4.62	* Avg. Vel. (ft/s)	*		*	4.62	*		*
* Max Chl Dpth (ft)	*	3.77	* Hydr. Depth (ft)	*		*	1.64	*		*
* Conv. Total (cfs)	*	14754.9	* Conv. (cfs)	*		*	14754.9	*		*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	133.90	*		*
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*		*	0.46	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	2.14	*		*
* Frctn Loss (ft)	*	0.09	* Cum Volume (acre-ft)	*	0.48	*	11.10	*		*
* C & E Loss (ft)	*	0.00	* Cum SA (acres)	*	0.23	*	5.95	*		*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	*	2764.17	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	1.02	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2763.15	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	*	2762.58	* Flow Area (sq ft)	*		*	616.73	*		*
* E.G. Slope (ft/ft)	*	0.005401	* Area (sq ft)	*		*	616.73	*		*
* Q Total (cfs)	*	5000.00	* Flow (cfs)	*		*	5000.00	*		*
* Top Width (ft)	*	182.60	* Top Width (ft)	*		*	182.60	*		*
* Vel Total (ft/s)	*	8.11	* Avg. Vel. (ft/s)	*		*	8.11	*		*
* Max Chl Dpth (ft)	*	6.14	* Hydr. Depth (ft)	*		*	3.38	*		*
* Conv. Total (cfs)	*	68035.1	* Conv. (cfs)	*		*	68035.1	*		*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	185.55	*		*
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*		*	1.12	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	9.09	*		*
* Frctn Loss (ft)	*	0.11	* Cum Volume (acre-ft)	*	0.52	*	22.18	*		*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	0.23	*	7.01	*		*

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	*	2766.63	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	*	1.74	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	*	2764.89	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	*	2764.33	* Flow Area (sq ft)	*		*	944.08	*		*
* E.G. Slope (ft/ft)	*	0.005658	* Area (sq ft)	*		*	944.08	*		*
* Q Total (cfs)	*	10000.00	* Flow (cfs)	*		*	10000.00	*		*
* Top Width (ft)	*	193.38	* Top Width (ft)	*		*	193.38	*		*
* Vel Total (ft/s)	*	10.59	* Avg. Vel. (ft/s)	*		*	10.59	*		*
* Max Chl Dpth (ft)	*	7.88	* Hydr. Depth (ft)	*		*	4.88	*		*
* Conv. Total (cfs)	*	132943.8	* Conv. (cfs)	*		*	132943.8	*		*
* Length Wtd. (ft)	*	18.79	* Wetted Per. (ft)	*		*	196.94	*		*
* Min Ch El (ft)	*	2757.01	* Shear (lb/sq ft)	*		*	1.69	*		*
* Alpha	*	1.00	* Stream Power (lb/ft s)	*		*	17.94	*		*
* Frctn Loss (ft)	*	0.11	* Cum Volume (acre-ft)	*	2.25	*	40.63	*	6.23	*
* C & E Loss (ft)	*	0.01	* Cum SA (acres)	*	1.47	*	9.16	*	6.71	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 146.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2772.93	37.59	2772.13	57.63	2772.04	82.12	2771.94	83.35	2771.93
85.58	2771.92	87.86	2771.91	142.55	2771.4	161.87	2771.3	169.91	2771.26
170.25	2771.26	219.75	2770.96	240.2	2770.93	254.65	2770.93	267.03	2771.57
280.54	2771.57	288.93	2771.57	305.47	2772.2	312.88	2772.2	352.42	2772.2

367.22	2772.2	374.35	2771.57	376.81	2770.71	377.1	2770.93	387.99	2770.65
393.93	2770.54	394.14	2770.32	395.99	2769.55	396.99	2769.11	397.19	2768.82
398.41	2768.1	398.99	2768.85	399.39	2767.95	399.65	2767.37	400.96	2766.62
403.43	2765.79	403.93	2765.52	404.81	2765.05	406.04	2764.3	408.03	2763.5
408.31	2763.4	410.37	2762.66	410.64	2762.62	412.24	2762.08	413.21	2761.74
415.8	2761.09	417.52	2760.66	419.22	2760.5	422.65	2760.18	425.78	2759.68
428.13	2759.72	431.31	2760.83	437.73	2761.27	445.74	2760.8	448.64	2759.97
467.8	2760.95	470.1	2760.78	481.31	2759.91	486.54	2761.54	492.71	2759.75
506.71	2760.02	512.21	2758.39	514.8	2758.45	522.02	2757.48	537.99	2757.68
558.8	2756.89	562	2758.35	568.92	2760.1	576.89	2760.22	577.68	2760.22
577.92	2760.28	580.25	2760.83	583.49	2761.45	586.7	2762.06	589.92	2762.68
593.2	2763.29	596.8	2763.91	600.83	2764.52	601.6	2764.63	603.01	2765.99
604.81	2766.38	608.82	2767.25	612.9	2768.11	613.1	2768.21	616.31	2768.41
623.92	2769.07	624.77	2769.15	626.1	2769.2	626.34	2769.85	628.01	2770.56
629.88	2771.27	632.71	2772.03	633.3	2772.65	635.32	2772.14	636.71	2772.75
636.88	2772.75	641.5	2772.41	669.25	2771.39	684.63	2770.75	696.69	2770.75
697.5	2770.75	720.09	2770.75	741.75	2770.75	751.3	2770.75	810.14	2771.11
842.76	2771.11	879.35	2770.48	896.69	2770.48	898.53	2771.11	905.8	2771.11
916.76	2771.11	948.03	2771.48	955.98	2771.74	959.2	2771.62	965.16	2771.42
966.88	2771.48	969.47	2771.78	974.82	2772.39	975.12	2772.4	980.09	2772.45
990.6	2772.58	1002.9	2772.64	1003.45	2772.66	1012.15	2772.91	1016.01	2773.02
1022.49	2773.31	1024.1	2773.39						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	393.93	.03	612.9	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
393.93	612.9	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.28	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2769.27	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.27	Flow Area (sq ft)		1866.91	7.60
E.G. Slope (ft/ft)	0.006578	Area (sq ft)		1866.91	7.60
Q Total (cfs)	31000.00	Flow (cfs)		30986.00	14.00
Top Width (ft)	229.50	Top Width (ft)		216.27	13.23
Vel Total (ft/s)	16.54	Avg. Vel. (ft/s)		16.60	1.84
Max Chl Dpth (ft)	12.38	Hydr. Depth (ft)		8.63	0.57
Conv. Total (cfs)	382215.9	Conv. (cfs)		382043.3	172.6
Length Wtd. (ft)	18.78	Wetted Per. (ft)		222.30	13.34
Min Ch El (ft)	2756.89	Shear (lb/sq ft)		3.45	0.23
Alpha	1.01	Stream Power (lb/ft s)		57.24	0.43
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	15.87	67.90	42.62
C & E Loss (ft)	0.06	Cum SA (acres)	8.40	10.78	18.09

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2771.67	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.75	Wt. n-Val.		0.030	
W.S. Elev (ft)	2767.91	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.91	Flow Area (sq ft)		1575.60	
E.G. Slope (ft/ft)	0.007013	Area (sq ft)		1575.60	
Q Total (cfs)	24490.00	Flow (cfs)		24490.00	
Top Width (ft)	212.57	Top Width (ft)		212.57	
Vel Total (ft/s)	15.54	Avg. Vel. (ft/s)		15.54	
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		7.41	
Conv. Total (cfs)	292429.9	Conv. (cfs)		292429.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		217.22	
Min Ch El (ft)	2756.89	Shear (lb/sq ft)		3.18	
Alpha	1.00	Stream Power (lb/ft s)		49.37	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	11.06	61.10	31.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.35	10.76	17.35

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 #PF 3

E.G. Elev (ft)	2774.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.86	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2771.09	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.19	Flow Area (sq ft)	13.73	2264.69	90.08
E.G. Slope (ft/ft)	0.004698	Area (sq ft)	13.73	2264.69	90.08
Q Total (cfs)	36000.00	Flow (cfs)	11.41	35809.57	179.02
Top Width (ft)	499.82	Top Width (ft)	78.40	218.97	202.45
Vel Total (ft/s)	15.20	Avg. Vel. (ft/s)	0.83	15.81	1.99
Max Chl Dpth (ft)	14.20	Hydr. Depth (ft)	0.18	10.34	0.44
Conv. Total (cfs)	525219.0	Conv. (cfs)	166.4	522440.8	2611.8
Length Wtd. (ft)	18.66	Wetted Per. (ft)	78.55	225.31	203.32
Min Ch El (ft)	2756.89	Shear (lb/sq ft)	0.05	2.95	0.13
Alpha	1.08	Stream Power (lb/ft s)	0.04	46.62	0.26
Frctn Loss (ft)	0.07	Cum Volume (acre-ft)	20.24	73.08	51.29
C & E Loss (ft)	0.27	Cum SA (acres)	9.53	10.82	18.65

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.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2761.02	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.65	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.08	Flow Area (sq ft)		204.77	

* E.G. Slope (ft/ft)	*0.005412	* Area (sq ft)	*	*	204.77	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	*	1000.00	*
* Top Width (ft)	* 130.48	* Top Width (ft)	*	*	130.48	*
* Vel Total (ft/s)	* 4.88	* Avg. Vel. (ft/s)	*	*	4.88	*
* Max Chl Dpth (ft)	* 3.76	* Hydr. Depth (ft)	*	*	1.57	*
* Conv. Total (cfs)	* 13592.8	* Conv. (cfs)	*	*	13592.8	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	*	131.98	*
* Min Ch El (ft)	* 2756.89	* Shear (lb/sq ft)	*	*	0.52	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	*	2.56	*
* Frctn Loss (ft)	* 0.11	* Cum Volume (acre-ft)	* 0.48	*	11.01	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	* 0.23	*	5.89	*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2764.06	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.12	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2762.94	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2762.54	* Flow Area (sq ft)	*	* 589.06	* *
* E.G. Slope (ft/ft)	*0.006231	* Area (sq ft)	*	* 589.06	* *
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	* *
* Top Width (ft)	* 181.73	* Top Width (ft)	*	* 181.73	* *
* Vel Total (ft/s)	* 8.49	* Avg. Vel. (ft/s)	*	* 8.49	* *
* Max Chl Dpth (ft)	* 6.05	* Hydr. Depth (ft)	*	* 3.24	* *
* Conv. Total (cfs)	* 63342.5	* Conv. (cfs)	*	* 63342.5	* *
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 184.15	* *
* Min Ch El (ft)	* 2756.89	* Shear (lb/sq ft)	*	* 1.24	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 10.56	* *
* Frctn Loss (ft)	* 0.12	* Cum Volume (acre-ft)	* 0.52	* 21.92	* *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.23	* 6.93	* *

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2766.51	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.88	* Wt. n-Val.	*	* 0.030	* *
* W.S. Elev (ft)	* 2764.63	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2764.27	* Flow Area (sq ft)	*	* 908.85	* *
* E.G. Slope (ft/ft)	*0.006513	* Area (sq ft)	*	* 908.85	* *
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	* *
* Top Width (ft)	* 196.11	* Top Width (ft)	*	* 196.11	* *
* Vel Total (ft/s)	* 11.00	* Avg. Vel. (ft/s)	*	* 11.00	* *
* Max Chl Dpth (ft)	* 7.74	* Hydr. Depth (ft)	*	* 4.63	* *
* Conv. Total (cfs)	*123907.9	* Conv. (cfs)	*	*123907.9	* *
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 199.02	* *
* Min Ch El (ft)	* 2756.89	* Shear (lb/sq ft)	*	* 1.86	* *
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 20.43	* *
* Frctn Loss (ft)	* 0.13	* Cum Volume (acre-ft)	* 2.25	* 40.23	* 6.23 *
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 1.47	* 9.07	* 6.71 *

.OSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 145.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2772.48	40.14	2771.73	61.53	2771.62	87.68	2771.48	88.99	2771.48
91.38	2771.46	93.81	2771.45	152.2	2770.91	172.82	2770.83	181.41	2770.8
181.77	2770.8	234.62	2770.51	256.45	2770.48	271.89	2770.48	285.1	2771.02
299.52	2771.02	308.49	2771.02	326.14	2771.57	334.06	2771.57	376.27	2771.57
392.07	2771.57	399.68	2771.02	402.31	2770.29	402.62	2770.48	414.25	2770.23
420.59	2770.16	420.79	2769.97	422.55	2769.25	423.5	2768.84	423.7	2768.59
424.86	2767.93	425.41	2768.57	425.79	2767.78	426.04	2767.28	427.29	2766.59
429.65	2765.8	430.11	2765.56	430.96	2765.12	432.13	2764.44	434.03	2763.69
434.29	2763.59	436.26	2762.88	436.52	2762.84	438.03	2762.32	438.96	2761.99
441.43	2761.33	443.07	2760.89	444.69	2760.68	447.96	2760.27	450.94	2759.62
453.17	2759.65	456.21	2760.61	462.33	2760.99	469.96	2760.6	472.72	2759.89
490.98	2760.76	493.17	2760.6	503.86	2759.87	508.84	2761.28	514.71	2759.75
528.05	2760	533.29	2758.61	535.77	2758.66	542.65	2757.39	557.87	2757.51
577.69	2756.77	581.39	2758.28	589.37	2759.75	598.57	2759.84	599.48	2759.84
599.76	2759.89	602.45	2760.36	606.18	2760.87	609.89	2761.39	613.59	2761.91
617.39	2762.43	621.54	2762.94	626.18	2763.46	627.07	2763.56	628.7	2765.17
630.78	2765.54	635.4	2766.37	640.11	2767.2	640.3	2767.29	643.32	2767.48
650.48	2768.17	651.27	2768.25	652.53	2768.32	652.76	2768.88	654.33	2769.51
656.08	2770.15	658.75	2770.85	659.3	2771.39	661.2	2770.98	662.51	2771.53
662.67	2771.54	667.02	2771.17	693.12	2770.3	707.59	2769.75	718.93	2769.75
719.7	2769.75	740.95	2769.75	761.32	2769.75	770.31	2769.75	825.65	2770.2
856.34	2770.2	890.76	2769.66	907.07	2769.66	908.8	2770.2	915.64	2770.2
925.95	2770.2	955.37	2770.66	962.84	2770.98	965.87	2770.92	971.48	2770.83
973.1	2770.91	975.54	2771.2	980.57	2771.8	980.86	2771.81	985.53	2771.93
995.42	2772.17	1006.98	2772.37	1007.5	2772.39	1015.69	2772.7	1019.32	2772.84
1025.41	2773.21	1026.93	2773.3						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	420.59	.03	640.11	.045

'nk Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

Left	Right	Left	Channel	Right	Coeff Contr.	Expan.
420.59	640.11	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2773.39	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 4.59	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2768.80	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2769.10	* Flow Area (sq ft)	*	* 1800.68	* 12.70 *

E.G. Slope (ft/ft)	0.007389	Area (sq ft)		1800.68	12.70	
Q Total (cfs)	31000.00	Flow (cfs)		30964.50	35.50	
Top Width (ft)	229.19	Top Width (ft)		216.58	12.62	
Vel Total (ft/s)	17.10	Avg. Vel. (ft/s)		17.20	2.79	
Max Chl Dpth (ft)	12.03	Hydr. Depth (ft)		8.31	1.01	
Conv. Total (cfs)	360642.4	Conv. (cfs)		360229.4	413.0	
Length Wtd. (ft)	18.78	Wetted Per. (ft)		221.84	13.00	
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		3.74	0.45	
Alpha	1.01	Stream Power (lb/ft s)		64.39	1.26	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	15.87	67.11	42.62	
C & E Loss (ft)	0.03	Cum SA (acres)	8.40	10.69	18.09	

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2771.51	Element			
Vel Head (ft)	3.92	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.60	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.82	Flow Area (sq ft)		1541.65	0.77
E.G. Slope (ft/ft)	0.007592	Area (sq ft)		1541.65	0.77
Q Total (cfs)	24490.00	Flow (cfs)		24489.31	0.69
Top Width (ft)	218.64	Top Width (ft)		214.23	4.42
Vel Total (ft/s)	15.88	Avg. Vel. (ft/s)		15.89	0.90
Max Chl Dpth (ft)	10.83	Hydr. Depth (ft)		7.20	0.18
Conv. Total (cfs)	281071.7	Conv. (cfs)		281063.7	8.0
Length Wtd. (ft)	18.79	Wetted Per. (ft)		218.31	4.45
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		3.35	0.08
Alpha	1.00	Stream Power (lb/ft s)		53.17	0.07
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	11.06	60.43	31.84
C & E Loss (ft)	0.02	Cum SA (acres)	7.35	10.67	17.35

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 3

			Left OB	Channel	Right OB
E.G. Elev (ft)	2774.61	Element			
Vel Head (ft)	2.96	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2771.65	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2771.65	Flow Area (sq ft)	220.16	2425.33	538.47
E.G. Slope (ft/ft)	0.003423	Area (sq ft)	220.16	2425.33	538.47
Q Total (cfs)	36000.00	Flow (cfs)	303.20	34284.95	1411.86
Top Width (ft)	924.32	Top Width (ft)	365.57	219.52	339.23
Vel Total (ft/s)	11.31	Avg. Vel. (ft/s)	1.38	14.14	2.62
Max Chl Dpth (ft)	14.88	Hydr. Depth (ft)	0.60	11.05	1.59
Conv. Total (cfs)	615327.1	Conv. (cfs)	5182.4	586012.6	24132.0
Length Wtd. (ft)	18.63	Wetted Per. (ft)	365.77	225.10	340.56
Min Ch El (ft)	2756.77	Shear (lb/sq ft)	0.13	2.30	0.34
Alpha	1.49	Stream Power (lb/ft s)	0.18	32.55	0.89
Frctn Loss (ft)	0.06	Cum Volume (acre-ft)	20.18	72.07	51.20
C & E Loss (ft)	0.04	Cum SA (acres)	9.41	10.73	18.58

Warning: The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.

CROSS SECTION OUTPUT Profile #PF 4

			Left OB	Channel	Right OB
E.G. Elev (ft)	2760.91	Element			
Vel Head (ft)	0.41	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.49	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2760.07	Flow Area (sq ft)		193.97	
E.G. Slope (ft/ft)	0.006284	Area (sq ft)		193.97	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	127.62	Top Width (ft)		127.62	
Vel Total (ft/s)	5.16	Avg. Vel. (ft/s)		5.16	
Max Chl Dpth (ft)	3.72	Hydr. Depth (ft)		1.52	
Conv. Total (cfs)	12615.0	Conv. (cfs)		12615.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		128.93	
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		0.59	
Alpha	1.00	Stream Power (lb/ft s)		3.04	
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.48	10.93	
C & E Loss (ft)	0.00	Cum SA (acres)	0.23	5.83	

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2763.93	Element			
Vel Head (ft)	1.20	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.73	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.45	Flow Area (sq ft)		568.55	
E.G. Slope (ft/ft)	0.007058	Area (sq ft)		568.55	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	183.01	Top Width (ft)		183.01	
Vel Total (ft/s)	8.79	Avg. Vel. (ft/s)		8.79	
Max Chl Dpth (ft)	5.96	Hydr. Depth (ft)		3.11	
Conv. Total (cfs)	59516.9	Conv. (cfs)		59516.9	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		185.04	
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		1.35	
Alpha	1.00	Stream Power (lb/ft s)		11.91	
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	0.52	21.68	
C & E Loss (ft)	0.02	Cum SA (acres)	0.23	6.86	

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2766.37	Element			
Vel Head (ft)	1.97	Wt. n-Val.		0.030	

W.S. Elev (ft)	2764.40	Reach Len. (ft)	23.86	18.79	11.80	
Crit W.S. (ft)	2764.15	Flow Area (sq ft)		887.87		
E.G. Slope (ft/ft)	0.007013	Area (sq ft)		887.87		
Q Total (cfs)	10000.00	Flow (cfs)		10000.00		
Top Width (ft)	195.70	Top Width (ft)		195.70		
Vel Total (ft/s)	11.26	Avg. Vel. (ft/s)		11.26		
Max Chl Dpth (ft)	7.63	Hydr. Depth (ft)		4.54		
Conv. Total (cfs)	119414.4	Conv. (cfs)		119414.4		
Length Wtd. (ft)	18.79	Wetted Per. (ft)		198.43		
Min Ch El (ft)	2756.77	Shear (lb/sq ft)		1.96		
Alpha	1.00	Stream Power (lb/ft s)		22.06		
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	2.25	39.84	6.23	
C & E Loss (ft)	0.02	Cum SA (acres)	1.47	8.99	6.71	

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 144.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2772.02	42.68	2771.32	65.43	2771.19	93.24	2771.03	94.63	2771.02
97.17	2771.01	99.76	2770.99	161.84	2770.43	183.78	2770.36	192.91	2770.33
193.29	2770.33	249.49	2770.06	272.71	2770.02	289.12	2770.02	303.18	2770.48
318.51	2770.48	328.04	2770.48	346.81	2770.93	355.23	2770.93	400.12	2770.93
416.92	2770.93	425.01	2770.48	427.81	2769.86	428.14	2770.02	440.51	2769.82
447.25	2769.77	447.44	2769.61	449.12	2768.95	450.02	2768.57	450.2	2768.36
451.31	2767.77	451.83	2768.28	452.2	2767.61	452.43	2767.18	453.62	2766.56
455.86	2765.81	456.3	2765.59	457.11	2765.19	458.22	2764.58	460.02	2763.88
460.28	2763.79	462.14	2763.1	462.39	2763.06	463.83	2762.56	464.71	2762.24
467.06	2761.57	468.61	2761.11	470.16	2760.86	473.26	2760.35	476.1	2759.55
478.22	2759.59	481.11	2760.39	486.92	2760.72	494.18	2760.4	496.8	2759.81
514.16	2760.56	516.25	2760.43	526.4	2759.84	531.14	2761.02	536.72	2759.75
549.4	2759.97	554.38	2758.82	556.74	2758.87	563.28	2757.3	577.74	2757.34
596.59	2756.66	600.78	2758.2	609.82	2759.41	620.25	2759.46	621.28	2759.45
621.59	2759.5	624.64	2759.88	628.87	2760.3	633.07	2760.72	637.27	2761.14
641.57	2761.57	646.28	2761.98	651.54	2762.4	652.55	2762.48	654.39	2764.34
656.75	2764.7	661.99	2765.49	667.32	2766.3	667.5	2766.37	670.33	2766.55
677.04	2767.27	677.78	2767.35	678.96	2767.43	679.17	2767.9	680.64	2768.46
682.29	2769.03	684.78	2769.66	685.3	2770.13	687.09	2769.83	688.31	2770.32
688.46	2770.32	692.53	2769.93	716.99	2769.2	730.54	2768.75	741.18	2768.75
741.89	2768.75	761.8	2768.75	780.89	2768.75	789.31	2768.75	841.17	2769.3
869.92	2769.3	902.17	2768.84	917.45	2768.84	919.07	2769.3	925.48	2769.3
935.14	2769.3	962.7	2769.84	969.71	2770.23	972.55	2770.23	977.81	2770.25
979.32	2770.34	981.6	2770.63	986.32	2771.21	986.59	2771.22	990.96	2771.4
1000.23	2771.77	1011.07	2772.09	1011.55	2772.11	1019.22	2772.49	1022.62	2772.66
1028.34	2773.1	1029.75	2773.2						

nning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	447.25	.03	667.32	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
447.25	667.32	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2773.21	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.87	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2768.34	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.48	Flow Area (sq ft)		1745.92	17.59
E.G. Slope (ft/ft)	0.008168	Area (sq ft)		1745.92	17.59
Q Total (cfs)	31000.00	Flow (cfs)		30937.25	62.75
Top Width (ft)	230.10	Top Width (ft)		217.09	13.01
Vel Total (ft/s)	17.58	Avg. Vel. (ft/s)		17.72	3.57
Max Chl Dpth (ft)	11.68	Hydr. Depth (ft)		8.04	1.35
Conv. Total (cfs)	343001.2	Conv. (cfs)		342306.9	694.2
Length Wtd. (ft)	18.70	Wetted Per. (ft)		221.69	13.46
Min Ch El (ft)	2756.66	Shear (lb/sq ft)		4.02	0.67
Alpha	1.01	Stream Power (lb/ft s)		71.16	2.38
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	15.87	66.34	42.62
C & E Loss (ft)	0.03	Cum SA (acres)	8.40	10.60	18.08

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2771.30	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.67	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.62	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.63	Flow Area (sq ft)		1590.52	8.83
E.G. Slope (ft/ft)	0.006860	Area (sq ft)		1590.52	8.83
Q Total (cfs)	24490.00	Flow (cfs)		24470.24	19.76
Top Width (ft)	226.85	Top Width (ft)		215.13	11.73
Vel Total (ft/s)	15.31	Avg. Vel. (ft/s)		15.39	2.24
Max Chl Dpth (ft)	10.96	Hydr. Depth (ft)		7.39	0.75
Conv. Total (cfs)	295691.4	Conv. (cfs)		295452.9	238.5
Length Wtd. (ft)	18.78	Wetted Per. (ft)		218.99	11.92
Min Ch El (ft)	2756.66	Shear (lb/sq ft)		3.11	0.32
Alpha	1.01	Stream Power (lb/ft s)		47.85	0.71
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	11.06	59.75	31.84
C & E Loss (ft)	0.07	Cum SA (acres)	7.35	10.58	17.35

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2774.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.72	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2769.63	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2771.29	Flow Area (sq ft)		2027.60	181.31

* E.G. Slope (ft/ft)	*0.006682	* Area (sq ft)	*		* 2027.60	*	181.31	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*		*35568.54	*	431.46	*
* Top Width (ft)	* 486.90	* Top Width (ft)	*		* 219.91	*	266.99	*
* Vel Total (ft/s)	* 16.30	* Avg. Vel. (ft/s)	*		* 17.54	*	2.38	*
* Max Chl Dpth (ft)	* 12.97	* Hydr. Depth (ft)	*		* 9.22	*	0.68	*
* Conv. Total (cfs)	*440409.0	* Conv. (cfs)	*		*435130.7	*	5278.3	*
* Length Wtd. (ft)	* 18.70	* Wetted Per. (ft)	*		* 224.82	*	267.72	*
Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)	*		* 3.76	*	0.28	*
Alpha	* 1.14	* Stream Power (lb/ft s)	*		* 66.00	*	0.67	*
* Frctn Loss (ft)	* 0.09	* Cum Volume (acre-ft)	*	20.12	* 71.11	*	51.11	*
* C & E Loss (ft)	* 0.18	* Cum SA (acres)	*	9.31	* 10.63	*	18.49	*

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.
Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	* 2760.78	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	* 0.46	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	* 2760.32	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	* 2760.00	* Flow Area (sq ft)	*		*	183.94	*		*
* E.G. Slope (ft/ft)	*0.007410	* Area (sq ft)	*		*	183.94	*		*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*		*	1000.00	*		*
* Top Width (ft)	* 126.60	* Top Width (ft)	*		*	126.60	*		*
* Vel Total (ft/s)	* 5.44	* Avg. Vel. (ft/s)	*		*	5.44	*		*
* Max Chl Dpth (ft)	* 3.66	* Hydr. Depth (ft)	*		*	1.45	*		*
* Conv. Total (cfs)	* 11617.2	* Conv. (cfs)	*		*	11617.2	*		*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*		*	127.75	*		*
* Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)	*		*	0.67	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		*	3.62	*		*
* Frctn Loss (ft)	* 0.15	* Cum Volume (acre-ft)	*	0.48	*	10.85	*		*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	0.23	*	5.78	*		*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2763.76	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	* 1.42	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	* 2762.34	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	* 2762.34	* Flow Area (sq ft)	*		*	522.79	*		*
* E.G. Slope (ft/ft)	*0.009536	* Area (sq ft)	*		*	522.79	*		*
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*		*	5000.00	*		*
* Top Width (ft)	* 186.31	* Top Width (ft)	*		*	186.31	*		*
* Vel Total (ft/s)	* 9.56	* Avg. Vel. (ft/s)	*		*	9.56	*		*
* Max Chl Dpth (ft)	* 5.68	* Hydr. Depth (ft)	*		*	2.81	*		*
* Conv. Total (cfs)	* 51203.3	* Conv. (cfs)	*		*	51203.3	*		*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*		*	188.01	*		*
* Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)	*		*	1.66	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		*	15.83	*		*
* Frctn Loss (ft)	* 0.18	* Cum Volume (acre-ft)	*	0.52	*	21.44	*		*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	0.23	*	6.78	*		*

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: 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 #PF 6

* E.G. Elev (ft)	* 2766.20	* Element	*	Left OB	*	Channel	*	Right OB	*
* Vel Head (ft)	* 2.20	* Wt. n-Val.	*		*	0.030	*		*
* W.S. Elev (ft)	* 2764.00	* Reach Len. (ft)	*	23.86	*	18.79	*	11.80	*
* Crit W.S. (ft)	* 2764.00	* Flow Area (sq ft)	*		*	840.44	*		*
* E.G. Slope (ft/ft)	*0.008338	* Area (sq ft)	*		*	840.44	*		*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*		*10000.00		*		*
* Top Width (ft)	* 194.34	* Top Width (ft)	*		*	194.34	*		*
* Vel Total (ft/s)	* 11.90	* Avg. Vel. (ft/s)	*		*	11.90	*		*
* Max Chl Dpth (ft)	* 7.34	* Hydr. Depth (ft)	*		*	4.32	*		*
* Conv. Total (cfs)	*109511.6	* Conv. (cfs)	*		*109511.6		*		*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*		*	196.96	*		*
* Min Ch El (ft)	* 2756.66	* Shear (lb/sq ft)	*		*	2.22	*		*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		*	26.43	*		*
* Frctn Loss (ft)	* 0.16	* Cum Volume (acre-ft)	*	2.25	*	39.47	*	6.23	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	*	1.47	*	8.90	*	6.71	*

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: 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: River #1
REACH: Reach #1 RS: 143.*

UT
cription:
ocation Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2771.57	45.22	2770.92	69.33	2770.76	98.8	2770.58	100.27	2770.57
102.96	2770.55	105.7	2770.53	171.49	2769.94	194.73	2769.89	204.4	2769.86
204.81	2769.86	264.36	2769.61	288.97	2769.57	306.35	2769.57	321.25	2769.93

337.5	2769.93	347.6	2769.93	367.49	2770.3	376.41	2770.3	423.98	2770.3		
441.78	2770.3	450.35	2769.93	453.31	2769.44	453.66	2769.57	466.77	2769.41		
473.91	2769.39	474.09	2769.25	475.68	2768.65	476.54	2768.31	476.71	2768.13		
477.76	2767.61	478.25	2767.99	478.6	2767.44	478.82	2767.08	479.94	2766.53		
482.07	2765.82	482.49	2765.62	483.25	2765.26	484.31	2764.72	486.02	2764.06		
486.26	2763.98	488.03	2763.33	488.26	2763.28	489.63	2762.8	490.46	2762.49		
492.69	2761.8	494.16	2761.34	495.62	2761.04	498.57	2760.43	501.26	2759.49		
503.27	2759.52	506.01	2760.17	511.52	2760.44	518.4	2760.2	520.88	2759.73		
537.34	2760.36	539.32	2760.26	548.94	2759.8	553.44	2760.75	558.73	2759.75		
570.75	2759.95	575.47	2759.04	577.7	2759.08	583.9	2757.21	597.62	2757.18		
615.48	2756.54	620.16	2758.13	630.27	2759.07	641.92	2759.07	643.08	2759.07		
643.43	2759.1	646.83	2759.4	651.56	2759.72	656.26	2760.05	660.95	2760.38		
665.76	2760.7	671.02	2761.02	676.9	2761.34	678.02	2761.4	680.08	2763.51		
682.72	2763.86	688.57	2764.62	694.53	2765.39	694.7	2765.45	697.34	2765.62		
703.6	2766.36	704.29	2766.45	705.39	2766.55	705.59	2766.93	706.96	2767.41		
708.49	2767.91	710.82	2768.48	711.31	2768.87	712.97	2768.67	714.11	2769.1		
714.25	2769.11	718.05	2768.7	740.86	2768.11	753.5	2767.75	763.42	2767.75		
764.09	2767.75	782.66	2767.75	800.46	2767.75	808.31	2767.75	856.68	2768.39		
883.5	2768.39	913.58	2768.02	927.83	2768.02	929.35	2768.39	935.32	2768.39		
944.33	2768.39	970.04	2769.02	976.58	2769.48	979.22	2769.53	984.13	2769.67		
985.54	2769.77	987.67	2770.05	992.07	2770.62	992.32	2770.63	996.4	2770.87		
1005.04	2771.37	1015.15	2771.81	1015.6	2771.84	1022.76	2772.28	1025.93	2772.48		
1031.26	2772.99	1032.58	2773.11								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	473.91	.03	694.53	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
473.91	694.53	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2772.71	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.61	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2769.10	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.47	Flow Area (sq ft)		1963.96	280.16
E.G. Slope (ft/ft)	0.005376	Area (sq ft)		1963.96	280.16
Q Total (cfs)	31000.00	Flow (cfs)		30285.18	714.82
Top Width (ft)	496.33	Top Width (ft)		220.03	276.29
Vel Total (ft/s)	13.81	Avg. Vel. (ft/s)		15.42	2.55
Max Chl Dpth (ft)	12.56	Hydr. Depth (ft)		8.93	1.01
Conv. Total (cfs)	422808.7	Conv. (cfs)		413059.3	9749.4
Length Wtd. (ft)	18.65	Wetted Per. (ft)		224.45	277.14
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		2.94	0.34
Alpha	1.22	Stream Power (lb/ft s)		45.28	0.87
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	15.87	65.54	42.58
C & E Loss (ft)	0.38	Cum SA (acres)	8.40	10.50	18.05

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.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2771.10	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.22	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.88	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.33	Flow Area (sq ft)		1482.85	10.17
E.G. Slope (ft/ft)	0.008643	Area (sq ft)		1482.85	10.17
Q Total (cfs)	24490.00	Flow (cfs)		24460.91	29.09
Top Width (ft)	226.34	Top Width (ft)		215.31	11.03
Vel Total (ft/s)	16.40	Avg. Vel. (ft/s)		16.50	2.86
Max Chl Dpth (ft)	10.34	Hydr. Depth (ft)		6.89	0.92
Conv. Total (cfs)	263420.8	Conv. (cfs)		263107.8	312.9
Length Wtd. (ft)	18.76	Wetted Per. (ft)		218.70	11.31
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		3.66	0.49
Alpha	1.01	Stream Power (lb/ft s)		60.35	1.39
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	11.06	59.09	31.84
C & E Loss (ft)	0.05	Cum SA (acres)	7.35	10.48	17.34

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2774.15	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.38	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2768.77	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.83	Flow Area (sq ft)		1891.42	191.23
E.G. Slope (ft/ft)	0.008315	Area (sq ft)		1891.42	191.23
Q Total (cfs)	36000.00	Flow (cfs)		35474.81	525.19
Top Width (ft)	479.04	Top Width (ft)		219.16	259.88
Vel Total (ft/s)	17.29	Avg. Vel. (ft/s)		18.76	2.75
Max Chl Dpth (ft)	12.23	Hydr. Depth (ft)		8.63	0.74
Conv. Total (cfs)	394788.2	Conv. (cfs)		389028.8	5759.4
Length Wtd. (ft)	18.67	Wetted Per. (ft)		223.52	260.61
Min Ch El (ft)	2756.54	Shear (lb/sq ft)		4.39	0.38
Alpha	1.16	Stream Power (lb/ft s)		82.39	1.05
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	20.12	70.26	51.06
C & E Loss (ft)	0.07	Cum SA (acres)	9.31	10.54	18.42

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.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2760.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.10	Reach Len. (ft)	23.86	18.79	11.80

* Crit W.S. (ft)	* 2759.90	* Flow Area (sq ft)	*	* 171.80	*
* E.G. Slope (ft/ft)	*0.009166	* Area (sq ft)	*	* 171.80	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	*
* Top Width (ft)	* 125.33	* Top Width (ft)	*	* 125.33	*
* Vel Total (ft/s)	* 5.82	* Avg. Vel. (ft/s)	*	* 5.82	*
* Max Chl Dpth (ft)	* 3.56	* Hydr. Depth (ft)	*	* 1.37	*
* Conv. Total (cfs)	* 10444.9	* Conv. (cfs)	*	* 10444.9	*
Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 126.33	*
Min Ch El (ft)	* 2756.54	* Shear (lb/sq ft)	*	* 0.78	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 4.53	*
* Frctn Loss (ft)	* 0.19	* Cum Volume (acre-ft)	* 0.48	* 10.77	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 0.23	* 5.72	*

Warning: Divided flow computed for this cross-section.

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2763.56	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 1.53	* Wt. n-Val.	*	* 0.030	*
* W.S. Elev (ft)	* 2762.03	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2762.14	* Flow Area (sq ft)	*	* 504.01	*
* E.G. Slope (ft/ft)	*0.010805	* Area (sq ft)	*	* 504.01	*
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*
* Top Width (ft)	* 186.70	* Top Width (ft)	*	* 186.70	*
* Vel Total (ft/s)	* 9.92	* Avg. Vel. (ft/s)	*	* 9.92	*
* Max Chl Dpth (ft)	* 5.49	* Hydr. Depth (ft)	*	* 2.70	*
* Conv. Total (cfs)	* 48102.3	* Conv. (cfs)	*	* 48102.3	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 188.43	*
* Min Ch El (ft)	* 2756.54	* Shear (lb/sq ft)	*	* 1.80	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 17.90	*
* Frctn Loss (ft)	* 0.19	* Cum Volume (acre-ft)	* 0.52	* 21.22	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.23	* 6.69	*

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2766.01	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.39	* Wt. n-Val.	*	* 0.030	*
* W.S. Elev (ft)	* 2763.63	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2763.82	* Flow Area (sq ft)	*	* 806.48	*
* E.G. Slope (ft/ft)	*0.009527	* Area (sq ft)	*	* 806.48	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*
* Top Width (ft)	* 193.72	* Top Width (ft)	*	* 193.72	*
* Vel Total (ft/s)	* 12.40	* Avg. Vel. (ft/s)	*	* 12.40	*
* Max Chl Dpth (ft)	* 7.08	* Hydr. Depth (ft)	*	* 4.16	*
* Conv. Total (cfs)	*102449.7	* Conv. (cfs)	*	*102449.7	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 196.35	*
* Min Ch El (ft)	* 2756.54	* Shear (lb/sq ft)	*	* 2.44	*
Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 30.29	*
Frctn Loss (ft)	* 0.17	* Cum Volume (acre-ft)	* 2.25	* 39.12	* 6.23 *
C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 1.47	* 8.82	* 6.71 *

Note: Program found supercritical flow starting at this cross section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 142.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2771.11	47.77	2770.51	73.23	2770.34	104.35	2770.12	105.91	2770.11
108.75	2770.09	111.65	2770.07	181.14	2769.46	205.69	2769.42	215.9	2769.4
216.33	2769.4	279.23	2769.17	305.22	2769.11	323.59	2769.11	339.32	2769.39
356.48	2769.39	367.15	2769.39	388.16	2769.66	397.58	2769.66	447.83	2769.66
466.63	2769.66	475.68	2769.39	478.81	2769.02	479.18	2769.11	493.03	2768.99
500.57	2769.01	500.74	2768.9	502.24	2768.35	503.05	2768.04	503.22	2767.9
504.21	2767.44	504.68	2767.7	505	2767.27	505.21	2766.98	506.27	2766.5
508.28	2765.83	508.68	2765.65	509.4	2765.33	510.4	2764.85	512.02	2764.25
512.24	2764.17	513.91	2763.55	514.13	2763.5	515.43	2763.04	516.22	2762.73
518.32	2762.04	519.71	2761.57	521.09	2761.21	523.88	2760.51	526.42	2759.43
528.32	2759.45	530.91	2759.95	536.12	2760.16	542.62	2760	544.97	2759.65
560.52	2760.16	562.39	2760.09	571.49	2759.77	575.73	2760.49	580.74	2759.75
592.1	2759.93	596.56	2759.25	598.67	2759.29	604.53	2757.12	617.49	2757.01
634.38	2756.42	639.55	2758.05	650.72	2758.72	663.6	2758.69	664.87	2758.68
665.26	2758.71	669.03	2758.92	674.25	2759.15	679.44	2759.38	684.63	2759.61
689.94	2759.84	695.76	2760.06	702.25	2760.28	703.5	2760.32	705.77	2762.69
708.69	2763.02	715.16	2763.74	721.74	2764.48	721.9	2764.52	724.35	2764.68
730.16	2765.46	730.8	2765.55	731.82	2765.66	732	2765.95	733.27	2766.36
734.7	2766.79	736.86	2767.3	737.31	2767.61	738.85	2767.52	739.91	2767.88
740.04	2767.89	743.56	2767.46	764.73	2767.02	776.46	2766.75	785.66	2766.75
786.28	2766.75	803.51	2766.75	820.03	2766.75	827.32	2766.75	872.2	2767.48
897.08	2767.48	924.99	2767.2	938.22	2767.2	939.62	2767.48	945.17	2767.48
953.53	2767.48	977.38	2768.2	983.44	2768.72	985.9	2768.84	990.45	2769.08
991.76	2769.2	993.73	2769.48	997.81	2770.03	998.05	2770.05	1001.83	2770.34
1009.85	2770.96	1019.23	2771.54	1019.65	2771.57	1026.29	2772.07	1029.23	2772.3
1034.18	2772.88	1035.4	2773.02						

nning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	500.57	.03	721.74	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
500.57	721.74	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2772.48	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.65	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.83	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.04	Flow Area (sq ft)		1749.13	184.06
E.G. Slope (ft/ft)	0.007925	Area (sq ft)		1749.13	184.06
Q Total (cfs)	31000.00	Flow (cfs)		30510.07	489.93
Top Width (ft)	460.92	Top Width (ft)		218.37	242.56
Vel Total (ft/s)	16.04	Avg. Vel. (ft/s)		17.44	2.66
Max Chl Dpth (ft)	11.41	Hydr. Depth (ft)		8.01	0.76
Conv. Total (cfs)	348222.8	Conv. (cfs)		342719.4	5503.4
Length Wtd. (ft)	18.67	Wetted Per. (ft)		222.31	243.20
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		3.89	0.37
Alpha	1.16	Stream Power (lb/ft s)		67.90	1.00
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	15.87	64.74	42.51
C & E Loss (ft)	0.10	Cum SA (acres)	8.40	10.41	17.97

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.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2770.72	Element	Left OB	Channel	Right OB
Vel Head (ft)	3.41	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2767.31	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.42	Flow Area (sq ft)		1635.29	72.85
E.G. Slope (ft/ft)	0.006233	Area (sq ft)		1635.29	72.85
Q Total (cfs)	24490.00	Flow (cfs)		24328.30	161.70
Top Width (ft)	366.58	Top Width (ft)		216.77	149.82
Vel Total (ft/s)	14.34	Avg. Vel. (ft/s)		14.88	2.22
Max Chl Dpth (ft)	10.89	Hydr. Depth (ft)		7.54	0.49
Conv. Total (cfs)	310209.6	Conv. (cfs)		308161.3	2048.2
Length Wtd. (ft)	18.75	Wetted Per. (ft)		220.36	150.26
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		2.89	0.19
Alpha	1.07	Stream Power (lb/ft s)		42.96	0.42
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	11.06	58.42	31.83
C & E Loss (ft)	0.24	Cum SA (acres)	7.35	10.39	17.32

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.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2773.93	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.92	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2768.02	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2770.32	Flow Area (sq ft)		1790.27	230.43
E.G. Slope (ft/ft)	0.009831	Area (sq ft)		1790.27	230.43
Q Total (cfs)	36000.00	Flow (cfs)		35285.93	714.07
Top Width (ft)	468.24	Top Width (ft)		218.66	249.57
Vel Total (ft/s)	17.82	Avg. Vel. (ft/s)		19.71	3.10
Max Chl Dpth (ft)	11.60	Hydr. Depth (ft)		8.19	0.92
Conv. Total (cfs)	363082.7	Conv. (cfs)		355880.9	7201.8
Length Wtd. (ft)	18.62	Wetted Per. (ft)		222.66	250.23
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		4.93	0.57
Alpha	1.20	Stream Power (lb/ft s)		97.26	1.75
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	20.12	69.47	51.00
C & E Loss (ft)	0.05	Cum SA (acres)	9.31	10.44	18.35

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2760.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.77	Wt. n-Val.		0.030	
W.S. Elev (ft)	2759.64	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2759.64	Flow Area (sq ft)		142.36	
E.G. Slope (ft/ft)	0.011829	Area (sq ft)		142.36	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	94.82	Top Width (ft)		94.82	
Vel Total (ft/s)	7.02	Avg. Vel. (ft/s)		7.02	
Max Chl Dpth (ft)	3.22	Hydr. Depth (ft)		1.50	
Conv. Total (cfs)	9194.4	Conv. (cfs)		9194.4	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		95.61	
Min Ch El (ft)	2756.42	Shear (lb/sq ft)		1.10	
Alpha	1.00	Stream Power (lb/ft s)		7.72	
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	0.48	10.70	
C & E Loss (ft)	0.02	Cum SA (acres)	0.23	5.68	

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2763.34	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.67	Wt. n-Val.		0.030	
W.S. Elev (ft)	2761.67	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2761.89	Flow Area (sq ft)		482.82	
E.G. Slope (ft/ft)	0.012368	Area (sq ft)		482.82	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	185.39	Top Width (ft)		185.39	
Vel Total (ft/s)	10.36	Avg. Vel. (ft/s)		10.36	
Max Chl Dpth (ft)	5.25	Hydr. Depth (ft)		2.60	

* Conv. Total (cfs)	* 44959.4	* Conv. (cfs)	*	* 44959.4	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 187.30	*
* Min Ch El (ft)	* 2756.42	* Shear (lb/sq ft)	*	* 1.99	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 20.61	*
* Frctn Loss (ft)	* 0.22	* Cum Volume (acre-ft)	* 0.52	* 21.01	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.23	* 6.61	*

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2765.80	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 2.56	* Wt. n-Val.	*	* 0.030	*
* W.S. Elev (ft)	* 2763.24	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2763.60	* Flow Area (sq ft)	*	* 778.45	*
* E.G. Slope (ft/ft)	*0.010868	* Area (sq ft)	*	* 778.45	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*
* Top Width (ft)	* 195.74	* Top Width (ft)	*	* 195.74	*
* Vel Total (ft/s)	* 12.85	* Avg. Vel. (ft/s)	*	* 12.85	*
* Max Chl Dpth (ft)	* 6.81	* Hydr. Depth (ft)	*	* 3.98	*
* Conv. Total (cfs)	* 95921.6	* Conv. (cfs)	*	* 95921.6	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 198.39	*
* Min Ch El (ft)	* 2756.42	* Shear (lb/sq ft)	*	* 2.66	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 34.20	*
* Frctn Loss (ft)	* 0.19	* Cum Volume (acre-ft)	* 2.25	* 38.77	* 6.23 *
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 1.47	* 8.74	* 6.71 *

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 141.*

INPUT
Description:
Station Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2770.66	50.31	2770.11	77.13	2769.91	109.91	2769.67	111.55	2769.66
114.54	2769.64	117.59	2769.61	190.79	2768.97	216.64	2768.94	227.4	2768.93
227.86	2768.93	294.1	2768.72	321.48	2768.66	340.82	2768.66	357.39	2768.84
375.47	2768.84	386.71	2768.84	408.83	2769.02	418.76	2769.02	471.68	2769.02
491.48	2769.02	501.02	2768.84	504.31	2768.6	504.7	2768.66	519.28	2768.58
527.23	2768.63	527.39	2768.54	528.8	2768.05	529.57	2767.77	529.72	2767.66
530.66	2767.28	531.1	2767.41	531.4	2767.09	531.6	2766.89	532.6	2766.47
534.49	2765.84	534.87	2765.69	535.55	2765.4	536.49	2764.99	538.01	2764.44
538.22	2764.36	539.8	2763.78	540.01	2763.72	541.22	2763.27	541.97	2762.98
543.95	2762.28	545.26	2761.79	546.56	2761.39	549.19	2760.59	551.58	2759.37
553.37	2759.39	555.81	2759.73	560.71	2759.89	566.84	2759.8	569.05	2759.57
583.7	2759.96	585.46	2759.92	594.03	2759.73	598.03	2760.23	602.74	2759.75
613.45	2759.9	617.65	2759.47	619.64	2759.5	625.16	2757.03	637.36	2756.84
653.27	2756.3	658.94	2757.97	671.17	2758.38	685.27	2758.31	686.67	2758.3
687.09	2758.31	691.22	2758.44	696.94	2758.57	702.63	2758.71	708.31	2758.84
714.13	2758.97	720.49	2759.1	727.61	2759.22	728.97	2759.25	731.47	2761.86
734.66	2762.17	741.74	2762.87	748.96	2763.57	749.1	2763.6	751.36	2763.75
756.71	2764.56	757.31	2764.65	758.25	2764.77	758.42	2764.98	759.59	2765.32
760.9	2765.67	762.89	2766.12	763.31	2766.35	764.73	2766.37	765.71	2766.66
765.83	2766.67	769.08	2766.22	788.6	2765.93	799.42	2765.75	807.9	2765.75
808.48	2765.75	824.37	2765.75	839.6	2765.75	846.32	2765.75	887.71	2766.57
910.66	2766.57	936.4	2766.39	948.6	2766.39	949.89	2766.57	955.01	2766.57
962.72	2766.57	984.72	2767.39	990.31	2767.97	992.57	2768.14	996.77	2768.5
997.98	2768.64	999.8	2768.9	1003.56	2769.44	1003.78	2769.46	1007.27	2769.81
1014.67	2770.56	1023.32	2771.26	1023.7	2771.3	1029.83	2771.86	1032.54	2772.11
1037.1	2772.77	1038.23	2772.93						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	527.23	.03	748.96	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
527.23	748.96	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2772.25	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 5.27	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2766.98	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2768.55	* Flow Area (sq ft)	*	* 1635.54	* 196.56 *
* E.G. Slope (ft/ft)	*0.009774	* Area (sq ft)	*	* 1635.54	* 196.56 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*30414.16	* 585.84 *
* Top Width (ft)	* 442.29	* Top Width (ft)	*	* 217.45	* 224.84 *
* Vel Total (ft/s)	* 16.92	* Avg. Vel. (ft/s)	*	* 18.60	* 2.98 *
* Max Chl Dpth (ft)	* 10.68	* Hydr. Depth (ft)	*	* 7.52	* 0.87 *
* Conv. Total (cfs)	*313560.3	* Conv. (cfs)	*	*307634.6	* 5925.7 *
* Length Wtd. (ft)	* 18.63	* Wetted Per. (ft)	*	* 221.01	* 225.33 *
* Min Ch El (ft)	* 2756.30	* Shear (lb/sq ft)	*	* 4.52	* 0.53 *
* Alpha	* 1.19	* Stream Power (lb/ft s)	*	* 83.97	* 1.59 *
* Frctn Loss (ft)	* 0.16	* Cum Volume (acre-ft)	* 15.87	* 64.01	* 42.46 *
* C & E Loss (ft)	* 0.06	* Cum SA (acres)	* 8.40	* 10.31	* 17.91 *

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

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2770.49	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 4.35	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2766.13	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80 *
* Crit W.S. (ft)	* 2767.42	* Flow Area (sq ft)	*	* 1451.79	* 47.78 *
* E.G. Slope (ft/ft)	*0.009204	* Area (sq ft)	*	* 1451.79	* 47.78 *
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24364.44	* 125.56 *
* Top Width (ft)	* 320.18	* Top Width (ft)	*	* 215.35	* 104.82 *
* Vel Total (ft/s)	* 16.33	* Avg. Vel. (ft/s)	*	* 16.78	* 2.63 *

* Max Chl Dpth (ft)	* 9.83	* Hydr. Depth (ft)	*	* 6.74	* 0.46	*
* Conv. Total (cfs)	*255273.5	* Conv. (cfs)	*	*253964.7	* 1308.8	*
* Length Wtd. (ft)	* 18.74	* Wetted Per. (ft)	*	* 218.73	* 105.16	*
* Min Ch El (ft)	* 2756.30	* Shear (lb/sq ft)	*	* 3.81	* 0.26	*
* Alpha	* 1.05	* Stream Power (lb/ft s)	*	* 64.00	* 0.69	*
* Frctn Loss (ft)	* 0.14	* Cum Volume (acre-ft)	* 11.06	* 57.75	* 31.81	*
* C & E Loss (ft)	* 0.09	* Cum SA (acres)	* 7.35	* 10.30	* 17.29	*

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.

CROSS SECTION OUTPUT Profile #PF 3

* E.G. Elev (ft)	* 2773.69	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 6.41	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2767.27	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2769.74	* Flow Area (sq ft)	*	* 1698.44	* 262.68	*
* E.G. Slope (ft/ft)	*0.011439	* Area (sq ft)	*	* 1698.44	* 262.68	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*34995.41	* 1004.58	*
* Top Width (ft)	* 450.33	* Top Width (ft)	*	* 217.73	* 232.60	*
* Vel Total (ft/s)	* 18.36	* Avg. Vel. (ft/s)	*	* 20.60	* 3.82	*
* Max Chl Dpth (ft)	* 10.97	* Hydr. Depth (ft)	*	* 7.80	* 1.13	*
* Conv. Total (cfs)	*336601.5	* Conv. (cfs)	*	*327208.6	* 9392.9	*
* Length Wtd. (ft)	* 18.56	* Wetted Per. (ft)	*	* 221.41	* 233.09	*
* Min Ch El (ft)	* 2756.30	* Shear (lb/sq ft)	*	* 5.48	* 0.80	*
* Alpha	* 1.23	* Stream Power (lb/ft s)	*	* 112.87	* 3.08	*
* Frctn Loss (ft)	* 0.20	* Cum Volume (acre-ft)	* 20.12	* 68.72	* 50.93	*
* C & E Loss (ft)	* 0.05	* Cum SA (acres)	* 9.31	* 10.35	* 18.29	*

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	* 2760.13	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.90	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2759.23	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2759.39	* Flow Area (sq ft)	*	* 131.42	*	*
* E.G. Slope (ft/ft)	*0.018243	* Area (sq ft)	*	* 131.42	*	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	*	*
* Top Width (ft)	* 107.60	* Top Width (ft)	*	* 107.60	*	*
* Vel Total (ft/s)	* 7.61	* Avg. Vel. (ft/s)	*	* 7.61	*	*
* Max Chl Dpth (ft)	* 2.93	* Hydr. Depth (ft)	*	* 1.22	*	*
* Conv. Total (cfs)	* 7403.8	* Conv. (cfs)	*	* 7403.8	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 108.34	*	*
* Min Ch El (ft)	* 2756.30	* Shear (lb/sq ft)	*	* 1.38	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 10.51	*	*
* Frctn Loss (ft)	* 0.27	* Cum Volume (acre-ft)	* 0.48	* 10.64	*	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.23	* 5.63	*	*

ote: Program found supercritical flow starting at this cross section.

OSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2763.08	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 1.79	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2761.30	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2761.61	* Flow Area (sq ft)	*	* 465.84	*	*
* E.G. Slope (ft/ft)	*0.013831	* Area (sq ft)	*	* 465.84	*	*
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*	*
* Top Width (ft)	* 184.06	* Top Width (ft)	*	* 184.06	*	*
* Vel Total (ft/s)	* 10.73	* Avg. Vel. (ft/s)	*	* 10.73	*	*
* Max Chl Dpth (ft)	* 4.99	* Hydr. Depth (ft)	*	* 2.53	*	*
* Conv. Total (cfs)	* 42515.0	* Conv. (cfs)	*	* 42515.0	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 186.25	*	*
* Min Ch El (ft)	* 2756.30	* Shear (lb/sq ft)	*	* 2.16	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 23.18	*	*
* Frctn Loss (ft)	* 0.25	* Cum Volume (acre-ft)	* 0.52	* 20.80	*	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 0.23	* 6.53	*	*

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2765.56	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.77	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2762.79	* Reach Len. (ft)	* 23.86	* 18.79	* 11.80	*
* Crit W.S. (ft)	* 2763.34	* Flow Area (sq ft)	*	* 749.37	*	*
* E.G. Slope (ft/ft)	*0.012568	* Area (sq ft)	*	* 749.37	*	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*	*
* Top Width (ft)	* 198.42	* Top Width (ft)	*	* 198.42	*	*
* Vel Total (ft/s)	* 13.34	* Avg. Vel. (ft/s)	*	* 13.34	*	*
* Max Chl Dpth (ft)	* 6.49	* Hydr. Depth (ft)	*	* 3.78	*	*
* Conv. Total (cfs)	* 89199.4	* Conv. (cfs)	*	* 89199.4	*	*
* Length Wtd. (ft)	* 18.79	* Wetted Per. (ft)	*	* 201.15	*	*
* Min Ch El (ft)	* 2756.30	* Shear (lb/sq ft)	*	* 2.92	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 39.01	*	*
* Frctn Loss (ft)	* 0.22	* Cum Volume (acre-ft)	* 2.25	* 38.44	* 6.23	*
* C & E Loss (ft)	* 0.02	* Cum SA (acres)	* 1.47	* 8.65	* 6.71	*

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 140.*

UT
cription:
ocation Elevation Data num= 127

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2770.2	52.86	2769.7	81.03	2769.49	115.47	2769.22	117.19	2769.2
120.34	2769.18	123.54	2769.15	200.43	2768.49	227.6	2768.47	238.9	2768.47
239.38	2768.47	308.98	2768.27	337.73	2768.2	358.06	2768.2	375.46	2768.3

394.45	2768.3	406.26	2768.3	429.5	2768.39	439.93	2768.39	495.53	2768.39
516.33	2768.39	526.35	2768.3	529.82	2768.17	530.22	2768.2	545.54	2768.16
553.89	2768.25	554.04	2768.18	555.37	2767.75	556.08	2767.51	556.23	2767.43
557.1	2767.11	557.52	2767.12	557.81	2766.92	557.99	2766.79	558.93	2766.44
560.71	2765.85	561.06	2765.72	561.7	2765.48	562.58	2765.13	564.01	2764.63
564.21	2764.56	565.68	2764	565.88	2763.94	567.02	2763.51	567.72	2763.23
569.58	2762.51	570.81	2762.02	572.03	2761.57	574.49	2760.67	576.74	2759.3
578.42	2759.32	580.7	2759.5	585.31	2759.61	591.06	2759.59	593.13	2759.49
606.88	2759.76	608.54	2759.75	616.58	2759.7	620.33	2759.97	624.75	2759.75
634.79	2759.88	638.74	2759.68	640.6	2759.71	645.78	2756.94	657.24	2756.68
672.17	2756.19	678.32	2757.9	691.62	2758.04	706.95	2757.93	708.47	2757.92
708.93	2757.92	713.41	2757.96	719.63	2758	725.81	2758.04	731.99	2758.07
738.31	2758.11	745.23	2758.14	752.96	2758.16	754.45	2758.17	757.16	2761.04
760.63	2761.33	768.33	2761.99	776.17	2762.66	776.3	2762.68	778.37	2762.82
783.27	2763.65	783.81	2763.75	784.68	2763.89	784.83	2764	785.91	2764.27
787.11	2764.55	788.93	2764.94	789.31	2765.09	790.61	2765.21	791.51	2765.44
791.62	2765.46	794.59	2764.99	812.47	2764.84	822.38	2764.75	830.15	2764.75
830.67	2764.75	845.22	2764.75	859.17	2764.75	865.33	2764.75	903.23	2765.66
924.24	2765.66	947.81	2765.57	958.98	2765.57	960.17	2765.66	964.85	2765.66
971.91	2765.66	992.05	2766.57	997.17	2767.22	999.25	2767.45	1003.09	2767.91
1004.2	2768.07	1005.86	2768.33	1009.31	2768.84	1009.51	2768.87	1012.7	2769.28
1019.48	2770.15	1027.4	2770.98	1027.75	2771.02	1033.36	2771.65	1035.84	2771.93
1040.02	2772.66	1041.05	2772.84						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	553.89	.03	776.17	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
553.89	776.17	23.86	18.79	11.8	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2772.00	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.81	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.19	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2767.98	Flow Area (sq ft)		1542.21	216.14
E.G. Slope (ft/ft)	0.011668	Area (sq ft)		1542.21	216.14
Q Total (cfs)	31000.00	Flow (cfs)		30208.78	791.22
Top Width (ft)	424.00	Top Width (ft)		216.49	207.51
Vel Total (ft/s)	17.63	Avg. Vel. (ft/s)		19.59	3.66
Max Chl Dpth (ft)	10.00	Hydr. Depth (ft)		7.12	1.04
Conv. Total (cfs)	286981.8	Conv. (cfs)		279657.1	7324.7
Length Wtd. (ft)	18.66	Wetted Per. (ft)		220.16	207.88
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		5.10	0.76
Alpha	1.20	Stream Power (lb/ft s)		99.96	2.77
Frctn Loss (ft)	0.20	Cum Volume (acre-ft)	15.87	63.33	42.41
C & E Loss (ft)	0.05	Cum SA (acres)	8.40	10.22	17.85

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

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2770.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	4.87	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2765.37	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2766.94	Flow Area (sq ft)		1365.33	71.76
E.G. Slope (ft/ft)	0.011146	Area (sq ft)		1365.33	71.76
Q Total (cfs)	24490.00	Flow (cfs)		24279.86	210.15
Top Width (ft)	328.25	Top Width (ft)		214.19	114.05
Vel Total (ft/s)	17.04	Avg. Vel. (ft/s)		17.78	2.93
Max Chl Dpth (ft)	9.18	Hydr. Depth (ft)		6.37	0.63
Conv. Total (cfs)	231964.1	Conv. (cfs)		229973.7	1990.5
Length Wtd. (ft)	18.75	Wetted Per. (ft)		217.72	114.38
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		4.36	0.44
Alpha	1.08	Stream Power (lb/ft s)		77.60	1.28
Frctn Loss (ft)	0.19	Cum Volume (acre-ft)	11.06	57.15	31.80
C & E Loss (ft)	0.05	Cum SA (acres)	7.35	10.20	17.26

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.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2773.41	Element	Left OB	Channel	Right OB
Vel Head (ft)	6.87	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2766.54	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2769.18	Flow Area (sq ft)		1618.08	290.04
E.G. Slope (ft/ft)	0.013174	Area (sq ft)		1618.08	290.04
Q Total (cfs)	36000.00	Flow (cfs)		34660.52	1339.49
Top Width (ft)	432.76	Top Width (ft)		217.51	215.25
Vel Total (ft/s)	18.87	Avg. Vel. (ft/s)		21.42	4.62
Max Chl Dpth (ft)	10.35	Hydr. Depth (ft)		7.44	1.35
Conv. Total (cfs)	313644.7	Conv. (cfs)		301974.7	11670.1
Length Wtd. (ft)	18.58	Wetted Per. (ft)		221.24	215.62
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		6.02	1.11
Alpha	1.24	Stream Power (lb/ft s)		128.86	5.11
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	20.12	68.00	50.86
C & E Loss (ft)	0.05	Cum SA (acres)	9.31	10.25	18.23

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2759.74	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.99	Wt. n-Val.		0.030	
W.S. Elev (ft)	2758.75	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2758.97	Flow Area (sq ft)		125.23	
E.G. Slope (ft/ft)	0.022811	Area (sq ft)		125.23	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	112.60	Top Width (ft)		112.60	

Vel Total (ft/s)	7.99	Avg. Vel. (ft/s)		7.99	
Max Chl Dpth (ft)	2.56	Hydr. Depth (ft)		1.11	
Conv. Total (cfs)	6621.0	Conv. (cfs)		6621.0	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		113.54	
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		1.57	
Alpha	1.00	Stream Power (lb/ft s)		12.54	
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)	0.48	10.59	
C & E Loss (ft)	0.01	Cum SA (acres)	0.23	5.59	

CROSS SECTION OUTPUT Profile #PF 5

			Left OB	Channel	Right OB
E.G. Elev (ft)	2762.80	Element			
Vel Head (ft)	1.91	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.89	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2761.30	Flow Area (sq ft)		450.39	
E.G. Slope (ft/ft)	0.015415	Area (sq ft)		450.39	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	183.12	Top Width (ft)		183.12	
Vel Total (ft/s)	11.10	Avg. Vel. (ft/s)		11.10	
Max Chl Dpth (ft)	4.70	Hydr. Depth (ft)		2.46	
Conv. Total (cfs)	40271.2	Conv. (cfs)		40271.2	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		185.70	
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		2.33	
Alpha	1.00	Stream Power (lb/ft s)		25.91	
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	0.52	20.60	
C & E Loss (ft)	0.01	Cum SA (acres)	0.23	6.46	

CROSS SECTION OUTPUT Profile #PF 6

			Left OB	Channel	Right OB
E.G. Elev (ft)	2765.28	Element			
Vel Head (ft)	2.97	Wt. n-Val.		0.030	
W.S. Elev (ft)	2762.31	Reach Len. (ft)	23.86	18.79	11.80
Crit W.S. (ft)	2762.99	Flow Area (sq ft)		722.98	
E.G. Slope (ft/ft)	0.014520	Area (sq ft)		722.98	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	201.98	Top Width (ft)		201.98	
Vel Total (ft/s)	13.83	Avg. Vel. (ft/s)		13.83	
Max Chl Dpth (ft)	6.12	Hydr. Depth (ft)		3.58	
Conv. Total (cfs)	82988.7	Conv. (cfs)		82988.7	
Length Wtd. (ft)	18.79	Wetted Per. (ft)		204.93	
Min Ch El (ft)	2756.19	Shear (lb/sq ft)		3.20	
Alpha	1.00	Stream Power (lb/ft s)		44.23	
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	2.25	38.13	6.23
C & E Loss (ft)	0.02	Cum SA (acres)	1.47	8.57	6.71

CROSS SECTION

VER: River #1
ACH: Reach #1 RS: 139

INPUT
Description:
Station Elevation Data num= 41

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2769.75	122.83	2768.75	210.08	2768	238.55	2766	250.4	2766
250.9	2766	353.99	2765.75	571.8	2765.75	580.55	2765.87	584.21	2764.75
587.25	2763.75	590.19	2762.75	592.82	2761.75	595.21	2760.75	597.5	2759.75
599.8	2758.75	601.9	2757.24	661.57	2757.92	666.41	2754.85	691.06	2754.07
697.71	2755.82	779.92	2755.09	782.85	2758.21	803.38	2759.75	805.38	2759.89
809.83	2760.75	817.41	2762.24	820.11	2761.75	852.39	2761.75	884.33	2761.75
918.74	2762.75	974.69	2762.75	981.1	2762.75	999.39	2763.75	1005.92	2764.75
1011.93	2765.75	1018.14	2766.75	1024.29	2767.75	1031.8	2770.75	1039.15	2771.75
1043.88	2772.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	580.55	.03	803.38	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
580.55	803.38	172.75	171.78	164.65	.1	.3

CROSS SECTION OUTPUT Profile #PF 1

			Left OB	Channel	Right OB
E.G. Elev (ft)	2771.41	Element			
Vel Head (ft)	8.87	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2762.54	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2765.29	Flow Area (sq ft)		1274.34	86.11
E.G. Slope (ft/ft)	0.022159	Area (sq ft)		1274.34	86.11
Q Total (cfs)	31000.00	Flow (cfs)		30636.96	363.04
Top Width (ft)	320.75	Top Width (ft)		212.64	108.11
Vel Total (ft/s)	22.79	Avg. Vel. (ft/s)		24.04	4.22
Max Chl Dpth (ft)	8.47	Hydr. Depth (ft)		5.99	0.80
Conv. Total (cfs)	208251.2	Conv. (cfs)		205812.3	2438.8
Length Wtd. (ft)	171.55	Wetted Per. (ft)		216.43	108.40
Min Ch El (ft)	2754.07	Shear (lb/sq ft)		8.15	1.10
Alpha	1.10	Stream Power (lb/ft s)		195.83	4.63
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	15.87	62.72	42.36
C & E Loss (ft)	0.31	Cum SA (acres)	8.40	10.13	17.81

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

CROSS SECTION OUTPUT Profile #PF 2

			Left OB	Channel	Right OB
E.G. Elev (ft)	2769.62	Element			
Vel Head (ft)	8.04	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2761.59	Reach Len. (ft)	172.75	171.78	164.65
Crit W.S. (ft)	2764.35	Flow Area (sq ft)		1072.71	10.94

* E.G. Slope (ft/ft)	*0.024617	* Area (sq ft)	*	* 1072.71	* 10.94	*
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*24433.09	* 56.91	*
* Top Width (ft)	* 220.87	* Top Width (ft)	*	* 210.17	* 10.70	*
* Vel Total (ft/s)	* 22.60	* Avg. Vel. (ft/s)	*	* 22.78	* 5.20	*
* Max Chl Dpth (ft)	* 7.52	* Hydr. Depth (ft)	*	* 5.10	* 1.02	*
* Conv. Total (cfs)	*156089.0	* Conv. (cfs)	*	*155726.3	* 362.7	*
* Length Wtd. (ft)	* 171.65	* Wetted Per. (ft)	*	* 213.78	* 10.87	*
* Min Ch El (ft)	* 2754.07	* Shear (lb/sq ft)	*	* 7.71	* 1.55	*
* Alpha	* 1.01	* Stream Power (lb/ft s)	*	* 175.64	* 8.05	*
* Frctn Loss (ft)	* 0.30	* Cum Volume (acre-ft)	* 11.06	* 56.62	* 31.78	*
* C & E Loss (ft)	* 0.32	* Cum SA (acres)	* 7.35	* 10.11	* 17.24	*

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 #PF 3

* E.G. Elev (ft)	* 2772.82	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 9.73	* Wt. n-Val.	*	* 0.030	* 0.045	*
* W.S. Elev (ft)	* 2763.09	* Reach Len. (ft)	* 172.75	* 171.78	* 164.65	*
* Crit W.S. (ft)	* 2766.55	* Flow Area (sq ft)	*	* 1391.46	* 170.79	*
* E.G. Slope (ft/ft)	*0.022046	* Area (sq ft)	*	* 1391.46	* 170.79	*
* Q Total (cfs)	*36000.00	* Flow (cfs)	*	*35203.81	* 796.19	*
* Top Width (ft)	* 398.09	* Top Width (ft)	*	* 214.18	* 183.90	*
* Vel Total (ft/s)	* 23.04	* Avg. Vel. (ft/s)	*	* 25.30	* 4.66	*
* Max Chl Dpth (ft)	* 9.02	* Hydr. Depth (ft)	*	* 6.50	* 0.93	*
* Conv. Total (cfs)	*242456.7	* Conv. (cfs)	*	*237094.4	* 5362.3	*
* Length Wtd. (ft)	* 171.46	* Wetted Per. (ft)	*	* 218.07	* 184.20	*
* Min Ch El (ft)	* 2754.07	* Shear (lb/sq ft)	*	* 8.78	* 1.28	*
* Alpha	* 1.18	* Stream Power (lb/ft s)	*	* 222.19	* 5.95	*
* Frctn Loss (ft)	* 0.31	* Cum Volume (acre-ft)	* 20.12	* 67.35	* 50.80	*
* C & E Loss (ft)	* 0.29	* Cum SA (acres)	* 9.31	* 10.16	* 18.17	*

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

CROSS SECTION OUTPUT Profile #PF 4

* E.G. Elev (ft)	* 2758.70	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 2.85	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2755.85	* Reach Len. (ft)	* 172.75	* 171.78	* 164.65	*
* Crit W.S. (ft)	* 2756.54	* Flow Area (sq ft)	*	* 73.87	*	*
* E.G. Slope (ft/ft)	*0.137366	* Area (sq ft)	*	* 73.87	*	*
* Q Total (cfs)	* 1000.00	* Flow (cfs)	*	* 1000.00	*	*
* Top Width (ft)	* 115.80	* Top Width (ft)	*	* 115.80	*	*
* Vel Total (ft/s)	* 13.54	* Avg. Vel. (ft/s)	*	* 13.54	*	*
* Max Chl Dpth (ft)	* 1.78	* Hydr. Depth (ft)	*	* 0.64	*	*
* Conv. Total (cfs)	* 2698.1	* Conv. (cfs)	*	* 2698.1	*	*
* Length Wtd. (ft)	* 171.78	* Wetted Per. (ft)	*	* 116.66	*	*
* Min Ch El (ft)	* 2754.07	* Shear (lb/sq ft)	*	* 5.43	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 73.51	*	*
* Frctn Loss (ft)	* 0.87	* Cum Volume (acre-ft)	* 0.48	* 10.54	*	*
* C & E Loss (ft)	* 0.19	* Cum SA (acres)	* 0.23	* 5.54	*	*

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 #PF 5

* E.G. Elev (ft)	* 2762.07	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 4.40	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2757.67	* Reach Len. (ft)	* 172.75	* 171.78	* 164.65	*
* Crit W.S. (ft)	* 2758.94	* Flow Area (sq ft)	*	* 297.04	*	*
* E.G. Slope (ft/ft)	*0.051072	* Area (sq ft)	*	* 297.04	*	*
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*	*
* Top Width (ft)	* 158.75	* Top Width (ft)	*	* 158.75	*	*
* Vel Total (ft/s)	* 16.83	* Avg. Vel. (ft/s)	*	* 16.83	*	*
* Max Chl Dpth (ft)	* 3.60	* Hydr. Depth (ft)	*	* 1.87	*	*
* Conv. Total (cfs)	* 22124.7	* Conv. (cfs)	*	* 22124.7	*	*
* Length Wtd. (ft)	* 171.78	* Wetted Per. (ft)	*	* 161.07	*	*
* Min Ch El (ft)	* 2754.07	* Shear (lb/sq ft)	*	* 5.88	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 98.98	*	*
* Frctn Loss (ft)	* 0.48	* Cum Volume (acre-ft)	* 0.52	* 20.44	*	*
* C & E Loss (ft)	* 0.25	* Cum SA (acres)	* 0.23	* 6.38	*	*

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

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2764.59	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 5.68	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2758.91	* Reach Len. (ft)	* 172.75	* 171.78	* 164.65	*
* Crit W.S. (ft)	* 2760.58	* Flow Area (sq ft)	*	* 522.79	*	*
* E.G. Slope (ft/ft)	*0.040243	* Area (sq ft)	*	* 522.79	*	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*	*
* Top Width (ft)	* 192.69	* Top Width (ft)	*	* 192.69	*	*
* Vel Total (ft/s)	* 19.13	* Avg. Vel. (ft/s)	*	* 19.13	*	*
* Max Chl Dpth (ft)	* 4.84	* Hydr. Depth (ft)	*	* 2.71	*	*
* Conv. Total (cfs)	* 49848.6	* Conv. (cfs)	*	* 49848.6	*	*
* Length Wtd. (ft)	* 171.75	* Wetted Per. (ft)	*	* 195.72	*	*
* Min Ch El (ft)	* 2754.07	* Shear (lb/sq ft)	*	* 6.71	*	*

* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 128.36	*	*
* Frctn Loss (ft)	* 0.43	* Cum Volume (acre-ft)	* 2.25	* 37.86	* 6.23	*
* C & E Loss (ft)	* 0.27	* Cum SA (acres)	* 1.47	* 8.48	* 6.71	*

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: River #1
REACH: Reach #1 RS: 130

INPUT
Description:
Station Elevation Data num= 109

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-329.97	2778	-326.97	2777	-324.12	2776	-321.7	2773	-319.71	2772
-317.71	2771	-315.72	2770	-313.73	2769	-311.73	2768	-309.74	2767
-295.4	2766	-239.67	2765	-228.16	2764	-194.92	2764	-129.95	2764
-127.06	2763	-123.98	2762	-120.22	2762	-110.54	2763	-110.53	2763
-.01	2764	0	2764	197.95	2765	197.96	2765	246.6	2765
261.24	2764.28	267.04	2764	267.05	2764	282.58	2762.8	282.59	2762.8
284.05	2763	284.06	2763	289.71	2762	289.72	2762	294.36	2761
294.37	2761	299.03	2760	299.04	2760	303.71	2759	303.72	2759
308.4	2758	308.41	2758	313.09	2757	313.1	2757	314.9	2756.96
314.91	2756.96	326.53	2756.59	326.54	2756.59	334.76	2753.3	334.76	2753.31
335.91	2756	335.92	2756	350.25	2753.25	350.26	2753.25	362.85	2754.77
362.86	2754.77	383.3	2755	429.42	2755.52	429.43	2755.51	436.01	2753.89
436.02	2753.89	456.36	2753.9	456.37	2753.9	476.41	2755.65	476.42	2755.65
495.5	2757.49	495.51	2757.49	507.59	2757.28	512.02	2757.21	512.03	2757.21
522.41	2759.75	522.42	2759.76	528.15	2761.11	528.16	2761.11	555.77	2760.75
555.78	2760.76	560.43	2761.75	560.44	2761.75	684.75	2761.75	684.76	2761.75
743.07	2760.75	743.08	2760.75	773.59	2760.75	773.6	2760.75	795.48	2760.75
795.94	2760.75	809.75	2761.75	809.76	2761.75	826.38	2762.75	866.79	2763.75
889.01	2764.75	894.02	2765.75	896.67	2766.75	896.67	2766.76	899.25	2767.75
901.38	2768.75	903.52	2769.75	911.41	2770.75	945.7	2770.75	951.33	2769.75
957.1	2768.75	961.49	2767.75	968.66	2766.75	968.68	2766.75	977.22	2767.75
981.89	2768.75	985.39	2771.75	990.06	2772.75	994.39	2773.75		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-329.97	.045	246.6	.03	528.16	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
246.6	528.16	295.76	287.33	274.51	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
329.97	197.95	2770	F

CROSS SECTION OUTPUT Profile #PF 1

* E.G. Elev (ft)	* 2767.61	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 4.90	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2762.71	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2764.38	* Flow Area (sq ft)	*	* 1612.08	* 391.50 *
* E.G. Slope (ft/ft)	*0.011070	* Area (sq ft)	* 5.87	* 1612.08	* 391.50 *
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*29367.39	* 1632.61 *
* Top Width (ft)	* 552.79	* Top Width (ft)	* 12.80	* 242.45	* 297.53 *
* Vel Total (ft/s)	* 15.47	* Avg. Vel. (ft/s)	*	* 18.22	* 4.17 *
* Max Chl Dpth (ft)	* 9.46	* Hydr. Depth (ft)	*	* 6.65	* 1.32 *
* Conv. Total (cfs)	*294631.2	* Conv. (cfs)	*	*279114.5	* 15516.7 *
* Length Wtd. (ft)	* 285.18	* Wetted Per. (ft)	*	* 246.66	* 297.72 *
* Min Ch El (ft)	* 2753.25	* Shear (lb/sq ft)	*	* 4.52	* 0.91 *
* Alpha	* 1.32	* Stream Power (lb/ft s)	*	* 82.28	* 3.79 *
* Frctn Loss (ft)	* 2.61	* Cum Volume (acre-ft)	* 15.86	* 57.03	* 41.46 *
* C & E Loss (ft)	* 1.19	* Cum SA (acres)	* 8.38	* 9.23	* 17.04 *

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

* E.G. Elev (ft)	* 2765.97	* Element	* Left OB	* Channel	* Right OB *
* Vel Head (ft)	* 3.65	* Wt. n-Val.	*	* 0.030	* 0.045 *
* W.S. Elev (ft)	* 2762.32	* Reach Len. (ft)	* 295.76	* 287.33	* 274.51 *
* Crit W.S. (ft)	* 2763.37	* Flow Area (sq ft)	*	* 1518.28	* 277.11 *
* E.G. Slope (ft/ft)	*0.008674	* Area (sq ft)	* 1.86	* 1518.28	* 277.11 *
* Q Total (cfs)	*24490.00	* Flow (cfs)	*	*23665.61	* 824.39 *
* Top Width (ft)	* 539.18	* Top Width (ft)	* 7.84	* 240.26	* 291.07 *
* Vel Total (ft/s)	* 13.64	* Avg. Vel. (ft/s)	*	* 15.59	* 2.97 *
* Max Chl Dpth (ft)	* 9.07	* Hydr. Depth (ft)	*	* 6.32	* 0.95 *
* Conv. Total (cfs)	*262959.0	* Conv. (cfs)	*	*254107.2	* 8851.9 *
* Length Wtd. (ft)	* 285.66	* Wetted Per. (ft)	*	* 244.43	* 291.25 *
* Min Ch El (ft)	* 2753.25	* Shear (lb/sq ft)	*	* 3.36	* 0.52 *
Alpha	* 1.26	* Stream Power (lb/ft s)	*	* 52.43	* 1.53 *
Frctn Loss (ft)	* 2.35	* Cum Volume (acre-ft)	* 11.06	* 51.51	* 31.24 *
C & E Loss (ft)	* 1.32	* Cum SA (acres)	* 7.34	* 9.22	* 16.67 *

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2768.79	Element	Left OB	Channel	Right OB
Vel Head (ft)	5.79	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2763.00	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2765.00	Flow Area (sq ft)		1683.47	479.76
E.G. Slope (ft/ft)	0.012922	Area (sq ft)	10.15	1683.47	479.76
Q Total (cfs)	36000.00	Flow (cfs)		33582.95	2417.06
Top Width (ft)	573.10	Top Width (ft)	16.59	248.17	308.34
Vel Total (ft/s)	16.64	Avg. Vel. (ft/s)		19.95	5.04
Max Chl Dpth (ft)	9.75	Hydr. Depth (ft)		6.78	1.56
Conv. Total (cfs)	316692.4	Conv. (cfs)		295429.6	21262.9
Length Wtd. (ft)	284.82	Wetted Per. (ft)		252.43	308.53
Min Ch El (ft)	2753.25	Shear (lb/sq ft)		5.38	1.25
Alpha	1.35	Stream Power (lb/ft s)		107.32	6.32
Frctn Loss (ft)	2.84	Cum Volume (acre-ft)	20.10	61.29	49.57
C & E Loss (ft)	1.18	Cum SA (acres)	9.28	9.25	17.24

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2756.98	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.15	Wt. n-Val.		0.030	
W.S. Elev (ft)	2756.82	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2755.85	Flow Area (sq ft)		319.37	
E.G. Slope (ft/ft)	0.001758	Area (sq ft)		319.37	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	169.40	Top Width (ft)		169.40	
Vel Total (ft/s)	3.13	Avg. Vel. (ft/s)		3.13	
Max Chl Dpth (ft)	3.57	Hydr. Depth (ft)		1.89	
Conv. Total (cfs)	23849.8	Conv. (cfs)		23849.8	
Length Wtd. (ft)	287.33	Wetted Per. (ft)		172.52	
Min Ch El (ft)	2753.25	Shear (lb/sq ft)		0.20	
Alpha	1.00	Stream Power (lb/ft s)		0.64	
Frctn Loss (ft)	0.73	Cum Volume (acre-ft)	0.48	9.77	
C & E Loss (ft)	0.01	Cum SA (acres)	0.23	4.97	

rning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2759.96	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.54	Wt. n-Val.		0.030	
W.S. Elev (ft)	2759.42	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2758.00	Flow Area (sq ft)		847.70	
E.G. Slope (ft/ft)	0.002390	Area (sq ft)		847.70	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	219.30	Top Width (ft)		219.30	
Vel Total (ft/s)	5.90	Avg. Vel. (ft/s)		5.90	
Max Chl Dpth (ft)	6.17	Hydr. Depth (ft)		3.87	
Conv. Total (cfs)	102277.4	Conv. (cfs)		102277.4	
Length Wtd. (ft)	287.33	Wetted Per. (ft)		222.97	
Min Ch El (ft)	2753.25	Shear (lb/sq ft)		0.57	
Alpha	1.00	Stream Power (lb/ft s)		3.35	
Frctn Loss (ft)	0.86	Cum Volume (acre-ft)	0.52	18.18	
C & E Loss (ft)	0.02	Cum SA (acres)	0.23	5.64	

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2762.31	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.90	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2761.41	Reach Len. (ft)	295.76	287.33	274.51
Crit W.S. (ft)	2759.60	Flow Area (sq ft)		1301.83	64.87
E.G. Slope (ft/ft)	0.002487	Area (sq ft)		1301.83	64.87
Q Total (cfs)	10000.00	Flow (cfs)		9933.18	66.82
Top Width (ft)	366.86	Top Width (ft)		235.70	131.15
Vel Total (ft/s)	7.32	Avg. Vel. (ft/s)		7.63	1.03
Max Chl Dpth (ft)	8.16	Hydr. Depth (ft)		5.52	0.49
Conv. Total (cfs)	200520.3	Conv. (cfs)		199180.4	1339.9
Length Wtd. (ft)	287.29	Wetted Per. (ft)		239.79	131.26
Min Ch El (ft)	2753.25	Shear (lb/sq ft)		0.84	0.08
Alpha	1.08	Stream Power (lb/ft s)		6.43	0.08
Frctn Loss (ft)	0.88	Cum Volume (acre-ft)	2.25	34.26	6.11
& E Loss (ft)	0.02	Cum SA (acres)	1.47	7.64	6.46

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 120

INPUT
Description:
Station Elevation Data num= 76

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-741.52	2769	-620.87	2768	-551.88	2767	-543.14	2764	-540.36	2764
-537.06	2765	-533.83	2766	-527.7	2766	-488.6	2765	-366.95	2764
-274.11	2763	-186.15	2762	-155.02	2761	-147.68	2760	-131.64	2760
-119.22	2761	-106.8	2762	-35.92	2763	0	2763	50.02	2762
110.9	2761	152.46	2760.03	153.73	2760	168.97	2759	175.86	2758
175.87	2758	179.66	2757	179.67	2757	181.81	2756	183.96	2755
186.11	2754	188.37	2753	192.2	2752	208.49	2752	208.5	2752
217.9	2753	217.91	2753	226.38	2754	226.39	2754	249.43	2755
265.63	2755	283.93	2755	293.22	2755	353.9	2756	388.76	2757
390.5	2758	392.24	2759	392.25	2759	393.98	2760	393.99	2760
396.77	2761	400.02	2762	404.19	2762	422.66	2762	464.57	2761
544.99	2761	709.9	2761	814.02	2760.75	823.72	2761.75	825.7	2761.75
826.66	2761.75	968	2761.75	980.94	2761.75	999.92	2761.75	1093.44	2761.75
1109.22	2762.75	1125.21	2763.75	1136.78	2764.75	1141.28	2765.75	1145.01	2766.75
1148.2	2767.75	1151.41	2768.75	1154.48	2769.75	1157.68	2772.75	1160.12	2773.75
1162.38	2774.75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-741.52	.045	0	.03	404.19	.045

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	404.19	158.39	153.64	149.14	.1	.3

Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-741.52	0	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	2765.11	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.43	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2763.68	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2763.47	Flow Area (sq ft)		2337.57	1641.98
E.G. Slope (ft/ft)	0.004436	Area (sq ft)	448.46	2337.57	1641.98
Q Total (cfs)	31000.00	Flow (cfs)		24742.83	6257.17
Top Width (ft)	1460.79	Top Width (ft)	336.78	404.19	719.82
Vel Total (ft/s)	7.79	Avg. Vel. (ft/s)		10.58	3.81
Max Chl Dpth (ft)	11.68	Hydr. Depth (ft)		5.78	2.28
Conv. Total (cfs)	465421.8	Conv. (cfs)		371479.1	93942.7
Length Wtd. (ft)	152.85	Wetted Per. (ft)		406.74	719.95
Min Ch El (ft)	2752.00	Shear (lb/sq ft)		1.59	0.63
Alpha	1.52	Stream Power (lb/ft s)		16.85	2.41
Frctn Loss (ft)	0.69	Cum Volume (acre-ft)	14.32	44.00	35.05
C & E Loss (ft)	0.02	Cum SA (acres)	7.19	7.10	13.84

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2764.37	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.35	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2763.02	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2762.98	Flow Area (sq ft)		2072.81	1173.91
E.G. Slope (ft/ft)	0.004673	Area (sq ft)	247.77	2072.81	1173.91
Q Total (cfs)	24490.00	Flow (cfs)		20783.13	3706.87
Top Width (ft)	1389.51	Top Width (ft)	275.97	404.19	709.35
Vel Total (ft/s)	7.54	Avg. Vel. (ft/s)		10.03	3.16
Max Chl Dpth (ft)	11.02	Hydr. Depth (ft)		5.13	1.65
Conv. Total (cfs)	358265.3	Conv. (cfs)		304037.3	54228.0
Length Wtd. (ft)	153.08	Wetted Per. (ft)		406.74	709.45
Min Ch El (ft)	2752.00	Shear (lb/sq ft)		1.49	0.48
Alpha	1.53	Stream Power (lb/ft s)		14.91	1.52
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	10.21	39.67	26.67
C & E Loss (ft)	0.01	Cum SA (acres)	6.37	7.10	13.52

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2765.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.55	Wt. n-Val.		0.030	0.045
W.S. Elev (ft)	2764.07	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2763.82	Flow Area (sq ft)		2498.51	1929.65
E.G. Slope (ft/ft)	0.004487	Area (sq ft)	590.22	2498.51	1929.65
Q Total (cfs)	36000.00	Flow (cfs)		27802.52	8197.48
Top Width (ft)	1508.05	Top Width (ft)	379.10	404.19	724.76
Vel Total (ft/s)	8.13	Avg. Vel. (ft/s)		11.13	4.25
Max Chl Dpth (ft)	12.07	Hydr. Depth (ft)		6.18	2.66
Conv. Total (cfs)	537462.9	Conv. (cfs)		415078.4	122384.5
Length Wtd. (ft)	152.72	Wetted Per. (ft)		406.74	724.90
Min Ch El (ft)	2752.00	Shear (lb/sq ft)		1.72	0.75
Alpha	1.51	Stream Power (lb/ft s)		19.15	3.17
Frctn Loss (ft)	0.70	Cum Volume (acre-ft)	18.06	47.50	41.97
C & E Loss (ft)	0.02	Cum SA (acres)	7.94	7.10	13.99

Warning: Divided flow computed for this cross-section.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.
Note: Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2756.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.25	Wt. n-Val.		0.030	
W.S. Elev (ft)	2755.99	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2755.42	Flow Area (sq ft)		248.94	
E.G. Slope (ft/ft)	0.004021	Area (sq ft)		248.94	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	171.20	Top Width (ft)		171.20	
Vel Total (ft/s)	4.02	Avg. Vel. (ft/s)		4.02	
Max Chl Dpth (ft)	3.99	Hydr. Depth (ft)		1.45	
Conv. Total (cfs)	15769.1	Conv. (cfs)		15769.1	
Length Wtd. (ft)	153.64	Wetted Per. (ft)		172.12	
Min Ch El (ft)	2752.00	Shear (lb/sq ft)		0.36	
Alpha	1.00	Stream Power (lb/ft s)		1.46	
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	0.48	7.89	
C & E Loss (ft)	0.05	Cum SA (acres)	0.23	3.85	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2759.08	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.73	Wt. n-Val.		0.030	
W.S. Elev (ft)	2758.35	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2757.51	Flow Area (sq ft)		729.87	
E.G. Slope (ft/ft)	0.003851	Area (sq ft)		729.87	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	217.68	Top Width (ft)		217.68	
Vel Total (ft/s)	6.85	Avg. Vel. (ft/s)		6.85	
Max Chl Dpth (ft)	6.35	Hydr. Depth (ft)		3.35	
Conv. Total (cfs)	80572.9	Conv. (cfs)		80572.9	
Length Wtd. (ft)	153.64	Wetted Per. (ft)		219.35	
Min Ch El (ft)	2752.00	Shear (lb/sq ft)		0.80	
Alpha	1.00	Stream Power (lb/ft s)		5.48	
Frctn Loss (ft)	0.40	Cum Volume (acre-ft)	0.52	12.98	
C & E Loss (ft)	0.07	Cum SA (acres)	0.23	4.20	

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

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2761.40	Element	Left OB	Channel	Right OB
Vel Head (ft)	1.13	Wt. n-Val.		0.030	
W.S. Elev (ft)	2760.27	Reach Len. (ft)	158.39	153.64	149.14
Crit W.S. (ft)	2759.07	Flow Area (sq ft)		1171.20	
E.G. Slope (ft/ft)	0.003889	Area (sq ft)	5.06	1171.20	
Q Total (cfs)	10000.00	Flow (cfs)		10000.00	
Top Width (ft)	273.97	Top Width (ft)	21.39	252.59	
Vel Total (ft/s)	8.54	Avg. Vel. (ft/s)		8.54	
Max Chl Dpth (ft)	8.27	Hydr. Depth (ft)		4.64	
Conv. Total (cfs)	160357.8	Conv. (cfs)		160357.8	
Length Wtd. (ft)	153.64	Wetted Per. (ft)		254.83	
Min Ch El (ft)	2752.00	Shear (lb/sq ft)		1.12	
Alpha	1.00	Stream Power (lb/ft s)		9.53	
Frctn Loss (ft)	0.50	Cum Volume (acre-ft)	2.23	26.10	5.91
C & E Loss (ft)	0.09	Cum SA (acres)	1.40	6.03	6.04

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 115

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	2767	4.83	2766	9.61	2765	11.16	2763	13.74	2764
16.32	2765	24.15	2765	124.55	2764	311.87	2763.02	314.97	2763
395.1	2762	477.26	2761	482.56	2760	505.65	2760	555.24	2761
679.5	2762	697.39	2762	706.13	2761	725.14	2760	747.88	2760
765.91	2760	799.67	2759	831.73	2758	835.05	2757	837.03	2756
839.03	2755	841.23	2754	843.42	2753	845.62	2752	847.82	2751
863.85	2751	869.22	2752	874.61	2753	887.51	2754	990.68	2754
1015.46	2754	1026.66	2755	1037.87	2756	1040.87	2757	1043.78	2758
1046.68	2759	1049.37	2760	1074.62	2761	1080.06	2761	1202.38	2761
1254.26	2761	1359.68	2761	1365.58	2761	1696.27	2760.75	1789.59	2760.75
1848.13	2761.75	1874.7	2762.73	1875.36	2762.75	1890.38	2763.75	1895.84	2764.75
1902.22	2765.75	1908.29	2766.75	1913.86	2767.75	1918.72	2768.75	1920.54	2769.75
1922.37	2770.75	1924.2	2771.75	1926.03	2772.75	1927.8	2773.75	1929.57	2774.75
1931.38	2777.75	1933.2	2778.75	1935.07	2779.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.045	679.5	.03	1074.62	.045

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

```
        679.5 1074.62          257.93  242.39  227.54            .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
       0   679.5    2770       F

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 2764.39  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.65  * Wt. n-Val.              *          *    0.030 *    0.045 *
* W.S. Elev (ft)          * 2762.74  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)          * 2762.74  * Flow Area (sq ft)       *          * 2380.23  * 1410.20  *
* E.G. Slope (ft/ft)      *0.004611  * Area (sq ft)            *  464.54  * 2380.23  * 1410.20  *
* Q Total (cfs)           *31000.00  * Flow (cfs)              *          *26387.81  * 4612.19  *
* Top Width (ft)          * 1539.36  * Top Width (ft)          *  343.79  *  395.12  *  800.45  *
* Vel Total (ft/s)        *    8.18  * Avg. Vel. (ft/s)        *          *   11.09  *    3.27  *
* Max Chl Dpth (ft)       *   11.74  * Hydr. Depth (ft)        *          *    6.02  *    1.76  *
* Conv. Total (cfs)       *456530.5  * Conv. (cfs)             *          *388607.8  * 67922.7  *
* Length Wtd. (ft)        *  239.37  * Wetted Per. (ft)        *          *  397.73  *  800.48  *
* Min Ch El (ft)          * 2751.00  * Shear (lb/sq ft)        *          *    1.72  *    0.51  *
* Alpha                   *    1.59  * Stream Power (lb/ft s)  *          *   19.10  *    1.66  *
* Frctn Loss (ft)         *    1.07  * Cum Volume (acre-ft)    *   12.66  *   35.68  *   29.83  *
* C & E Loss (ft)         *    0.11  * Cum SA (acres)          *    5.95  *    5.69  *   11.24  *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)          * 2763.65  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.48  * Wt. n-Val.              *          *    0.030 *    0.045 *
* W.S. Elev (ft)          * 2762.17  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)          * 2762.17  * Flow Area (sq ft)       *          * 2152.76  *  953.92  *
* E.G. Slope (ft/ft)      *0.004512  * Area (sq ft)            *  279.90  * 2152.76  *  953.92  *
* Q Total (cfs)           *24490.00  * Flow (cfs)              *          *22080.13  * 2409.86  *
* Top Width (ft)          * 1477.56  * Top Width (ft)          *  297.66  *  395.12  *  784.78  *
* Vel Total (ft/s)        *    7.88  * Avg. Vel. (ft/s)        *          *   10.26  *    2.53  *
* Max Chl Dpth (ft)       *   11.17  * Hydr. Depth (ft)        *          *    5.45  *    1.22  *
* Conv. Total (cfs)       *364581.7  * Conv. (cfs)             *          *328706.2  * 35875.6  *
* Length Wtd. (ft)        *  240.15  * Wetted Per. (ft)        *          *  397.73  *  784.79  *
* Min Ch El (ft)          * 2751.00  * Shear (lb/sq ft)        *          *    1.52  *    0.34  *
* Alpha                   *    1.54  * Stream Power (lb/ft s)  *          *   15.64  *    0.87  *
* Frctn Loss (ft)         *    1.10  * Cum Volume (acre-ft)    *    9.25  *   32.22  *   23.03  *
* C & E Loss (ft)         *    0.08  * Cum SA (acres)          *    5.33  *    5.69  *   10.96  *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #PF 3
*****************************************************************************************
* E.G. Elev (ft)          * 2764.90  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    1.75  * Wt. n-Val.              *          *    0.030 *    0.045 *
* W.S. Elev (ft)          * 2763.15  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)          * 2763.15  * Flow Area (sq ft)       *          * 2541.81  * 1738.85  *
* E.G. Slope (ft/ft)      *0.004625  * Area (sq ft)            *  613.01  * 2541.81  * 1738.85  *
* Q Total (cfs)           *36000.00  * Flow (cfs)              *          *29484.84  * 6515.16  *
* Top Width (ft)          * 1594.88  * Top Width (ft)          *  393.01  *  395.12  *  806.75  *
* Vel Total (ft/s)        *    8.41  * Avg. Vel. (ft/s)        *          *   11.60  *    3.75  *
* Max Chl Dpth (ft)       *   12.15  * Hydr. Depth (ft)        *          *    6.43  *    2.16  *
* Conv. Total (cfs)       *529364.9  * Conv. (cfs)             *          *433562.2  * 95802.7  *
* Length Wtd. (ft)        *  238.84  * Wetted Per. (ft)        *          *  397.73  *  806.79  *
* Min Ch El (ft)          * 2751.00  * Shear (lb/sq ft)        *          *    1.85  *    0.62  *
* Alpha                   *    1.59  * Stream Power (lb/ft s)  *          *   21.40  *    2.33  *
* Frctn Loss (ft)         *    1.00  * Cum Volume (acre-ft)    *   15.87  *   38.61  *   35.69  *
* C & E Loss (ft)         *    0.16  * Cum SA (acres)          *    6.53  *    5.69  *   11.37  *
*****************************************************************************************

Warning: The energy equation could not be balanced within the specified number of iterations.  The
         program used critical depth for the water surface and continued on with the calculations.
Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Warning: During the standard step iterations, when the assumed water surface was set equal to critical
         depth, the calculated water surface came back below critical depth.  This indicates that there
         is not a valid subcritical answer.  The program defaulted to critical depth.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #PF 4
*****************************************************************************************
* E.G. Elev (ft)          * 2755.96  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.08  * Wt. n-Val.              *          *    0.030 *          *
* W.S. Elev (ft)          * 2755.88  * Reach Len. (ft)         *  257.93  *  242.39  *  227.54  *
* Crit W.S. (ft)          * 2754.52  * Flow Area (sq ft)       *          *  436.64  *          *
* E.G. Slope (ft/ft)      *0.000758  * Area (sq ft)            *          *  436.64  *          *
* Q Total (cfs)           * 1000.00  * Flow (cfs)              *          * 1000.00  *          *
* Top Width (ft)          *  199.22  * Top Width (ft)          *          *  199.22  *          *
* Vel Total (ft/s)        *    2.29  * Avg. Vel. (ft/s)        *          *    2.29  *          *
```

* Max Chl Dpth (ft)	* 4.88	* Hydr. Depth (ft)	*		* 2.19	*	*
* Conv. Total (cfs)	* 36323.7	* Conv. (cfs)	*		* 36323.7	*	*
* Length Wtd. (ft)	* 242.39	* Wetted Per. (ft)	*		* 200.61	*	*
* Min Ch El (ft)	* 2751.00	* Shear (lb/sq ft)	*		* 0.10	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*		* 0.24	*	*
* Frctn Loss (ft)	* 0.25	* Cum Volume (acre-ft)	*	0.48	* 6.69	*	*
* C & E Loss (ft)	* 0.00	* Cum SA (acres)	*	0.23	* 3.20	*	*

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

CROSS SECTION OUTPUT Profile #PF 5

* E.G. Elev (ft)	* 2758.60	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.48	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2758.12	* Reach Len. (ft)	* 257.93	* 242.39	* 227.54	*
* Crit W.S. (ft)	* 2756.40	* Flow Area (sq ft)	*	* 899.52	*	*
* E.G. Slope (ft/ft)	*0.001908	* Area (sq ft)	*	* 899.52	*	*
* Q Total (cfs)	* 5000.00	* Flow (cfs)	*	* 5000.00	*	*
* Top Width (ft)	* 216.32	* Top Width (ft)	*	* 216.32	*	*
* Vel Total (ft/s)	* 5.56	* Avg. Vel. (ft/s)	*	* 5.56	*	*
* Max Chl Dpth (ft)	* 7.12	* Hydr. Depth (ft)	*	* 4.16	*	*
* Conv. Total (cfs)	*114453.9	* Conv. (cfs)	*	*114453.9	*	*
* Length Wtd. (ft)	* 242.39	* Wetted Per. (ft)	*	* 218.47	*	*
* Min Ch El (ft)	* 2751.00	* Shear (lb/sq ft)	*	* 0.49	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 2.73	*	*
* Frctn Loss (ft)	* 0.75	* Cum Volume (acre-ft)	* 0.52	* 10.11	*	*
* C & E Loss (ft)	* 0.04	* Cum SA (acres)	* 0.23	* 3.43	*	*

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

CROSS SECTION OUTPUT Profile #PF 6

* E.G. Elev (ft)	* 2760.82	* Element	* Left OB	* Channel	* Right OB	*
* Vel Head (ft)	* 0.84	* Wt. n-Val.	*	* 0.030	*	*
* W.S. Elev (ft)	* 2759.98	* Reach Len. (ft)	* 257.93	* 242.39	* 227.54	*
* Crit W.S. (ft)	* 2758.01	* Flow Area (sq ft)	*	* 1362.75	*	*
* E.G. Slope (ft/ft)	*0.002728	* Area (sq ft)	*	* 1362.75	*	*
* Q Total (cfs)	*10000.00	* Flow (cfs)	*	*10000.00	*	*
* Top Width (ft)	* 282.77	* Top Width (ft)	*	* 282.77	*	*
* Vel Total (ft/s)	* 7.34	* Avg. Vel. (ft/s)	*	* 7.34	*	*
* Max Chl Dpth (ft)	* 8.98	* Hydr. Depth (ft)	*	* 4.82	*	*
* Conv. Total (cfs)	*191453.1	* Conv. (cfs)	*	*191453.1	*	*
* Length Wtd. (ft)	* 242.27	* Wetted Per. (ft)	*	* 285.27	*	*
* Min Ch El (ft)	* 2751.00	* Shear (lb/sq ft)	*	* 0.81	*	*
* Alpha	* 1.00	* Stream Power (lb/ft s)	*	* 5.97	*	*
* Frctn Loss (ft)	* 0.84	* Cum Volume (acre-ft)	* 2.23	* 21.64	* 5.91	*
* C & E Loss (ft)	* 0.01	* Cum SA (acres)	* 1.36	* 5.08	* 6.04	*

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

CROSS SECTION

RIVER: River #1
REACH: Reach #1 RS: 110

INPUT
Description:
Station Elevation Data num= 68

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
-600.38	2767	-579.98	2766	-400.38	2765	-181.14	2762	-81.76	2761
-57.48	2760	-47.61	2759	0	2759	227.2	2760	237.17	2760
274.46	2759	312.01	2758	358.58	2758	379.63	2758	383.11	2757
386.65	2756	390.19	2755	392.73	2754	392.74	2754	395.22	2753
397.63	2752	410.68	2751	426.46	2751	431.11	2752	435.76	2753
446.04	2754	470.07	2755	481.43	2755	501.92	2754.75	563.14	2754
587.96	2754	594.62	2755	602.49	2756	613.17	2757	626.03	2757.97
626.5	2758	890.32	2759	967.13	2759	1086.65	2759	1302.26	2760
1331.06	2759.75	1340.58	2759.75	1426.39	2759.75	1446.33	2759.75	1459.98	2759.75
1515.86	2760.75	1570.65	2761.75	1587.84	2762.75	1592.77	2763.75	1597.63	2764.75
1602.74	2765.75	1607.53	2766.75	1611.47	2767.75	1613.74	2768.75	1616.01	2769.75
1618.28	2770.75	1620.53	2771.75	1622.77	2772.75	1624.98	2773.75	1627.19	2774.75
1629.4	2775.75	1631.62	2776.75	1633.89	2777.75	1636.29	2778.75	1638.58	2779.75
1640.84	2782.75	1643.09	2783.75	1645.32	2784.75				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
-600.38	.045	227.2	.03	626.5	.045

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
227.2 626.5 308.04 322.72 332.25 .1 .3
Ineffective Flow num= 1

Sta L	Sta R	Elev	Permanent
-600.38	227.2	2770	F

CROSS SECTION OUTPUT Profile #PF 1

E.G. Elev (ft)	* 2762.83	* Element	* Left OB	* Channel	* Right OB	*
el Head (ft)	* 1.27	* Wt. n-Val.	*	* 0.030	* 0.045	*
W.S. Elev (ft)	* 2761.56	* Reach Len. (ft)	* 308.04	* 322.72	* 332.25	*
* Crit W.S. (ft)	* 2761.33	* Flow Area (sq ft)	*	* 2243.21	* 2128.75	*
* E.G. Slope (ft/ft)	*0.004315	* Area (sq ft)	* 652.21	* 2243.21	* 2128.75	*
* Q Total (cfs)	*31000.00	* Flow (cfs)	*	*23002.85	* 7997.15	*
* Top Width (ft)	* 1697.93	* Top Width (ft)	* 364.79	* 399.30	* 933.84	*
* Vel Total (ft/s)	* 7.09	* Avg. Vel. (ft/s)	*	* 10.25	* 3.76	*

Max Chl Dpth (ft)	10.56	Hydr. Depth (ft)		5.62	2.28	
Conv. Total (cfs)	471950.3	Conv. (cfs)		350200.0	121750.3	
Length Wtd. (ft)	324.87	Wetted Per. (ft)		400.88	933.86	
Min Ch El (ft)	2751.00	Shear (lb/sq ft)		1.51	0.61	
Alpha	1.62	Stream Power (lb/ft s)		15.46	2.31	
Frctn Loss (ft)	0.55	Cum Volume (acre-ft)	9.35	22.82	20.59	
C & E Loss (ft)	0.27	Cum SA (acres)	3.85	3.48	6.71	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 2

E.G. Elev (ft)	2762.15	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.22	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2760.92	Reach Len. (ft)	308.04	322.72	332.25	
Crit W.S. (ft)	2760.82	Flow Area (sq ft)		1988.19	1543.51	
E.G. Slope (ft/ft)	0.004641	Area (sq ft)	439.28	1988.19	1543.51	
Q Total (cfs)	24490.00	Flow (cfs)		19510.89	4979.11	
Top Width (ft)	1605.24	Top Width (ft)	307.09	399.30	898.84	
Vel Total (ft/s)	6.93	Avg. Vel. (ft/s)		9.81	3.23	
Max Chl Dpth (ft)	9.92	Hydr. Depth (ft)		4.98	1.72	
Conv. Total (cfs)	359479.3	Conv. (cfs)		286392.8	73086.5	
Length Wtd. (ft)	324.54	Wetted Per. (ft)		400.88	898.86	
Min Ch El (ft)	2751.00	Shear (lb/sq ft)		1.44	0.50	
Alpha	1.64	Stream Power (lb/ft s)		14.10	1.61	
Frctn Loss (ft)	0.51	Cum Volume (acre-ft)	7.12	20.69	16.50	
C & E Loss (ft)	0.28	Cum SA (acres)	3.54	3.48	6.56	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2763.34	Element	Left OB	Channel	Right OB	
Vel Head (ft)	1.22	Wt. n-Val.		0.030	0.045	
W.S. Elev (ft)	2762.12	Reach Len. (ft)	308.04	322.72	332.25	
Crit W.S. (ft)	2761.67	Flow Area (sq ft)		2464.89	2653.11	
E.G. Slope (ft/ft)	0.003807	Area (sq ft)	869.87	2464.89	2653.11	
Q Total (cfs)	36000.00	Flow (cfs)		25283.57	10716.43	
Top Width (ft)	1766.64	Top Width (ft)	416.89	399.30	950.46	
Vel Total (ft/s)	7.03	Avg. Vel. (ft/s)		10.26	4.04	
Max Chl Dpth (ft)	11.12	Hydr. Depth (ft)		6.17	2.79	
Conv. Total (cfs)	583436.7	Conv. (cfs)		409760.0	173676.7	
Length Wtd. (ft)	325.11	Wetted Per. (ft)		400.88	950.49	
Min Ch El (ft)	2751.00	Shear (lb/sq ft)		1.46	0.66	
Alpha	1.59	Stream Power (lb/ft s)		14.99	2.68	
Frctn Loss (ft)	0.53	Cum Volume (acre-ft)	11.48	24.68	24.22	
C & E Loss (ft)	0.25	Cum SA (acres)	4.13	3.48	6.78	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2755.71	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.12	Wt. n-Val.		0.030		
W.S. Elev (ft)	2755.59	Reach Len. (ft)	308.04	322.72	332.25	
Crit W.S. (ft)	2754.51	Flow Area (sq ft)		367.31		
E.G. Slope (ft/ft)	0.001455	Area (sq ft)		367.31		
Q Total (cfs)	1000.00	Flow (cfs)		1000.00		
Top Width (ft)	211.19	Top Width (ft)		211.19		
Vel Total (ft/s)	2.72	Avg. Vel. (ft/s)		2.72		
Max Chl Dpth (ft)	4.59	Hydr. Depth (ft)		1.74		
Conv. Total (cfs)	26220.5	Conv. (cfs)		26220.5		
Length Wtd. (ft)	322.72	Wetted Per. (ft)		212.30		
Min Ch El (ft)	2751.00	Shear (lb/sq ft)		0.16		
Alpha	1.00	Stream Power (lb/ft s)		0.43		
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.48	4.45		
C & E Loss (ft)	0.03	Cum SA (acres)	0.23	2.06		

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

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2757.81	Element	Left OB	Channel	Right OB	
Vel Head (ft)	0.90	Wt. n-Val.		0.030		
W.S. Elev (ft)	2756.92	Reach Len. (ft)	308.04	322.72	332.25	
Crit W.S. (ft)	2756.48	Flow Area (sq ft)		658.11		
E.G. Slope (ft/ft)	0.005800	Area (sq ft)		658.11		
Q Total (cfs)	5000.00	Flow (cfs)		5000.00		
Top Width (ft)	228.88	Top Width (ft)		228.88		
Vel Total (ft/s)	7.60	Avg. Vel. (ft/s)		7.60		
Max Chl Dpth (ft)	5.92	Hydr. Depth (ft)		2.88		
Conv. Total (cfs)	65654.0	Conv. (cfs)		65654.0		
Length Wtd. (ft)	322.72	Wetted Per. (ft)		230.23		

```
* Min Ch El (ft)          * 2751.00  * Shear (lb/sq ft)        *          *    1.04  *          *
* Alpha                   *    1.00  * Stream Power (lb/ft s) *          *    7.86  *          *
* Frctn Loss (ft)         *    1.49  * Cum Volume (acre-ft)   *    0.52  *    5.77  *          *
* C & E Loss (ft)         *    0.13  * Cum SA (acres)         *    0.23  *    2.19  *          *
*****************************************************************************************

Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
         section.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION OUTPUT  Profile #PF 6
*****************************************************************************************
* E.G. Elev (ft)          * 2759.97  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.92  * Wt. n-Val.              *          *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2759.05  * Reach Len. (ft)         *  308.04  *  322.72  *  332.25  *
* Crit W.S. (ft)          * 2758.31  * Flow Area (sq ft)       *          * 1266.23  *  154.75  *
* E.G. Slope (ft/ft)      *0.004521  * Area (sq ft)            *    2.62  * 1266.23  *  154.75  *
* Q Total (cfs)           *10000.00  * Flow (cfs)              *          * 9836.35  *  163.66  *
* Top Width (ft)          *  883.84  * Top Width (ft)          *   59.24  *  353.87  *  470.73  *
* Vel Total (ft/s)        *    7.04  * Avg. Vel. (ft/s)        *          *    7.77  *    1.06  *
* Max Chl Dpth (ft)       *    8.05  * Hydr. Depth (ft)        *          *    3.58  *    0.33  *
* Conv. Total (cfs)       *148726.6  * Conv. (cfs)             *          *146292.6  *  2434.0  *
* Length Wtd. (ft)        *  323.33  * Wetted Per. (ft)        *          *  355.43  *  470.73  *
* Min Ch El (ft)          * 2751.00  * Shear (lb/sq ft)        *          *    1.01  *    0.09  *
* Alpha                   *    1.20  * Stream Power (lb/ft s) *          *    7.81  *    0.10  *
* Frctn Loss (ft)         *    0.38  * Cum Volume (acre-ft)   *    2.22  *   14.32  *    5.50  *
* C & E Loss (ft)         *    0.23  * Cum SA (acres)         *    1.18  *    3.31  *    4.82  *
*****************************************************************************************

Warning: Divided flow computed for this cross-section.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         water surface was used.

CROSS SECTION


RIVER: River #1
REACH: Reach #1            RS: 100

INPUT
Description:
Station Elevation Data     num=      78
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
*****************************************************************************
 -1079.5    2765 -908.05    2764 -796.29    2763 -637.85    2760 -590.66    2760
 -582.71    2760 -429.48    2760 -343.01    2760 -257.47    2759 -240.37    2758
 -236.92    2757 -233.51    2756 -230.22    2755 -227.02    2754 -223.93    2753
 -185.04    2753 -174.13    2754 -169.65    2755 -165.16    2756 -160.66    2757
  -156.1    2758 -123.66    2758  -99.38    2758       0    2758   48.99    2757
   69.53    2757   69.54    2757   92.94    2757   92.95    2757  136.19    2756
   136.2    2756  181.29    2755  186.69    2755  207.37    2756  220.09    2756
  222.63    2755  222.64    2755  225.18    2754  227.72    2753  227.73    2753
  230.27    2752  232.22 2751.36  233.31    2751  236.48    2750  271.72    2750
  275.17    2751  279.24    2752  328.16    2753  339.63    2754  339.64    2754
  380.46    2754  380.47    2754  390.22 2753.86  451.75    2753  486.38    2752
  497.38    2752   501.1    2753  504.87    2754  504.88    2754  507.69    2755
  539.73    2756  571.48    2757  643.34    2758  716.38    2758  890.83    2757
  890.84    2757  1036.2    2757 1036.21    2757 1095.21    2758 1202.49    2758
  1202.5    2758 1304.69    2758 1327.57    2759 1346.89    2760 1361.89    2761
 1372.87    2764 1372.88    2764 1398.46    2765

Manning's n Values         num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
*********************************************
 -1079.5    .045       0     .03  539.73    .045

Bank Sta: Left   Right    Coeff Contr.   Expan.
             0  539.73             .1       .3
Ineffective Flow     num=       1
   Sta L   Sta R    Elev  Permanent
 -1079.5  -156.1    2764        F

CROSS SECTION OUTPUT  Profile #PF 1
*****************************************************************************************
* E.G. Elev (ft)          * 2762.01  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.36  * Wt. n-Val.              *   0.045  *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2761.65  * Reach Len. (ft)         *          *          *          *
* Crit W.S. (ft)          * 2759.16  * Flow Area (sq ft)       *  569.75  * 3916.64  * 3269.32  *
* E.G. Slope (ft/ft)      *0.000888  * Area (sq ft)            * 1993.08  * 3916.64  * 3269.32  *
* Q Total (cfs)           *31000.00  * Flow (cfs)              * 1328.86  *21614.41  * 8056.73  *
* Top Width (ft)          * 2089.26  * Top Width (ft)          *  724.99  *  539.73  *  824.54  *
* Vel Total (ft/s)        *    4.00  * Avg. Vel. (ft/s)        *    2.33  *    5.52  *    2.46  *
* Max Chl Dpth (ft)       *   11.65  * Hydr. Depth (ft)        *    3.65  *    7.26  *    3.97  *
* Conv. Total (cfs)       *1040404.0  * Conv. (cfs)            * 44598.6  *725410.4  *270395.4  *
* Length Wtd. (ft)        *          * Wetted Per. (ft)        *  156.10  *  541.65  *  824.74  *
* Min Ch El (ft)          * 2750.00  * Shear (lb/sq ft)        *    0.20  *    0.40  *    0.22  *
* Alpha                   *    1.44  * Stream Power (lb/ft s) *    0.47  *    2.21  *    0.54  *
* Frctn Loss (ft)         *          * Cum Volume (acre-ft)   *          *          *          *
* C & E Loss (ft)         *          * Cum SA (acres)         *          *          *          *
*****************************************************************************************

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

CROSS SECTION OUTPUT  Profile #PF 2
*****************************************************************************************
* E.G. Elev (ft)          * 2761.35  * Element                 *  Left OB *  Channel * Right OB *
* Vel Head (ft)           *    0.29  * Wt. n-Val.              *   0.045  *   0.030  *   0.045  *
* W.S. Elev (ft)          * 2761.06  * Reach Len. (ft)         *          *          *          *
* Crit W.S. (ft)          * 2758.72  * Flow Area (sq ft)       *  477.68  * 3598.28  * 2783.60  *
```

E.G. Slope (ft/ft)	0.000792	Area (sq ft)	1574.64	3598.28	2783.60	
Q Total (cfs)	24490.00	Flow (cfs)	935.57	17723.89	5830.55	
Top Width (ft)	2055.95	Top Width (ft)	693.84	539.73	822.38	
Vel Total (ft/s)	3.57	Avg. Vel. (ft/s)	1.96	4.93	2.09	
Max Chl Dpth (ft)	11.06	Hydr. Depth (ft)	3.06	6.67	3.38	
Conv. Total (cfs)	870261.1	Conv. (cfs)	33245.7	629824.8	207190.6	
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	822.50	
Min Ch El (ft)	2750.00	Shear (lb/sq ft)	0.15	0.33	0.17	
Alpha	1.47	Stream Power (lb/ft s)	0.30	1.62	0.35	
Frctn Loss (ft)		Cum Volume (acre-ft)				
C & E Loss (ft)		Cum SA (acres)				

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

CROSS SECTION OUTPUT Profile #PF 3

E.G. Elev (ft)	2762.56	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2762.17	Reach Len. (ft)			
Crit W.S. (ft)	2759.52	Flow Area (sq ft)	650.92	4197.31	3698.59
E.G. Slope (ft/ft)	0.000898	Area (sq ft)	2377.23	4197.31	3698.59
Q Total (cfs)	36000.00	Flow (cfs)	1668.61	24395.03	9936.36
Top Width (ft)	2118.62	Top Width (ft)	752.45	539.73	826.44
Vel Total (ft/s)	4.21	Avg. Vel. (ft/s)	2.56	5.81	2.69
Max Chl Dpth (ft)	12.17	Hydr. Depth (ft)	4.17	7.78	4.48
Conv. Total (cfs)	1201381.0	Conv. (cfs)	55684.2	814103.3	331593.2
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	826.71
Min Ch El (ft)	2750.00	Shear (lb/sq ft)	0.23	0.43	0.25
Alpha	1.42	Stream Power (lb/ft s)	0.60	2.52	0.67
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

CROSS SECTION OUTPUT Profile #PF 4

E.G. Elev (ft)	2755.55	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.02	Wt. n-Val.		0.030	
W.S. Elev (ft)	2755.53	Reach Len. (ft)			
Crit W.S. (ft)	2752.80	Flow Area (sq ft)		833.69	
E.G. Slope (ft/ft)	0.000181	Area (sq ft)	135.82	833.69	
Q Total (cfs)	1000.00	Flow (cfs)		1000.00	
Top Width (ft)	408.34	Top Width (ft)	64.69	343.65	
Vel Total (ft/s)	1.20	Avg. Vel. (ft/s)		1.20	
Max Chl Dpth (ft)	5.53	Hydr. Depth (ft)		2.43	
Conv. Total (cfs)	74297.4	Conv. (cfs)		74297.4	
Length Wtd. (ft)		Wetted Per. (ft)		345.43	
Min Ch El (ft)	2750.00	Shear (lb/sq ft)		0.03	
Alpha	1.00	Stream Power (lb/ft s)		0.03	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 5

E.G. Elev (ft)	2756.20	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.48	Wt. n-Val.		0.030	
W.S. Elev (ft)	2755.72	Reach Len. (ft)			
Crit W.S. (ft)	2754.80	Flow Area (sq ft)		900.77	
E.G. Slope (ft/ft)	0.003760	Area (sq ft)	148.25	900.77	
Q Total (cfs)	5000.00	Flow (cfs)		5000.00	
Top Width (ft)	428.88	Top Width (ft)	66.17	362.71	
Vel Total (ft/s)	5.55	Avg. Vel. (ft/s)		5.55	
Max Chl Dpth (ft)	5.72	Hydr. Depth (ft)		2.48	
Conv. Total (cfs)	81546.4	Conv. (cfs)		81546.4	
Length Wtd. (ft)		Wetted Per. (ft)		364.54	
Min Ch El (ft)	2750.00	Shear (lb/sq ft)		0.58	
Alpha	1.00	Stream Power (lb/ft s)		3.22	
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

Warning: Divided flow computed for this cross-section.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, water surface was used.

CROSS SECTION OUTPUT Profile #PF 6

E.G. Elev (ft)	2759.35	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.045	0.030	0.045
W.S. Elev (ft)	2759.21	Reach Len. (ft)			
Crit W.S. (ft)	2756.21	Flow Area (sq ft)	188.87	2599.73	1287.90
E.G. Slope (ft/ft)	0.000535	Area (sq ft)	624.51	2599.73	1287.90
Q Total (cfs)	10000.00	Flow (cfs)	163.82	8475.71	1360.47
Top Width (ft)	1607.06	Top Width (ft)	275.43	539.73	791.90
Vel Total (ft/s)	2.45	Avg. Vel. (ft/s)	0.87	3.26	1.06
Max Chl Dpth (ft)	9.21	Hydr. Depth (ft)	1.21	4.82	1.63
Conv. Total (cfs)	432279.7	Conv. (cfs)	7081.7	366387.8	58810.1
Length Wtd. (ft)		Wetted Per. (ft)	156.10	541.65	791.96
Min Ch El (ft)	2750.00	Shear (lb/sq ft)	0.04	0.16	0.05
Alpha	1.52	Stream Power (lb/ft s)	0.04	0.52	0.06
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

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

SUMMARY OF MANNING'S N VALUES

River:River #1

Reach	River Sta.	n1	n2	n3
Reach #1	180	.045	.03	.045
Reach #1	170	.045	.03	.045
Reach #1	160	.045	.03	.045
Reach #1	150	.045	.03	.045
Reach #1	149.*	.045	.03	.045
Reach #1	148.*	.045	.03	.045
Reach #1	147.*	.045	.03	.045
Reach #1	146.*	.045	.03	.045
Reach #1	145.*	.045	.03	.045
Reach #1	144.*	.045	.03	.045
Reach #1	143.*	.045	.03	.045
Reach #1	142.*	.045	.03	.045
Reach #1	141.*	.045	.03	.045
Reach #1	140.*	.045	.03	.045
Reach #1	139	.045	.03	.045
Reach #1	130	.045	.03	.045
Reach #1	120	.045	.03	.045
Reach #1	115	.045	.03	.045
Reach #1	110	.045	.03	.045
Reach #1	100	.045	.03	.045

SUMMARY OF REACH LENGTHS

River: River #1

Reach	River Sta.	Left	Channel	Right
Reach #1	180	44.45	181.54	256.85
Reach #1	170	130.15	130.15	130.15
Reach #1	160	203.69	188.86	197
Reach #1	150	23.86	18.79	11.8
Reach #1	149.*	23.86	18.79	11.8
Reach #1	148.*	23.86	18.79	11.8
Reach #1	147.*	23.86	18.79	11.8
Reach #1	146.*	23.86	18.79	11.8
Reach #1	145.*	23.86	18.79	11.8
Reach #1	144.*	23.86	18.79	11.8
Reach #1	143.*	23.86	18.79	11.8
Reach #1	142.*	23.86	18.79	11.8
Reach #1	141.*	23.86	18.79	11.8
Reach #1	140.*	23.86	18.79	11.8
Reach #1	139	172.75	171.78	164.65
Reach #1	130	295.76	287.33	274.51
Reach #1	120	158.39	153.64	149.14
Reach #1	115	257.93	242.39	227.54
Reach #1	110	308.04	322.72	332.25
Reach #1	100			

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: River #1

Reach	River Sta.	Contr.	Expan.
Reach #1	180	.1	.3
Reach #1	170	.1	.3
Reach #1	160	.1	.3
Reach #1	150	.1	.3
Reach #1	149.*	.1	.3
Reach #1	148.*	.1	.3
Reach #1	147.*	.1	.3
Reach #1	146.*	.1	.3
Reach #1	145.*	.1	.3
Reach #1	144.*	.1	.3
Reach #1	143.*	.1	.3
Reach #1	142.*	.1	.3
Reach #1	141.*	.1	.3
Reach #1	140.*	.1	.3
Reach #1	139	.1	.3
Reach #1	130	.1	.3
Reach #1	120	.1	.3
Reach #1	115	.1	.3
Reach #1	110	.1	.3
Reach #1	100	.1	.3

Profile Outpu[illegible]e - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Reach #1	180	PF 1	31000.00	2759.08	2775.13	2769.76	2775.99	0.000962	7.44	4166.17	379.51	0.40
Reach #1	180	PF 2	24490.00	2759.08	2773.22	2768.85	2774.00	0.001096	7.10	3447.07	371.67	0.41
Reach #1	180	PF 3	36000.00	2759.08	2776.50	2770.43	2777.42	0.000892	7.67	4713.35	450.20	0.39
Reach #1	180	PF 4	1000.00	2759.08	2762.80	2762.13	2763.10	0.004290	4.40	227.08	140.27	0.61
Reach #1	180	PF 5	5000.00	2759.08	2765.84	2764.60	2766.37	0.003189	5.84	856.67	279.32	0.59
Reach #1	180	PF 6	10000.00	2759.08	2768.18	2766.24	2768.77	0.002022	6.13	1630.48	349.86	0.50
Reach #1	170	PF 1	31000.00	2758.49	2773.49	2770.35	2775.57	0.003402	11.58	2676.74	248.09	0.62
Reach #1	170	PF 2	24490.00	2758.49	2771.71	2769.11	2773.56	0.003581	10.92	2241.82	241.93	0.63
Reach #1	170	PF 3	36000.00	2758.49	2774.76	2771.24	2777.00	0.003299	12.03	2994.62	252.63	0.61
Reach #1	170	PF 4	1000.00	2758.49	2761.84	2761.35	2762.22	0.005401	4.93	203.00	119.52	0.67
Reach #1	170	PF 5	5000.00	2758.49	2764.72	2763.92	2765.61	0.005075	7.57	660.60	181.90	0.70
Reach #1	170	PF 6	10000.00	2758.49	2766.91	2765.78	2768.16	0.004905	8.95	1117.67	226.59	0.71
Reach #1	160	PF 1	31000.00	2757.67	2771.67	2769.83	2774.92	0.005009	14.46	2143.16	196.67	0.77
Reach #1	160	PF 2	24490.00	2757.67	2770.34	2768.41	2772.97	0.004500	13.00	1883.39	193.18	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.60	2770.85	2776.32	0.005364	15.47	2327.25	199.04	0.80
Reach #1	160	PF 4	1000.00	2757.67	2761.59	2760.46	2761.77	0.001922	3.41	293.37	143.78	0.42
Reach #1	160	PF 5	5000.00	2757.67	2764.42	2762.91	2765.07	0.002752	6.44	775.80	180.92	0.55
Reach #1	160	PF 6	10000.00	2757.67	2766.44	2764.67	2767.62	0.003300	8.73	1145.67	186.02	0.62
Reach #1	150	PF 1	31000.00	2757.36	2770.81	2769.32	2774.06	0.004221	14.46	2143.28	212.96	0.80
Reach #1	150	PF 2	24490.00	2757.36	2769.43	2767.97	2772.14	0.004114	13.21	1853.82	208.31	0.78
Reach #1	150	PF 3	36000.00	2757.36	2771.72	2770.31	2775.40	0.004348	15.39	2339.88	216.41	0.82
Reach #1	150	PF 4	1000.00	2757.36	2761.08	2760.15	2761.33	0.002820	3.96	252.50	133.45	0.51
Reach #1	150	PF 5	5000.00	2757.36	2763.65	2762.71	2764.44	0.003824	7.15	699.46	190.67	0.66
Reach #1	150	PF 6	10000.00	2757.36	2765.59	2764.36	2766.93	0.003828	9.31	1074.28	196.14	0.70
Reach #1	149.*	PF 1	31000.00	2757.24	2770.46	2769.35	2773.95	0.004726	14.99	2068.13	214.10	0.85
Reach #1	149.*	PF 2	24490.00	2757.24	2769.11	2768.00	2772.04	0.004623	13.73	1784.08	208.51	0.83
Reach #1	149.*	PF 3	36000.00	2757.24	2771.40	2770.36	2775.30	0.004754	15.85	2272.86	224.11	0.86
Reach #1	149.*	PF 4	1000.00	2757.24	2761.00	2760.12	2761.27	0.003214	4.15	240.74	131.19	0.54
Reach #1	149.*	PF 5	5000.00	2757.24	2763.51	2762.68	2764.36	0.004215	7.43	673.19	187.37	0.69
Reach #1	149.*	PF 6	10000.00	2757.24	2765.38	2764.36	2766.84	0.004290	9.70	1031.39	194.23	0.74
Reach #1	148.*	PF 1	31000.00	2757.13	2770.02	2769.39	2773.81	0.005431	15.64	1982.41	215.47	0.91
Reach #1	148.*	PF 2	24490.00	2757.13	2768.79	2768.02	2771.93	0.005184	14.22	1722.12	209.44	0.87
Reach #1	148.*	PF 3	36000.00	2757.13	2771.16	2770.34	2775.20	0.005027	16.14	2238.64	232.57	0.89
Reach #1	148.*	PF 4	1000.00	2757.13	2760.90	2760.11	2761.20	0.003837	4.39	227.75	130.90	0.59
Reach #1	148.*	PF 5	5000.00	2757.13	2763.34	2762.66	2764.27	0.004768	7.77	643.83	184.58	0.73
Reach #1	148.*	PF 6	10000.00	2757.13	2765.14	2764.34	2766.74	0.004921	10.15	985.55	193.12	0.79
Reach #1	147.*	PF 1	31000.00	2757.01	2769.59	2769.33	2773.68	0.006135	16.25	1909.75	222.39	0.96
Reach #1	147.*	PF 2	24490.00	2757.01	2768.54	2767.99	2771.82	0.005621	14.54	1684.75	211.69	0.91
Reach #1	147.*	PF 3	36000.00	2757.01	2771.07	2770.31	2775.10	0.004984	16.11	2252.60	239.16	0.89
Reach #1	147.*	PF 4	1000.00	2757.01	2760.78	2760.07	2761.11	0.004593	4.62	216.35	132.11	0.64
Reach #1	147.*	PF 5	5000.00	2757.01	2763.15	2762.58	2764.17	0.005401	8.11	616.73	182.60	0.78
Reach #1	147.*	PF 6	10000.00	2757.01	2764.89	2764.33	2766.63	0.005658	10.59	944.08	193.38	0.84
Reach #1	146.*	PF 1	31000.00	2756.89	2769.27	2769.27	2773.55	0.006578	16.60	1874.51	229.50	1.00
Reach #1	146.*	PF 2	24490.00	2756.89	2767.91	2767.91	2771.67	0.007013	15.54	1575.60	212.57	1.01
Reach #1	146.*	PF 3	36000.00	2756.89	2771.09	2770.19	2774.96	0.004698	15.81	2368.49	499.82	0.87
Reach #1	146.*	PF 4	1000.00	2756.89	2760.65	2760.08	2761.02	0.005412	4.88	204.77	130.48	0.69
Reach #1	146.*	PF 5	5000.00	2756.89	2762.94	2762.54	2764.06	0.006231	8.49	589.06	181.73	0.83
Reach #1	146.*	PF 6	10000.00	2756.89	2764.63	2764.27	2766.51	0.006513	11.00	908.85	196.11	0.90
Reach #1	145.*	PF 1	31000.00	2756.77	2768.80	2769.10	2773.39	0.007389	17.20	1813.38	229.19	1.05
Reach #1	145.*	PF 2	24490.00	2756.77	2767.60	2767.82	2771.51	0.007592	15.89	1542.43	218.64	1.04
Reach #1	145.*	PF 3	36000.00	2756.77	2771.65	2771.65	2774.61	0.003423	14.14	3183.96	924.32	0.75
Reach #1	145.*	PF 4	1000.00	2756.77	2760.49	2760.07	2760.91	0:006284	5.16	193.97	127.62	0.74
Reach #1	145.*	PF 5	5000.00	2756.77	2762.73	2762.45	2763.93	0.007058	8.79	568.55	183.01	0.88
Reach #1	145.*	PF 6	10000.00	2756.77	2764.40	2764.15	2766.37	0.007013	11.26	887.87	195.70	0.93
Reach #1	144.*	PF 1	31000.00	2756.66	2768.34	2769.48	2773.21	0.008168	17.72	1763.51	230.10	1.10
Reach #1	144.*	PF 2	24490.00	2756.66	2767.62	2767.63	2771.30	0.006860	15.39	1599.35	226.85	1.00
Reach #1	144.*	PF 3	36000.00	2756.66	2769.63	2771.29	2774.36	0.006682	17.54	2208.91	486.90	1.02
Reach #1	144.*	PF 4	1000.00	2756.66	2760.32	2760.00	2760.78	0.007410	5.44	183.94	126.60	0.79
Reach #1	144.*	PF 5	5000.00	2756.66	2762.34	2762.34	2763.76	0.009536	9.56	522.79	186.31	1.01
Reach #1	144.*	PF 6	10000.00	2756.66	2764.00	2764.00	2766.20	0.008338	11.90	840.44	194.34	1.01
Reach #1	143.*	PF 1	31000.00	2756.54	2769.10	2769.47	2772.71	0.005376	15.42	2244.12	496.33	0.91
Reach #1	143.*	PF 2	24490.00	2756.54	2766.88	2767.33	2771.10	0.008643	16.50	1493.02	226.34	1.11
Reach #1	143.*	PF 3	36000.00	2756.54	2768.77	2770.83	2774.15	0.008315	18.76	2082.65	479.04	1.13
Reach #1	143.*	PF 4	1000.00	2756.54	2760.10	2759.90	2760.62	0.009166	5.82	171.80	125.33	0.88

Reach #1	3.*	PF 5	5000.00	2756.54	2762.03	2762.14	2763.56	.010805	9.92	504.01	186.70	1.06
Reach #1	143.*	PF 6	10000.00	2756.54	2763.63	2763.82	2766.01	0.009527	12.40	806.48	193.72	1.07
Reach #1	142.*	PF 1	31000.00	2756.42	2767.83	2769.04	2772.48	0.007925	17.44	1933.20	460.92	1.09
Reach #1	142.*	PF 2	24490.00	2756.42	2767.31	2767.42	2770.72	0.006233	14.88	1708.14	366.58	0.95
Reach #1	142.*	PF 3	36000.00	2756.42	2768.02	2770.32	2773.93	0.009831	19.71	2020.70	468.24	1.21
Reach #1	142.*	PF 4	1000.00	2756.42	2759.64	2759.64	2760.41	0.011829	7.02	142.36	94.82	1.01
Reach #1	142.*	PF 5	5000.00	2756.42	2761.67	2761.89	2763.34	0.012368	10.36	482.82	185.39	1.13
Reach #1	142.*	PF 6	10000.00	2756.42	2763.24	2763.60	2765.80	0.010868	12.85	778.45	195.74	1.14
Reach #1	141.*	PF 1	31000.00	2756.30	2766.98	2768.55	2772.25	0.009774	18.60	1832.11	442.29	1.19
Reach #1	141.*	PF 2	24490.00	2756.30	2766.13	2767.42	2770.49	0.009204	16.78	1499.57	320.18	1.14
Reach #1	141.*	PF 3	36000.00	2756.30	2767.27	2769.74	2773.69	0.011439	20.60	1961.12	450.33	1.30
Reach #1	141.*	PF 4	1000.00	2756.30	2759.23	2759.39	2760.13	0.018243	7.61	131.42	107.60	1.21
Reach #1	141.*	PF 5	5000.00	2756.30	2761.30	2761.61	2763.08	0.013831	10.73	465.84	184.06	1.19
Reach #1	141.*	PF 6	10000.00	2756.30	2762.79	2763.34	2765.56	0.012568	13.34	749.37	198.42	1.21
Reach #1	140.*	PF 1	31000.00	2756.19	2766.19	2767.98	2772.00	0.011668	19.59	1758.35	424.00	1.29
Reach #1	140.*	PF 2	24490.00	2756.19	2765.37	2766.94	2770.24	0.011146	17.78	1437.09	328.25	1.24
Reach #1	140.*	PF 3	36000.00	2756.19	2766.54	2769.18	2773.41	0.013174	21.42	1908.12	432.76	1.38
Reach #1	140.*	PF 4	1000.00	2756.19	2758.75	2758.97	2759.74	0.022811	7.99	125.23	112.60	1.33
Reach #1	140.*	PF 5	5000.00	2756.19	2760.89	2761.30	2762.80	0.015415	11.10	450.39	183.12	1.25
Reach #1	140.*	PF 6	10000.00	2756.19	2762.31	2762.99	2765.28	0.014520	13.83	722.98	201.98	1.29
Reach #1	139	PF 1	31000.00	2754.07	2762.54	2765.29	2771.41	0.022159	24.04	1360.45	320.75	1.73
Reach #1	139	PF 2	24490.00	2754.07	2761.59	2764.35	2769.62	0.024617	22.78	1083.65	220.87	1.78
Reach #1	139	PF 3	36000.00	2754.07	2763.09	2766.55	2772.82	0.022046	25.30	1562.24	398.09	1.75
Reach #1	139	PF 4	1000.00	2754.07	2755.85	2756.54	2758.70	0.137366	13.54	73.87	115.80	2.99
Reach #1	139	PF 5	5000.00	2754.07	2757.67	2758.94	2762.07	0.051072	16.83	297.04	158.75	2.17
Reach #1	139	PF 6	10000.00	2754.07	2758.91	2760.58	2764.59	0.040243	19.13	522.79	192.69	2.05
Reach #1	130	PF 1	31000.00	2753.25	2762.71	2764.38	2767.61	0.011070	18.22	2003.58	552.79	1.25
Reach #1	130	PF 2	24490.00	2753.25	2762.32	2763.37	2765.97	0.008674	15.59	1795.39	539.18	1.09
Reach #1	130	PF 3	36000.00	2753.25	2763.00	2765.00	2768.79	0.012922	19.95	2163.23	573.10	1.35
Reach #1	130	PF 4	1000.00	2753.25	2756.82	2755.85	2756.98	0.001758	3.13	319.37	169.40	0.40
Reach #1	130	PF 5	5000.00	2753.25	2759.42	2758.00	2759.96	0.002390	5.90	847.70	219.30	0.53
Reach #1	130	PF 6	10000.00	2753.25	2761.41	2759.60	2762.31	0.002487	7.63	1366.70	366.86	0.57
Reach #1	120	PF 1	31000.00	2752.00	2763.68	2763.47	2765.11	0.004436	10.58	3979.55	1460.79	0.78
Reach #1	120	PF 2	24490.00	2752.00	2763.02	2762.98	2764.37	0.004673	10.03	3246.72	1389.51	0.78
Reach #1	120	PF 3	36000.00	2752.00	2764.07	2763.82	2765.62	0.004487	11.13	4428.16	1508.05	0.79
Reach #1	120	PF 4	1000.00	2752.00	2755.99	2755.42	2756.24	0.004021	4.02	248.94	171.20	0.59
Reach #1	120	PF 5	5000.00	2752.00	2758.35	2757.51	2759.08	0.003851	6.85	729.87	217.68	0.66
Reach #1	120	PF 6	10000.00	2752.00	2760.27	2759.07	2761.40	0.003889	8.54	1171.20	273.97	0.70
Reach #1	115	PF 1	31000.00	2751.00	2762.74	2762.74	2764.39	0.004611	11.09	3790.42	1539.36	0.80
Reach #1	115	PF 2	24490.00	2751.00	2762.17	2762.17	2763.65	0.004512	10.26	3106.68	1477.56	0.77
Reach #1	115	PF 3	36000.00	2751.00	2763.15	2763.15	2764.90	0.004625	11.60	4280.65	1594.88	0.81
Reach #1	115	PF 4	1000.00	2751.00	2755.88	2754.52	2755.96	0.000758	2.29	436.64	199.22	0.27
Reach #1	115	PF 5	5000.00	2751.00	2758.12	2756.40	2758.60	0.001908	5.56	899.52	216.32	0.48
Reach #1	115	PF 6	10000.00	2751.00	2759.98	2758.01	2760.82	0.002728	7.34	1362.75	282.77	0.59
Reach #1	110	PF 1	31000.00	2751.00	2761.56	2761.33	2762.83	0.004315	10.25	4371.96	1697.93	0.76
Reach #1	110	PF 2	24490.00	2751.00	2760.92	2760.82	2762.15	0.004641	9.81	3531.70	1605.24	0.78
Reach #1	110	PF 3	36000.00	2751.00	2762.12	2761.67	2763.34	0.003807	10.26	5118.00	1766.64	0.73
Reach #1	110	PF 4	1000.00	2751.00	2755.59	2754.51	2755.71	0.001455	2.72	367.31	211.19	0.36
Reach #1	110	PF 5	5000.00	2751.00	2756.92	2756.48	2757.81	0.005800	7.60	658.11	228.88	0.79
Reach #1	110	PF 6	10000.00	2751.00	2759.05	2758.31	2759.97	0.004521	7.77	1420.98	883.84	0.72
Reach #1	100	PF 1	31000.00	2750.00	2761.65	2759.16	2762.01	0.000888	5.52	7755.70	2089.26	0.36
Reach #1	100	PF 2	24490.00	2750.00	2761.06	2758.72	2761.35	0.000792	4.93	6859.56	2055.95	0.34
Reach #1	100	PF 3	36000.00	2750.00	2762.17	2759.52	2762.56	0.000898	5.81	8546.82	2118.62	0.37
Reach #1	100	PF 4	1000.00	2750.00	2755.53	2752.80	2755.55	0.000181	1.20	833.69	408.34	0.14
Reach #1	100	PF 5	5000.00	2750.00	2755.72	2754.80	2756.20	0.003760	5.55	900.77	428.88	0.62
Reach #1	100	PF 6	10000.00	2750.00	2759.21	2756.21	2759.35	0.000535	3.26	4076.50	1607.06	0.26

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ERRORS WARNINGS AND NOTES
Errors Warnings and Notes for Plan : Plan 46

River: River #1  Reach: Reach #1     RS: 180     Profile: PF 1
     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.
River: River #1  Reach: Reach #1     RS: 180     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 180     Profile: PF 3
     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.
River: River #1  Reach: Reach #1     RS: 180     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 180     Profile: PF 6
     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.
River: River #1  Reach: Reach #1     RS: 170     Profile: PF 1
     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.
River: River #1  Reach: Reach #1     RS: 170     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 170     Profile: PF 3
     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.
River: River #1  Reach: Reach #1     RS: 170     Profile: PF 4
     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.
River: River #1  Reach: Reach #1     RS: 170     Profile: PF 5
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 170     Profile: PF 6
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 160     Profile: PF 1
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 160     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 160     Profile: PF 3
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 160     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 160     Profile: PF 5
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 160     Profile: PF 6
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 150     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 150     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 149.*     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 149.*     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 148.*     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 148.*     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 147.*     Profile: PF 2
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 147.*     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 146.*     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 146.*     Profile: PF 3
     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.
River: River #1  Reach: Reach #1     RS: 146.*     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 145.*     Profile: PF 1
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 145.*     Profile: PF 2
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 145.*     Profile: PF 3
     Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
             for the water surface and continued on with the calculations.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
River: River #1  Reach: Reach #1     RS: 145.*     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 144.*     Profile: PF 3
     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.
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 144.*     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 144.*     Profile: PF 5
     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.
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River: River #1  Reach: Reach #1     RS: 144.*     Profile: PF 6
     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.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 1
     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.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 2
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 3
     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.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 5
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 143.*     Profile: PF 6
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 1
     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.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 3
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 142.*     Profile: PF 4
     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:Divided flow computed for this cross-section.
     Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
             water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
             program defaulted to critical depth.
River: River #1  Reach: Reach #1     RS: 141.*     Profile: PF 1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 141.*     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 141.*     Profile: PF 4
     Note:   Program found supercritical flow starting at this cross section.
River: River #1  Reach: Reach #1     RS: 140.*     Profile: PF 1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 140.*     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 1
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 2
     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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 3
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 4
     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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 5
     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.
River: River #1  Reach: Reach #1     RS: 139     Profile: PF 6
     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.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 1
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 2
     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.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 3
     Warning:Divided flow computed for this cross-section.
     Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
     Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
             the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 4
     Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
             This may indicate the need for additional cross sections.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 5
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
     Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 130     Profile: PF 6
     Warning:Divided flow computed for this cross-section.
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    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 1
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
.ver: River #1  Reach: Reach #1     RS: 120     Profile: PF 2
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 3
    Warning:Divided flow computed for this cross-section.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
    Note:   Hydraulic jump has occurred between this cross section and the previous upstream section.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 4
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 5
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 120     Profile: PF 6
    Warning:Divided flow computed for this cross-section.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 1
    Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
            for the water surface and continued on with the calculations.
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
            water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
            program defaulted to critical depth.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 2
    Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
            for the water surface and continued on with the calculations.
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
            water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
            program defaulted to critical depth.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 3
    Warning:The energy equation could not be balanced within the specified number of iterations.  The program used critical depth
            for the water surface and continued on with the calculations.
    Warning:Divided flow computed for this cross-section.
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Warning:During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated
            water surface came back below critical depth.  This indicates that there is not a valid subcritical answer.  The
            program defaulted to critical depth.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 4
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 5
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 115     Profile: PF 6
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 1
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 2
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 3
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 4
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 5
    Warning:The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section.  This may indicate
            the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
            used.
River: River #1  Reach: Reach #1     RS: 110     Profile: PF 6
    Warning:Divided flow computed for this cross-section.
    Warning:The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for additional cross sections.
    Warning:The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4.
            This may indicate the need for additional cross sections.
    Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
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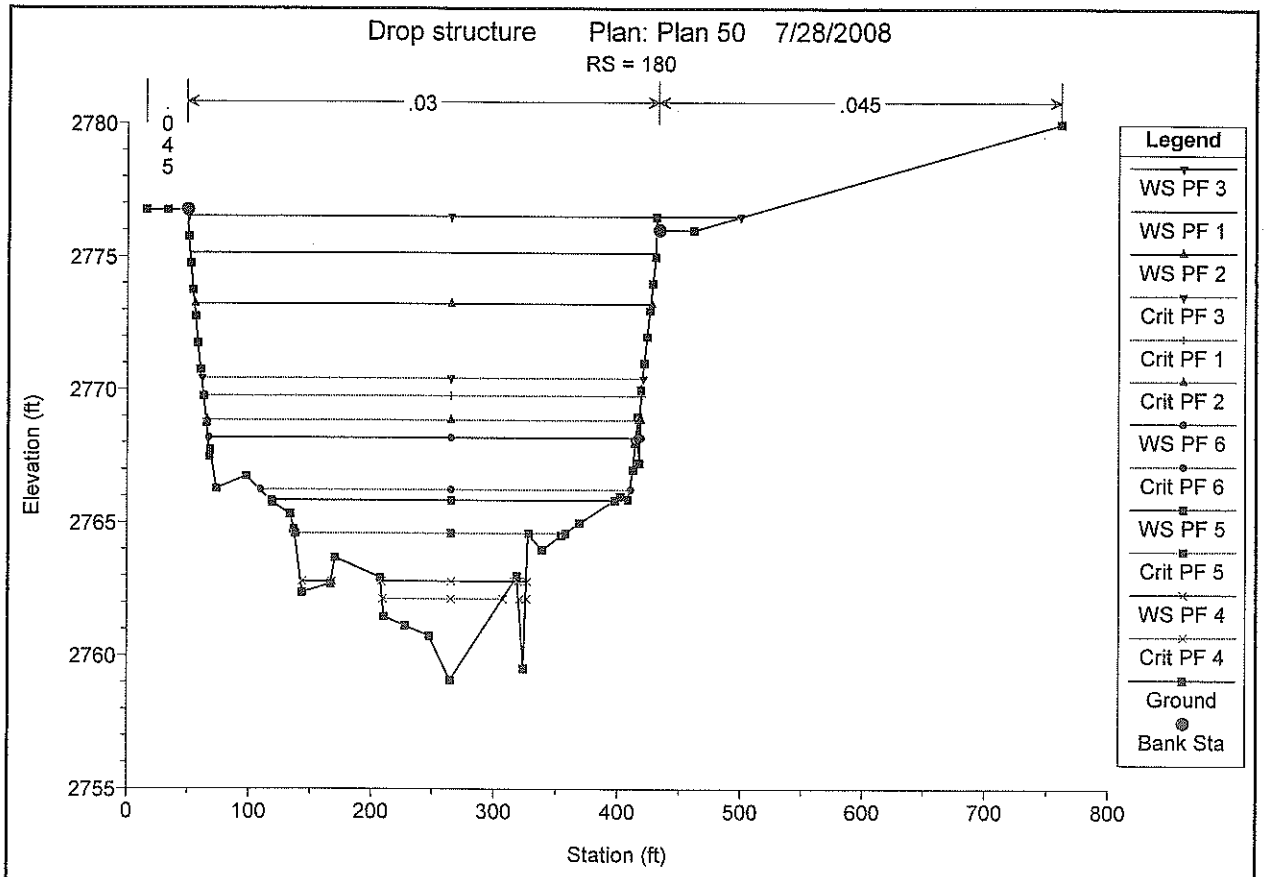
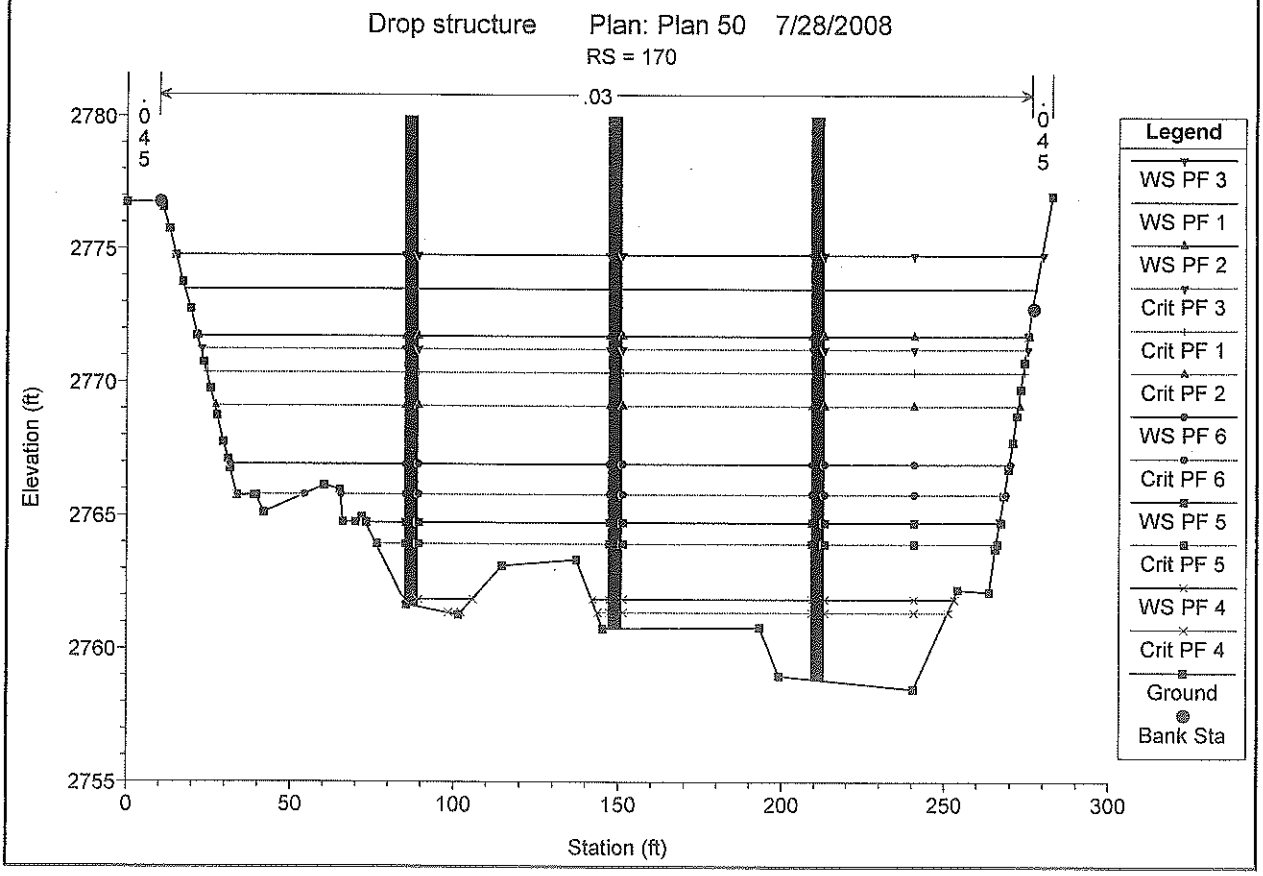
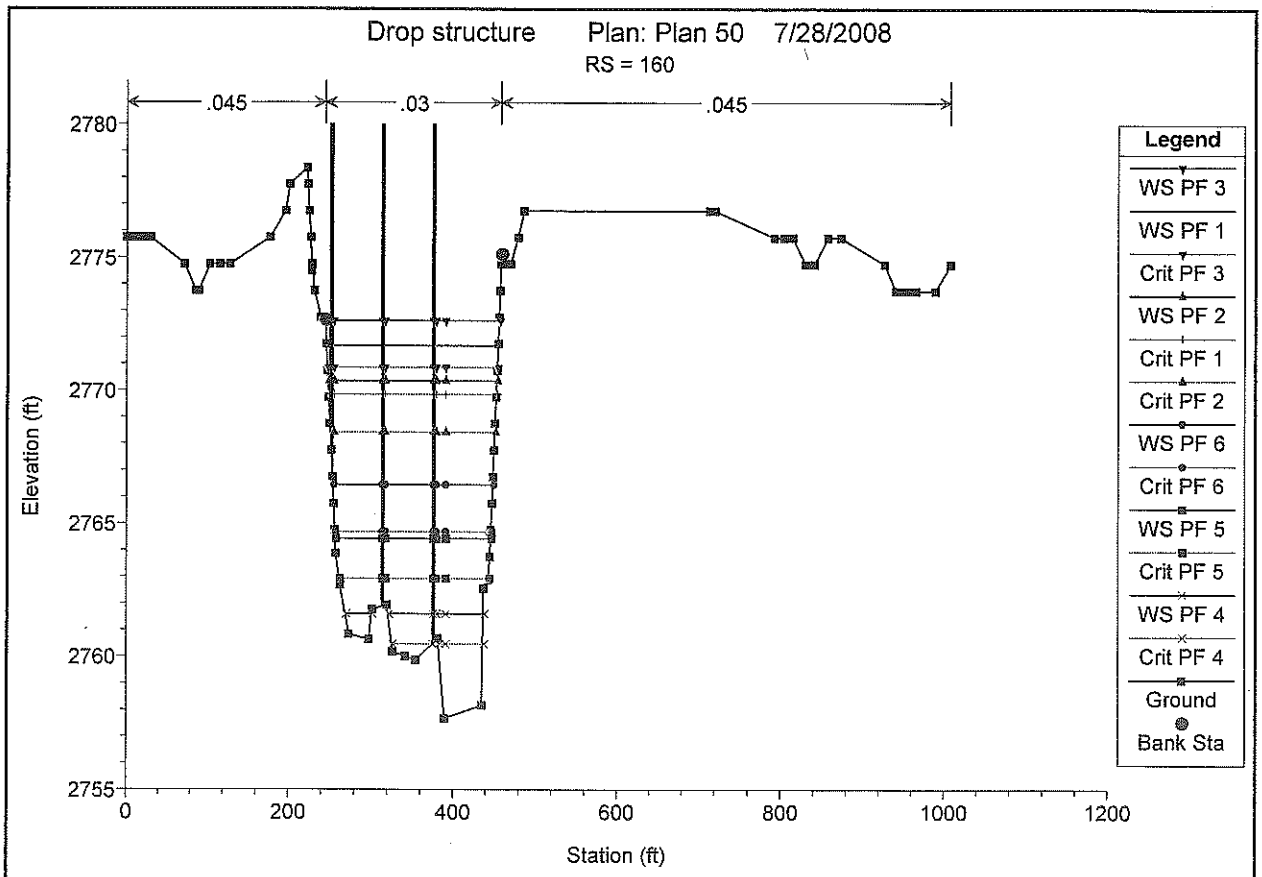
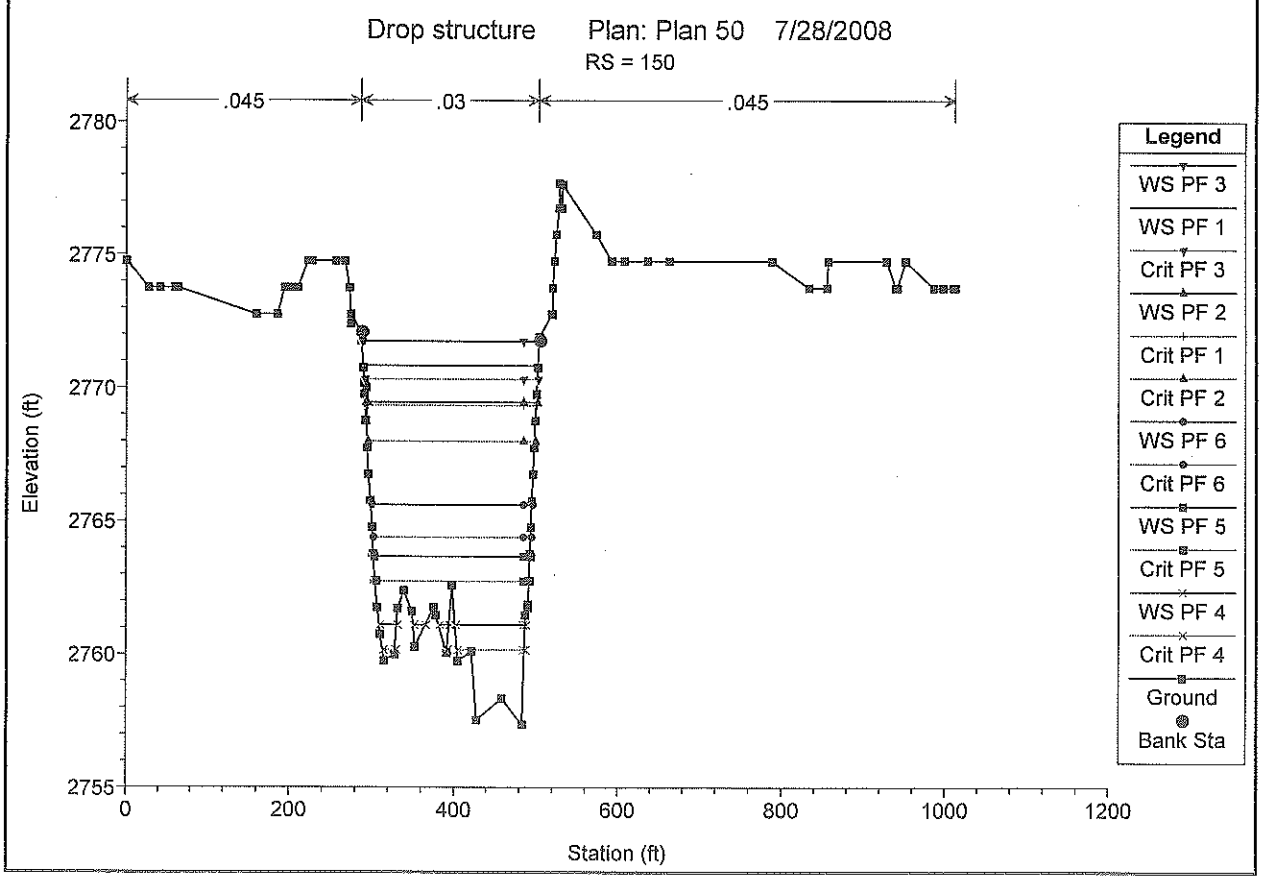
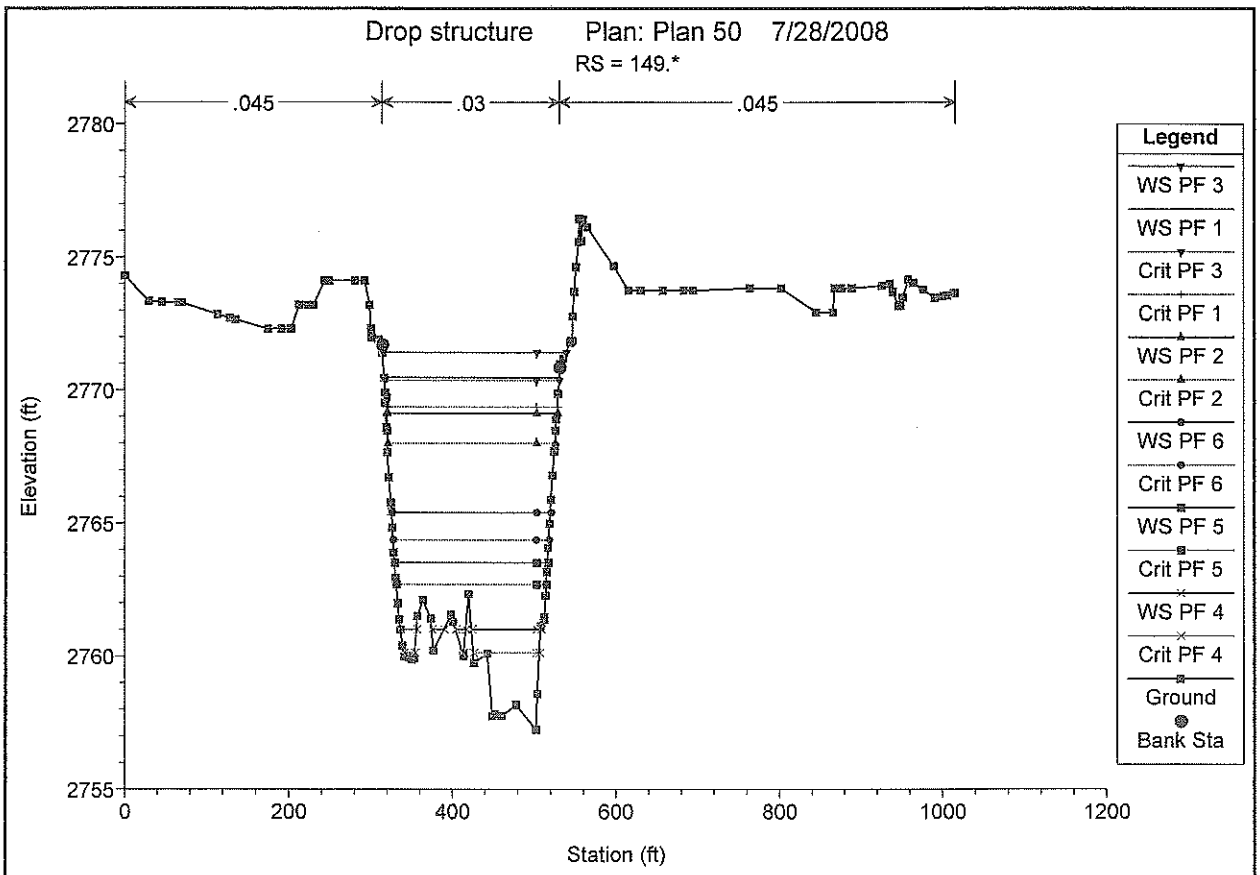
            used.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 1
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 2
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
.ver: River #1  Reach: Reach #1     RS: 100     Profile: PF 3
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 4
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 5
     Warning:Divided flow computed for this cross-section.
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
River: River #1  Reach: Reach #1     RS: 100     Profile: PF 6
     Note:   Multiple critical depths were found at this location.  The critical depth with the lowest, valid, water surface was
             used.
```

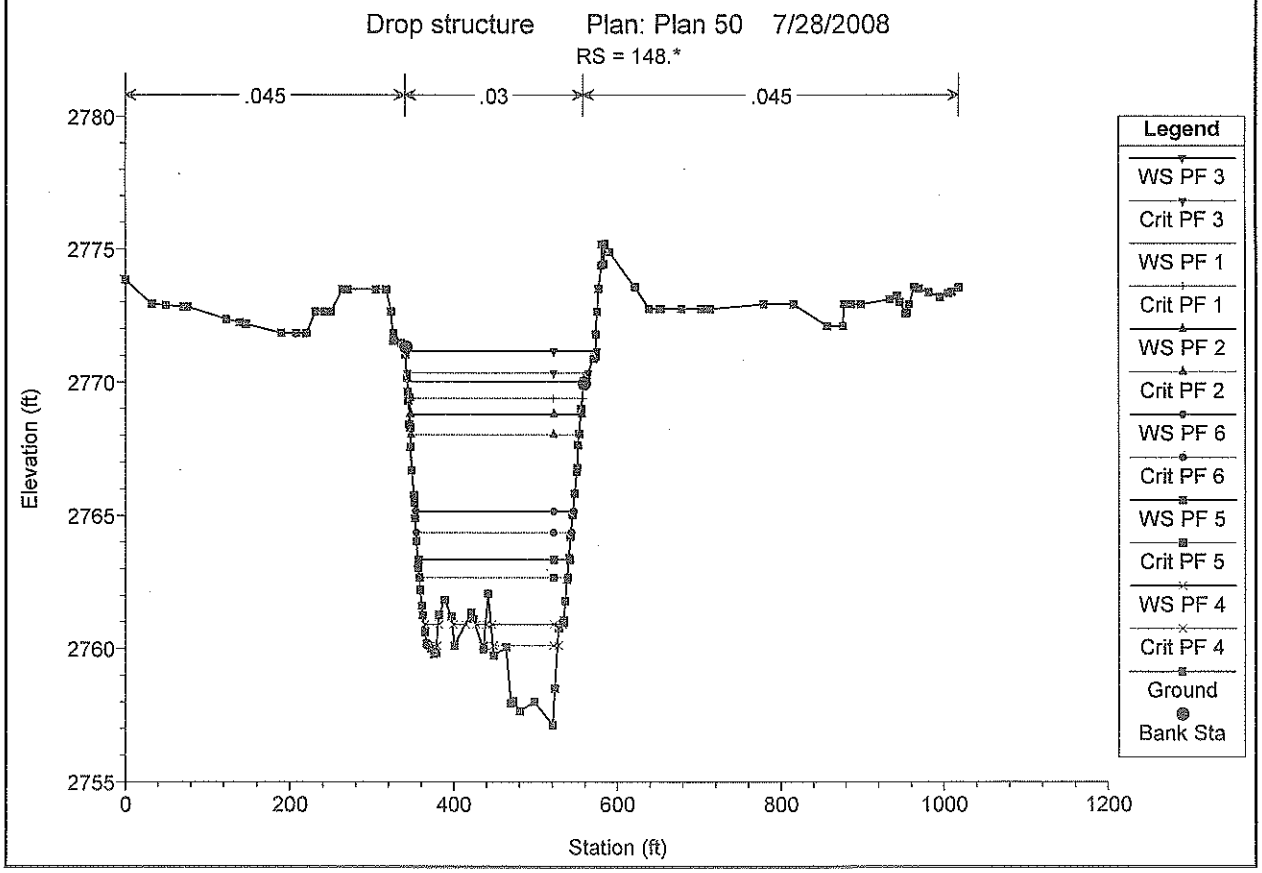

Drop structure Plan: Plan 50 7/28/2008
RS = 180
.03
.045
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

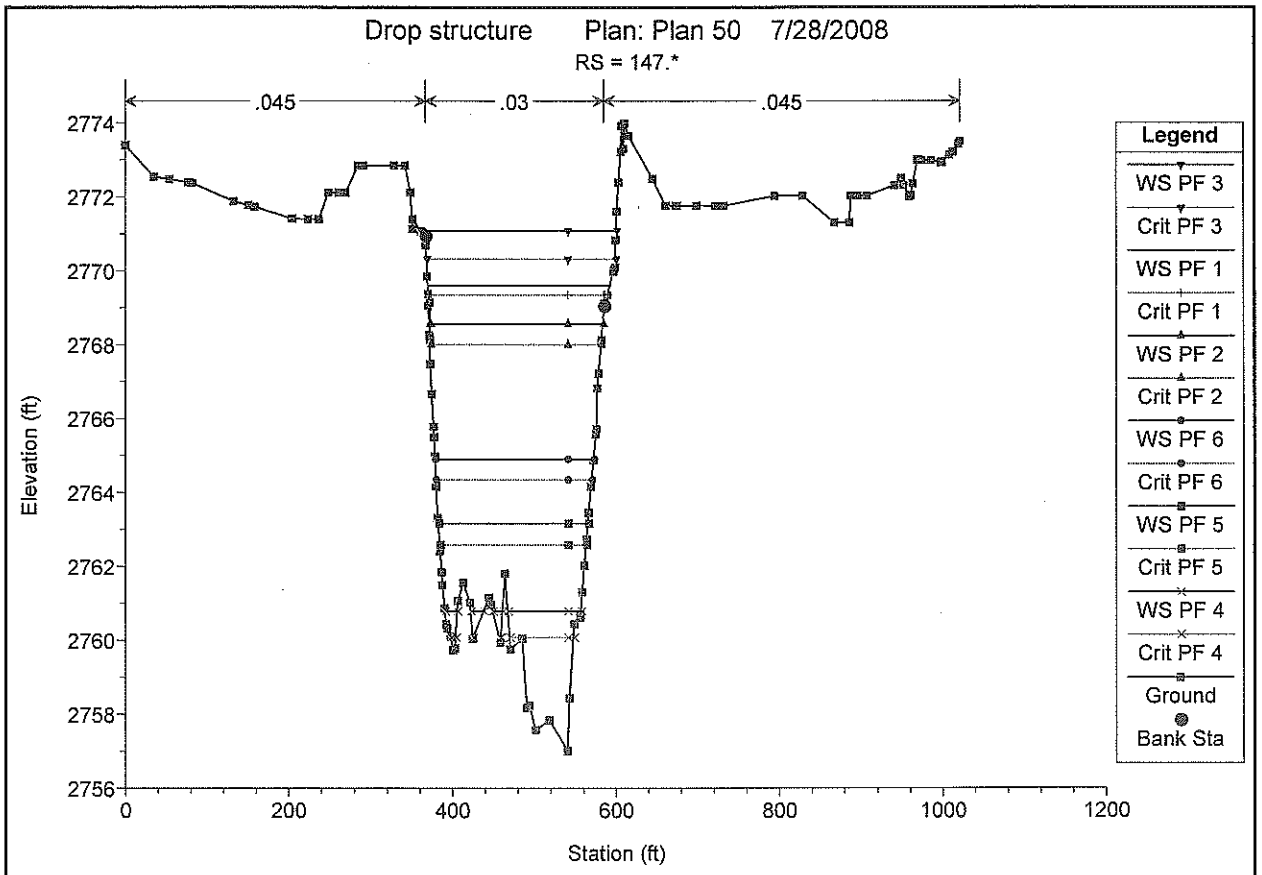

Drop structure Plan: Plan 50 7/28/2008
RS = 170
.03
.045
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

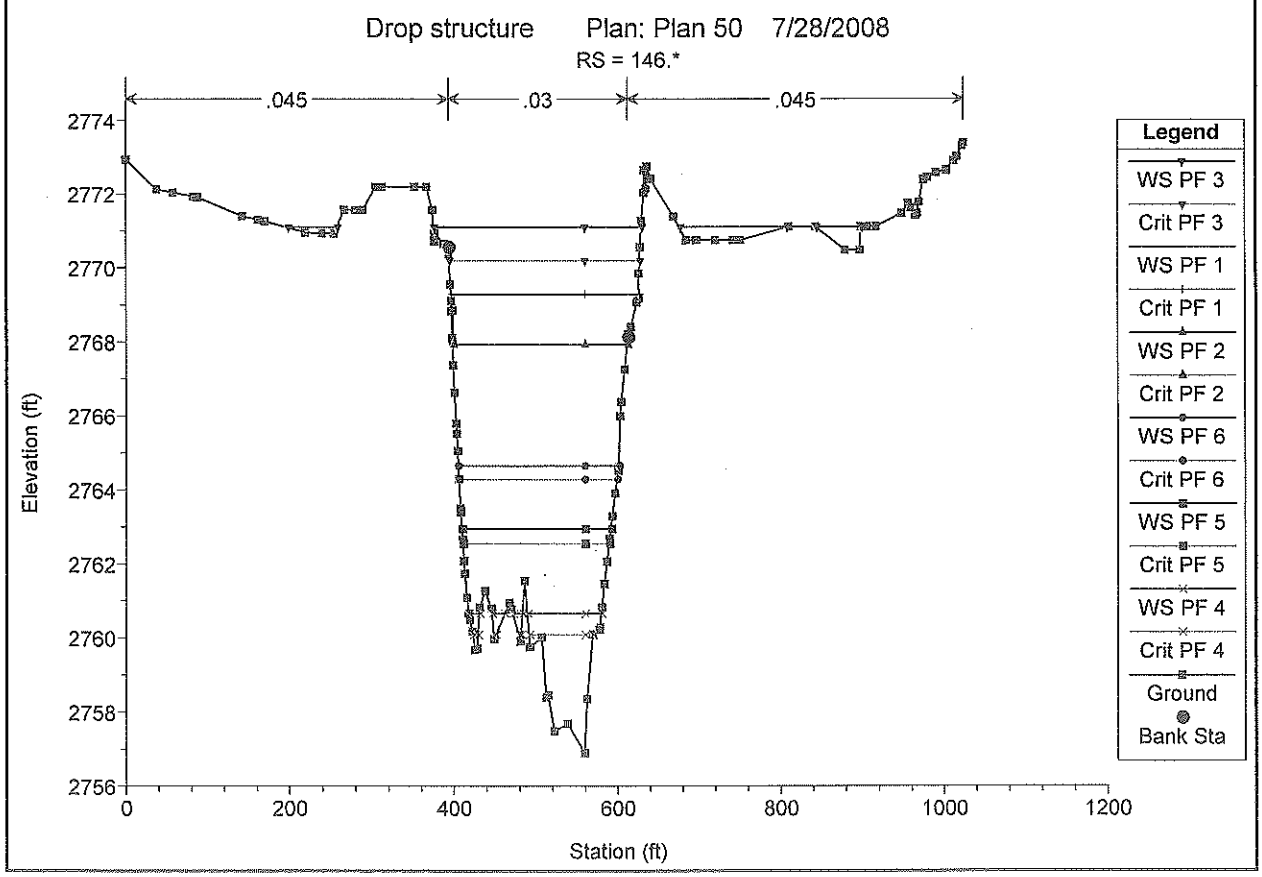

Drop structure Plan: Plan 50 7/28/2008
RS = 160
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

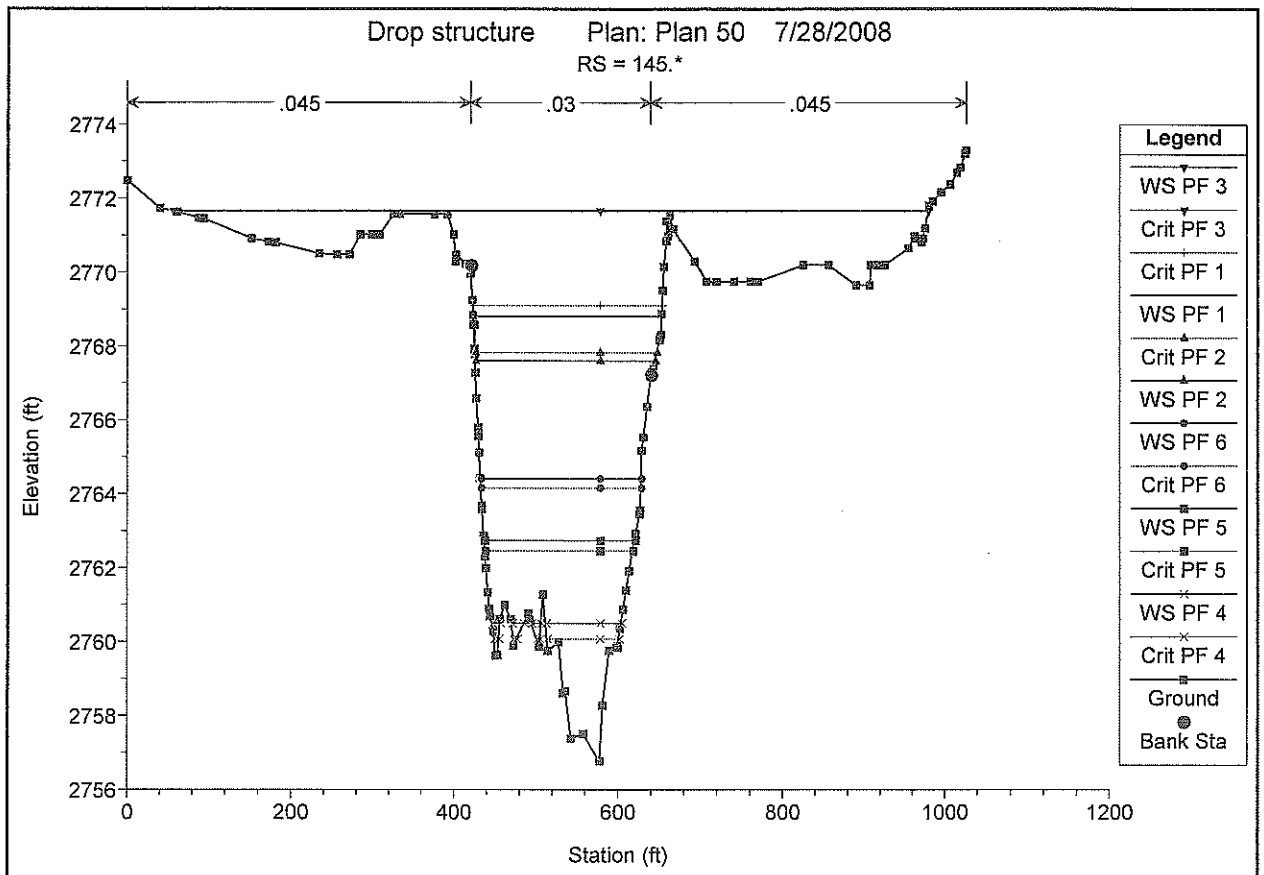

Drop structure Plan: Plan 50 7/28/2008
RS = 150
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
WS PF 2
Crit PF 1
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

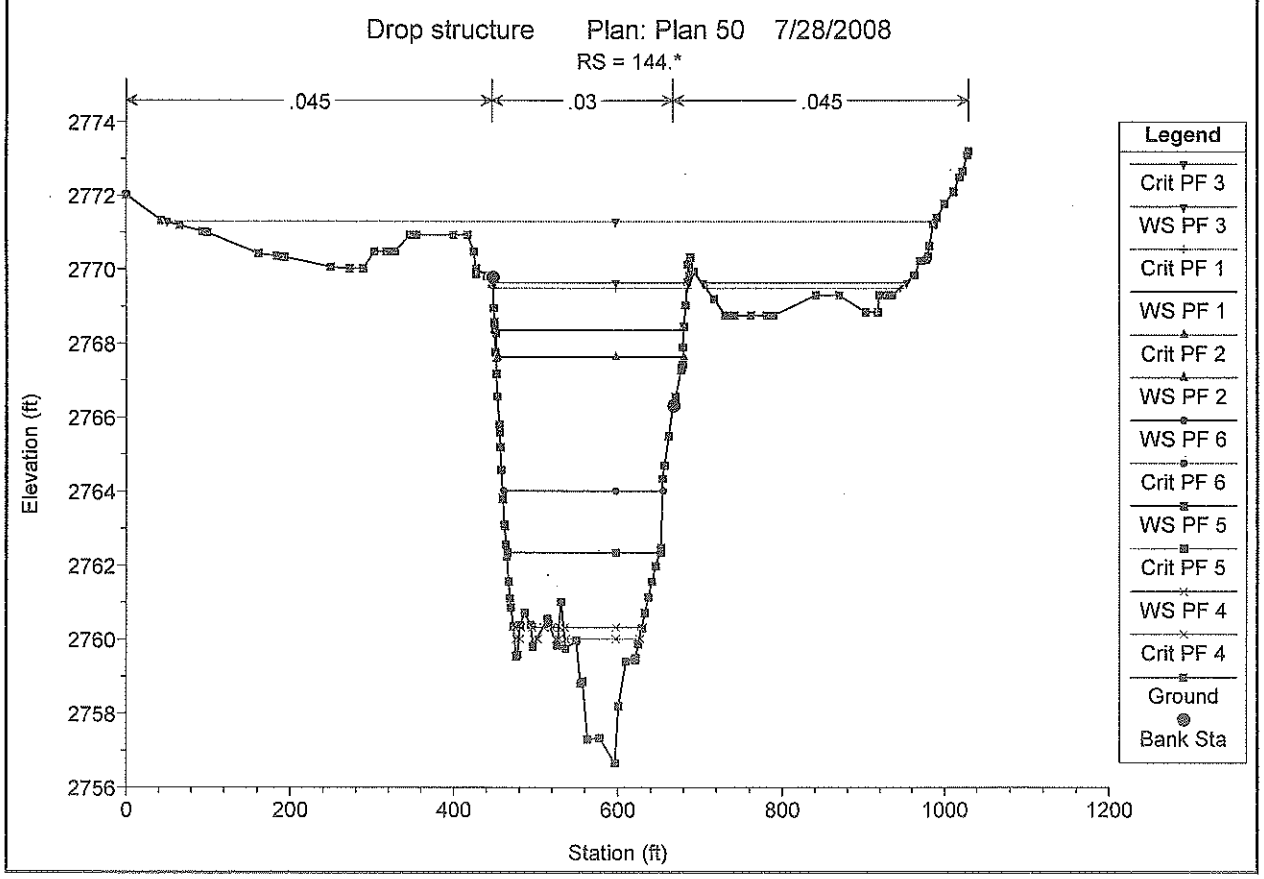

Drop structure Plan: Plan 50 7/28/2008
RS = 149.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
Crit PF 3
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

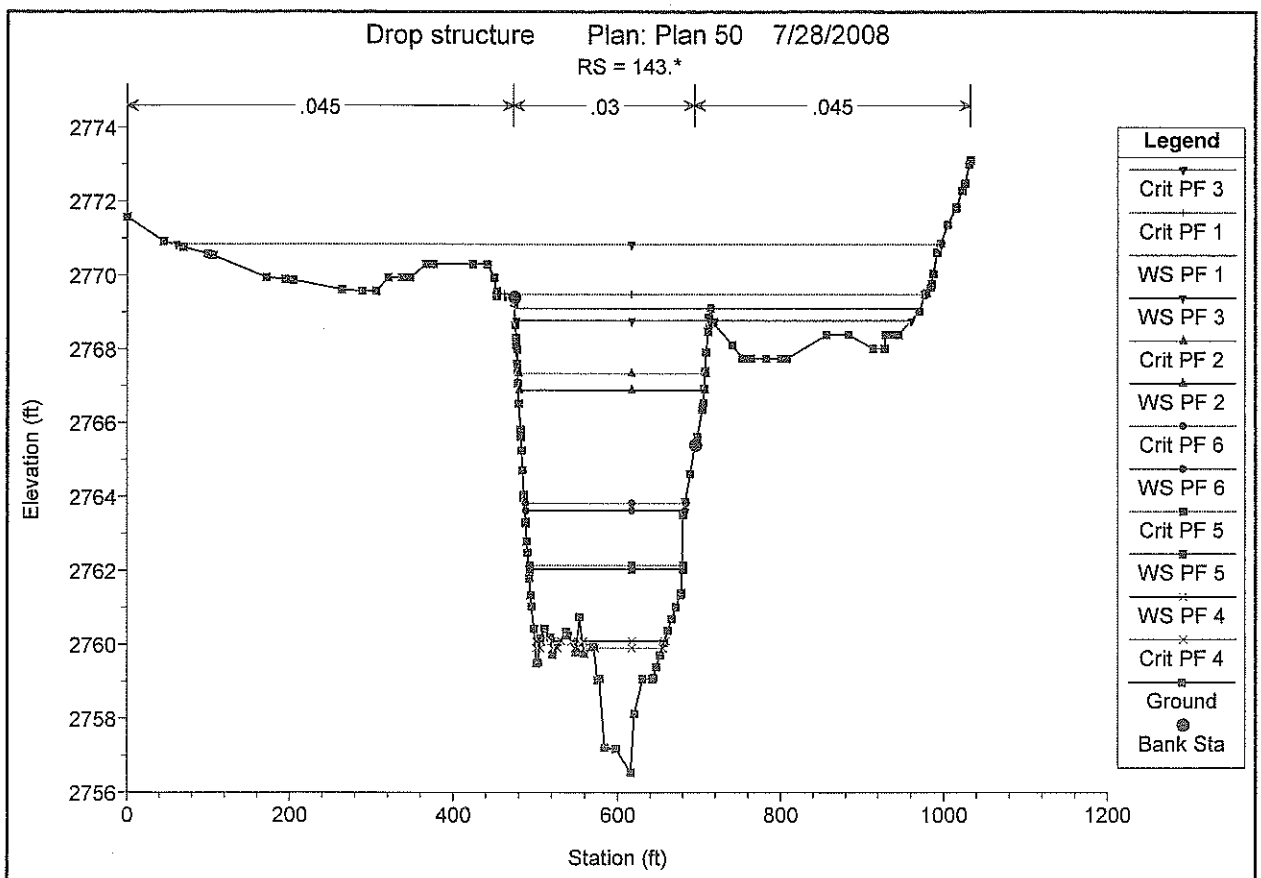

Drop structure Plan: Plan 50 7/28/2008
RS = 148.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

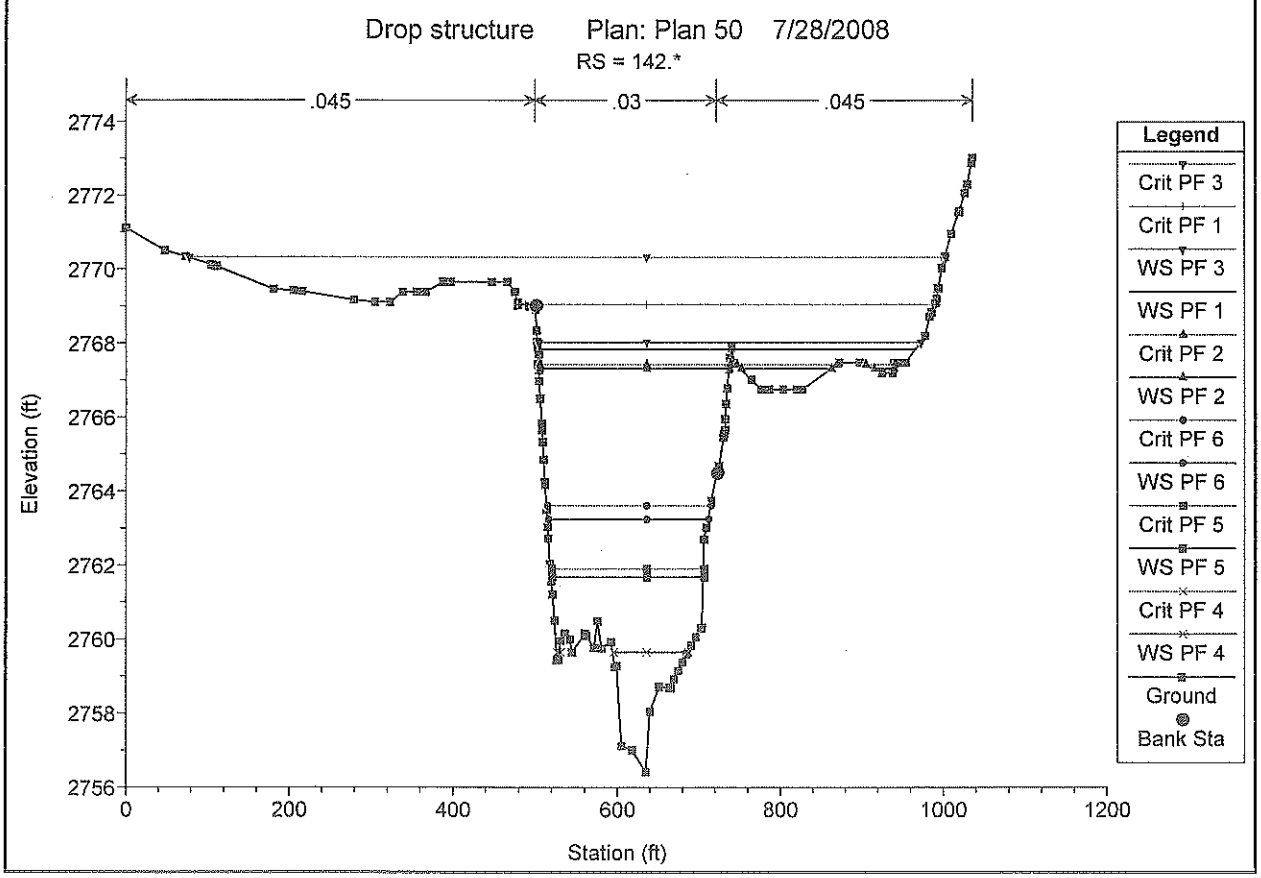

Drop structure Plan: Plan 50 7/28/2008
RS = 147.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

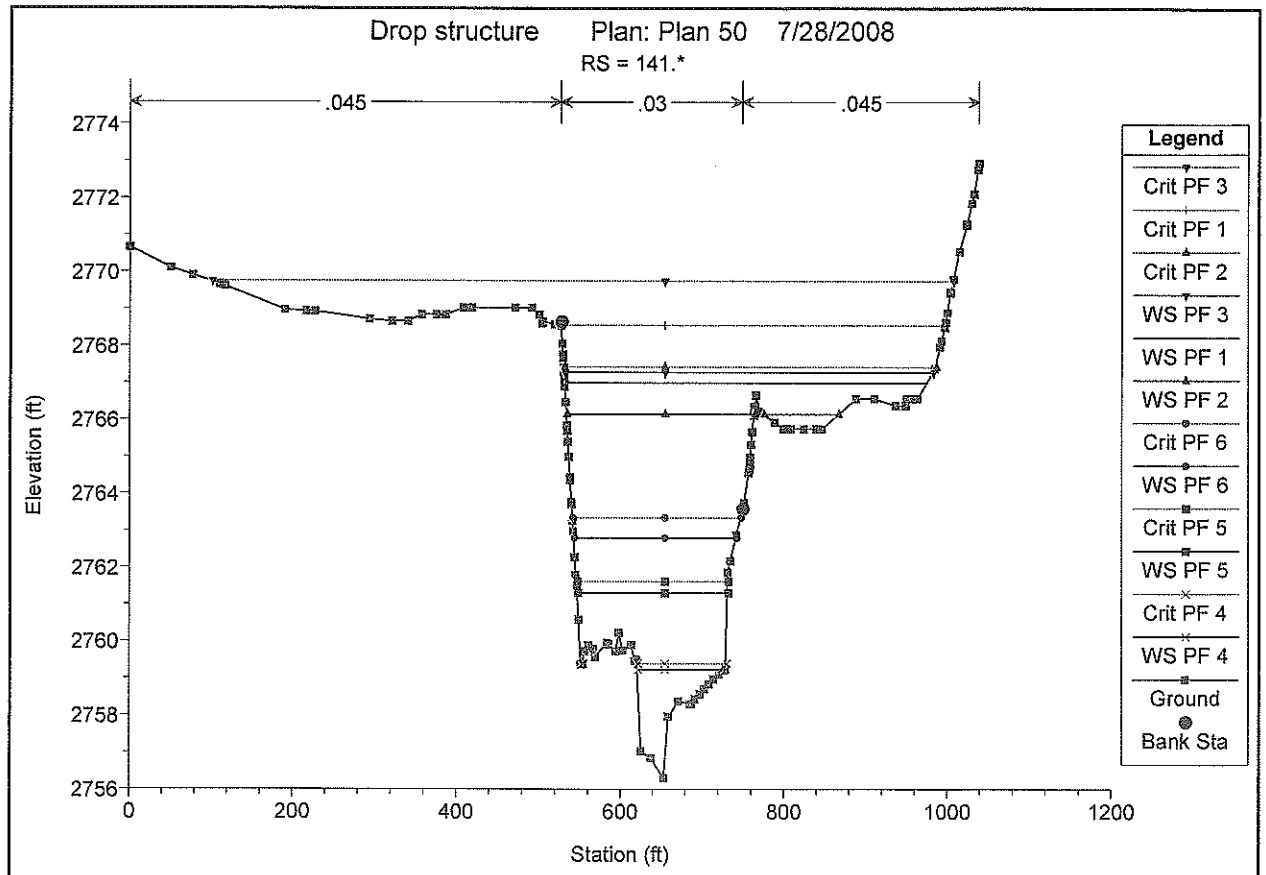

Drop structure Plan: Plan 50 7/28/2008
RS = 146.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

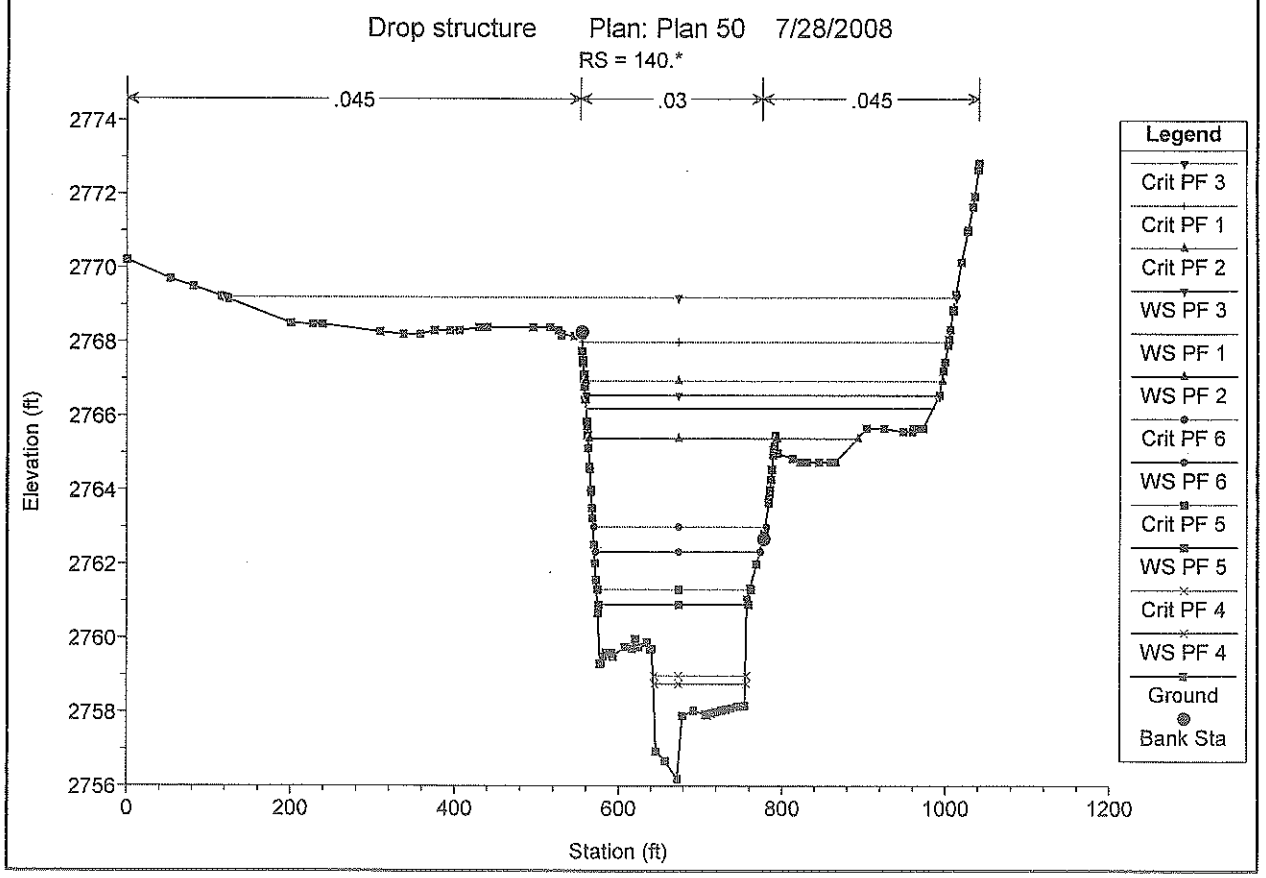

Drop structure Plan: Plan 50 7/28/2008
RS = 145.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

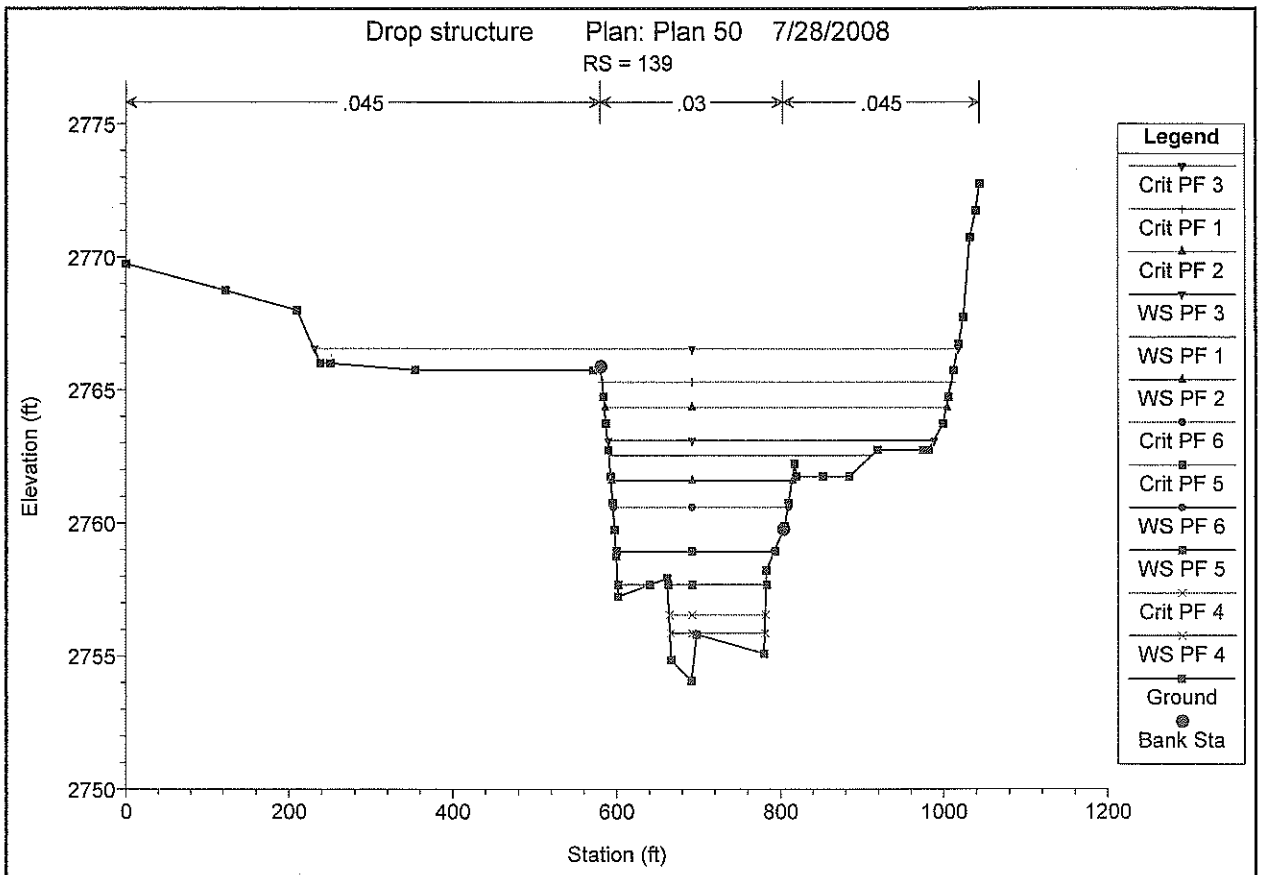

Drop structure Plan: Plan 50 7/28/2008
RS = 144.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
WS PF 3
Crit PF 1
WS PF 1
Crit PF 2
WS PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

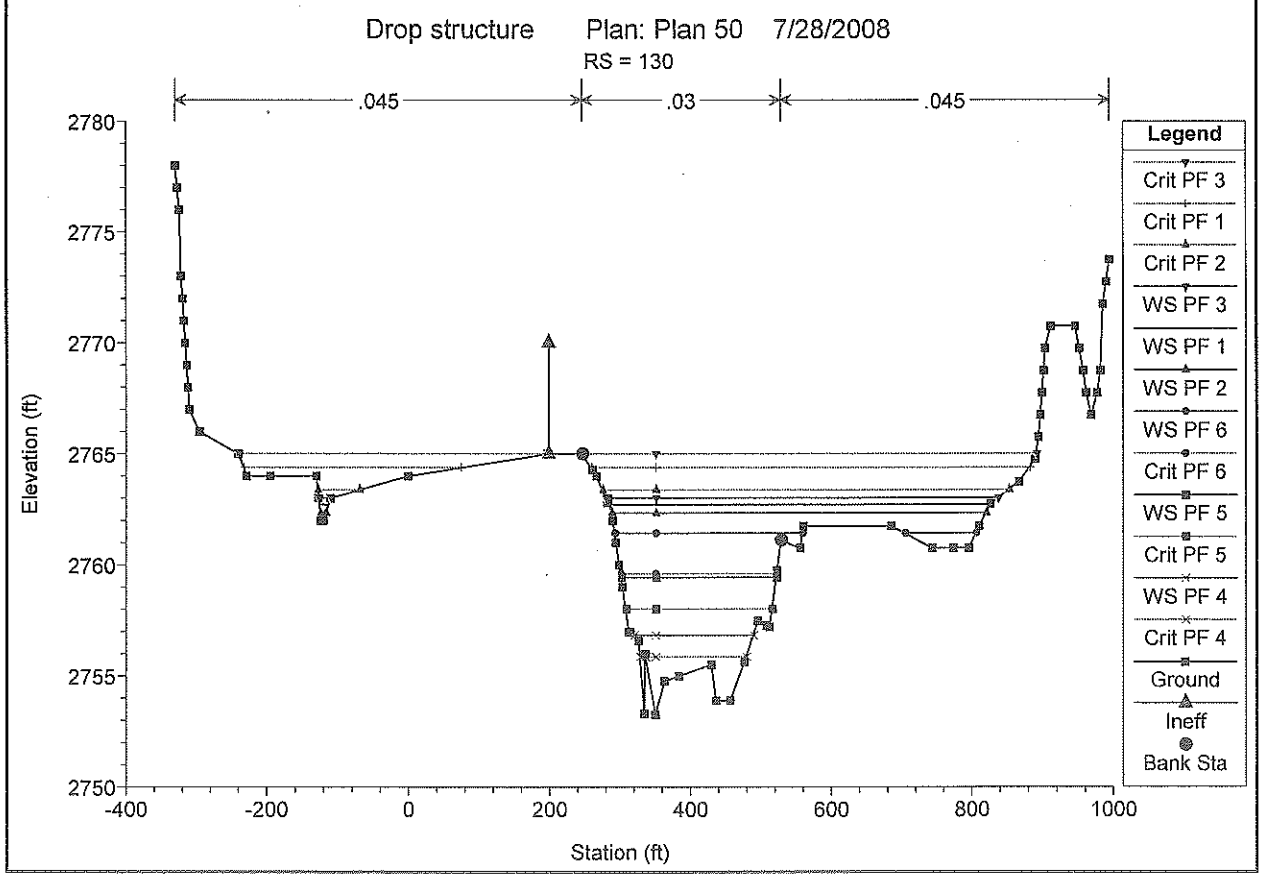

Drop structure Plan: Plan 50 7/28/2008
RS = 143.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 1
WS PF 3
Crit PF 2
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
WS PF 4
Crit PF 4
Ground
Bank Sta

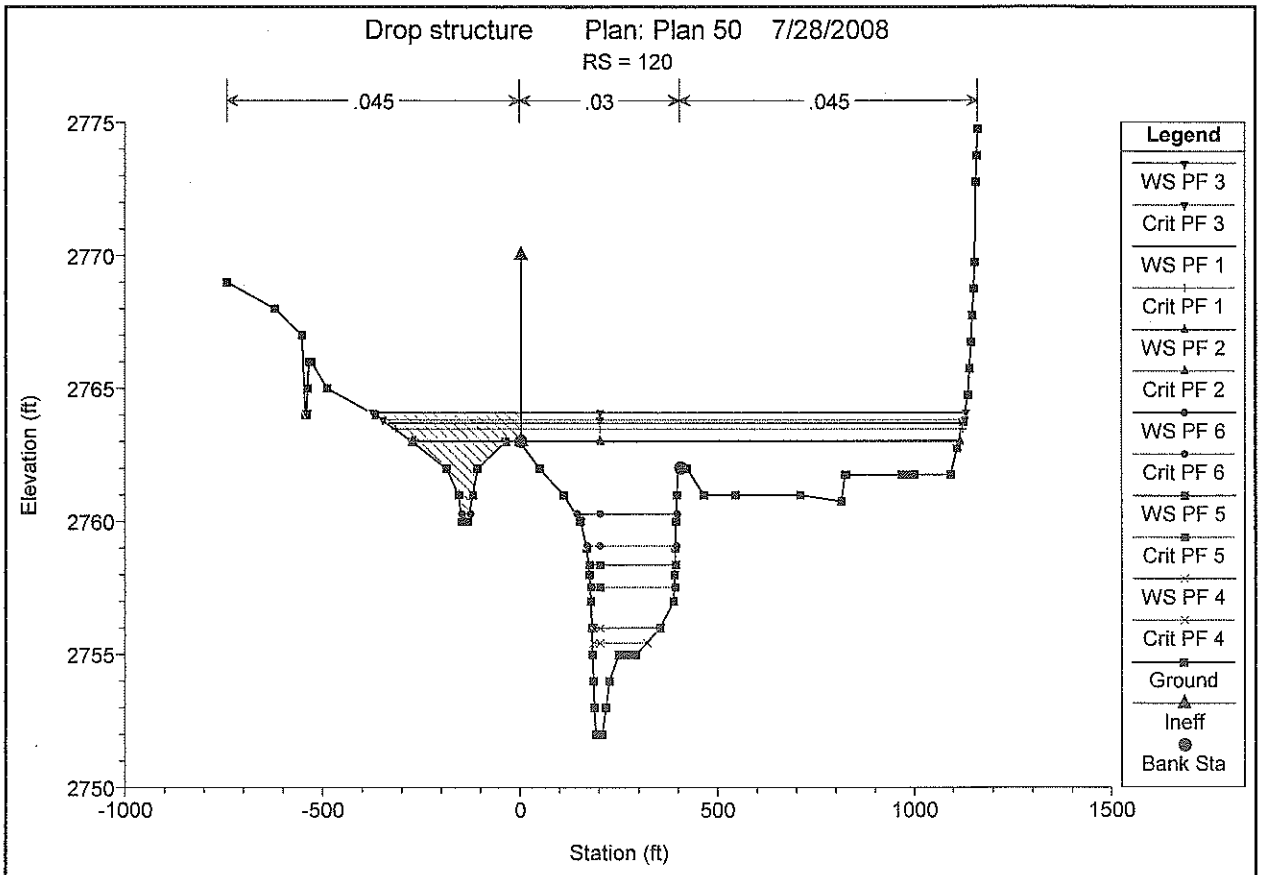

Drop structure Plan: Plan 50 7/28/2008
RS = 142.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
WS PF 3
WS PF 1
Crit PF 2
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

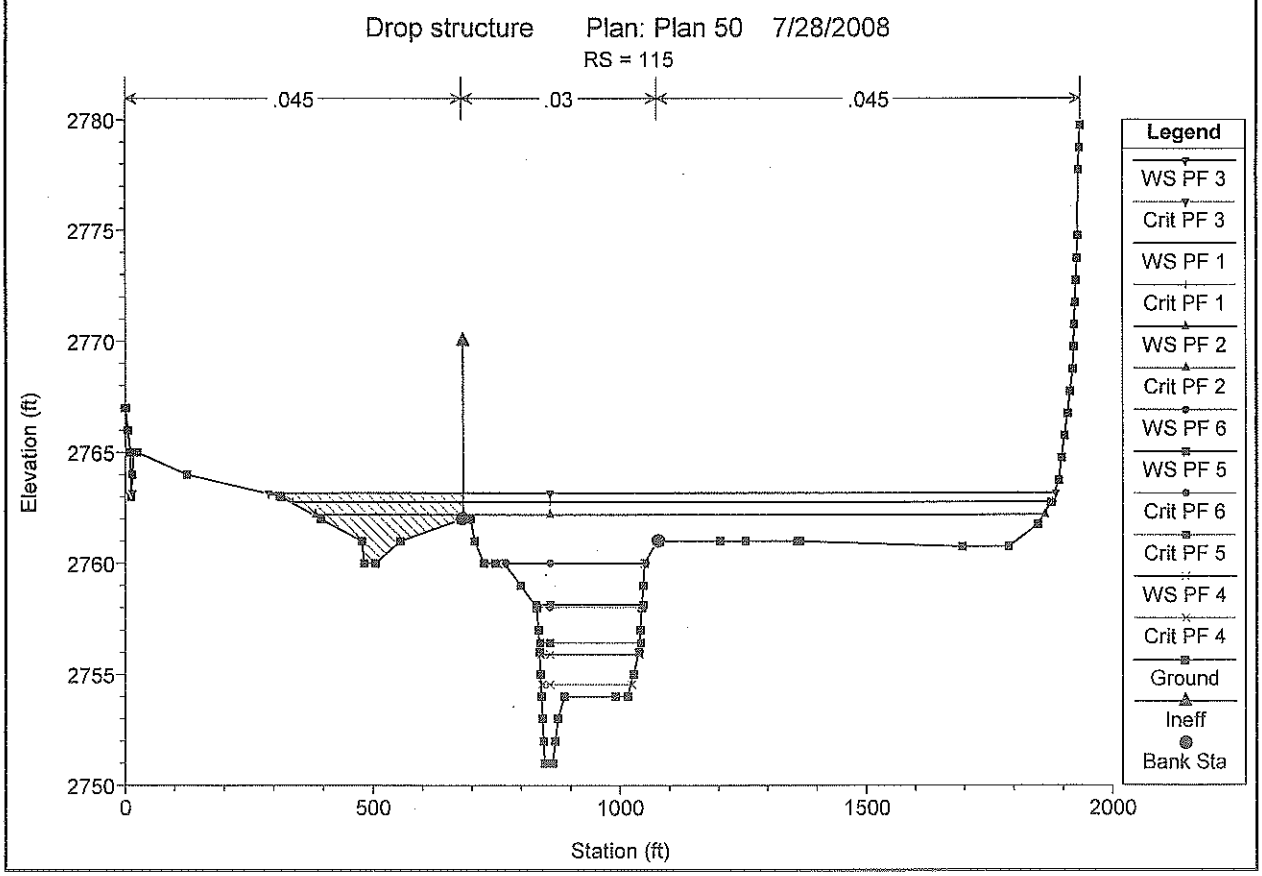

Drop structure Plan: Plan 50 7/28/2008
RS = 141.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

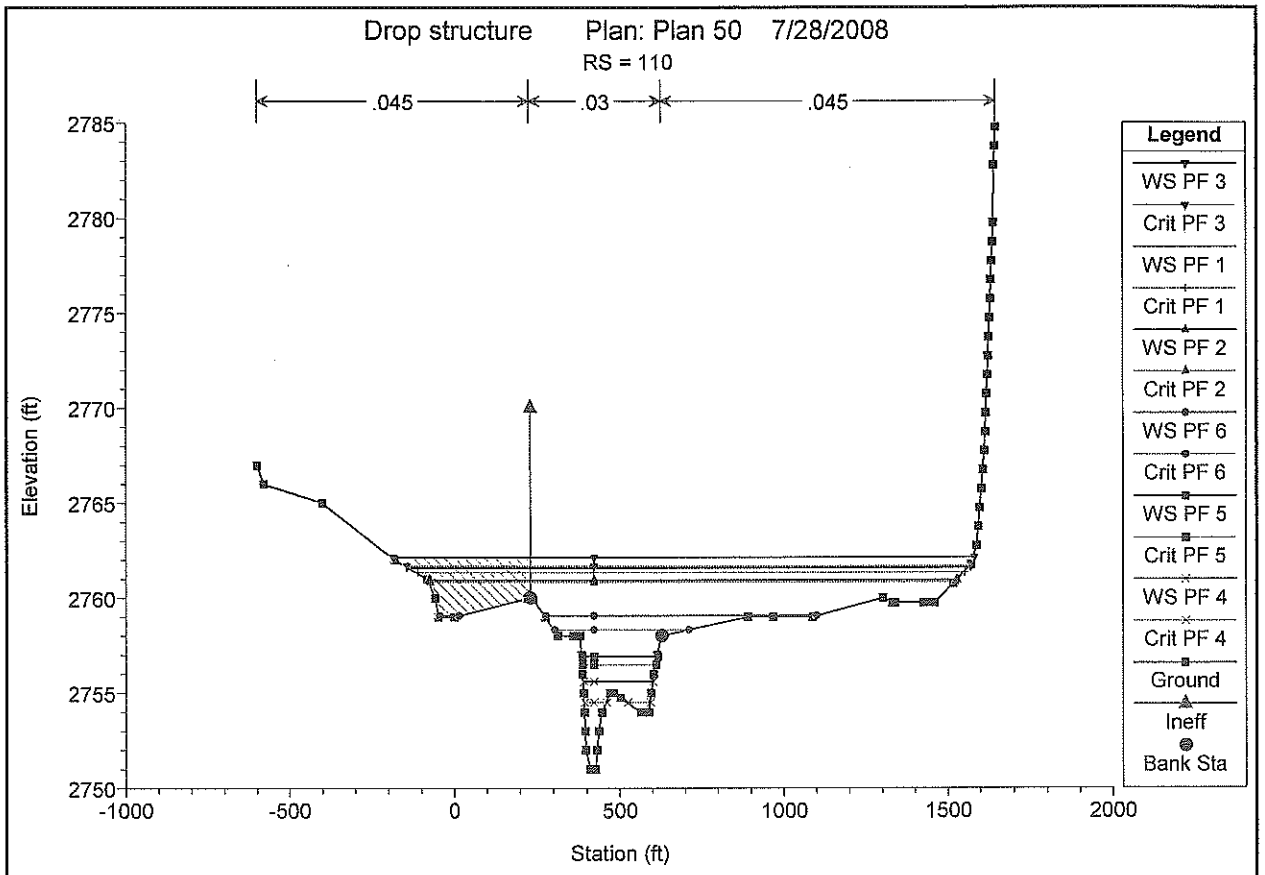

Drop structure Plan: Plan 50 7/28/2008
RS = 140.*
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Crit PF 6
WS PF 6
Crit PF 5
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

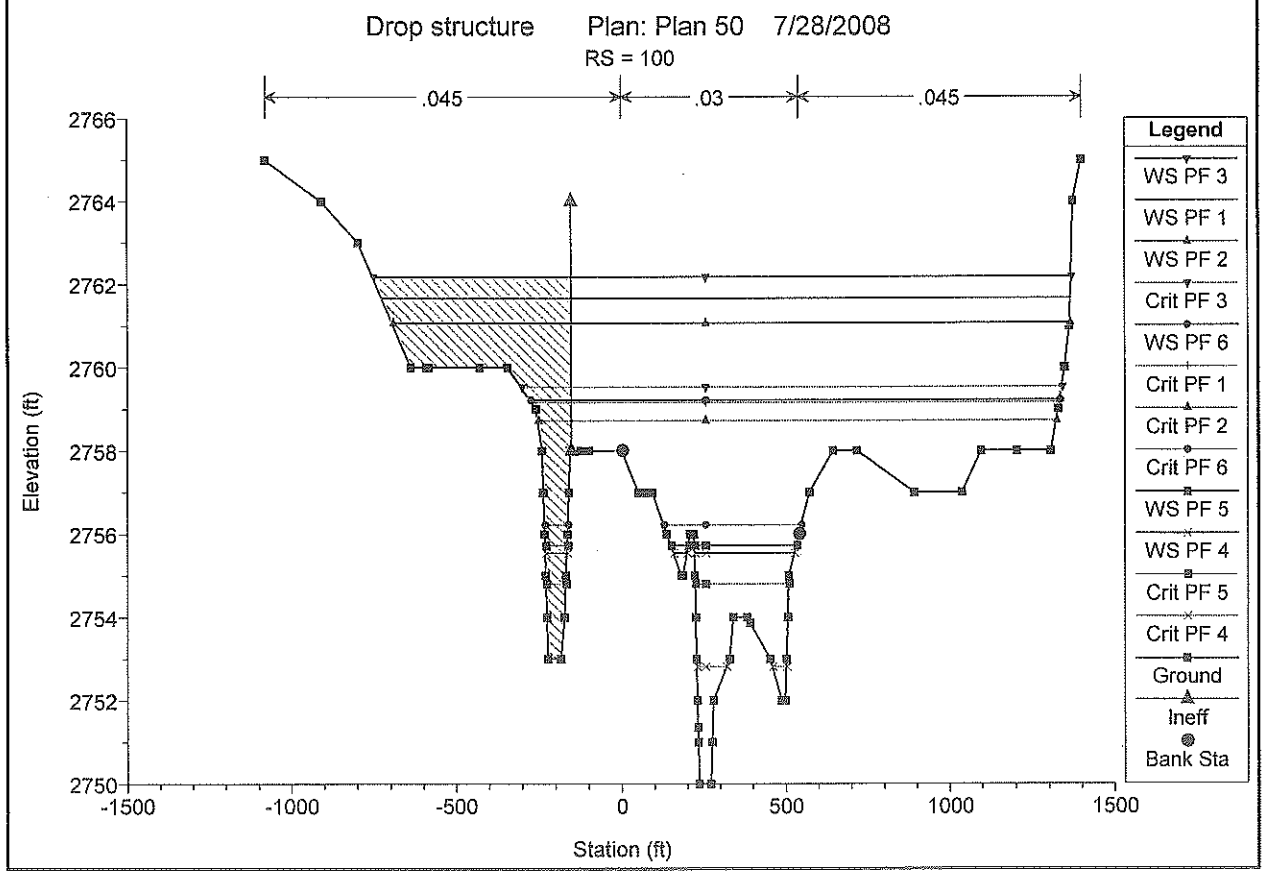

Drop structure Plan: Plan 50 7/28/2008
RS = 139
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
Crit PF 6
Crit PF 5
WS PF 6
WS PF 5
Crit PF 4
WS PF 4
Ground
Bank Sta

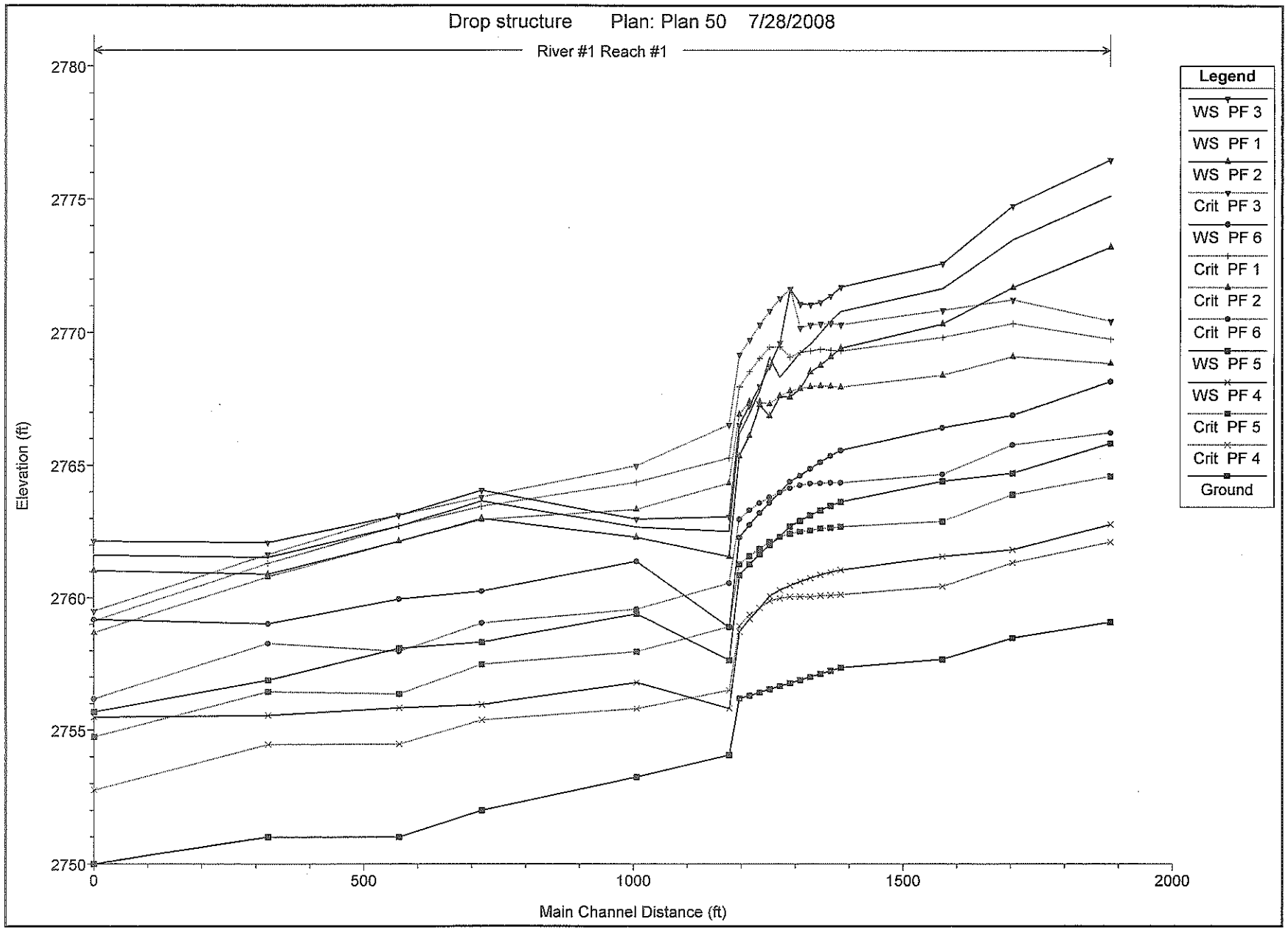

Drop structure Plan: Plan 50 7/28/2008
RS = 130
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
Crit PF 3
Crit PF 1
Crit PF 2
WS PF 3
WS PF 1
WS PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Ineff
Bank Sta

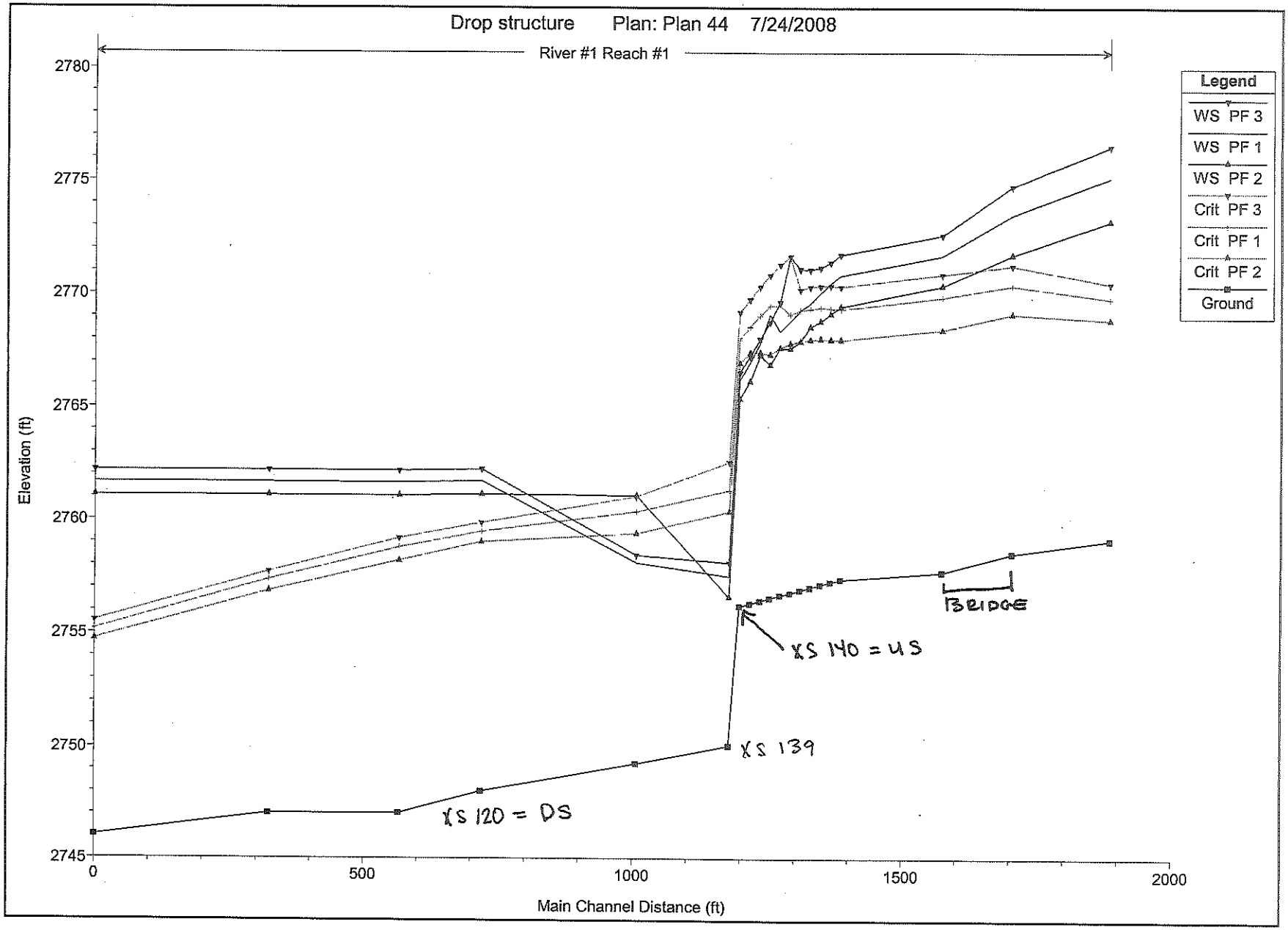

Drop structure Plan: Plan 50 7/28/2008
RS = 120
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 50 7/28/2008
RS = 115
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
WS PF 5
Crit PF 6
Crit PF 5
WS PF 4
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 50 7/28/2008
RS = 110
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
Crit PF 3
WS PF 1
Crit PF 1
WS PF 2
Crit PF 2
WS PF 6
Crit PF 6
WS PF 5
Crit PF 5
WS PF 4
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 50 7/28/2008
RS = 100
.045
.03
.045
Elevation (ft)
Station (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
WS PF 6
Crit PF 1
Crit PF 2
Crit PF 6
WS PF 5
WS PF 4
Crit PF 5
Crit PF 4
Ground
Ineff
Bank Sta


Drop structure Plan: Plan 50 7/28/2008
River #1 Reach #1
Elevation (ft)
2780
2775
2770
2765
2760
2755
2750
0
500
1000
1500
2000
Main Channel Distance (ft)
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
WS PF 6
Crit PF 1
Crit PF 2
Crit PF 6
WS PF 5
WS PF 4
Crit PF 5
Crit PF 4
Ground


Drop structure Plan: Plan 44 7/24/2008
River #1 Reach #1
Legend
WS PF 3
WS PF 1
WS PF 2
Crit PF 3
Crit PF 1
Crit PF 2
Ground
Elevation (ft)
2780
2775
2770
2765
2760
2755
2750
2745
0
500
1000
1500
2000
Main Channel Distance (ft)
BRIDGE
XS 140 = US
XS 139
XS 120 = DS

DROP STRUCTURE 2 FT
LOW FLOW

HEC-RAS Plan: Plan 46 River: River #1 Reach: Reach #1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	180	PF 4	1000.00	2759.08	2762.80	2762.13	2763.10	0.004290	4.40	227.08	140.27	0.61
Reach #1	180	PF 5	5000.00	2759.08	2765.84	2764.60	2766.37	0.003189	5.84	856.67	279.32	0.59
Reach #1	180	PF 6	10000.00	2759.08	2768.18	2766.24	2768.77	0.002022	6.13	1630.48	349.86	0.50
Reach #1	170	PF 4	1000.00	2758.49	2761.84	2761.35	2762.22	0.005401	4.93	203.00	119.52	0.67
Reach #1	170	PF 5	5000.00	2758.49	2764.72	2763.92	2765.61	0.005075	7.57	660.60	181.90	0.70
Reach #1	170	PF 6	10000.00	2758.49	2766.91	2765.78	2768.16	0.004905	8.95	1117.67	226.59	0.71
Reach #1	160	PF 4	1000.00	2757.67	2761.59	2760.46	2761.77	0.001922	3.41	293.37	143.78	0.42
Reach #1	160	PF 5	5000.00	2757.67	2764.42	2762.91	2765.07	0.002752	6.44	775.80	180.92	0.55
Reach #1	160	PF 6	10000.00	2757.67	2766.44	2764.67	2767.62	0.003300	8.73	1145.67	186.02	0.62
Reach #1	150	PF 4	1000.00	2757.36	2761.08	2760.15	2761.33	0.002820	3.96	252.50	133.45	0.51
Reach #1	150	PF 5	5000.00	2757.36	2763.65	2762.71	2764.44	0.003824	7.15	699.46	190.67	0.66
Reach #1	150	PF 6	10000.00	2757.36	2765.59	2764.36	2766.93	0.003828	9.31	1074.28	196.14	0.70
Reach #1	149.*	PF 4	1000.00	2757.24	2761.00	2760.12	2761.27	0.003214	4.15	240.74	131.19	0.54
Reach #1	149.*	PF 5	5000.00	2757.24	2763.51	2762.68	2764.36	0.004215	7.43	673.19	187.37	0.69
Reach #1	149.*	PF 6	10000.00	2757.24	2765.38	2764.36	2766.84	0.004290	9.70	1031.39	194.23	0.74
Reach #1	148.*	PF 4	1000.00	2757.13	2760.90	2760.11	2761.20	0.003837	4.39	227.75	130.90	0.59
Reach #1	148.*	PF 5	5000.00	2757.13	2763.34	2762.66	2764.27	0.004768	7.77	643.83	184.58	0.73
Reach #1	148.*	PF 6	10000.00	2757.13	2765.14	2764.34	2766.74	0.004921	10.15	985.55	193.12	0.79
Reach #1	147.*	PF 4	1000.00	2757.01	2760.78	2760.07	2761.11	0.004593	4.62	216.35	132.11	0.64
Reach #1	147.*	PF 5	5000.00	2757.01	2763.15	2762.58	2764.17	0.005401	8.11	616.73	182.60	0.78
Reach #1	147.*	PF 6	10000.00	2757.01	2764.89	2764.33	2766.63	0.005658	10.59	944.08	193.38	0.84
Reach #1	146.*	PF 4	1000.00	2756.89	2760.65	2760.08	2761.02	0.005412	4.88	204.77	130.48	0.69
Reach #1	146.*	PF 5	5000.00	2756.89	2762.94	2762.54	2764.06	0.006231	8.49	589.06	181.73	0.83
Reach #1	146.*	PF 6	10000.00	2756.89	2764.63	2764.27	2766.51	0.006513	11.00	908.85	196.11	0.90
Reach #1	145.*	PF 4	1000.00	2756.77	2760.49	2760.07	2760.91	0.006284	5.16	193.97	127.62	0.74
Reach #1	145.*	PF 5	5000.00	2756.77	2762.73	2762.45	2763.93	0.007058	8.79	568.55	183.01	0.88
Reach #1	145.*	PF 6	10000.00	2756.77	2764.40	2764.15	2766.37	0.007013	11.26	887.87	195.70	0.93
Reach #1	144.*	PF 4	1000.00	2756.66	2760.32	2760.00	2760.78	0.007410	5.44	183.94	126.60	0.79
Reach #1	144.*	PF 5	5000.00	2756.66	2762.34	2762.34	2763.76	0.009536	9.56	522.79	186.31	1.01
Reach #1	144.*	PF 6	10000.00	2756.66	2764.00	2764.00	2766.20	0.008338	11.90	840.44	194.34	1.01
Reach #1	143.*	PF 4	1000.00	2756.54	2760.10	2759.90	2760.62	0.009166	5.82	171.80	125.33	0.88
Reach #1	143.*	PF 5	5000.00	2756.54	2762.03	2762.14	2763.56	0.010805	9.92	504.01	186.70	1.06
Reach #1	143.*	PF 6	10000.00	2756.54	2763.63	2763.82	2766.01	0.009527	12.40	806.48	193.72	1.07
Reach #1	142.*	PF 4	1000.00	2756.42	2759.64	2759.64	2760.41	0.011829	7.02	142.36	94.82	1.01
Reach #1	142.*	PF 5	5000.00	2756.42	2761.67	2761.89	2763.34	0.012368	10.36	482.82	185.39	1.13
Reach #1	142.*	PF 6	10000.00	2756.42	2763.24	2763.60	2765.80	0.010868	12.85	778.45	195.74	1.14
Reach #1	141.*	PF 4	1000.00	2756.30	2759.23	2759.39	2760.13	0.018243	7.61	131.42	107.60	1.21
Reach #1	141.*	PF 5	5000.00	2756.30	2761.30	2761.61	2763.08	0.013831	10.73	465.84	184.06	1.19
Reach #1	141.*	PF 6	10000.00	2756.30	2762.79	2763.34	2765.56	0.012568	13.34	749.37	198.42	1.21
Reach #1	140.*	PF 4	1000.00	2756.19	2758.75	2758.97	2759.74	0.022811	7.99	125.23	112.60	1.33
Reach #1	140.*	PF 5	5000.00	2756.19	2760.89	2761.30	2762.80	0.015415	11.10	450.39	183.12	1.25
Reach #1	140.*	PF 6	10000.00	2756.19	2762.31	2762.99	2765.28	0.014520	13.83	722.98	201.98	1.29
Reach #1	139	PF 4	1000.00	2754.07	2755.85	2756.54	2758.70	0.137366	13.54	73.87	115.80	2.99
Reach #1	139	PF 5	5000.00	2754.07	2757.67	2758.94	2762.07	0.051072	16.83	297.04	158.75	2.17
Reach #1	139	PF 6	10000.00	2754.07	2758.91	2760.58	2764.59	0.040243	19.13	522.79	192.69	2.05
Reach #1	130	PF 4	1000.00	2753.25	2756.82	2755.85	2756.98	0.001758	3.13	319.37	169.40	0.40
Reach #1	130	PF 5	5000.00	2753.25	2759.42	2758.00	2759.96	0.002390	5.90	847.70	219.30	0.53
Reach #1	130	PF 6	10000.00	2753.25	2761.41	2759.60	2762.31	0.002487	7.63	1366.70	366.86	0.57
Reach #1	120	PF 4	1000.00	2752.00	2755.99	2755.42	2756.24	0.004021	4.02	248.94	171.20	0.59
Reach #1	120	PF 5	5000.00	2752.00	2758.35	2757.51	2759.08	0.003851	6.85	729.87	217.68	0.66
Reach #1	120	PF 6	10000.00	2752.00	2760.27	2759.07	2761.40	0.003889	8.54	1171.20	273.97	0.70
Reach #1	115	PF 4	1000.00	2751.00	2755.88	2754.52	2755.96	0.000758	2.29	436.64	199.22	0.27
Reach #1	115	PF 5	5000.00	2751.00	2758.12	2756.40	2758.60	0.001908	5.56	899.52	216.32	0.48
Reach #1	115	PF 6	10000.00	2751.00	2759.98	2758.01	2760.82	0.002728	7.34	1362.75	282.77	0.59
Reach #1	110	PF 4	1000.00	2751.00	2755.59	2754.51	2755.71	0.001455	2.72	367.31	211.19	0.36
Reach #1	110	PF 5	5000.00	2751.00	2756.92	2756.48	2757.81	0.005800	7.60	658.11	228.88	0.79
Reach #1	110	PF 6	10000.00	2751.00	2759.05	2758.31	2759.97	0.004521	7.77	1420.98	883.84	0.72

HEC-RAS Plan: Plan 46 River: River #1 Reach: Reach #1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	100	PF 4	1000.00	2750.00	2755.53	2752.80	2755.55	0.000181	1.20	833.69	408.34	0.14
Reach #1	100	PF 5	5000.00	2750.00	2755.72	2754.80	2756.20	0.003760	5.55	900.77	428.88	0.62
Reach #1	100	PF 6	10000.00	2750.00	2759.21	2756.21	2759.35	0.000535	3.26	4076.50	1607.06	0.26

DROP STRUCTURE 4 FT
LOW FLOWS

HEC-RAS Plan: Plan 46 River: River #1 Reach: Reach #1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	180	PF 4	1000.00	2759.08	2762.80	2762.13	2763.10	0.004290	4.40	227.08	140.27	0.61
Reach #1	180	PF 5	5000.00	2759.08	2765.84	2764.60	2766.37	0.003189	5.84	856.67	279.32	0.59
Reach #1	180	PF 6	10000.00	2759.08	2768.18	2766.24	2768.77	0.002022	6.13	1630.48	349.86	0.50
Reach #1	170	PF 4	1000.00	2758.49	2761.84	2761.35	2762.22	0.005401	4.93	203.00	119.52	0.67
Reach #1	170	PF 5	5000.00	2758.49	2764.72	2763.92	2765.81	0.005075	7.57	660.60	181.90	0.70
Reach #1	170	PF 6	10000.00	2758.49	2766.91	2765.78	2768.16	0.004905	8.95	1117.67	226.59	0.71
Reach #1	160	PF 4	1000.00	2757.67	2761.59	2760.46	2761.77	0.001922	3.41	293.37	143.78	0.42
Reach #1	160	PF 5	5000.00	2757.67	2764.42	2762.91	2765.07	0.002752	6.44	775.80	180.92	0.55
Reach #1	160	PF 6	10000.00	2757.67	2766.44	2764.67	2767.62	0.003300	8.73	1145.67	186.02	0.62
Reach #1	150	PF 4	1000.00	2757.36	2761.08	2760.15	2761.33	0.002820	3.96	252.50	133.45	0.51
Reach #1	150	PF 5	5000.00	2757.36	2763.65	2762.71	2764.44	0.003824	7.15	699.46	190.67	0.66
Reach #1	150	PF 6	10000.00	2757.36	2765.59	2764.36	2766.93	0.003828	9.31	1074.28	196.14	0.70
Reach #1	149.*	PF 4	1000.00	2757.24	2761.00	2760.12	2761.27	0.003214	4.15	240.74	131.19	0.54
Reach #1	149.*	PF 5	5000.00	2757.24	2763.51	2762.68	2764.36	0.004215	7.43	673.19	187.37	0.69
Reach #1	149.*	PF 6	10000.00	2757.24	2765.38	2764.36	2766.84	0.004290	9.70	1031.39	194.23	0.74
Reach #1	148.*	PF 4	1000.00	2757.13	2760.90	2760.11	2761.20	0.003837	4.39	227.75	130.90	0.59
Reach #1	148.*	PF 5	5000.00	2757.13	2763.34	2762.66	2764.27	0.004768	7.77	643.83	184.58	0.73
Reach #1	148.*	PF 6	10000.00	2757.13	2765.14	2764.34	2766.74	0.004921	10.15	985.55	193.12	0.79
Reach #1	147.*	PF 4	1000.00	2757.01	2760.78	2760.07	2761.11	0.004593	4.62	216.35	132.11	0.64
Reach #1	147.*	PF 5	5000.00	2757.01	2763.15	2762.58	2764.17	0.005401	8.11	616.73	182.60	0.78
Reach #1	147.*	PF 6	10000.00	2757.01	2764.89	2764.33	2766.63	0.005658	10.59	944.08	193.38	0.84
Reach #1	146.*	PF 4	1000.00	2756.89	2760.65	2760.08	2761.02	0.005412	4.88	204.77	130.48	0.69
Reach #1	146.*	PF 5	5000.00	2756.89	2762.94	2762.54	2764.06	0.006231	8.49	589.06	181.73	0.83
Reach #1	146.*	PF 6	10000.00	2756.89	2764.63	2764.27	2766.51	0.006513	11.00	908.85	196.11	0.90
Reach #1	145.*	PF 4	1000.00	2756.77	2760.49	2760.07	2760.91	0.006284	5.16	193.97	127.62	0.74
Reach #1	145.*	PF 5	5000.00	2756.77	2762.73	2762.45	2763.93	0.007058	8.79	568.55	183.01	0.88
Reach #1	145.*	PF 6	10000.00	2756.77	2764.40	2764.15	2766.37	0.007013	11.26	887.87	195.70	0.93
Reach #1	144.*	PF 4	1000.00	2756.66	2760.32	2760.00	2760.78	0.007410	5.44	183.94	126.60	0.79
Reach #1	144.*	PF 5	5000.00	2756.66	2762.34	2762.34	2763.76	0.009536	9.56	522.79	186.31	1.01
Reach #1	144.*	PF 6	10000.00	2756.66	2764.00	2764.00	2766.20	0.008338	11.90	840.44	194.34	1.01
Reach #1	143.*	PF 4	1000.00	2756.54	2760.10	2759.90	2760.62	0.009166	5.82	171.80	125.33	0.88
Reach #1	143.*	PF 5	5000.00	2756.54	2762.03	2762.14	2763.56	0.010805	9.92	504.01	186.70	1.06
Reach #1	143.*	PF 6	10000.00	2756.54	2763.63	2763.82	2766.01	0.009527	12.40	806.48	193.72	1.07
Reach #1	142.*	PF 4	1000.00	2756.42	2759.64	2759.64	2760.41	0.011829	7.02	142.36	94.82	1.01
Reach #1	142.*	PF 5	5000.00	2756.42	2761.67	2761.89	2763.34	0.012368	10.36	482.82	185.39	1.13
Reach #1	142.*	PF 6	10000.00	2756.42	2763.24	2763.60	2765.80	0.010868	12.85	778.45	195.74	1.14
Reach #1	141.*	PF 4	1000.00	2756.30	2759.23	2759.39	2760.13	0.018243	7.61	131.42	107.60	1.21
Reach #1	141.*	PF 5	5000.00	2756.30	2761.30	2761.61	2763.08	0.013831	10.73	465.84	184.06	1.19
Reach #1	141.*	PF 6	10000.00	2756.30	2762.79	2763.34	2765.56	0.012568	13.34	749.37	198.42	1.21
Reach #1	140.*	PF 4	1000.00	2756.19	2758.75	2758.97	2759.74	0.022811	7.99	125.23	112.60	1.33
Reach #1	140.*	PF 5	5000.00	2756.19	2760.89	2761.30	2762.80	0.015415	11.10	450.39	183.12	1.25
Reach #1	140.*	PF 6	10000.00	2756.19	2762.31	2762.99	2765.28	0.014520	13.83	722.98	201.98	1.29
Reach #1	139	PF 4	1000.00	2752.07	2753.71	2754.54	2758.34	0.262034	17.28	57.87	102.11	4.05
Reach #1	139	PF 5	5000.00	2752.07	2755.30	2756.94	2761.81	0.071063	20.47	244.25	124.60	2.58
Reach #1	139	PF 6	10000.00	2752.07	2756.50	2758.58	2764.29	0.065248	22.40	446.45	186.62	2.55
Reach #1	130	PF 4	1000.00	2751.25	2755.69	2753.86	2755.76	0.000571	2.08	481.65	204.13	0.24
Reach #1	130	PF 5	5000.00	2751.25	2757.47	2756.00	2757.99	0.002302	5.83	857.94	219.71	0.52
Reach #1	130	PF 6	10000.00	2751.25	2759.90	2757.60	2760.64	0.001862	6.94	1575.12	522.11	0.50
Reach #1	120	PF 4	1000.00	2750.00	2755.57	2753.40	2755.62	0.000353	1.78	562.99	212.28	0.19
Reach #1	120	PF 5	5000.00	2750.00	2756.57	2755.51	2757.21	0.003161	6.43	777.16	219.54	0.60
Reach #1	120	PF 6	10000.00	2750.00	2759.33	2757.02	2760.03	0.002333	6.75	1599.38	726.51	0.54
Reach #1	115	PF 4	1000.00	2749.00	2755.56	2752.51	2755.59	0.000117	1.28	781.10	209.32	0.12
Reach #1	115	PF 5	5000.00	2749.00	2756.38	2754.40	2756.80	0.001643	5.23	956.18	225.29	0.45
Reach #1	115	PF 6	10000.00	2749.00	2759.21	2756.01	2759.68	0.001525	5.51	2013.31	1233.61	0.44
Reach #1	110	PF 4	1000.00	2749.00	2755.53	2752.51	2755.56	0.000127	1.25	802.32	238.99	0.12
Reach #1	110	PF 5	5000.00	2749.00	2755.78	2754.48	2756.30	0.002562	5.80	861.52	243.10	0.54
Reach #1	110	PF 6	10000.00	2749.00	2759.20	2756.31	2759.37	0.000606	3.68	3891.91	1641.99	0.28

HEC-RAS Plan: Plan 46 River: River #1 Reach: Reach #1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	100	PF 4	1000.00	2748.00	2755.53	2750.79	2755.54	0.000028	0.58	1851.07	936.16	0.06
Reach #1	100	PF 5	5000.00	2748.00	2755.72	2752.80	2755.83	0.000586	2.71	2019.99	1004.98	0.26
Reach #1	100	PF 6	10000.00	2748.00	2759.21	2754.21	2759.26	0.000120	1.95	7087.15	2038.54	0.13

DROP STRUCTURE 6 FT
LOW FLOWS

HEC-RAS Plan: Plan 46 River: River #1 Reach: Reach #1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	180	PF 4	1000.00	2759.08	2762.80	2762.13	2763.10	0.004290	4.40	227.08	140.27	0.61
Reach #1	180	PF 5	5000.00	2759.08	2765.84	2764.60	2766.37	0.003189	5.84	856.67	279.32	0.59
Reach #1	180	PF 6	10000.00	2759.08	2768.18	2766.24	2768.77	0.002022	6.13	1630.48	349.86	0.50
Reach #1	170	PF 4	1000.00	2758.49	2761.84	2761.35	2762.22	0.005401	4.93	203.00	119.52	0.67
Reach #1	170	PF 5	5000.00	2758.49	2764.72	2763.92	2765.61	0.005075	7.57	660.60	181.90	0.70
Reach #1	170	PF 6	10000.00	2758.49	2766.91	2765.78	2768.16	0.004905	8.95	1117.67	226.59	0.71
Reach #1	160	PF 4	1000.00	2757.67	2761.59	2760.46	2761.77	0.001922	3.41	293.37	143.78	0.42
Reach #1	160	PF 5	5000.00	2757.67	2764.42	2762.91	2765.07	0.002752	6.44	775.80	180.92	0.55
Reach #1	160	PF 6	10000.00	2757.67	2766.44	2764.67	2767.62	0.003300	8.73	1145.67	186.02	0.62
Reach #1	150	PF 4	1000.00	2757.36	2761.08	2760.15	2761.33	0.002820	3.96	252.50	133.45	0.51
Reach #1	150	PF 5	5000.00	2757.36	2763.65	2762.71	2764.44	0.003824	7.15	699.46	190.67	0.66
Reach #1	150	PF 6	10000.00	2757.36	2765.59	2764.36	2766.93	0.003828	9.31	1074.28	196.14	0.70
Reach #1	149.*	PF 4	1000.00	2757.24	2761.00	2760.12	2761.27	0.003214	4.15	240.74	131.19	0.54
Reach #1	149.*	PF 5	5000.00	2757.24	2763.51	2762.68	2764.36	0.004215	7.43	673.19	187.37	0.69
Reach #1	149.*	PF 6	10000.00	2757.24	2765.38	2764.36	2766.84	0.004290	9.70	1031.39	194.23	0.74
Reach #1	148.*	PF 4	1000.00	2757.13	2760.90	2760.11	2761.20	0.003837	4.39	227.75	130.90	0.59
Reach #1	148.*	PF 5	5000.00	2757.13	2763.34	2762.66	2764.27	0.004768	7.77	643.83	184.58	0.73
Reach #1	148.*	PF 6	10000.00	2757.13	2765.14	2764.34	2766.74	0.004921	10.15	985.55	193.12	0.79
Reach #1	147.*	PF 4	1000.00	2757.01	2760.78	2760.07	2761.11	0.004593	4.62	216.35	132.11	0.64
Reach #1	147.*	PF 5	5000.00	2757.01	2763.15	2762.58	2764.17	0.005401	8.11	616.73	182.60	0.78
Reach #1	147.*	PF 6	10000.00	2757.01	2764.89	2764.33	2766.63	0.005658	10.59	944.08	193.38	0.84
Reach #1	146.*	PF 4	1000.00	2756.89	2760.65	2760.08	2761.02	0.005412	4.88	204.77	130.48	0.69
Reach #1	146.*	PF 5	5000.00	2756.89	2762.94	2762.54	2764.06	0.006231	8.49	589.06	181.73	0.83
Reach #1	146.*	PF 6	10000.00	2756.89	2764.63	2764.27	2766.51	0.006513	11.00	908.85	196.11	0.90
Reach #1	145.*	PF 4	1000.00	2756.77	2760.49	2760.07	2760.91	0.006284	5.16	193.97	127.62	0.74
Reach #1	145.*	PF 5	5000.00	2756.77	2762.73	2762.45	2763.93	0.007056	8.79	568.55	183.01	0.88
Reach #1	145.*	PF 6	10000.00	2756.77	2764.40	2764.15	2766.37	0.007013	11.26	887.87	195.70	0.93
Reach #1	144.*	PF 4	1000.00	2756.66	2760.32	2760.00	2760.78	0.007410	5.44	183.94	126.60	0.79
Reach #1	144.*	PF 5	5000.00	2756.66	2762.34	2762.34	2763.76	0.009536	9.56	522.79	186.31	1.01
Reach #1	144.*	PF 6	10000.00	2756.66	2764.00	2764.00	2766.20	0.008338	11.90	840.44	194.34	1.01
Reach #1	143.*	PF 4	1000.00	2756.54	2760.10	2759.90	2760.62	0.009166	5.82	171.80	125.33	0.88
Reach #1	143.*	PF 5	5000.00	2756.54	2762.03	2762.14	2763.56	0.010805	9.92	504.01	186.70	1.06
Reach #1	143.*	PF 6	10000.00	2756.54	2763.63	2763.82	2766.01	0.009527	12.40	806.48	193.72	1.07
Reach #1	142.*	PF 4	1000.00	2756.42	2759.64	2759.64	2760.41	0.011829	7.02	142.36	94.82	1.01
Reach #1	142.*	PF 5	5000.00	2756.42	2761.67	2761.89	2763.34	0.012368	10.36	482.82	185.39	1.13
Reach #1	142.*	PF 6	10000.00	2756.42	2763.24	2763.60	2765.80	0.010868	12.85	778.45	195.74	1.14
Reach #1	141.*	PF 4	1000.00	2756.30	2759.23	2759.39	2760.13	0.018243	7.61	131.42	107.60	1.21
Reach #1	141.*	PF 5	5000.00	2756.30	2761.30	2761.61	2763.08	0.013814	10.73	466.02	184.06	1.19
Reach #1	141.*	PF 6	10000.00	2756.30	2762.79	2763.34	2765.56	0.012568	13.34	749.37	198.42	1.21
Reach #1	140.*	PF 4	1000.00	2756.19	2758.75	2758.97	2759.74	0.022811	7.99	125.23	112.60	1.33
Reach #1	140.*	PF 5	5000.00	2756.19	2760.89	2761.30	2762.80	0.015410	11.10	450.44	183.13	1.25
Reach #1	140.*	PF 6	10000.00	2756.19	2762.31	2762.99	2765.28	0.014520	13.83	722.98	201.98	1.29
Reach #1	139	PF 4	1000.00	2750.07	2755.57	2752.54	2755.60	0.000205	1.53	653.10	202.99	0.15
Reach #1	139	PF 5	5000.00	2750.07	2753.04	2754.95	2761.54	0.103913	23.39	213.74	118.80	3.07
Reach #1	139	PF 6	10000.00	2750.07	2754.24	2756.58	2764.04	0.092924	25.12	398.16	182.77	3.00
Reach #1	130	PF 4	1000.00	2749.25	2755.55	2751.85	2755.58	0.000086	1.14	877.61	220.49	0.10
Reach #1	130	PF 5	5000.00	2749.25	2756.21	2753.98	2756.58	0.001329	4.88	1023.69	226.27	0.40
Reach #1	130	PF 6	10000.00	2749.25	2759.31	2755.60	2759.70	0.000850	5.21	2336.95	624.40	0.35
Reach #1	120	PF 4	1000.00	2748.00	2755.54	2751.40	2755.55	0.000060	1.00	995.15	232.39	0.09
Reach #1	120	PF 5	5000.00	2748.00	2755.87	2753.51	2756.21	0.001202	4.66	1073.19	238.03	0.39
Reach #1	120	PF 6	10000.00	2748.00	2759.23	2755.02	2759.43	0.000653	3.85	3483.05	1412.57	0.29
Reach #1	115	PF 4	1000.00	2747.00	2755.53	2750.51	2755.54	0.000035	0.81	1240.05	266.48	0.07
Reach #1	115	PF 5	5000.00	2747.00	2755.80	2752.40	2756.03	0.000749	3.81	1313.07	276.29	0.31
Reach #1	115	PF 6	10000.00	2747.00	2759.21	2754.01	2759.34	0.000343	3.18	4348.46	1606.59	0.22
Reach #1	110	PF 4	1000.00	2747.00	2755.53	2750.51	2755.54	0.000029	0.65	1846.13	1119.14	0.06
Reach #1	110	PF 5	5000.00	2747.00	2755.70	2752.48	2755.84	0.000616	3.08	2012.47	1203.35	0.27
Reach #1	110	PF 6	10000.00	2747.00	2759.21	2754.31	2759.26	0.000143	2.21	6601.94	1809.14	0.14

HEC-RAS Plan: Plan 46 River: River #1 Reach: Reach #1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	100	PF 4	1000.00	2746.00	2755.53	2748.79	2755.53	0.000004	0.30	4553.67	1640.62	0.02
Reach #1	100	PF 5	5000.00	2746.00	2755.72	2750.80	2755.75	0.000086	1.40	4837.77	1660.54	0.11
Reach #1	100	PF 6	10000.00	2746.00	2759.21	2752.21	2759.23	0.000041	1.36	10126.91	2075.86	0.08

DROP STRUCTURE 2FT.

HEC-RAS Plan: Plan 46 River: River #1 Reach: Reach #1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	180	PF 1	31000.00	2759.08	2775.13	2769.76	2775.99	0.000962	7.44	4166.17	379.51	0.40
Reach #1	180	PF 2	24490.00	2759.08	2773.22	2768.85	2774.00	0.001096	7.10	3447.07	371.67	0.41
Reach #1	180	PF 3	36000.00	2759.08	2776.50	2770.43	2777.42	0.000892	7.67	4713.35	450.20	0.39
Reach #1	170	PF 1	31000.00	2758.49	2773.49	2770.35	2775.57	0.003402	11.58	2676.74	248.09	0.62
Reach #1	170	PF 2	24490.00	2758.49	2771.71	2769.11	2773.56	0.003581	10.92	2241.82	241.93	0.63
Reach #1	170	PF 3	36000.00	2758.49	2774.76	2771.24	2777.00	0.003299	12.03	2994.62	252.63	0.61
Reach #1	160	PF 1	31000.00	2757.67	2771.67	2769.83	2774.92	0.005009	14.46	2143.16	196.67	0.77
Reach #1	160	PF 2	24490.00	2757.67	2770.34	2768.41	2772.97	0.004500	13.00	1883.39	193.18	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.60	2770.85	2776.32	0.005364	15.47	2327.25	199.04	0.80
Reach #1	150	PF 1	31000.00	2757.36	2770.81	2769.32	2774.06	0.004221	14.46	2143.28	212.96	0.80
Reach #1	150	PF 2	24490.00	2757.36	2769.43	2767.97	2772.14	0.004114	13.21	1853.82	208.31	0.78
Reach #1	150	PF 3	36000.00	2757.36	2771.72	2770.31	2775.40	0.004348	15.39	2339.88	216.41	0.82
Reach #1	149.*	PF 1	31000.00	2757.24	2770.46	2769.35	2773.95	0.004726	14.99	2068.13	214.10	0.85
Reach #1	149.*	PF 2	24490.00	2757.24	2769.11	2768.00	2772.04	0.004623	13.73	1784.08	208.51	0.83
Reach #1	149.*	PF 3	36000.00	2757.24	2771.40	2770.36	2775.30	0.004754	15.85	2272.86	224.11	0.86
Reach #1	148.*	PF 1	31000.00	2757.13	2770.02	2769.39	2773.81	0.005431	15.64	1982.41	215.47	0.91
Reach #1	148.*	PF 2	24490.00	2757.13	2769.79	2768.02	2771.93	0.005184	14.22	1722.12	209.44	0.87
Reach #1	148.*	PF 3	36000.00	2757.13	2771.16	2770.34	2775.20	0.005027	16.14	2238.64	232.57	0.89
Reach #1	147.*	PF 1	31000.00	2757.01	2769.59	2769.33	2773.68	0.006135	16.25	1909.75	222.39	0.96
Reach #1	147.*	PF 2	24490.00	2757.01	2768.54	2767.99	2771.82	0.005621	14.54	1684.75	211.69	0.91
Reach #1	147.*	PF 3	36000.00	2757.01	2771.07	2770.31	2775.10	0.004984	16.11	2252.60	239.16	0.89
Reach #1	146.*	PF 1	31000.00	2756.89	2769.27	2769.27	2773.55	0.006578	16.60	1874.51	229.50	1.00
Reach #1	146.*	PF 2	24490.00	2756.89	2767.91	2767.91	2771.67	0.007013	15.54	1575.60	212.57	1.01
Reach #1	146.*	PF 3	36000.00	2756.89	2771.09	2770.19	2774.96	0.004698	15.81	2368.49	499.82	0.87
Reach #1	145.*	PF 1	31000.00	2756.77	2768.80	2769.10	2773.39	0.007389	17.20	1813.38	229.19	1.05
Reach #1	145.*	PF 2	24490.00	2756.77	2767.60	2767.82	2771.51	0.007592	15.89	1542.43	218.64	1.04
Reach #1	145.*	PF 3	36000.00	2756.77	2771.65	2771.65	2774.61	0.003423	14.14	3183.96	924.32	0.75
Reach #1	144.*	PF 1	31000.00	2756.66	2768.34	2769.46	2773.21	0.008168	17.72	1763.51	230.10	1.10
Reach #1	144.*	PF 2	24490.00	2756.66	2767.62	2767.63	2771.30	0.006860	15.39	1599.35	226.85	1.00
Reach #1	144.*	PF 3	36000.00	2756.66	2769.63	2771.29	2774.36	0.006682	17.54	2208.91	486.90	1.02
Reach #1	143.*	PF 1	31000.00	2756.54	2769.10	2769.47	2772.71	0.005376	15.42	2244.12	496.33	0.91
Reach #1	143.*	PF 2	24490.00	2756.54	2766.88	2767.33	2771.10	0.008643	16.50	1493.02	226.34	1.11
Reach #1	143.*	PF 3	36000.00	2756.54	2768.77	2770.83	2774.15	0.008315	18.76	2082.65	479.04	1.13
Reach #1	142.*	PF 1	31000.00	2756.42	2767.83	2769.04	2772.48	0.007925	17.44	1933.20	460.92	1.09
Reach #1	142.*	PF 2	24490.00	2756.42	2767.31	2767.42	2770.72	0.006233	14.88	1708.14	366.58	0.95
Reach #1	142.*	PF 3	36000.00	2756.42	2768.02	2770.32	2773.93	0.009831	19.71	2020.70	468.24	1.21
Reach #1	141.*	PF 1	31000.00	2756.30	2766.98	2768.55	2772.25	0.009774	18.60	1832.11	442.29	1.19
Reach #1	141.*	PF 2	24490.00	2756.30	2766.13	2767.42	2770.49	0.009204	16.78	1499.57	320.18	1.14
Reach #1	141.*	PF 3	36000.00	2756.30	2767.27	2769.74	2773.69	0.011439	20.60	1961.12	450.33	1.30
Reach #1	140.*	PF 1	31000.00	2756.19	2766.19	2767.98	2772.00	0.011668	19.59	1758.35	424.00	1.29
Reach #1	140.*	PF 2	24490.00	2756.19	2765.37	2766.94	2770.24	0.011146	17.78	1437.09	328.25	1.24
Reach #1	140.*	PF 3	36000.00	2756.19	2766.54	2769.18	2773.41	0.013174	21.42	1908.12	432.76	1.38
Reach #1	139	PF 1	31000.00	2754.07	2762.54	2765.29	2771.41	0.022159	24.04	1360.45	320.75	1.73
Reach #1	139	PF 2	24490.00	2754.07	2761.59	2764.35	2769.62	0.024617	22.78	1083.65	220.87	1.78
Reach #1	139	PF 3	36000.00	2754.07	2763.09	2766.55	2772.82	0.022046	25.30	1562.24	398.09	1.75
Reach #1	130	PF 1	31000.00	2753.25	2762.71	2764.38	2767.61	0.011070	18.22	2003.58	552.79	1.25
Reach #1	130	PF 2	24490.00	2753.25	2762.32	2763.37	2765.97	0.008674	15.59	1795.39	539.18	1.09
Reach #1	130	PF 3	36000.00	2753.25	2763.00	2765.00	2768.79	0.012922	19.95	2163.23	573.10	1.35
Reach #1	120	PF 1	31000.00	2752.00	2763.68	2763.47	2765.11	0.004436	10.58	3979.55	1460.79	0.78
Reach #1	120	PF 2	24490.00	2752.00	2763.02	2762.98	2764.37	0.004673	10.03	3246.72	1389.51	0.78
Reach #1	120	PF 3	36000.00	2752.00	2764.07	2763.82	2765.62	0.004487	11.13	4428.16	1508.05	0.79
Reach #1	115	PF 1	31000.00	2751.00	2762.74	2762.74	2764.39	0.004611	11.09	3790.42	1539.36	0.80
Reach #1	115	PF 2	24490.00	2751.00	2762.17	2762.17	2763.65	0.004512	10.26	3106.68	1477.56	0.77
Reach #1	115	PF 3	36000.00	2751.00	2763.15	2763.15	2764.90	0.004625	11.60	4280.65	1594.88	0.81
Reach #1	110	PF 1	31000.00	2751.00	2761.56	2761.33	2762.83	0.004315	10.25	4371.96	1697.93	0.76
Reach #1	110	PF 2	24490.00	2751.00	2760.92	2760.82	2762.15	0.004641	9.81	3531.70	1605.24	0.78
Reach #1	110	PF 3	36000.00	2751.00	2762.12	2761.67	2763.34	0.003807	10.26	5118.00	1766.64	0.73

HEC-RAS Plan: Plan 46 River: River #1 Reach: Reach #1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	100	PF 1	31000.00	2750.00	2761.65	2759.16	2762.01	0.000888	5.52	7755.70	2089.26	0.36
Reach #1	100	PF 2	24490.00	2750.00	2761.06	2758.72	2761.35	0.000792	4.93	6859.56	2055.95	0.34
Reach #1	100	PF 3	36000.00	2750.00	2762.17	2759.52	2762.56	0.000898	5.81	8546.82	2118.62	0.37

DROP STRUCTURE 4FT.

HEC-RAS Plan: Plan 45 River: River #1 Reach: Reach #1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	180	PF 1	31000.00	2759.08	2775.13	2769.76	2775.99	0.000962	7.44	4166.17	379.51	0.40
Reach #1	180	PF 2	24490.00	2759.08	2773.22	2768.85	2774.00	0.001096	7.10	3447.07	371.67	0.41
Reach #1	180	PF 3	36000.00	2759.08	2776.50	2770.43	2777.42	0.000892	7.67	4713.35	450.20	0.39
Reach #1	170	PF 1	31000.00	2758.49	2773.49	2770.35	2775.57	0.003402	11.58	2676.74	248.09	0.62
Reach #1	170	PF 2	24490.00	2758.49	2771.71	2769.11	2773.56	0.003581	10.92	2241.82	241.93	0.63
Reach #1	170	PF 3	36000.00	2758.49	2774.76	2771.24	2777.00	0.003299	12.03	2994.62	252.63	0.61
Reach #1	160	PF 1	31000.00	2757.67	2771.67	2769.83	2774.92	0.005009	14.46	2143.16	196.67	0.77
Reach #1	160	PF 2	24490.00	2757.67	2770.34	2768.41	2772.97	0.004500	13.00	1883.39	193.18	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.60	2770.85	2776.32	0.005364	15.47	2327.25	199.04	0.80
Reach #1	150	PF 1	31000.00	2757.36	2770.81	2769.32	2774.06	0.004221	14.46	2143.28	212.96	0.80
Reach #1	150	PF 2	24490.00	2757.36	2769.43	2767.97	2772.14	0.004114	13.21	1853.82	208.31	0.78
Reach #1	150	PF 3	36000.00	2757.36	2771.72	2770.31	2775.40	0.004348	15.39	2339.88	216.41	0.82
Reach #1	149.*	PF 1	31000.00	2757.24	2770.46	2769.35	2773.95	0.004726	14.99	2068.13	214.10	0.85
Reach #1	149.*	PF 2	24490.00	2757.24	2769.11	2768.00	2772.04	0.004623	13.73	1784.08	208.51	0.83
Reach #1	149.*	PF 3	36000.00	2757.24	2771.40	2770.36	2775.30	0.004754	15.85	2272.86	224.11	0.86
Reach #1	148.*	PF 1	31000.00	2757.13	2770.02	2769.39	2773.81	0.005431	15.64	1982.41	215.47	0.91
Reach #1	148.*	PF 2	24490.00	2757.13	2768.79	2768.02	2771.93	0.005184	14.22	1722.12	209.44	0.87
Reach #1	148.*	PF 3	36000.00	2757.13	2771.16	2770.34	2775.20	0.005027	16.14	2238.64	232.57	0.89
Reach #1	147.*	PF 1	31000.00	2757.01	2769.59	2769.33	2773.68	0.006135	16.25	1909.75	222.39	0.96
Reach #1	147.*	PF 2	24490.00	2757.01	2768.54	2767.99	2771.82	0.005621	14.54	1684.75	211.69	0.91
Reach #1	147.*	PF 3	36000.00	2757.01	2771.07	2770.31	2775.10	0.004984	16.11	2252.60	239.16	0.89
Reach #1	146.*	PF 1	31000.00	2756.89	2769.27	2769.27	2773.55	0.006578	16.60	1874.51	229.50	1.00
Reach #1	146.*	PF 2	24490.00	2756.89	2767.91	2767.91	2771.67	0.007013	15.54	1575.60	212.57	1.01
Reach #1	146.*	PF 3	36000.00	2756.89	2771.09	2770.19	2774.96	0.004698	15.81	2368.49	499.82	0.87
Reach #1	145.*	PF 1	31000.00	2756.77	2768.80	2769.10	2773.39	0.007389	17.20	1813.38	229.19	1.05
Reach #1	145.*	PF 2	24490.00	2756.77	2767.60	2767.82	2771.51	0.007592	15.89	1542.43	218.64	1.04
Reach #1	145.*	PF 3	36000.00	2756.77	2771.65	2771.65	2774.61	0.003423	14.14	3183.96	924.32	0.75
Reach #1	144.*	PF 1	31000.00	2756.66	2768.34	2769.48	2773.21	0.008168	17.72	1763.51	230.10	1.10
Reach #1	144.*	PF 2	24490.00	2756.66	2767.62	2767.63	2771.30	0.006860	15.39	1599.35	226.85	1.00
Reach #1	144.*	PF 3	36000.00	2756.66	2769.63	2771.29	2774.36	0.006682	17.64	2208.91	486.90	1.02
Reach #1	143.*	PF 1	31000.00	2756.54	2769.10	2769.47	2772.71	0.005376	15.42	2244.12	496.33	0.91
Reach #1	143.*	PF 2	24490.00	2756.54	2766.88	2767.33	2771.10	0.008643	16.50	1493.02	226.34	1.11
Reach #1	143.*	PF 3	36000.00	2756.54	2768.77	2770.83	2774.15	0.008315	18.76	2082.65	479.04	1.13
Reach #1	142.*	PF 1	31000.00	2756.42	2767.83	2769.04	2772.48	0.007925	17.44	1933.20	460.92	1.09
Reach #1	142.*	PF 2	24490.00	2756.42	2767.31	2767.42	2770.72	0.006233	14.88	1708.14	366.58	0.95
Reach #1	142.*	PF 3	36000.00	2756.42	2768.02	2770.32	2773.93	0.009831	19.71	2020.70	468.24	1.21
Reach #1	141.*	PF 1	31000.00	2756.30	2766.98	2768.55	2772.25	0.009774	18.60	1832.11	442.29	1.19
Reach #1	141.*	PF 2	24490.00	2756.30	2766.13	2767.42	2770.49	0.009204	16.78	1499.57	320.18	1.14
Reach #1	141.*	PF 3	36000.00	2756.30	2767.27	2769.74	2773.69	0.011439	20.60	1961.12	450.33	1.30
Reach #1	140.*	PF 1	31000.00	2756.19	2766.19	2767.98	2772.00	0.011668	19.59	1758.35	424.00	1.29
Reach #1	140.*	PF 2	24490.00	2756.19	2765.37	2766.94	2770.24	0.011146	17.78	1437.09	328.25	1.24
Reach #1	140.*	PF 3	36000.00	2756.19	2766.54	2769.18	2773.41	0.013174	21.42	1908.12	432.76	1.38
Reach #1	139	PF 1	31000.00	2752.07	2759.94	2763.29	2771.13	0.031528	26.89	1176.49	295.55	2.03
Reach #1	139	PF 2	24490.00	2752.07	2758.98	2762.35	2769.35	0.037115	25.85	951.71	216.35	2.14
Reach #1	139	PF 3	36000.00	2752.07	2760.53	2764.55	2772.54	0.030061	27.97	1357.16	320.37	2.02
Reach #1	130	PF 1	31000.00	2751.25	2760.37	2762.38	2766.09	0.013532	19.55	1819.28	540.75	1.37
Reach #1	130	PF 2	24490.00	2751.25	2759.88	2761.36	2764.35	0.011289	17.07	1565.82	521.73	1.23
Reach #1	130	PF 3	36000.00	2751.25	2760.67	2763.00	2767.38	0.015241	21.31	1984.22	551.54	1.46
Reach #1	120	PF 1	31000.00	2750.00	2761.90	2761.45	2763.16	0.003757	9.99	4234.29	1484.75	0.72
Reach #1	120	PF 2	24490.00	2750.00	2761.29	2760.98	2762.42	0.003740	9.28	3546.07	1418.71	0.70
Reach #1	120	PF 3	36000.00	2750.00	2762.40	2761.83	2763.71	0.003589	10.30	4801.15	1553.57	0.71
Reach #1	115	PF 1	31000.00	2749.00	2761.61	2760.74	2762.62	0.002511	8.95	4838.01	1691.52	0.60
Reach #1	115	PF 2	24490.00	2749.00	2761.03	2760.16	2761.90	0.002334	8.14	4133.17	1569.14	0.57
Reach #1	115	PF 3	36000.00	2749.00	2762.13	2761.15	2763.19	0.002450	9.28	5465.87	1784.40	0.60
Reach #1	110	PF 1	31000.00	2749.00	2761.65	2759.33	2762.08	0.001062	6.28	7201.35	1845.73	0.40
Reach #1	110	PF 2	24490.00	2749.00	2761.06	2758.82	2761.40	0.000940	5.60	6392.71	1816.80	0.37
Reach #1	110	PF 3	36000.00	2749.00	2762.17	2759.67	2762.64	0.001081	6.62	7912.88	1871.10	0.41

HEC-RAS Plan: Plan 45 River: River #1 Reach: Reach #1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	100	PF 1	31000.00	2748.00	2761.65	2757.15	2761.83	0.000327	3.94	10798.62	2121.22	0.23
Reach #1	100	PF 2	24490.00	2748.00	2761.06	2756.72	2761.19	0.000266	3.40	9900.19	2101.23	0.20
Reach #1	100	PF 3	36000.00	2748.00	2762.17	2757.52	2762.37	0.000355	4.26	11591.33	2138.84	0.24

DROP STRUCTURE 6 FT.

HEC-RAS Plan: Plan 42 River: River #1 Reach: Reach #1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	180	PF 1	31000.00	2759.08	2775.13	2769.76	2775.99	0.000962	7.44	4166.17	379.51	0.40
Reach #1	180	PF 2	24490.00	2759.08	2773.22	2768.85	2774.00	0.001096	7.10	3447.07	371.67	0.41
Reach #1	180	PF 3	36000.00	2759.08	2776.50	2770.43	2777.42	0.000892	7.67	4713.35	450.20	0.39
Reach #1	170	PF 1	31000.00	2758.49	2773.49	2770.35	2775.57	0.003402	11.58	2676.74	248.09	0.62
Reach #1	170	PF 2	24490.00	2758.49	2771.71	2769.11	2773.56	0.003581	10.92	2241.82	241.93	0.63
Reach #1	170	PF 3	36000.00	2758.49	2774.76	2771.24	2777.00	0.003299	12.03	2994.62	252.63	0.61
Reach #1	160	PF 1	31000.00	2757.67	2771.67	2769.83	2774.92	0.005009	14.46	2143.16	196.67	0.77
Reach #1	160	PF 2	24490.00	2757.67	2770.34	2768.41	2772.97	0.004500	13.00	1883.39	193.18	0.73
Reach #1	160	PF 3	36000.00	2757.67	2772.60	2770.85	2776.32	0.005364	15.47	2327.25	199.04	0.80
Reach #1	150	PF 1	31000.00	2757.36	2770.81	2769.32	2774.06	0.004221	14.46	2143.28	212.96	0.80
Reach #1	150	PF 2	24490.00	2757.36	2769.43	2767.97	2772.14	0.004114	13.21	1853.82	208.31	0.78
Reach #1	150	PF 3	36000.00	2757.36	2771.72	2770.31	2775.40	0.004348	15.39	2339.88	216.41	0.82
Reach #1	149.*	PF 1	31000.00	2757.24	2770.46	2769.35	2773.95	0.004726	14.99	2068.13	214.10	0.85
Reach #1	149.*	PF 2	24490.00	2757.24	2769.11	2768.00	2772.04	0.004623	13.73	1784.08	208.51	0.83
Reach #1	149.*	PF 3	36000.00	2757.24	2771.40	2770.36	2775.30	0.004754	15.85	2272.86	224.11	0.86
Reach #1	148.*	PF 1	31000.00	2757.13	2770.02	2769.39	2773.81	0.005431	15.64	1982.41	215.47	0.91
Reach #1	148.*	PF 2	24490.00	2757.13	2768.79	2768.02	2771.93	0.005184	14.22	1722.12	209.44	0.87
Reach #1	148.*	PF 3	36000.00	2757.13	2771.16	2770.34	2775.20	0.005027	16.14	2238.64	232.57	0.89
Reach #1	147.*	PF 1	31000.00	2757.01	2769.59	2769.33	2773.68	0.006135	16.25	1909.75	222.39	0.96
Reach #1	147.*	PF 2	24490.00	2757.01	2768.54	2767.99	2771.82	0.005621	14.54	1684.75	211.69	0.91
Reach #1	147.*	PF 3	36000.00	2757.01	2771.07	2770.31	2775.10	0.004984	16.11	2252.60	239.16	0.89
Reach #1	146.*	PF 1	31000.00	2756.89	2769.27	2769.27	2773.55	0.006578	16.60	1874.51	229.50	1.00
Reach #1	146.*	PF 2	24490.00	2756.89	2767.91	2767.91	2771.67	0.007013	15.54	1575.60	212.57	1.01
Reach #1	146.*	PF 3	36000.00	2756.89	2771.09	2770.19	2774.96	0.004698	15.81	2368.49	499.82	0.87
Reach #1	145.*	PF 1	31000.00	2756.77	2768.80	2769.10	2773.39	0.007389	17.20	1813.38	229.19	1.05
Reach #1	145.*	PF 2	24490.00	2756.77	2767.60	2767.82	2771.51	0.007592	15.89	1542.43	218.64	1.04
Reach #1	145.*	PF 3	36000.00	2756.77	2771.65	2771.65	2774.61	0.003423	14.14	3183.96	924.32	0.75
Reach #1	144.*	PF 1	31000.00	2756.66	2768.34	2769.48	2773.21	0.008168	17.72	1763.51	230.10	1.10
Reach #1	144.*	PF 2	24490.00	2756.66	2767.62	2767.63	2771.30	0.006860	15.39	1599.35	226.85	1.00
Reach #1	144.*	PF 3	36000.00	2756.66	2769.63	2771.29	2774.36	0.006682	17.54	2208.91	486.90	1.02
Reach #1	143.*	PF 1	31000.00	2756.54	2769.10	2769.47	2772.71	0.005376	15.42	2244.12	496.33	0.91
Reach #1	143.*	PF 2	24490.00	2756.54	2766.88	2767.33	2771.10	0.008643	16.50	1493.02	226.34	1.11
Reach #1	143.*	PF 3	36000.00	2756.54	2768.77	2770.83	2774.15	0.008315	18.76	2082.65	479.04	1.13
Reach #1	142.*	PF 1	31000.00	2756.42	2767.83	2769.04	2772.48	0.007925	17.44	1933.20	460.92	1.09
Reach #1	142.*	PF 2	24490.00	2756.42	2767.31	2767.42	2770.72	0.006233	14.88	1708.14	366.58	0.95
Reach #1	142.*	PF 3	36000.00	2756.42	2768.02	2770.32	2773.93	0.009831	19.71	2020.70	468.24	1.21
Reach #1	141.*	PF 1	31000.00	2756.30	2766.98	2768.55	2772.25	0.009774	18.60	1832.11	442.29	1.19
Reach #1	141.*	PF 2	24490.00	2756.30	2766.13	2767.42	2770.49	0.009204	16.78	1499.57	320.18	1.14
Reach #1	141.*	PF 3	36000.00	2756.30	2767.27	2769.74	2773.69	0.011439	20.60	1981.12	450.33	1.30
Reach #1	140.*	PF 1	31000.00	2756.19	2766.19	2767.98	2772.00	0.011668	19.59	1758.35	424.00	1.29
Reach #1	140.*	PF 2	24490.00	2756.19	2765.37	2766.94	2770.24	0.011146	17.78	1437.09	328.25	1.24
Reach #1	140.*	PF 3	36000.00	2756.19	2766.54	2769.18	2773.41	0.013174	21.42	1908.12	432.76	1.38
Reach #1	139	PF 1	31000.00	2750.07	2757.49	2761.29	2770.87	0.041964	29.39	1062.54	220.15	2.31
Reach #1	139	PF 2	24490.00	2750.07	2756.58	2760.35	2769.09	0.050404	28.40	864.64	213.33	2.46
Reach #1	139	PF 3	36000.00	2750.07	2758.10	2762.54	2772.29	0.038693	30.31	1222.81	302.93	2.26
Reach #1	130	PF 1	31000.00	2749.25	2758.08	2760.33	2764.61	0.016040	20.74	1669.03	530.80	1.48
Reach #1	130	PF 2	24490.00	2749.25	2761.05	2759.36	2762.17	0.002241	9.20	3403.30	1132.71	0.58
Reach #1	130	PF 3	36000.00	2749.25	2758.41	2761.00	2765.97	0.017730	22.47	1845.30	542.46	1.57
Reach #1	120	PF 1	31000.00	2748.00	2761.70	2759.45	2762.24	0.001237	6.82	6272.85	1667.32	0.43
Reach #1	120	PF 2	24490.00	2748.00	2761.10	2758.98	2761.54	0.001077	6.04	5595.32	1638.74	0.40
Reach #1	120	PF 3	36000.00	2748.00	2762.22	2759.83	2762.82	0.001277	7.24	6864.50	1688.92	0.44
Reach #1	115	PF 1	31000.00	2747.00	2761.63	2758.74	2762.05	0.000809	6.03	7295.69	1891.00	0.36
Reach #1	115	PF 2	24490.00	2747.00	2761.05	2758.16	2761.38	0.000678	5.28	6582.27	1887.12	0.32
Reach #1	115	PF 3	36000.00	2747.00	2762.15	2759.15	2762.62	0.000858	6.45	7926.90	1894.30	0.37
Reach #1	110	PF 1	31000.00	2747.00	2761.65	2757.33	2761.86	0.000401	4.50	9942.01	1897.68	0.25
Reach #1	110	PF 2	24490.00	2747.00	2761.06	2756.82	2761.22	0.000324	3.88	9132.51	1876.20	0.23
Reach #1	110	PF 3	36000.00	2747.00	2762.17	2757.67	2762.41	0.000437	4.86	10656.70	1916.46	0.27

HEC-RAS Plan: Plan 42 River: River #1 Reach: Reach #1 (Continued)

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl
			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Reach #1	100	PF 1	31000.00	2746.00	2761.65	2755.15	2761.75	0.000151	3.05	13843.85	2134.92	0.16
Reach #1	100	PF 2	24490.00	2746.00	2761.06	2754.72	2761.13	0.000116	2.58	12944.44	2120.64	0.14
Reach #1	100	PF 3	36000.00	2746.00	2762.17	2755.52	2762.29	0.000171	3.34	14637.24	2147.50	0.17

GEOTECHNICAL ENGINEERING FIELD INVESTIGATION REPORT
(SCOUR DEPTH RESULTS)

Terracon
Consulting Engineers & Scientists

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Tucson, Arizona 85719
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Fax 520.792.2539
www.terracon.com

September 21, 2007

Psomas
800 East Wetmore Road
Suite 110
Tucson, Arizona 85719

Attn: Janice Hughes, RG, PE, LEED AP

RE: Geotechnical Engineering Report
Houghton Road, Soil Cement Depth
Pantano Wash
Tucson, Arizona
Terracon Project No. 63075027

Terracon has completed the geotechnical engineering investigation for the Houghton Road project, (Terracon Project Number 63075027, dated September 4, 2007). We have been requested by Janice Hughes of Psomas to provide additional services concerning the depth to the toe of the soil cement erosion bank protection located east of the Houghton Road Pantano Brigde. We have previously provided information concerning a change in the subgrade acceptance chart in addendum 1 dated July 27, 2007.

A total of 4 test pits were excavated on September 14, 2007. The test pits were excavated to depths of 4 to 7 feet at the locations shown on the attached Site Plan. Test pits were advanced with a back hoe and a twenty-four inch bucket. The depth to the toe of the soil cement erosion bank protection is given in the table below.

	Location	Depth to Toe of Soil Cement (ft)
TP-1	Northern Spur Dike	7
TP-2	Southern Spur Dike	6-½
TP-3	South just East of bridge	6
TP-4	North just East of Bridge	4

Presented on the attached Logs of Boring, surface soils to maximum depths of excavation in TP-1, TP-2 and TP-3 consists mostly of clayey silty sands with varying amounts of gravel. Surface soils to maximum depth of excavation in TP-4 consist mostly of sands with trace amounts of silt and gravel. Large boulders consisting of quartz was excavated in TP-1 and TP-2. The boulders were encountered around depths of three to four feet. Native

desert vegetation surrounded TP-1, TP-2 and TP-3. Large amounts of erosion can be seen at TP-4. The main water flow for the wash occurs in this area.

All previous recommendations provided remain valid. If you have any questions regarding this letter please contact us.

Sincerely,

TERRACON

Registered Professional Engineer (Civil)
CERTIFICATE NO.
31130
OLEG B.
LYSYJ
DATE SIGNED 9/21/07
ARIZONA, U.S.A.

Jennifer N. Hall
Staff Engineer

Oleg B. Lysyj, P.E.
Principal

Copies: (3) Addressee

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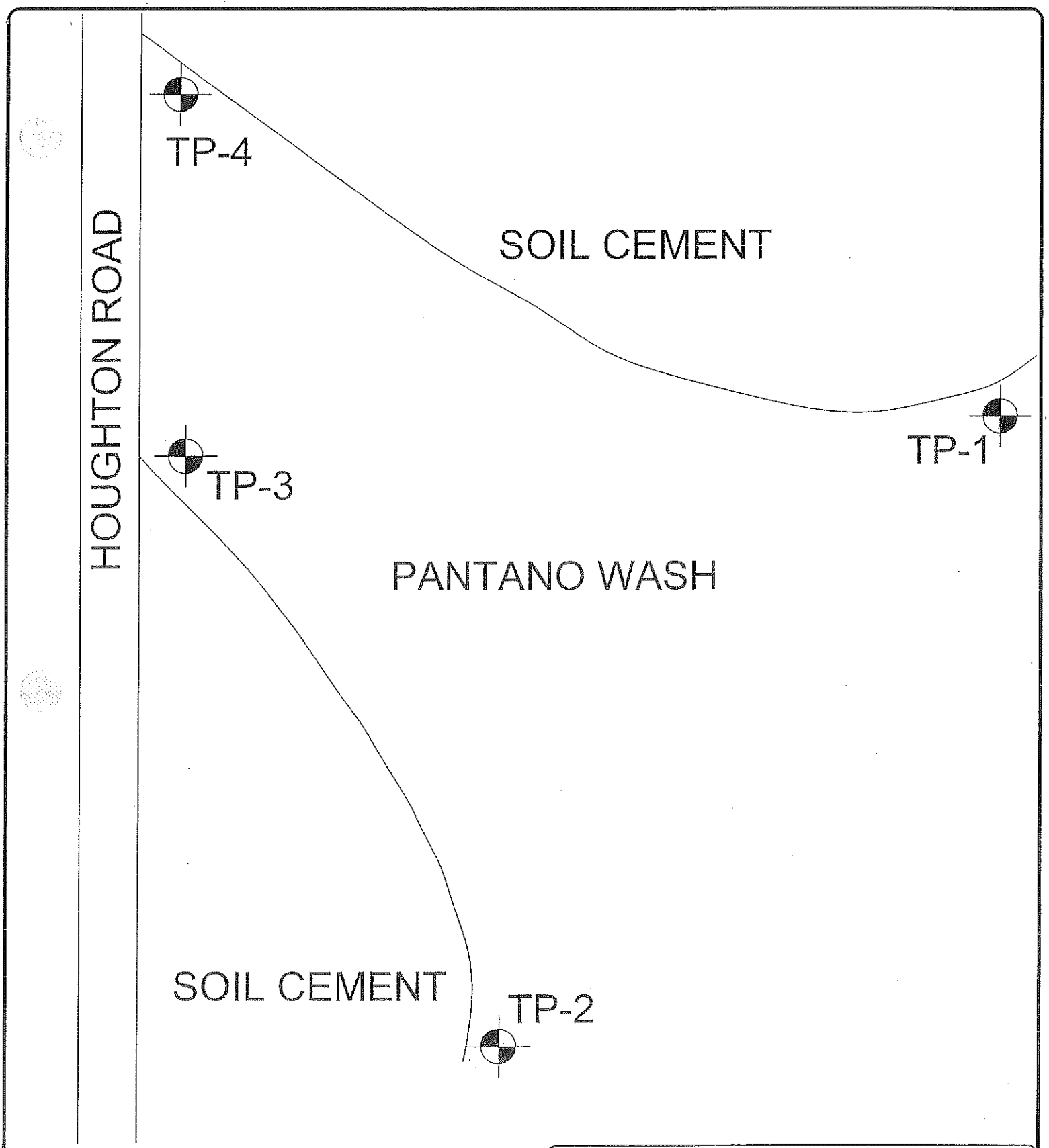


LEGEND

APPROXIMATE TEST PIT LOCATION

N

DIAGRAM IS FOR GENERAL LOCATION ONLY, AND IS NOT INTENDED FOR CONSTRUCTION PURPOSES

SITE PLAN AND BORING LOCATIONS
hOUGHTON ROAD
PANTANO WASH
TUCSON, ARIZONA
PSOMAS

Project Mngr:	OBL	Terracon	Project No.	63075027
Designed By:			Scale:	None
Checked By:		355 South Euclid, Suite 107 Tucson, Arizona 85719	Date:	09-21-07
Approved By:	OBL		Drawn By:	JNH
File Name: n:\Projects\2006\63075027.1\63075027.1.dwg L(Layout1)			Figure No.	1

LOG OF TEST PIT NO. TP-1

CLIENT Psomas

SITE Pantano Wash, Tucson, Arizona

PROJECT Houghton Road, Soil Cement Depth

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (in)	SAMPLES BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS Liquid Limit	TESTS PLASTICITY INDEX	TESTS -200
	CLAYEY SILTY SAND TRACE GRAVEL; brown, low plasticity fines, no cementation		SC-SM	1	BS							
		5										
	7.5 Bottom of Test Pit											

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	None AB
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	9-14-07		
BORING COMPLETED	9-14-07		
RIG	Backhoe	FOREMAN	JNH
Approved	OBL	JOB #	63075027

LOG OF TEST PIT NO. TP-2

CLIENT
Psomas

SITE
Pantano Wash
Tucson, Arizona

PROJECT
Houghton Road, Soil Cement Depth

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (in)	SAMPLES BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS Liquid Limit	TESTS PLASTICITY INDEX	TESTS -200
	CLAYEY SILTY SAND TRACE GRAVEL; brown, low plasticity fines, no cementation		SC-SM	1	BS							
		5										
	7											
	Bottom of Test Pit											

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	None AB
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	9-14-07		
BORING COMPLETED	9-14-07		
RIG	Backhoe	FOREMAN	JNH
Approved	OBL	JOB #	63075027

LOG OF TEST PIT NO. TP-3

CLIENT **Psomas**

SITE **Pantano Wash**
Tucson, Arizona

PROJECT **Houghton Road, Soil Cement Depth**

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (in)	SAMPLES BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS Liquid Limit	TESTS PLASTICITY INDEX	TESTS -200
	CLAYEY SILTY SAND WITH GRAVEL; brown, low plasticity fines, no cementation		SC-SM	1	BS							
		5										
	6											
	Bottom of Test Pit											

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	None AB
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	9-14-07		
BORING COMPLETED	9-14		
RIG	Backhoe	FOREMAN	JNH
Approved	OBL	JOB #	63075027

LOG OF BORING NO. TP-4

CLIENT
Psomas

SITE
Pantano Wash
Tucson, Arizona

PROJECT
Houghton Road, Soil Cement Depth

GRAPHIC LOG	DESCRIPTION	DEPTH, ft.	USCS SYMBOL	SAMPLES NUMBER	SAMPLES TYPE	SAMPLES RECOVERY (in)	SAMPLES BLOWS/FT.	TESTS WATER CONTENT, %	TESTS DRY DENSITY pcf	TESTS Liquid Limit	TESTS PLASTICITY INDEX	TESTS -200
	SAND TRACE SILT AND GRAVEL; brown, non-plastic fines, no cementation		SP	1	BS							
	4											
	Bottom of Test Pit											

The stratification lines represent the approximate boundary lines between soil and rock types: in-situ, the transition may be gradual.

WATER LEVEL OBSERVATIONS, ft		
WL	None WD	None AB
WL		
WL	Backfilled Upon Completion	

Terracon

BORING STARTED	9-14-07		
BORING COMPLETED	9-14-07		
RIG	Backhoe	FOREMAN	JNH
Approved	OBL	JOB #	63075027

GENERAL NOTES

DRILLING & SAMPLING SYMBOLS:

SS:	Split Spoon - 1-3/8" I.D., 2" O.D., unless otherwise noted	HS:	Hollow Stem Auger
ST:	Thin-Walled Tube - 2" O.D., unless otherwise noted	PA:	Power Auger
RS:	Ring Sampler - 2.42" I.D., 3" O.D., unless otherwise noted	HA:	Hand Auger
DB:	Diamond Bit Coring - 4", N, B	RB:	Rock Bit
BS:	Bulk Sample or Auger Sample	WB:	Wash Boring or Mud Rotary

The number of blows required to advance a standard 2-inch O.D. split-spoon sampler (SS) the last 12 inches of the total 18-inch penetration with a 140-pound hammer falling 30 inches is considered the "Standard Penetration" or "N-value". For 3" O.D. ring samplers (RS) the penetration value is reported as the number of blows required to advance the sampler 12 inches using a 140-pound hammer falling 30 inches, reported as "blows per foot," and is not considered equivalent to the "Standard Penetration"or "N-value".

WATER LEVEL MEASUREMENT SYMBOLS:

WL:	Water Level	WS:	While Sampling	N/E:	Not Encountered
WCI:	Wet Cave in	WD:	While Drilling		
DCI:	Dry Cave in	BCR:	Before Casing Removal		
AB:	After Boring	ACR:	After Casing Removal		

Water levels indicated on the boring logs are the levels measured in the borings at the times indicated. Groundwater levels at other times and other locations across the site could vary. In pervious soils, the indicated levels may reflect the location of groundwater. In low permeability soils, the accurate determination of groundwater levels may not be possible with only short-term observations.

DESCRIPTIVE SOIL CLASSIFICATION: Soil classification is based on the Unified Classification System. Coarse Grained Soils have more than 50% of their dry weight retained on a #200 sieve; their principal descriptors are: boulders, cobbles, gravel or sand. Fine Grained Soils have less than 50% of their dry weight retained on a #200 sieve; they are principally described as clays if they are plastic, and silts if they are slightly plastic or non-plastic. Major constituents may be added as modifiers and minor constituents may be added according to the relative proportions based on grain size. In addition to gradation, coarse-grained soils are defined on the basis of their in-place relative density and fine-grained soils on the basis of their consistency.

CONSISTENCY OF FINE-GRAINED SOILS

Unconfined Compressive Strength, Qu, psf	Standard Penetration or N-value (SS) Blows/Ft.	Consistency
< 500	<2	Very Soft
500 – 1,000	2-3	Soft
1,001 – 2,000	4-6	Medium Stiff
2,001 – 4,000	7-12	Stiff
4,001 – 8,000	13-26	Very Stiff
8,000+	26+	Hard

RELATIVE DENSITY OF COARSE-GRAINED SOILS

Standard Penetration or N-value (SS) Blows/Ft.	Ring Sampler (RS) Blows/Ft.	Relative Density
0 – 3	0-6	Very Loose
4 – 9	7-18	Loose
10 – 29	19-58	Medium Dense
30 – 49	59-98	Dense
50+	99+	Very Dense

RELATIVE PROPORTIONS OF SAND AND GRAVEL

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 15
With	15 – 29
Modifier	> 30

GRAIN SIZE TERMINOLOGY

Major Component of Sample	Particle Size
Boulders	Over 12 in. (300mm)
Cobbles	12 in. to 3 in. (300mm to 75 mm)
Gravel	3 in. to #4 sieve (75mm to 4.75 mm)
Sand	#4 to #200 sieve (4.75mm to 0.075mm)
Silt or Clay	Passing #200 Sieve (0.075mm)

RELATIVE PROPORTIONS OF FINES

Descriptive Term(s) of other constituents	Percent of Dry Weight
Trace	< 5
With	5 – 12
Modifiers	> 12

PLASTICITY DESCRIPTION

Term	Plasticity Index
Non-plastic	0
Low	1-10
Medium	11-30
High	30+

Terracon

UNIFIED SOIL CLASSIFICATION SYSTEM

Criteria for Assigning Group Symbols and Group Names Using Laboratory Tests[A]					Soil Classification	
					Group Symbol	Group Name[B]
Coarse Grained Soils More than 50% retained on No. 200 sieve	Gravels More than 50% of coarse fraction retained on No. 4 sieve	Clean Gravels Less than 5% fines[C]	$Cu \geq 4$ and $1 \leq Cc \leq 3$[E]		GW	Well-graded gravel[F]
			$Cu < 4$ and/or $1 > Cc > 3$[E]		GP	Poorly graded gravel[F]
		Gravels with Fines More than 12% fines[C]	Fines classify as ML or MH		GM	Silty gravel[F,G,H]
			Fines classify as CL or CH		GC	Clayey gravel[F,G,H]
	Sands 50% or more of coarse fraction passes No. 4 sieve	Clean Sands Less than 5% fines[D]	$Cu \geq 6$ and $1 \leq Cc \leq 3$[E]		SW	Well-graded sand[I]
			$Cu < 6$ and/or $1 > Cc > 3$[E]		SP	Poorly graded sand[I]
		Sands with Fines More than 12% fines[D]	Fines classify as ML or MH		SM	Silty sand[G,H,I]
			Fines Classify as CL or CH		SC	Clayey sand[G,H,I]
Fine-Grained Soils 50% or more passes the No. 200 sieve	Silts and Clays Liquid limit less than 50	inorganic	PI > 7 and plots on or above "A" line[J]		CL	Lean clay[K,L,M]
			PI < 4 or plots below "A" line[J]		ML	Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OL	Organic clay[K,L,M,N] / Organic silt[K,L,M,O]
	Silts and Clays Liquid limit 50 or more	inorganic	PI plots on or above "A" line		CH	Fat clay[K,L,M]
			PI plots below "A" line		MH	Elastic Silt[K,L,M]
		organic	Liquid limit - oven dried / Liquid limit - not dried	< 0.75	OH	Organic clay[K,L,M,P] / Organic silt[K,L,M,Q]
Highly organic soils	Primarily organic matter, dark in color, and organic odor				PT	Peat

[A] Based on the material passing the 3-in. (75-mm) sieve

[B] If field sample contained cobbles or boulders, or both, add "with cobbles or boulders, or both" to group name.

[C] Gravels with 5 to 12% fines require dual symbols: GW-GM well-graded gravel with silt, GW-GC well-graded gravel with clay, GP-GM poorly graded gravel with silt, GP-GC poorly graded gravel with clay.

[D] Sands with 5 to 12% fines require dual symbols: SW-SM well-graded sand with silt, SW-SC well-graded sand with clay, SP-SM poorly graded sand with silt, SP-SC poorly graded sand with clay

[E] $Cu = D_{60}/D_{10}$ $\quad Cc = \frac{(D_{30})^2}{D_{10} \times D_{60}}$

[F] If soil contains ≥ 15% sand, add "with sand" to group name.

[G] If fines classify as CL-ML, use dual symbol GC-GM, or SC-SM.

[H] If fines are organic, add "with organic fines" to group name.

[I] If soil contains ≥ 15% gravel, add "with gravel" to group name.

[J] If Atterberg limits plot in shaded area, soil is a CL-ML, silty clay.

[K] If soil contains 15 to 29% plus No. 200, add "with sand" or "with gravel," whichever is predominant.

[L] If soil contains ≥ 30% plus No. 200 predominantly sand, add "sandy" to group name.

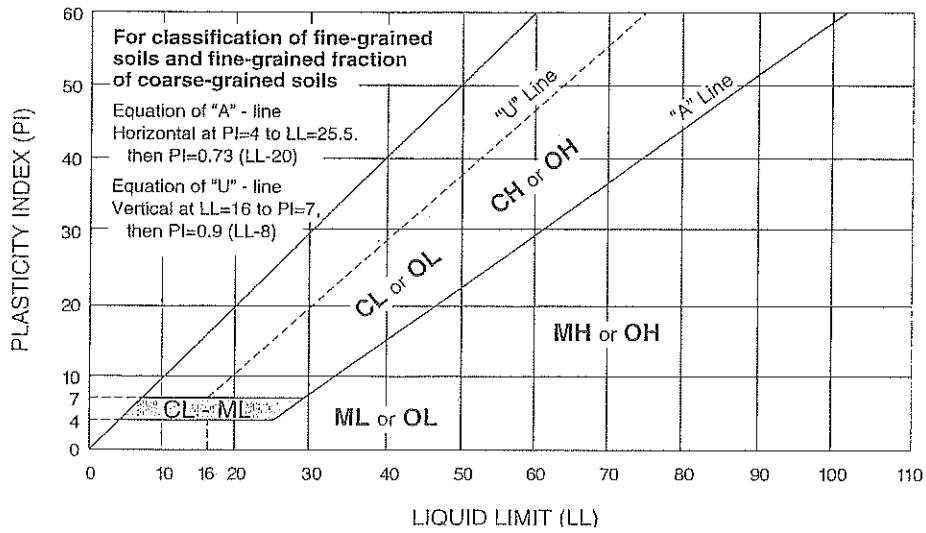
[M] If soil contains ≥ 30% plus No. 200, predominantly gravel, add "gravelly" to group name.

[N] PI ≥ 4 and plots on or above "A" line.

[O] PI < 4 or plots below "A" line.

[P] PI plots on or above "A" line.

[Q] PI plots below "A" line.



Terracon

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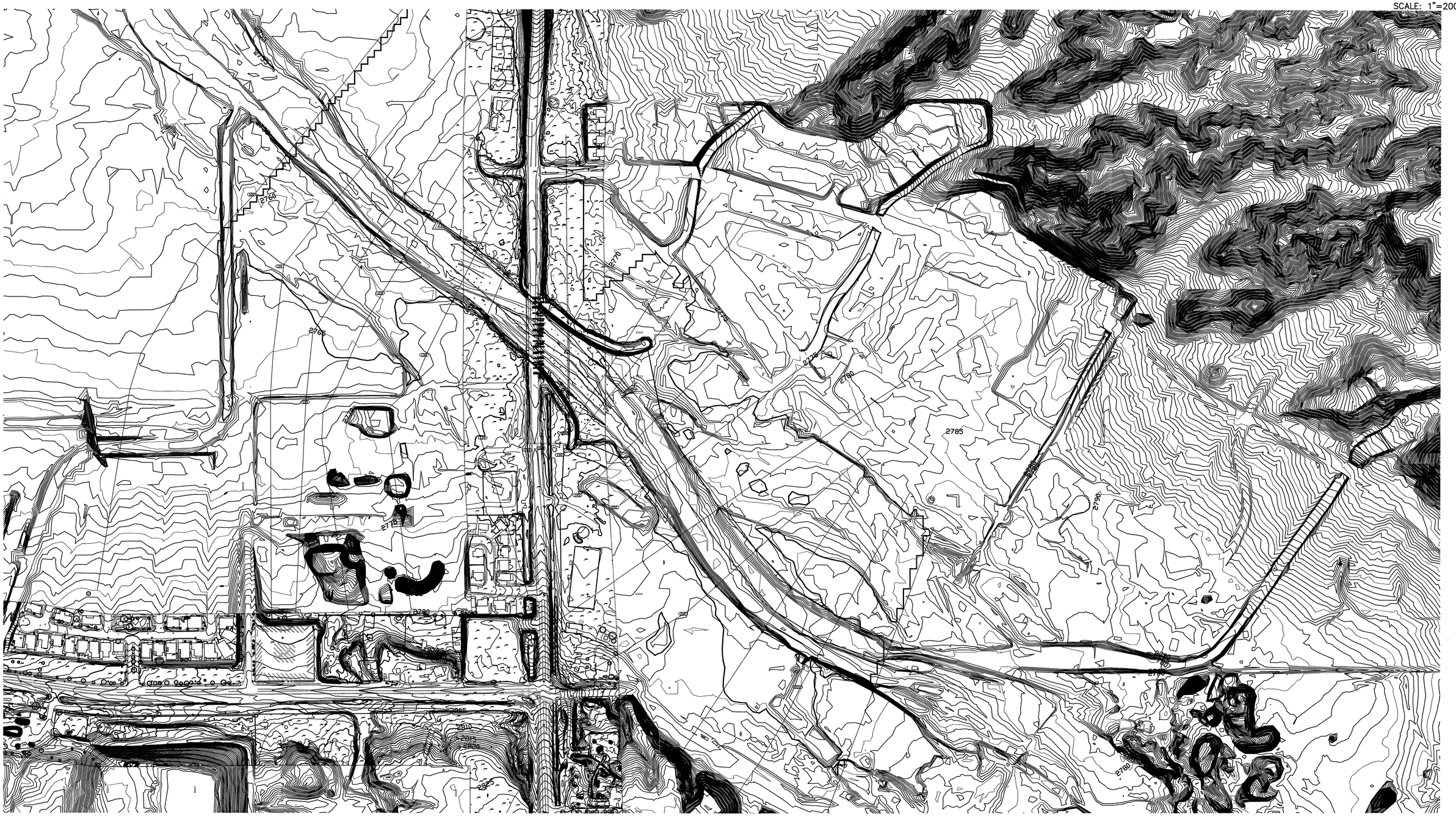
SCALE: 1"=200'



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RiverCAD X-Sections
FOR
Houghton Road Bridge

PROJ NO: 06099-01
DATE: 02/05/07
SCALE: 1" = 200'
1 OF 1

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