POE & ASSOCIATES, INC. CONSULTING ENGINEERS
5940 E. Central, Suite 200 (316) 685-4114
Wichita, Kansas 67208 FAX: (316) 685-4444

August 1, 2006

Mr. Scott Lindebak, P.E.
City of Wichita – Stormwater Engineer
455 N. Main, 7th Floor
Wichita, KS 67202

Re: Terradyne West Addition

Dear Scott:

Attached is a copy of the flood study for the Brookhaven Tributary of Four Mile Creek provided to me by Sedgwick County. This is the tributary that runs through Terradyne West Addition.

Additionally attached is a copy of the Division of Water Resources Floodway Fringe Fill Permit. Please call me if you have any questions.

Sincerely,
POE & ASSOCIATES, INC.

James M. Ubert, P.E.
Project Manager

KANSAS
DEPARTMENT OF AGRICULTURE
ADRIAN J. POLANSKY, SECRETARY

KATHLEEN SEBELIUS, GOVERNOR

June 16, 2006

TERRADYNE RESIDENTIAL, LLC
CRAIG SMITH
9340 E. CENTRAL
WICHITA, KS 67206

Re: Floodway Fringe Fill for
Residential Development
Trib. to Fourmile Creek(Floodplain)
Sedgwick County
WSN: LSG-0306-FF; ECA: 2006150

Dear Mr. Smith:

Consideration has been given to your application for the approval of plans relating to the placement of floodway fringe fill for residential development in the floodplain of a tributary to Fourmile Creek at a location in the SE ¼ of Section 13, Township 27 South, Range 02 East, Sedgwick County, Kansas.

In accordance with the provisions of K.S.A. 24-126, the Chief Engineer has approved the plans and issued the enclosed approval of application, authorizing construction of the proposed project. Please note the conditions on the reverse side of the approval document. Condition No. 9 requires the owner to notify this office within 30 days after the project is completed. A Notice and Proof of Completion form is enclosed for this purpose. Special conditions have been added to minimize the removal of riparian vegetation, to prohibit the introduction of toxic or deleterious materials into the watercourse, and requiring the project to meet local floodplain management requirements.

The one set of plans submitted to this office has been endorsed with the Chief Engineer's approval and will be retained in our files. Should you desire any copies of the plans with the Chief Engineer's approval shown thereon, please submit the required number.

Under the Water Projects Environmental Coordination Act, K.S.A. 82a-325 to 327, an application notice was sent to 7 state agencies for their review and comments. Responses are attached. We request you review their environmental concerns and take appropriate steps to address any adverse comments.

The work has been authorized to be completed on or before July 1, 2008. Approval for construction of this project will expire on that date unless the time is subsequently specifically extended by the Chief Engineer. Any desired extension of time should be requested in writing approximately 30 days prior to the expiration date.

Sincerely,

John R. Roth, PE
Water Structures Engineer

Enclosure

pc: James M. Ubert, PE
Poe & Associates, Inc.
Corps of Engineers, State Regulatory Office
Sedgwick County Floodplain Administrator
Stafford Field Office

LSG-0306-FF
JB2
WY
JRR

KANSAS

CORPORATION COMMISSION

KATHLEEN SEBELIUS, GOVERNOR
BRIAN J. MOLINE, CHAIR
ROBERT E. KREHBIEL, COMMISSIONER
MICHAEL C. MOFFET, COMMISSIONER

April 13, 2006

John R. Roth
Division of Water Resources
109 SW 9th St. 2nd Floor
Topeka, KS 66612-1283

Re: DWR Application No. 06150
Permit for floodway fringe fill
SE/4 Sec. 13-27S-02E
Sedgwick County, Kansas

Dear Mr. Roth:

A review of Conservation Division files revealed that drilling activity has occurred within the acreage described above. According to our records, one well has been drilled within the project area. Additional wells or surface ponds may exist or have existed within the acreage described above which we do not have any record of. Should any oil field related problems or additional wells be located during construction, please call, Doug Louis at (316) 630-4000, so appropriate regulatory response can be made.

If you have any questions or concerns, please call me at (316) 337-6243.

Sincerely,

Kathy Haynes

Kathy Haynes
Department of Environmental Protection and Remediation

Cc: D Louis

RECEIVED
MAY 01 2006
STAFFORD FIELD OFFICE
DIVISION OF WATER RESOURCES

WATER RESOURCES
APR 18 2006
KS DEPT

Conservation Division, Finney State Office Building, 130 S. Market, Room 2078, Wichita, KS 67202-3802
Voice 316.337.6200 FAX 316.337.6211 www.kcc.state.ks.us

...E OF KANSAS
...PORATION COMMISSION

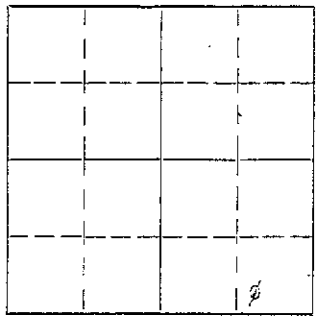
...Information Completely
...Required Affidavit
...al or Deliver Report to:
Conservation Division
State Corporation Commission,
800 Bitting Building
Wichita, Kansas

WELL PLUGGING RECORD
OR
FORMATION PLUGGING RECORD 193

RECEIVED
JUN 10
BY

Strike out upper line when reporting plugging off formations.

NORTH



Locate well correctly on above Section Plat

Sedgwick County. Sec. 12 Twp. 27 Rge. 2 (E) (W)
Location as "NE¼NW¼SW¼" or footage from lines 330 ft from S line, 990 from E lin
Lease Owner The Gerhrand-Pulse Oil & Drilling Company SW SE SE
Lease Name Smith Well No. 1
Office Address 527½-North Main, Hutchinson, Kansas
Character of Well (Completed as Oil, Gas or Dry Hole) Dry
Date, well completed May 31st 193 7
Application for plugging filed May 31st 193 7
Application for plugging approved 193
Plugging Commenced May 31st 193 7
Plugging Completed June 2nd 193 7
Reason for abandonment of well or producing formation Dry

If a producing well is abandoned, date of last production 193
Was permission obtained from the Conservation Division or its agents before plugging was commenced? Yes

Name of Conservation Agent who supervised plugging of this well Brackenridge
Producing formation Depth to top Bottom Total Depth of Well 2776 Feet
Show depth and thickness of all water, oil and gas formations.

OIL, GAS OR WATER RECORDS — CASING RECORD

Formation	Content	From	To	Size	Put In	Pulled Out
				15½	226'	215'
				12½	1145	1145
				10	2016	2016
				8	2612	2592
				5 5/16	3214	3154

Describe in detail the manner in which the well was plugged, indicating where the mud fluid was placed and the method or methods used in introducing it into the hole. If cement or other plugs were used, state the character of same and depth placed, from feet to feet for each plug set.

Cemented bottom to 2820, mudded from 2820 to 2592
Cement plug 10 sacks, Rock iron cuttings and 50 sacks
of cement from 2460 to 2390, bridged 215 20 sacks of
cement, hole filled to top and 5 five sacks of cement
for top plugging.

13 27 2E
9-2 18

WATER RESOURCES
RECEIVED
APR 18 2006
KSDEPT

(If additional description is necessary use BACK of this sheet)

Correspondence regarding this well should be addressed to The Gerhrand-Pulse Oil & Drilling Co.
Address 527½ North Main Street, Hutchinson, Kansas.

STATE OF Kansas, COUNTY OF Reno, ss.

(employee of owner) or (owner or operator) of the above-described well, being first duly sworn on oath, says: That I have knowledge of the facts, statements, and matters herein contained and the log of the above-described well as filed and that the same are true and correct. So help me God.

(Signature)

527½ North Main Street, Hutchinson, Kansas
(Address)

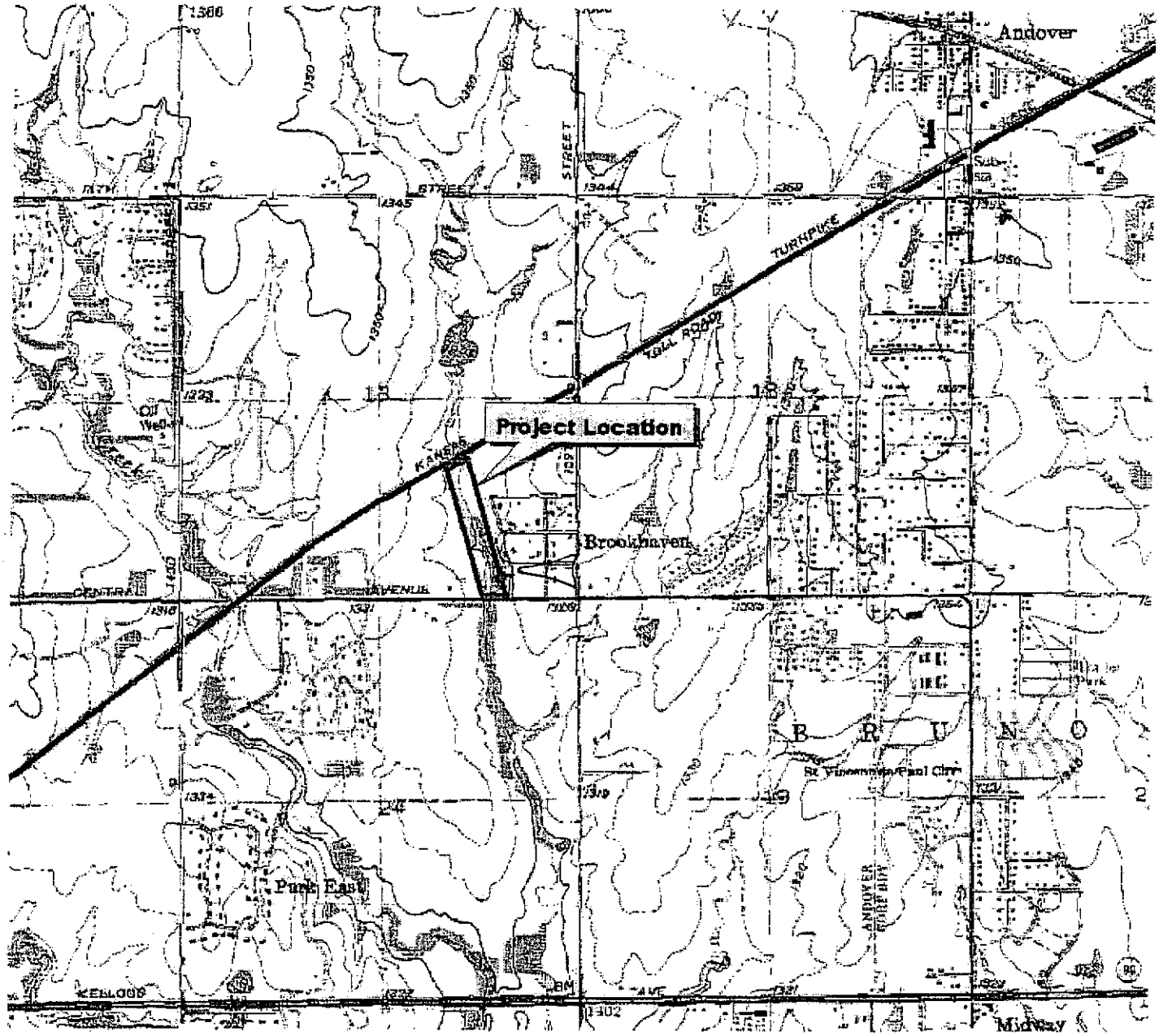
SUBSCRIBED AND SWORN TO before me this 9th day of June, 1937

My commission expires 1940

Notary Public.

16-5344 10-36—5M

WSN: LSG-0306-FF
ECA: 2006150
Floodway Fringe Fill



Andover KS Quad
(T 27 South, R 02 East)

N

W E

2000 0 2000 4000 6000 Feet

RECEIVED
MAY 01 2006
STAFFORD FIELD OFFICE
DIVISION OF WATER RESOURCES

WATER RESOURCES
RECEIVED
APR 18 2006
KS DEPT OF AGRICULTURE

KANSAS

DEPARTMENT OF WILDLIFE AND PARKS

KATHLEEN SEBELIUS, GOVERNOR

May 11, 2006

Mr. John Roth
Kansas Department of Agriculture
Stafford Field Office
105 N. Main
Drawer F
Stafford, KS 67578-1342

RECEIVED
MAY 12 2006
STAFFORD FIELD OFFICE
DIVISION OF WATER RESOURCES

Ref: D6.0000
Sedgwick
ECA2006150
Track: 20060223

Dear Mr. Roth:

We have reviewed ECA Notice 2006150 involving residential development in the Terradyne West floodplain Brookhaven Creek in Section 13, Township 27 South, Range 2 East, in Sedgwick County. The project was reviewed for potential impacts on crucial wildlife habitats, current state-listed threatened and endangered species and species in need of conservation, and public recreation areas for which this agency has some administrative authority.

We have no objections to this project as designed and simply recommend implementing standard erosion control BMP's, temporary weed-free seeding/mulching to protect water quality during construction, minimize any / all further instream construction activities and the use of native grasses and forbs to permanently revegetate all areas disturbed by construction.

Results of our review indicate there will be no significant impacts to crucial wildlife habitats; therefore, no special mitigation measures are recommended. The project will not impact any public recreational areas, nor could we document any potential impacts to currently listed threatened or endangered species or species in need of conservation. No Department of Wildlife and Parks permits or special authorizations will be needed if construction is started within one year, and no design changes are made in the project plans. Since the Department's recreational land obligations and the State's species listings periodically change, if construction has not started within one year of this date, or if design changes are made in the project plans, the project sponsor must contact this office to verify continued applicability of this assessment report. For our purposes, we consider construction started when advertisements for bids are distributed.

Thank you for the opportunity to provide these comments and recommendations.

Sincerely,

Eric R. Johnson, Aquatic Ecologist
Environmental Services Section

Pratt Operations Office
512 SE 25th Ave., Pratt, KS 67124-8174
Phone 620-672-5911 Fax 620-672-6020 www.kdwp.state.ks.us

K-STATE
Kansas Forest Service
[illegible]
Manhattan, KS [illegible]
[illegible]
[illegible]
[illegible]
[illegible]

Memorandum

TO: Applicant(s)

FROM: Kansas Forest Service, Kansas State University

SUBJECT: Division of Water Resources Permits/Approvals

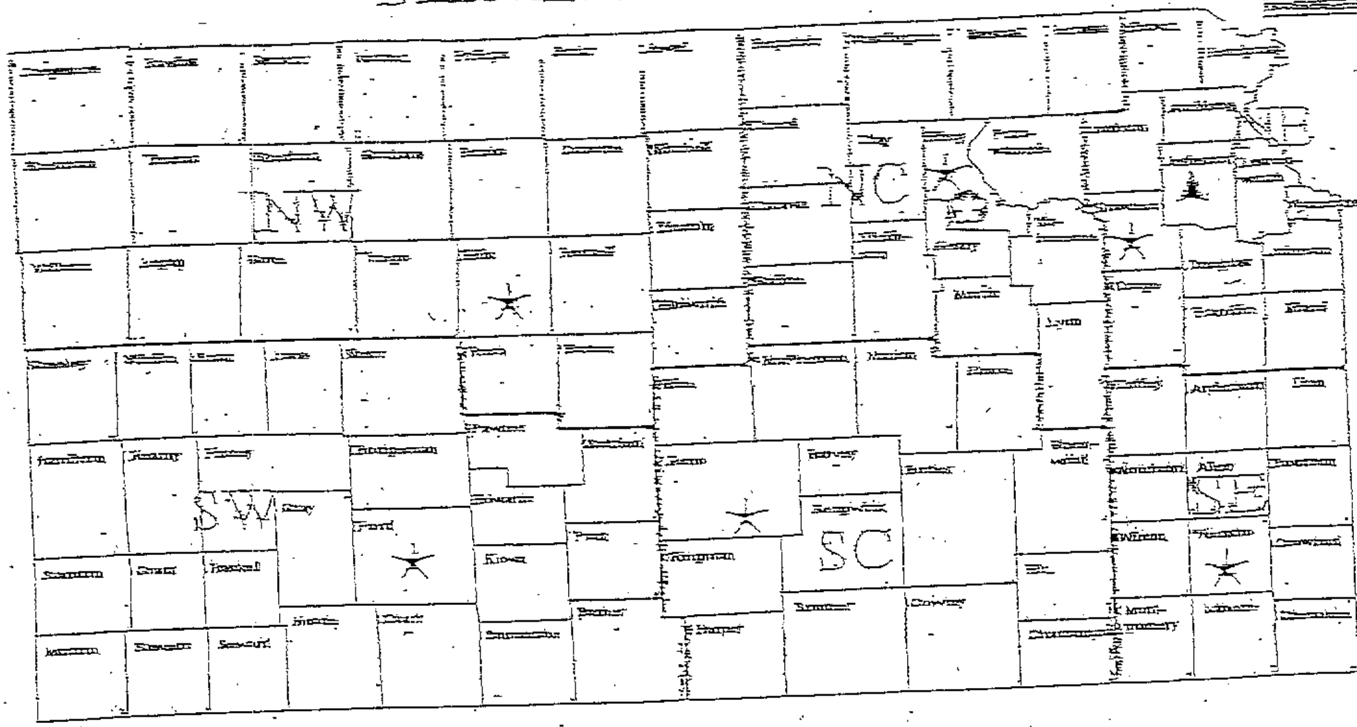
Under the Water Projects Environmental Coordination Act, the Kansas Forest Service is responsible for reviewing permit applications from the Kansas Department of Agriculture, Division of Water Resources to determine if your project will affect critical forest resources of our state. Due to the large volume of permit applications, we are unable to sufficiently review them all. To provide you with the basic information you need regarding forest resources, we have asked the Division of Water Resources to provide all applicants with the information in this memorandum.

Forest land only makes up approximately four percent of the total land area of Kansas. Any direct effects at a project site can have significant impacts in a local area as well as impacts on the total forest resources of Kansas. Forests provide important benefits in improving water quality, reducing soil erosion, providing wildlife habitat, providing recreational opportunities and producing wood products. Riparian forests, directly associated with streams and rivers, act as filters, reducing sediment flow and filtering out non-point source pollutants before they enter streams or rivers. Any removal of forest land greater than one acre in size should be mitigated, on land suitable for trees, by replanting native trees adapted to the site using a minimum spacing of 10' X 10' or 435 trees per acre.

District Foresters are available, upon request, to provide professional assistance in preparing tree planting plans, including tree species selection, proper planting procedures, weed control recommendations and after planting care. The service is free of charge. Cost-share programs may be available to assist with the reestablishment of trees. A list of District Foresters and District Boundary Map are located on the back page.

KANSAS

Kansas Forest Service
State and District Offices



★ NW
James H. Strine
District Forester
Kansas Forest Service
1232 240th Avenue
Hays, KS 67601-5228
785-625-3425, Ext. 220
Fax: 785-623-4369
Email: JStrine@Oznet.ksu.edu

★ NC
Thad K. Rhodes
District Forester
Kansas Forest Service
1125 Westport Drive
Manhattan, KS 66502-2868
785-776-5182
Fax: 785-[illegible]-7983
Email: TRhodes@Oznet.ksu.edu

★ NE
John M. [illegible]
District Forester
Kansas Forest Service
2610 Plass Court, Suite C
Topeka, KS 66611-1975
785-267-2495
Fax: 785-267-2274
Email: [illegible]@Oznet.ksu.edu

★ SW
Troy L. Brattin
District Forester
Kansas Forest Service
107 Layton Street
Dodge City, KS 67801-2498
620-227-2392
Fax: 620-227-6024
Email: TBrattin@Oznet.ksu.edu

★ SC
Dennis W. Carlson
District Forester
Kansas Forest Service
9 West 28th, Suite B
Hutchinson, KS [illegible]
620-[illegible]
Fax: 620-[illegible]-3866
Email: DCarlson@Oznet.ksu.edu

★ SE
David N. Bruton[illegible]
District Forester
Kansas Forest Service
508 W 14th Street
Chanute, KS 66720-2895
620-431-1560
Fax: 620-431-2108
Email: DBru[illegible]@Oznet.ksu.edu

▲ Statewide
David L. Bruton
Utilization & Marketing Forester
[illegible] Broadway
Valley Falls, KS 66088-1312
785-945-6291
Fax: 785-945-6852
Email: D[illegible]@Oznet.ksu.edu

⊙ STATE OFFICE
Kansas Forest Service
2610 Claflin Road
Manhattan, KS 66502-2798
785-532-3300
Fax: 785-532-3305
Email: [illegible]@Oznet.ksu.edu

KANSAS

STATE

HISTORICAL

SOCIETY

◆

Cultural Resources
Division

◆

6425 S.W. 6th Avenue
Topeka, Kansas
66615-1099
PHONE# (785) 272-8681
[illegible]# (785) 272-8682
[illegible]# (785) 272-8683

◆

KANSAS HISTORY CENTER

Administration
Center for Historical Research
Cultural Resources
Education / Outreach
Historic Sites
Kansas Museum of History
Library & Archives

HISTORIC SITES

Adair Cabin
Constitution Hall
Cottonwood Ranch
First Territorial Capitol
Fort Hays
Goodnow House
Grinter Place
Hollenberg Station
Kaw Mission
Marais des Cygnes Massacre
Mine Creek Battlefield
[illegible] American Heritage Museum
[illegible]awnee Indian Village
Pawnee Rock
Shawnee Indian Mission

MEMORANDUM

To: BCA Permit Applicant

From: Kansas State Historical Society
Bob Hoard, State Archeologist

Re: Historic and Prehistoric Cultural Resources

Because of time and budget constraints, the Kansas State Historical Society has elected to waive review of permit applications under the Water Projects Environmental Coordination Act (KSA 82a-325 *et seq*). However, digging, grading, and other types of construction activities may reveal the presence of buried historic and/or prehistoric archeological sites or artifacts within your project area. If archeological materials are encountered during construction, please contact me at 785-272-8681 ex. 268 or by email at rhoard@kshs.org and do not further disturb the site. If the materials appear to be significant, we may ask for the opportunity to document or salvage them.

In the event human burials or remains are encountered, the Kansas Unmarked Burial Sites Preservation Act (KSA 75-2741 through 75-2754) requires the finder to immediately report these discoveries to the local law enforcement agency. If the remains are not the result of criminal activity, their fate will be determined by the Unmarked Burial Sites Preservation Board. Encountering an unmarked burial does not necessarily stop a project. Discussion with the Board may lead to modification of the project, and in some cases the burial is removed and the project allowed to proceed. Human burials and associated artifacts must not be further disturbed after their discovery, until law enforcement officials or the Unmarked Burial Sites Preservation Board has determined appropriate action. The Unmarked Burial Sites Preservation Act provides substantial penalties for intentionally disturbing human burials and grave goods, whether located on public or private property. If you find a bone that you suspect may be human, leave it where it is and get expert help to identify it. The county coroner, a medical doctor, or an archeologist can help.

What To Look For

Archeological sites from the historic and prehistoric periods may be buried. Prehistoric sites can be recognized by the presence of discolored earth, bones, stone tools (arrow heads, knives, scrapers), stone flakes (thin, sharp-edged pieces of stone produced when making chipped stone tools), burned stones, and pieces of coarse, unglazed pottery. Stone flakes are the most commonly found artifact.

Historic-period sites can be recognized by the presence of stone, brick, or concrete foundation walls, or concentrations of these materials. Many of the items used in historic times are similar to those used today. Bottles, cups, "tin" cans, buckets, hand tools, glass fragments, and other items can be easily recognized. If you are unsure of the significance of what you have found, contact my office.

Thank you for assisting us in preserving the archeological heritage of Kansas.

****

These actions do not constitute compliance with Section 106 of the National Historic Preservation Act. If this project receives Federal funding, licensing, permitting, or assistance you must contact the State Historic Preservation Office (785-272-8681 ex. 240) prior to construction for a review of the undertaking under Federal law.

APPROVAL CONDITIONS

1. This approval grants no water rights nor other property rights, nor does it authorize any injury to private property, invasion of private rights nor impairment of senior water rights, nor does it exempt the applicant from obtaining consent from appropriate federal, state or local government.
2. The work shall at all times be subject to supervision and inspection by representatives of the Division of Water Resources.
3. No changes in the work, maps, plans, profiles and specifications as approved shall be made except with the written consent of the Chief Engineer.
4. Any work authorized by this approval will be maintained in a condition satisfactory to the Chief Engineer and substantially in accordance with the approved plans.
5. The clearing of trees, brush, drift and other debris, in order to maintain the work substantially in accordance with the approved plans is hereby authorized, except that the removal of plantings made specifically for habitat or environmental mitigation is not authorized by this approval.
6. Any excess material deposited in the stream channel incidental to the construction and maintenance of the project authorized by this approval shall be removed and the channel restored to a condition satisfactory to the Chief Engineer and substantially in accordance with the approved plans.
7. All areas disturbed by construction or other exposed soil areas shall be seeded and maintained with a mixture of grass or other vegetation appropriate to the soils, climate and project in order to minimize erosion and protect the project integrity.
8. If the work is not completed on or before the 1st day of July, 2008, this approval, if not specifically extended, shall cease and be null and void. If, upon the expiration or revocation of the approval, the work has not been completed, the applicant shall, at his own expense and to such extent and in such time and manner as the Chief Engineer may require, remove all or any portion of the uncompleted work and restore the watercourse to a satisfactory condition. No claim shall be made against the State of Kansas on account of any such removal or alteration.
9. Within thirty (30) days after the completion of the work authorized in this approval, the applicant shall file with the Division a statement that the work has been performed in accordance with this approval and the approved maps, plans, profiles and specifications.
10. The Chief Engineer reserves the right to require such changes in the maps, plans, profiles and specifications as may be considered necessary. The Chief Engineer further reserves the right to modify, suspend or revoke this approval at any time, should the applicant fail to comply with any of the conditions of this approval or regulations of the Division without sufficient cause or should such action be deemed necessary in the interest of public safety and welfare.
11. The clearing of riparian timber and vegetation shall be restricted to the minimum required to accomplish the work and not interfere with the beneficial use of the project.
12. No deleterious or toxic materials shall be introduced into the watercourse or reservoir by runoff, leaching or disposal during or in connection with the work authorized by this permit.
13. The project must meet the floodplain management requirements of the local authority.

THE STATE OF KANSAS

KANSAS DEPARTMENT OF AGRICULTURE
Adrian J. Polansky, Secretary of Agriculture

DIVISION OF WATER RESOURCES
David L. Pope, Chief Engineer

APPROVAL OF APPLICATION
NO. LSG-0306-FF
K.S.A. *24-126*

The Chief Engineer of the Division of Water Resources, Kansas Department of Agriculture, by virtue of the powers and duties imposed by K.S.A. 24-126, hereby issues this approval to Terradyne Residential, LLC, giving his consent to place floodway fringe fill for residential development in the floodplain of a tributary to Fourmile Creek at a location in the SE ¼ of Section 13, Township 27 South, Range 02 East, Sedgwick County, Kansas.

All work authorized by this approval shall be performed in accordance with the maps, plans, profiles and specifications filed with the application and approved by the Chief Engineer, and in accordance with plans for any changes or modifications subsequently approved by the Chief Engineer subject to the provisions of the aforementioned statute, its regulations and the attached approval conditions.

Witness my hand this 16th day of June, 2006.

DIVISION OF WATER RESOURCES
DAVID L. POPE
CHIEF ENGINEER
DEPARTMENT of AGRICULTURE

Edward E. Byrd, P.E. for
David L. Pope, P.E.
Chief Engineer
Division of Water Resources
Kansas Department of Agriculture

State of Kansas)
)SS
County of Shawnee)

The foregoing instrument was acknowledged before me this 16th day of June, 2006 by Edward E. Byrd as an authorized agent of David L. Pope, Chief Engineer, Division of Water Resources, Kansas Department of Agriculture.

OFFICIAL SEAL
LAURIE MARTINEZ
MY COMMISSION EXPIRES
Sept 16, 2009

Notary Public

RECORD THIS PERMIT WITH THE REGISTER OF DEEDS OF THE COUNTY WHEREIN THE WORK IS LOCATED

DWR 3-200.0 (Rev. 11/92)

Thursday, August 06, 1998

HEC-RAS Version 2.0 April 1997
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X      X  XXXXXX    XXXX         XXXX        XX       XXXX
X      X  X         X    X       X   X      X  X     X
X      X  X         X            X   X     X    X    X
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: BROOKHAVEN CREEK - FLOODWAY
Project File : brhven1.prj
Run Date and Time: 8/6/98 15:02:52

Project in English units

Project Description:
SEDGWICK COUNTY, KANSAS G&O FLOOD INSURANCE STUDY FILE "BRKHVN1.DAT"

BROOKHAVEN TRIBUTARY TO FOUR MILE CREEK CALIBRATION RUN

100-YEAR FREQUENCY NATURAL FLOOD PROFILE
VERIFIED AND PROOFED

PLAN DATA

Plan Title: Imported Plan 01
Plan File : d:\hec\ras\brhven1.p01

Geometry Title: Imported Geom 01
Geometry File : d:\hec\ras\brhven1.g01

Flow Title   : Imported Flow 01
Flow File   : d:\hec\ras\brhven1.f01

Plan Summary Information:

Number of:	Cross Sections	= 41	Mulitple Openings	=	0
	Culverts	= 0	Inline Weirs	=	0
	Bridges	= 5			

Computational Information

Water surface calculation tolerance	=	0.01
Critical depth calculaton tolerance	=	0.01
Maximum number of interations	=	20
Maximum difference tolerance	=	0.3
Flow tolerance factor	=	0.001

Computational Flow Regime: Subcritical Flow

Encroachment Data

Equal Conveyance	=	True
Left Offset	=	0
Right Offset	=	0

River = RIVER-1 Reach = Reach-1

RS	Profile	Method	Value1	Value2
1	PF#2	1	10171	10779
2	PF#2	1	10171	10779
3	PF#2	1	10171	10779
4	PF#2	1	10050	10450
5	PF#2	1	10130	10530
6	PF#2	1	9950	10400
6.5	PF#2	0		
7	PF#2	1	9950	10400
8	PF#2	1	10000	10400
9	PF#2	1	10418	10508
9.5	PF#2	0		
10	PF#2	1	10418	10508
11	PF#2	1	9970	10320
12	PF#2	1	9970	10320
13	PF#2	1	10100	10475
13.5	PF#2	0		
14	PF#2	1	10100	10475
15	PF#2	1	9985	10485
16	PF#2	1	10200	10600
17	PF#2	1	10190	10590
18	PF#2	1	10620	10870
19	PF#2	1	10081	10222
20	PF#2	1	10000	10300
21	PF#2	1	10050	10250
22	PF#2	1	10150	10300
22.5	PF#2	0		
23	PF#2	1	10150	10300
24	PF#2	1	10150	10300
25	PF#2	1	10150	10300
26	PF#2	1	10150	10300
27	PF#2	1	10150	10300
28	PF#2	1	10150	10328
29	PF#2	1	10250	10500
30	PF#2	1	10000	10250
31	PF#2	1	10000	10250
31.5	PF#2	0		
32	PF#2	1	10000	10250
33	PF#2	1	10000	10200
34	PF#2	1	10125	10325
35	PF#2	1	10600	10820
36	PF#2	1	10650	10875
37	PF#2	1	10650	10850
38	PF#2	1	10000	10450

39	PF#2	1	11000	11450
40	PF#2	1	10080	10330
41	PF#2	1	10080	10330

FLOW DATA

Flow Title: Imported Flow 01
Flow File : d:\hec\ras\brhven1.f01

Flow Data (cfs)

River	Reach	RS	PF#1	PF#2
RIVER-1	Reach-1	41	3780	3780
RIVER-1	Reach-1	29	4450	4450
RIVER-1	Reach-1	7	4175	4175
RIVER-1	Reach-1	3	8080	8080

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
RIVER-1	Reach-1	PF#1		Known WS = 1290
RIVER-1	Reach-1	PF#2		Known WS = 1291

GEOMETRY DATA

Geometry Title: Imported Geom 01
Geometry File : d:\hec\ras\brhven1.g01

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 41

INPUT
Description: 3 229
This is a REPEATED section.
G&O CROSS SECTION @ STATION
17404 END OF ANALYSIS OF BROOKHAVEN CREEK

Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9700	1340	9984	1330	10084	1329.3	10184	1329.3	10184	1326.8
10197	1326.8	10197	1330.4	10284	1330.1	10384	1330.9	10820	1340

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

9700 .06 10184 .04 10197 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
10184 10197 45 45 45 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9700	10184	1330.9	10197	10820	1331.7

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1332.43	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.19	Wt. n-Val.	0.060
0.040 0.050			
E.G. Elev (ft)	1332.63	Reach Len. (ft)	45.00
45.00 45.00			
Crit W.S. (ft)	1331.70	Flow Area (sq ft)	676.11
73.25 439.96			
E.G. Slope (ft/ft)	0.004533	Area (sq ft)	676.11
73.25 439.96			
Q Total (cfs)	3780.00	Flow (cfs)	2082.91
448.86 1248.23			
Top Width (ft)	542.67	Top Width (ft)	269.15
13.00 260.53			
Vel Total (ft/s)	3.18	Avg. Vel. (ft/s)	3.08
6.13 2.84			
Max Chl Dpth (ft)	5.63	Hydr. Depth (ft)	2.51
5.63 1.69			
Conv. Total (cfs)	56145.5	Conv. (cfs)	30938.1
6667.0 18540.4			
Length Wtd. (ft)	45.00	Wetted Per. (ft)	269.19
19.10 260.55			
Min Ch El (ft)	1326.80	Shear (lb/sq ft)	0.71
1.09 0.48			
Alpha	1.22	Stream Power (lb/ft s)	2.19
6.65 1.36			
Frctn Loss (ft)	0.36	Cum Volume (acre-ft)	1026.66
182.57 290.39			
C & E Loss (ft)	0.13	Cum SA (acres)	119.42
28.74 107.99			

Warning - The conveyance ratio (upstream 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 parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1333.00	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.36	Wt. n-Val.	0.060
0.040 0.050			
E.G. Elev (ft)	1333.36	Reach Len. (ft)	45.00
45.00 45.00			

Crit W.S. (ft)	1331.92	Flow Area (sq ft)	384.23
80.54 363.54			
E.G. Slope (ft/ft)	0.005518	Area (sq ft)	384.23
80.54 363.54			
Q Total (cfs)	3780.00	Flow (cfs)	1650.67
580.03 1549.30			
Top Width (ft)	250.00	Top Width (ft)	104.00
13.00 133.00			
Vel Total (ft/s)	4.56	Avg. Vel. (ft/s)	4.30
7.20 4.26			
Max Chl Dpth (ft)	6.20	Hydr. Depth (ft)	3.69
6.20 2.73			
Conv. Total (cfs)	50887.0	Conv. (cfs)	22221.6
7808.4 20856.9			
Length Wtd. (ft)	45.00	Wetted Per. (ft)	107.67
19.10 135.53			
Min Ch El (ft)	1326.80	Shear (lb/sq ft)	1.23
1.45 0.92			
Alpha	1.13	Stream Power (lb/ft s)	5.28
10.46 3.94			
Frctn Loss (ft)	0.34	Cum Volume (acre-ft)	887.53
194.60 195.32			
C & E Loss (ft)	0.07	Cum SA (acres)	44.28
28.75 42.22			

Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 40

INPUT
Description: 3.22
FIS CROSS SECTION O @ STATION 17359

Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9700	1340	9984	1330	10084	1329.3	10184	1329.3	10184	1326.8
10197	1326.8	10197	1330.4	10284	1330.1	10384	1330.9	10820	1340

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9700	.06	10184	.04	10197	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10184	10197	600	840	700	.3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1331.52	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.61	Wt. n-Val.	0.060
0.040 0.050			
E.G. Elev (ft)	1332.14	Reach Len. (ft)	600.00
840.00 700.00			
Crit W.S. (ft)	1331.52	Flow Area (sq ft)	442.99
61.42 222.76			
E.G. Slope (ft/ft)	0.018139	Area (sq ft)	442.99
61.42 222.76			
Q Total (cfs)	3780.00	Flow (cfs)	2202.99
669.54 907.47			
Top Width (ft)	473.25	Top Width (ft)	243.31
13.00 216.94			
Vel Total (ft/s)	5.20	Avg. Vel. (ft/s)	4.97
10.90 4.07			
Max Chl Dpth (ft)	4.72	Hydr. Depth (ft)	1.82
4.72 1.03			
Conv. Total (cfs)	28065.9	Conv. (cfs)	16356.9
4971.3 6737.8			
Length Wtd. (ft)	648.70	Wetted Per. (ft)	243.34
19.10 216.95			
Min Ch El (ft)	1326.80	Shear (lb/sq ft)	2.06
3.64 1.16			
Alpha	1.46	Stream Power (lb/ft s)	10.25
39.70 4.74			
Frctn Loss (ft)	0.86	Cum Volume (acre-ft)	1026.08
182.50 290.05			
C & E Loss (ft)	0.29	Cum SA (acres)	119.15
28.73 107.75			

Warning - The energy equation could not be balanced within the specified number of iterations. The program used critical depth for the water surface and continued on with the calculations.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to critical depth, the calculated water surface came back below critical depth. This indicates that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1332.37	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.58	Wt. n-Val.	0.060
0.040 0.050			
E.G. Elev (ft)	1332.96	Reach Len. (ft)	600.00
840.00 700.00			
Crit W.S. (ft)		Flow Area (sq ft)	319.60
72.46 280.88			
E.G. Slope (ft/ft)	0.010685	Area (sq ft)	319.60
72.46 280.88			
Q Total (cfs)	3780.00	Flow (cfs)	1696.37
676.75 1406.88			
Top Width (ft)	250.00	Top Width (ft)	104.00
13.00 133.00			
Vel Total (ft/s)	5.62	Avg. Vel. (ft/s)	5.31
9.34 5.01			
Max Chl Dpth (ft)	5.57	Hydr. Depth (ft)	3.07
5.57 2.11			
Conv. Total (cfs)	36568.8	Conv. (cfs)	16411.2
6547.1 13610.5			
Length Wtd. (ft)	669.00	Wetted Per. (ft)	107.05
19.10 134.91			
Min Ch El (ft)	1326.80	Shear (lb/sq ft)	1.99
2.53 1.39			
Alpha	1.19	Stream Power (lb/ft s)	10.57
23.63 6.96			
Frctn Loss (ft)	1.74	Cum Volume (acre-ft)	887.16
194.53 194.98			
C & E Loss (ft)	0.24	Cum SA (acres)	44.18
28.73 42.08			

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.
Warning - The energy loss was 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: 39

INPUT
Description: 3.06
FIS CROSS SECTION N @ STATION 16519

Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10000	1340	10500	1330	10580	1327	11330	1327	11335	1324.4
11355	1324.4	11360	1327	11460	1330	11780	1340		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

10000 .06 11330 .04 11360 .05

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
11330 11360 580 790 580 .3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1330.49	Element	Left OB Channel Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.060 0.040 0.050
E.G. Elev (ft)	1330.52	Reach Len. (ft)	580.00 790.00 580.00
Crit W.S. (ft)		Flow Area (sq ft)	2783.01 169.71 202.88
E.G. Slope (ft/ft)	0.000443	Area (sq ft)	2783.01 169.71 202.88
Q Total (cfs)	3780.00	Flow (cfs)	3185.95 409.63 184.42
Top Width (ft)	1000.21	Top Width (ft)	854.52 30.00 115.69
Vel Total (ft/s)	1.20	Avg. Vel. (ft/s)	1.14 2.41 0.91
Max Chl Dpth (ft)	6.09	Hydr. Depth (ft)	3.26 5.66 1.75
Conv. Total (cfs)	179660.4	Conv. (cfs)	151425.8 19469.4 8765.3
Length Wtd. (ft)	604.32	Wetted Per. (ft)	854.58 31.27 115.74
Min Ch El (ft)	1324.40	Shear (lb/sq ft)	0.09 0.15 0.05
Alpha	1.24	Stream Power (lb/ft s)	0.10 0.36 0.04
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)	1003.87 180.27 286.63
C & E Loss (ft)	0.01	Cum SA (acres)	111.59 28.31 105.07

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1330.87	Element	Left OB Channel Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.060 0.040 0.050
E.G. Elev (ft)	1330.97	Reach Len. (ft)	580.00 790.00 580.00
Crit W.S. (ft)		Flow Area (sq ft)	1277.38 181.12 226.88
E.G. Slope (ft/ft)	0.001150	Area (sq ft)	1277.38 181.12 226.88
Q Total (cfs)	3780.00	Flow (cfs)	2624.32 735.91 419.77
Top Width (ft)	450.00	Top Width (ft)	330.00 30.00 90.00
Vel Total (ft/s)	2.24	Avg. Vel. (ft/s)	2.05 4.06 1.85
Max Chl Dpth (ft)	6.47	Hydr. Depth (ft)	3.87

6.04	2.52				
	Conv. Total (cfs)	111463.7	Conv. (cfs)	77385.3	
21700.5	12377.9				
	Length Wtd. (ft)	611.99	Wetted Per. (ft)	333.87	
31.27	91.21				
	Min Ch El (ft)	1324.40	Shear (lb/sq ft)	0.27	
0.42	0.18				
	Alpha	1.30	Stream Power (lb/ft s)	0.56	
1.69	0.33				
	Frctn Loss (ft)	0.42	Cum Volume (acre-ft)	876.17	
192.08	190.90				
	C & E Loss (ft)	0.02	Cum SA (acres)	41.19	
28.32	40.29				

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

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 38

INPUT
Description: 2.91
FIS CROSS SECTION M @ STATION 15729

Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9800	1331	10000	1328.5	10100	1325.8	10200	1325.7	10312	1324.6
10315	1322.2	10325	1322.2	10331	1325.3	10400	1325.4	10500	1329.2
10900	1340								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9800	.05	10312	.04	10331	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10312	10331	980	1160	1350	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

	W.S. Elev (ft)	1330.13	Element	Left OB	Channel Right OB
	Vel Head (ft)	0.06	Wt. n-Val.	0.050	0.040 0.050
	E.G. Elev (ft)	1330.19	Reach Len. (ft)	980.00	1160.00 1350.00
	Crit W.S. (ft)		Flow Area (sq ft)	1398.91	137.72 628.32
	E.G. Slope (ft/ft)	0.000658	Area (sq ft)	1398.91	137.72 628.32

Q Total (cfs)	3780.00	Flow (cfs)	2298.21
465.86 1015.93			
Top Width (ft)	664.55	Top Width (ft)	442.20
19.00 203.35			
Vel Total (ft/s)	1.75	Avg. Vel. (ft/s)	1.64
3.38 1.62			
Max Chl Dpth (ft)	7.93	Hydr. Depth (ft)	3.16
7.25 3.09			
Conv. Total (cfs)	147343.6	Conv. (cfs)	89583.7
18159.0 39600.8			
Length Wtd. (ft)	1106.72	Wetted Per. (ft)	442.25
20.60 203.44			
Min Ch El (ft)	1322.20	Shear (lb/sq ft)	0.13
0.27 0.13			
Alpha	1.23	Stream Power (lb/ft s)	0.21
0.93 0.21			
Frctn Loss (ft)	1.40	Cum Volume (acre-ft)	976.03
177.49 281.09			
C & E Loss (ft)	0.03	Cum SA (acres)	102.96
27.87 102.95			

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

W.S. Elev (ft)	1330.48	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.05	Wt. n-Val.	0.050
0.040 0.050			
E.G. Elev (ft)	1330.53	Reach Len. (ft)	980.00
1160.00 1350.00			
Crit W.S. (ft)		Flow Area (sq ft)	1402.46
144.39 560.27			
E.G. Slope (ft/ft)	0.000448	Area (sq ft)	1402.46
144.39 560.27			
Q Total (cfs)	3780.00	Flow (cfs)	2391.89
415.77 972.33			
Top Width (ft)	450.00	Top Width (ft)	312.00
19.00 119.00			
Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)	1.71
2.88 1.74			
Max Chl Dpth (ft)	8.28	Hydr. Depth (ft)	4.50
7.60 4.71			
Conv. Total (cfs)	178629.9	Conv. (cfs)	113032.8
19647.9 45949.2			
Length Wtd. (ft)	1127.46	Wetted Per. (ft)	314.02
20.60 122.21			
Min Ch El (ft)	1322.20	Shear (lb/sq ft)	0.12
0.20 0.13			
Alpha	1.10	Stream Power (lb/ft s)	0.21
0.56 0.22			
Frctn Loss (ft)	1.30	Cum Volume (acre-ft)	858.33

189.13	185.66				
C & E Loss (ft)		0.08	Cum SA (acres)		36.91
27.87	38.90				

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need
for additional cross sections.
Warning - The conveyance ratio (upstream 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: P37

INPUT
Description: 2.69
G&O CROSS SECTION @ STATION 14569

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9450	1340	9560	1337.2	9670	1335.4	9780	1333.2	9890	1330.9
10000	1328.6	10170	1326.2	10200	1325	10264	1327.6	10400	1328.7
10600	1328.5	10716	1328.1	10731	1323.7	10776	1323.4	10829	1325
10848	1327.9	11000	1333.1	11100	1336.1				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9450	.05	10170	.04	10848	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10716	10848	80	120	150	.1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1328.42	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.34	Wt. n-Val.	0.043	0.040	0.050
E.G. Elev (ft)	1328.76	Reach Len. (ft)	80.00	120.00	150.00
Crit W.S. (ft)		Flow Area (sq ft)	449.92	517.64	3.91
E.G. Slope (ft/ft)	0.003367	Area (sq ft)	449.92	517.64	3.91
Q Total (cfs)	3780.00	Flow (cfs)	1014.88		

2762.39 2.73			
Top Width (ft)	591.10	Top Width (ft)	443.98
132.00 15.11			
Vel Total (ft/s)	3.89	Avg. Vel. (ft/s)	2.26
5.34 0.70			
Max Chl Dpth (ft)	5.02	Hydr. Depth (ft)	1.01
3.92 0.26			
Conv. Total (cfs)	65146.7	Conv. (cfs)	17490.9
47608.6 47.1			
Length Wtd. (ft)	114.64	Wetted Per. (ft)	444.08
132.88 15.12			
Min Ch El (ft)	1323.40	Shear (lb/sq ft)	0.21
0.82 0.05			
Alpha	1.46	Stream Power (lb/ft s)	0.48
4.37 0.04			
Frctn Loss (ft)	0.90	Cum Volume (acre-ft)	955.23
168.76 271.30			
C & E Loss (ft)	0.13	Cum SA (acres)	92.99
25.86 99.56			

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.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1328.25	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.90	Wt. n-Val.	0.040
0.040 0.050			
E.G. Elev (ft)	1329.15	Reach Len. (ft)	80.00
120.00 150.00			
Crit W.S. (ft)		Flow Area (sq ft)	3.38
495.94 0.64			
E.G. Slope (ft/ft)	0.007261	Area (sq ft)	3.38
495.94 0.64			
Q Total (cfs)	3780.00	Flow (cfs)	1.92
3777.39 0.69			
Top Width (ft)	178.25	Top Width (ft)	44.25
132.00 2.00			
Vel Total (ft/s)	7.56	Avg. Vel. (ft/s)	0.57
7.62 1.08			
Max Chl Dpth (ft)	4.85	Hydr. Depth (ft)	0.08
3.76 0.32			
Conv. Total (cfs)	44359.0	Conv. (cfs)	22.6
44328.3 8.1			
Length Wtd. (ft)	119.53	Wetted Per. (ft)	44.25
132.88 2.29			
Min Ch El (ft)	1323.40	Shear (lb/sq ft)	0.03
1.69 0.13			

Alpha		1.01	Stream Power (lb/ft s)	0.02	
12.89	0.14				
Frctn Loss (ft)		1.38	Cum Volume (acre-ft)	842.51	
180.60	176.97				
C & E Loss (ft)		0.03	Cum SA (acres)	32.90	
25.86	37.02				

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

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 36

INPUT
Description: 2.668
G&O CROSS SECTION @ STATION 14449

Station Elevation Data num= 11

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9450	1340	10000	1329	10100	1327	10200	1327	10250	1327
10500	1327	10760	1326	10800	1321	10850	1322	10875	1328
11200	1340								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9450	.05	10760	.06	10875	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10760	10875	90	120	160	.1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)		1326.04	Element	Left OB	Channel Right OB
Vel Head (ft)		1.69	Wt. n-Val.	0.050	0.060
E.G. Elev (ft)		1327.73	Reach Len. (ft)	90.00	120.00 160.00
Crit W.S. (ft)		1326.04	Flow Area (sq ft)	0.23	362.78
E.G. Slope (ft/ft)		0.035030	Area (sq ft)	0.23	362.78
Q Total (cfs)		3780.00	Flow (cfs)	0.09	3779.91
Top Width (ft)		117.66	Top Width (ft)	10.82	

106.84			
Vel Total (ft/s)	10.41	Avg. Vel. (ft/s)	0.42
10.42			
Max Chl Dpth (ft)	5.04	Hydr. Depth (ft)	0.02
3.40			
Conv. Total (cfs)	20196.4	Conv. (cfs)	0.5
20195.9			
Length Wtd. (ft)	111.85	Wetted Per. (ft)	10.82
107.64			
Min Ch El (ft)	1321.00	Shear (lb/sq ft)	0.05
7.37			
Alpha	1.00	Stream Power (lb/ft s)	0.02
76.80			
Frctn Loss (ft)	1.18	Cum Volume (acre-ft)	954.82
167.55 271.29			
C & E Loss (ft)	0.46	Cum SA (acres)	92.57
25.53 99.54			

Warning - The energy equation could not be balanced within the specified number of iterations. The
program used critical depth for the water surface and continued on with the calculations.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need
for additional cross sections.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to
critical depth, the calculated water surface came back below critical depth. This indicates
that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1326.58	Element	Left OB
Channel Right OB			
Vel Head (ft)	1.17	Wt. n-Val.	0.050
0.060			
E.G. Elev (ft)	1327.75	Reach Len. (ft)	90.00
120.00 160.00			
Crit W.S. (ft)	1326.05	Flow Area (sq ft)	40.00
420.38			
E.G. Slope (ft/ft)	0.021033	Area (sq ft)	40.00
420.38			
Q Total (cfs)	3780.00	Flow (cfs)	87.75
3692.25			
Top Width (ft)	219.06	Top Width (ft)	110.00
109.06			

Vel Total (ft/s)	8.21	Avg. Vel. (ft/s)	2.19
8.78			
Max Chl Dpth (ft)	5.58	Hydr. Depth (ft)	0.36
3.85			
Conv. Total (cfs)	26064.1	Conv. (cfs)	605.1
25459.0			
Length Wtd. (ft)	115.63	Wetted Per. (ft)	110.15
109.93			
Min Ch El (ft)	1321.00	Shear (lb/sq ft)	0.48
5.02			
Alpha	1.12	Stream Power (lb/ft s)	1.05
44.10			
Frctn Loss (ft)	1.73	Cum Volume (acre-ft)	842.47
179.34 176.97			
C & E Loss (ft)	0.18	Cum SA (acres)	32.76
25.53 37.02			

Warning - The 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 - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 35

INPUT
Description: 2.645
G&O CROSS SECTION @ STATION 14329

Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9780	1330	10010	1325	10060	1324	10200	1324	10500	1324
10700	1323	10750	1319	10820	1325	10850	1330		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9780	.05	10700	.06	10820	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10700	10820	90	130	160 .1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1325.13	Element	Left OB Channel Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.050

0.060 0.050			
E.G. Elev (ft)	1325.29	Reach Len. (ft)	90.00
130.00 160.00			
Crit W.S. (ft)		Flow Area (sq ft)	854.33
425.47 0.05			
E.G. Slope (ft/ft)	0.004982	Area (sq ft)	854.33
425.47 0.05			
Q Total (cfs)	3780.00	Flow (cfs)	2054.62
1725.36 0.02			
Top Width (ft)	816.70	Top Width (ft)	695.93
120.00 0.77			
Vel Total (ft/s)	2.95	Avg. Vel. (ft/s)	2.40
4.06 0.33			
Max Chl Dpth (ft)	6.13	Hydr. Depth (ft)	1.23
3.55 0.06			
Conv. Total (cfs)	53552.2	Conv. (cfs)	29108.3
24443.7 0.2			
Length Wtd. (ft)	114.37	Wetted Per. (ft)	695.94
120.42 0.78			
Min Ch El (ft)	1319.00	Shear (lb/sq ft)	0.38
1.10 0.02			
Alpha	1.22	Stream Power (lb/ft s)	0.92
4.46 0.01			
Frctn Loss (ft)	0.15	Cum Volume (acre-ft)	953.93
166.46 271.29			
C & E Loss (ft)	0.04	Cum SA (acres)	91.84
25.21 99.54			

Warning - The conveyance ratio (upstream 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

W.S. Elev (ft)	1325.27	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.55	Wt. n-Val.	0.050
0.060			
E.G. Elev (ft)	1325.82	Reach Len. (ft)	90.00
130.00 160.00			
Crit W.S. (ft)		Flow Area (sq ft)	202.22
442.67			
E.G. Slope (ft/ft)	0.011292	Area (sq ft)	202.22
442.67			
Q Total (cfs)	3780.00	Flow (cfs)	1009.34
2770.66			
Top Width (ft)	220.00	Top Width (ft)	100.00
120.00			
Vel Total (ft/s)	5.86	Avg. Vel. (ft/s)	4.99
6.26			
Max Chl Dpth (ft)	6.27	Hydr. Depth (ft)	2.02
3.69			
Conv. Total (cfs)	35571.5	Conv. (cfs)	9498.4
26073.1			
Length Wtd. (ft)	119.99	Wetted Per. (ft)	101.77
120.69			
Min Ch El (ft)	1319.00	Shear (lb/sq ft)	1.40
2.59			

Alpha	1.03	Stream Power (lb/ft s)	6.99
16.18			
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)	842.22
178.15 176.97			
C & E Loss (ft)	0.12	Cum SA (acres)	32.55
25.22 37.02			

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

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 34

INPUT
Description: 2.62
FIS CROSS SECTION L @ STATION 14199

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9700	1330	10000	1323.1	10100	1319.7	10176	1319	10188	1316.6
10198	1319.8	10259	1319.6	10294	1319.1	10300	1316.7	10310	1316.7
10314	1319.1	10400	1322.4	10500	1324.8	10750	1330		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9700	.05	10176	.06	10314	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10176	10314	800	840	790 .1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1325.06	Element	Left OB Channel Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.050 0.060 0.050
E.G. Elev (ft)	1325.11	Reach Len. (ft)	800.00 840.00 790.00
Crit W.S. (ft)		Flow Area (sq ft)	884.61 838.33 519.14
E.G. Slope (ft/ft)	0.000580	Area (sq ft)	884.61 838.33 519.14
Q Total (cfs)	3780.00	Flow (cfs)	1426.33 1649.30 704.37
Top Width (ft)	598.11	Top Width (ft)	261.41 138.00 198.71
Vel Total (ft/s)	1.69	Avg. Vel. (ft/s)	1.61 1.97 1.36
Max Chl Dpth (ft)	8.46	Hydr. Depth (ft)	3.38

6.07 2.61			
Conv. Total (cfs)	157005.3	Conv. (cfs)	59243.8
68505.0 29256.5			
Length Wtd. (ft)	811.32	Wetted Per. (ft)	261.49
139.87 198.80			
Min Ch El (ft)	1316.60	Shear (lb/sq ft)	0.12
0.22 0.09			
Alpha	1.06	Stream Power (lb/ft s)	0.20
0.43 0.13			
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	952.14
164.58 270.34			
C & E Loss (ft)	0.01	Cum SA (acres)	90.85
24.83 99.17			

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

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1325.20	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.15	Wt. n-Val.	0.050
0.060 0.050			
E.G. Elev (ft)	1325.35	Reach Len. (ft)	800.00
840.00 790.00			
Crit W.S. (ft)		Flow Area (sq ft)	304.06
856.61 64.74			
E.G. Slope (ft/ft)	0.001335	Area (sq ft)	304.06
856.61 64.74			
Q Total (cfs)	3780.00	Flow (cfs)	1011.32
2595.04 173.64			
Top Width (ft)	200.00	Top Width (ft)	51.00
138.00 11.00			
Vel Total (ft/s)	3.08	Avg. Vel. (ft/s)	3.33
3.03 2.68			
Max Chl Dpth (ft)	8.60	Hydr. Depth (ft)	5.96
6.21 5.89			
Conv. Total (cfs)	103438.4	Conv. (cfs)	27674.5
71012.3 4751.6			
Length Wtd. (ft)	820.80	Wetted Per. (ft)	56.73
139.87 16.68			
Min Ch El (ft)	1316.60	Shear (lb/sq ft)	0.45
0.51 0.32			
Alpha	1.01	Stream Power (lb/ft s)	1.49
1.55 0.87			
Frctn Loss (ft)	0.50	Cum Volume (acre-ft)	841.70
176.21 176.85			
C & E Loss (ft)	0.02	Cum SA (acres)	32.39
24.83 37.00			

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

CROSS SECTION RIVER: RIVER-1

REACH: Reach-1 RS: 33

INPUT
Description: 2"46
FIS CROSS SECTION K @ STATION 13359

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9250	1330	9400	1327.5	9550	1324.9	9700	1322.4	9850	1319.8
10000	1317.3	10050	1316.1	10100	1316.4	10116	1314.2	10153	1312.7
10158	1313.8	10164	1317	10200	1317.7	10250	1320.6	10300	1321.6
10960	1330								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9250	.05	10100	.06	10164	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10100	10164	100	100	100 .3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1324.92	Element	Left OB Channel Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.050 0.060 0.050
E.G. Elev (ft)	1324.93	Reach Len. (ft)	100.00 100.00 100.00
Crit W.S. (ft)		Flow Area (sq ft)	2563.52 693.78 1185.07
E.G. Slope (ft/ft)	0.000105	Area (sq ft)	2563.52 693.78 1185.07
Q Total (cfs)	3780.00	Flow (cfs)	2177.41 853.57 749.02
Top Width (ft)	1012.02	Top Width (ft)	551.16 64.00 396.86
Vel Total (ft/s)	0.85	Avg. Vel. (ft/s)	0.85 1.23 0.63
Max Chl Dpth (ft)	12.22	Hydr. Depth (ft)	4.65 10.84 2.99
Conv. Total (cfs)	368479.9	Conv. (cfs)	212256.7 83207.4 73015.7
Length Wtd. (ft)	100.00	Wetted Per. (ft)	551.23 65.10 396.98
Min Ch El (ft)	1312.70	Shear (lb/sq ft)	0.03 0.07 0.02
Alpha	1.16	Stream Power (lb/ft s)	0.03 0.09 0.01
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	920.47 149.80 254.88
C & E Loss (ft)	0.00	Cum SA (acres)	83.39

22.88 93.77

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

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1324.75	Element	Left OB	Channel Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.050	0.060 0.050
E.G. Elev (ft)	1324.82	Reach Len. (ft)	100.00	100.00 100.00
Crit W.S. (ft)		Flow Area (sq ft)	827.88	683.14 266.54
E.G. Slope (ft/ft)	0.000344	Area (sq ft)	827.88	683.14 266.54
Q Total (cfs)	3780.00	Flow (cfs)	1780.27	1504.35 495.38
Top Width (ft)	200.00	Top Width (ft)	100.00	64.00 36.00
Vel Total (ft/s)	2.13	Avg. Vel. (ft/s)	2.15	2.20 1.86
Max Chl Dpth (ft)	12.05	Hydr. Depth (ft)	8.28	10.67 7.40
Conv. Total (cfs)	203760.0	Conv. (cfs)	95965.1	81091.4 26703.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	107.47	65.10 43.06
Min Ch El (ft)	1312.70	Shear (lb/sq ft)	0.17	0.23 0.13
Alpha	1.01	Stream Power (lb/ft s)	0.36	0.50 0.25
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	831.30	161.37 173.85
C & E Loss (ft)	0.01	Cum SA (acres)	31.00	22.88 36.57

Warning - The conveyance ratio (upstream 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: 32

INPUT
Description: 2.419
G&O BRIDGE TABLE FOR KANSAS TURNPIKE I-35

Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev

8900	1330	9280	1320	9500	1319	9600	1318.4	9700
1317.9								
9800	1317.5	9900	1317	10000	1316.5	10050	1315.5	10075
1315								
10100	1314.5	10108.5	1314	10108.5	1313.3	10118.5	1313.3	10118.5
1320.6								
10119.5	1320.6	10119.5	1313.3	10129.5	1313.3	10129.5	1314	10165
1314.8								
10200	1315.5	10250	1315.9	10300	1317	10400	1319.5	10420
1320								
10500	1321.4	10600	1323.2	10700	1325	10980	1330	

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8900	.05	10108.5	.02	10129.5	.05

KTA Bridge

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10108.5	10129.5	83	83	.3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1324.92	Element	Left OB Channel Right OB
Vel Head (ft)	0.00	Wt. n-Val.	0.050 0.020 0.050
E.G. Elev (ft)	1324.92	Reach Len. (ft)	0.00 0.00 0.00
Crit W.S. (ft)	1317.95	Flow Area (sq ft)	6291.79 236.76 3053.08
E.G. Slope (ft/ft)	0.000015	Area (sq ft)	6291.79 236.76 3053.08
Q Total (cfs)	3780.00	Flow (cfs)	2457.00 236.18 1086.82
Top Width (ft)	1602.68	Top Width (ft)	1015.53 21.00 566.15
Vel Total (ft/s)	0.39	Avg. Vel. (ft/s)	0.39 1.00 0.36
Max Chl Dpth (ft)	11.62	Hydr. Depth (ft)	6.20 11.27 5.39
Conv. Total (cfs)	970310.8	Conv. (cfs)	630701.8 60627.2 278981.9
Length Wtd. (ft)	0.00	Wetted Per. (ft)	1015.63 37.00 566.26
Min Ch El (ft)	1313.30	Shear (lb/sq ft)	0.01 0.01 0.01
Alpha	1.27	Stream Power (lb/ft s)	0.00 0.01 0.00
Frctn Loss (ft)		Cum Volume (acre-ft)	910.31 148.73 250.02
C & E Loss (ft)		Cum SA (acres)	81.59 22.78 92.66

Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1324.74	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.05	Wt. n-Val.	0.050
0.020 0.050			
E.G. Elev (ft)	1324.79	Reach Len. (ft)	0.00
0.00 0.00			
Crit W.S. (ft)	1317.79	Flow Area (sq ft)	1013.71
233.04 1155.32			
E.G. Slope (ft/ft)	0.000128	Area (sq ft)	1013.71
233.04 1155.32			
Q Total (cfs)	3780.00	Flow (cfs)	1439.68
668.13 1672.20			
Top Width (ft)	250.00	Top Width (ft)	108.50
21.00 120.50			
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.42
2.87 1.45			
Max Chl Dpth (ft)	11.44	Hydr. Depth (ft)	9.34
11.10 9.59			
Conv. Total (cfs)	334088.2	Conv. (cfs)	127243.1
59051.2 147793.8			
Length Wtd. (ft)	0.00	Wetted Per. (ft)	116.78
37.00 129.36			
Min Ch El (ft)	1313.30	Shear (lb/sq ft)	0.07
0.05 0.07			
Alpha	1.27	Stream Power (lb/ft s)	0.10
0.14 0.10			
Frctn Loss (ft)		Cum Volume (acre-ft)	829.19
160.32 172.22			
C & E Loss (ft)		Cum SA (acres)	30.76
22.79 36.39			

Warning - The parabolic search method failed to converge on critical depth.
The program will try the
cross section slice/secant method to find critical depth.

BRIDGE RIVER: RIVER-1
REACH: Reach-1 RS: 31.5

INPUT
Description: Bridge #5

Distance from Upstream XS = 0
Deck/Roadway Width = 83
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 16

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
8900	1330	1330	9500	1329.6	1319	9600	1328.9	1318.4
9700	1328.4	1317.9	9800	1328.1	1317.5	9900	1328	1317
10108.5	1328	1314	10108.5	1328	1320.6	10129.5	1328	1320.6
10129.5	1328	1314	10300	1328	1317	10400	1328.1	1319.5
10500	1328.3	1321.4	10600	1328.7	1323.2	10700	1329.2	1325
10980	1330	1330						

Upstream Bridge Cross Section Data
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta

W.S. Elev (ft)	1324.74	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.05	Wt. n-Val.	0.050
0.020 0.050			
E.G. Elev (ft)	1324.79	Reach Len. (ft)	0.00
0.00 0.00			
Crit W.S. (ft)	1317.79	Flow Area (sq ft)	1013.71
233.04 1155.32			
E.G. Slope (ft/ft)	0.000128	Area (sq ft)	1013.71
233.04 1155.32			
Q Total (cfs)	3780.00	Flow (cfs)	1439.68
668.13 1672.20			
Top Width (ft)	250.00	Top Width (ft)	108.50
21.00 120.50			
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.42
2.87 1.45			
Max Chl Dpth (ft)	11.44	Hydr. Depth (ft)	9.34
11.10 9.59			
Conv. Total (cfs)	334088.2	Conv. (cfs)	127243.1
59051.2 147793.8			
Length Wtd. (ft)	0.00	Wetted Per. (ft)	116.78
37.00 129.36			
Min Ch El (ft)	1313.30	Shear (lb/sq ft)	0.07
0.05 0.07			
Alpha	1.27	Stream Power (lb/ft s)	0.10
0.14 0.10			
Frctn Loss (ft)		Cum Volume (acre-ft)	829.19
160.32 172.22			
C & E Loss (ft)		Cum SA (acres)	30.76
22.79 36.39			

Warning - The parabolic search method failed to converge on critical depth.
The program will try the
cross section slice/secant method to find critical depth.

BRIDGE RIVER: RIVER-1
REACH: Reach-1 RS: 31.5

INPUT
Description: Bridge #5

Distance from Upstream XS = 0
Deck/Roadway Width = 83
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 16

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
8900	1330	1330	9500	1329.6	1319	9600	1328.9	1318.4
9700	1328.4	1317.9	9800	1328.1	1317.5	9900	1328	1317
10108.5	1328	1314	10108.5	1328	1320.6	10129.5	1328	1320.6
10129.5	1328	1314	10300	1328	1317	10400	1328.1	1319.5
10500	1328.3	1321.4	10600	1328.7	1323.2	10700	1329.2	1325
10980	1330	1330						

Upstream Bridge Cross Section Data
Station Elevation Data num= 29

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta

Elev
8900 1330 9280 1320 9500 1319 9600 1318.4 9700
1317.9
9800 1317.5 9900 1317 10000 1316.5 10050 1315.5 10075
1315
10100 1314.5 10108.5 1314 10108.5 1313.3 10118.5 1313.3 10118.5
1320.6
10119.5 1320.6 10119.5 1313.3 10129.5 1313.3 10129.5 1314 10165
1314.8
10200 1315.5 10250 1315.9 10300 1317 10400 1319.5 10420
1320
10500 1321.4 10600 1323.2 10700 1325 10980 1330

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8900	.05	10108.5	.02	10129.5	.05

Bank Sta: Left Right Coeff Contr. Expan.
10108.5 10129.5 .3 .5

Downstream Deck/Roadway Coordinates
num= 16

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
8900	1330	1330	9500	1329.6	1319	9600	1328.9	1318.4
9700	1328.4	1317.9	9800	1328.1	1317.5	9900	1328	1317
10108.5	1328	1314	10108.5	1328	1320.6	10129.5	1328	1320.6
10129.5	1328	1314	10300	1328	1317	10400	1328.1	1319.5
10500	1328.3	1321.4	10600	1328.7	1323.2	10700	1329.2	1325
10980	1330	1330						

Downstream Bridge Cross Section Data
Station Elevation Data num= 16
Sta Elev Sta Elev Sta Elev Sta Elev Sta
Elev
8900 1330 9280 1320 10000 1316.5 10050 1315.5 10075
1315
10100 1314.5 10108.5 1314 10108.5 1313.3 10129.5 1313.3 10129.5
1314
10165 1314.8 10200 1315.5 10250 1315.9 10300 1317 10420
1320
10980 1330

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8900	.05	10108.5	.06	10129.5	.05

Bank Sta: Left Right Coeff Contr. Expan.
10108.5 10129.5 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
8900	10108.5	1321	10129.5	10980	1321

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 1328
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 10119 Downstream= 10119
Upstream num= 2
Width Elev Width Elev
1 1313.3 1 1320.6
Downstream num= 2
Width Elev Width Elev
1 1313.3 1 1320.6

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Yarnell KVal = 1.25
Selected Low Flow Methods = Yarnell

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd =.8006408
Max Low Cord = 1320.6

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the downstream end
Criteria to check for pressure flow = Upstream water surface

BRIDGE OUTPUT: Profile #PF#1
Opening : Bridge #1

E.G. US. (ft)	1324.92	Element	Inside BR US
Inside BR DS			
W.S. US. (ft)	1324.92	E.G. Elev (ft)	1325.25
1322.86			
Q Total (cfs)	3780.00	W.S. Elev (ft)	1323.76
1321.53			
Q Bridge (cfs)	3780.00	Crit W.S. (ft)	1322.36
1321.53			
Q Weir (cfs)		Max Chl Dpth (ft)	10.45
8.23			
Weir Sta Lft (ft)		Vel Total (ft/s)	5.10
7.83			
Weir Sta Rgt (ft)		Flow Area (sq ft)	741.38
482.63			
Weir Submerg		Froude # Chl	0.68
2.01			
Weir Max Depth (ft)		Specif Force (cu ft)	3394.85
2115.61			
Min Top Rd (ft)	1328.00	Hydr Depth (ft)	7.18
3.44			
Min El Prs (ft)	1320.60	W.P. Total (ft)	837.27
1020.61			
Delta EG (ft)	3.90	Conv. Total (cfs)	34676.4
12925.2			
Delta WS (ft)	3.91	Top Width (ft)	103.33
140.16			
BR Open Area (sq ft)	1064.02	Frctn Loss (ft)	

BR Open Vel (ft/s)	7.83	C & E Loss (ft)	
Coef of Q		Shear Total (lb/sq ft)	0.66
2.52			
Br Sel Mthd	Momentum	Power Total (lb/ft s)	3.35
19.78			

Warning - The flow regime calculated by the momentum equation shows class B flow. For the best
solution, this profile should be run as a mixed flow problem.
Note - The water surface computed by the sluice gate equation (during pressure only calculations) is
below the physical low chord of the bridge.
Note - The downstream water surface is below the minimum elevation for pressure flow. The sluice
gate equations were used for pressure flow.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

BRIDGE OUTPUT Profile #PF#2
Opening : Bridge #1

E.G. US. (ft)	1324.79	Element	Inside BR US
Inside BR DS			
W.S. US. (ft)	1324.74	E.G. Elev (ft)	1325.25
1322.86			
Q Total (cfs)	3780.00	W.S. Elev (ft)	1323.76
1321.53			
Q Bridge (cfs)	3780.00	Crit W.S. (ft)	1322.36
1321.53			
Q Weir (cfs)		Max Chl Dpth (ft)	10.45
8.23			
Weir Sta Lft (ft)		Vel Total (ft/s)	5.10
7.83			
Weir Sta Rgt (ft)		Flow Area (sq ft)	741.38
482.63			
Weir Submerg		Froude # Chl	0.68
2.01			
Weir Max Depth (ft)		Specif Force (cu ft)	3394.85
2115.61			
Min Top Rd (ft)	1328.00	Hydr Depth (ft)	7.18
3.44			
Min El Prs (ft)	1320.60	W.P. Total (ft)	837.27
1020.61			
Delta EG (ft)	3.68	Conv. Total (cfs)	34676.4
12925.2			
Delta WS (ft)	3.74	Top Width (ft)	103.33
140.16			
BR Open Area (sq ft)	1064.02	Frctn Loss (ft)	
BR Open Vel (ft/s)	7.83	C & E Loss (ft)	
Coef of Q		Shear Total (lb/sq ft)	0.66
2.52			
Br Sel Mthd	Momentum	Power Total (lb/ft s)	3.35
19.78			

Warning - The flow regime calculated by the momentum equation shows class B flow. For the best
solution, this profile should be run as a mixed flow problem.
Note - The water surface computed by the sluice gate equation (during pressure only calculations) is
below the physical low chord of the bridge.
Note - The downstream water surface is below the minimum elevation for pressure flow. The sluice
gate equations were used for pressure flow.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 31

INPUT
Description: 2.418
This is a REPEATED section.
G&O CROSS SECTION @ STATION
13176

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8900	1330	9280	1320	10000	1316.5	10050	1315.5	10075	1315
10100	1314.5	10108.5	1314	10108.5	1313.3	10129.5	1313.3	10129.5	1314
10165	1314.8	10200	1315.5	10250	1315.9	10300	1317	10420	1320
10980	1330								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
8900	.05	10108.5	.06	10129.5	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
10108.5	10129.5	105	85	75	.3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
8900	10108.5	1321	10129.5	10980	1321

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1321.01	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.050	0.060	0.050
E.G. Elev (ft)	1321.02	Reach Len. (ft)	105.00	85.00	75.00
Crit W.S. (ft)	1321.01	Flow Area (sq ft)	2612.93		

161.86 1262.17			
E.G. Slope (ft/ft)	0.000202	Area (sq ft)	2612.93
161.86 1262.17			
Q Total (cfs)	3780.00	Flow (cfs)	2304.92
213.11 1261.96			
Top Width (ft)	1234.71	Top Width (ft)	866.79
21.00 346.92			
Vel Total (ft/s)	0.94	Avg. Vel. (ft/s)	0.88
1.32 1.00			
Max Chl Dpth (ft)	7.71	Hydr. Depth (ft)	3.01
7.71 3.64			
Conv. Total (cfs)	265734.3	Conv. (cfs)	162036.2
14982.0 88716.1			
Length Wtd. (ft)	92.09	Wetted Per. (ft)	866.84
22.40 347.00			
Min Ch El (ft)	1313.30	Shear (lb/sq ft)	0.04
0.09 0.05			
Alpha	1.03	Stream Power (lb/ft s)	0.03
0.12 0.05			
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	909.44
148.46 250.00			
C & E Loss (ft)	0.02	Cum SA (acres)	81.36
22.78 92.66			

Warning - The energy equation could not be balanced within the specified number of iterations. The
program used critical depth for the water surface and continued on with the calculations.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.
Warning - During the standard step iterations, when the assumed water surface was set equal to
critical depth, the calculated water surface came back below critical depth. This indicates
that there is not a valid subcritical answer. The program defaulted to critical depth.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1321.01	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.10	Wt. n-Val.	0.050
0.060 0.050			
E.G. Elev (ft)	1321.11	Reach Len. (ft)	105.00
85.00 75.00			
Crit W.S. (ft)	1321.01	Flow Area (sq ft)	608.20
161.86 704.96			
E.G. Slope (ft/ft)	0.000765	Area (sq ft)	608.20
161.86 704.96			
Q Total (cfs)	3780.00	Flow (cfs)	1535.30

414.47 1830.23			
Top Width (ft)	250.00	Top Width (ft)	108.50
21.00 120.50			
Vel Total (ft/s)	2.56	Avg. Vel. (ft/s)	2.52
2.56 2.60			
Max Chl Dpth (ft)	7.71	Hydr. Depth (ft)	5.61
7.71 5.85			
Conv. Total (cfs)	136637.0	Conv. (cfs)	55497.2
14982.0 66157.8			
Length Wtd. (ft)	88.21	Wetted Per. (ft)	113.04
22.40 125.63			
Min Ch El (ft)	1313.30	Shear (lb/sq ft)	0.26
0.35 0.27			
Alpha	1.00	Stream Power (lb/ft s)	0.65
0.88 0.70			
Frctn Loss (ft)	0.11	Cum Volume (acre-ft)	828.32
160.04 172.20			
C & E Loss (ft)	0.01	Cum SA (acres)	30.53
22.79 36.39			

Warning - The energy equation could not be balanced within the specified number of iterations. The
program used critical depth for the water surface and continued on with the calculations.
Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The cross section had to be extended vertically during the critical depth 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.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 30

INPUT
Description: 2.4
FIS CROSS SECTION J @ STATION 13901 13091

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
8900	1330	9280	1320	10000	1316.5	10050	1315.5	10075	1315
10100	1314.5	10108.5	1314	10108.5	1313.3	10129.5	1313.3	10129.5	1314
10165	1314.8	10200	1315.5	10250	1315.9	10300	1317	10420	1320

10980 1330

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
8900	.1	10075	.05	10108.5	.06	10129.5	.05	10165	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10108.5	10129.5	1000	1000	960 .3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1319.36	Element	Left OB Channel Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.082 0.060 0.076
E.G. Elev (ft)	1319.43	Reach Len. (ft)	1000.00 1000.00 960.00
Crit W.S. (ft)		Flow Area (sq ft)	1269.56 127.22 762.86
E.G. Slope (ft/ft)	0.002341	Area (sq ft)	1269.56 127.22 762.86
Q Total (cfs)	3780.00	Flow (cfs)	1769.69 485.28 1525.03
Top Width (ft)	982.32	Top Width (ft)	696.49 21.00 264.83
Vel Total (ft/s)	1.75	Avg. Vel. (ft/s)	1.39 3.81 2.00
Max Chl Dpth (ft)	6.06	Hydr. Depth (ft)	1.82 6.06 2.88
Conv. Total (cfs)	78124.6	Conv. (cfs)	36575.8 10029.7 31519.2
Length Wtd. (ft)	978.43	Wetted Per. (ft)	696.53 22.40 264.89
Min Ch El (ft)	1313.30	Shear (lb/sq ft)	0.27 0.83 0.42
Alpha	1.43	Stream Power (lb/ft s)	0.37 3.17 0.84
Frctn Loss (ft)	0.85	Cum Volume (acre-ft)	904.76 148.17 248.26
C & E Loss (ft)	0.02	Cum SA (acres)	79.48 22.74 92.14

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

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1320.13	Element	Left OB Channel Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.071 0.060 0.073
E.G. Elev (ft)	1320.28	Reach Len. (ft)	1000.00 1000.00 960.00

Crit W.S. (ft)		Flow Area (sq ft)	513.30
143.49 599.57			
E.G. Slope (ft/ft)	0.002391	Area (sq ft)	513.30
143.49 599.57			
Q Total (cfs)	3780.00	Flow (cfs)	1456.23
599.38 1724.39			
Top Width (ft)	250.00	Top Width (ft)	108.50
21.00 120.50			
Vel Total (ft/s)	3.01	Avg. Vel. (ft/s)	2.84
4.18 2.88			
Max Chl Dpth (ft)	6.83	Hydr. Depth (ft)	4.73
6.83 4.98			
Conv. Total (cfs)	77299.2	Conv. (cfs)	29779.1
12257.0 35263.1			
Length Wtd. (ft)	976.07	Wetted Per. (ft)	112.17
22.40 124.75			
Min Ch El (ft)	1313.30	Shear (lb/sq ft)	0.68
0.96 0.72			
Alpha	1.07	Stream Power (lb/ft s)	1.94
3.99 2.06			
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	826.97
159.74 171.08			
C & E Loss (ft)	0.02	Cum SA (acres)	30.27
22.75 36.18			

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was 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: 29

INPUT
Description: 2.21
FIS CROSS SECTION I @ STATION 12091

Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9990	1320	10000	1318.4	10100	1316.3	10200	1315.1	10309	1311.5
10320	1308.2	10328	1311.4	10400	1311.7	10500	1313.2	10850	1320

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9990	.05	10200	.07	10400	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10309	10328	820	810	770 .1

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1318.53	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.04	Wt. n-Val.	0.063
0.070 0.056			
E.G. Elev (ft)	1318.56	Reach Len. (ft)	820.00
810.00 770.00			
Crit W.S. (ft)		Flow Area (sq ft)	969.84
165.24 1839.85			
E.G. Slope (ft/ft)	0.000488	Area (sq ft)	969.84
165.24 1839.85			
Q Total (cfs)	4450.00	Flow (cfs)	1220.57
315.72 2913.71			
Top Width (ft)	774.91	Top Width (ft)	309.79
19.00 446.13			
Vel Total (ft/s)	1.50	Avg. Vel. (ft/s)	1.26
1.91 1.58			
Max Chl Dpth (ft)	10.33	Hydr. Depth (ft)	3.13
8.70 4.12			
Conv. Total (cfs)	201379.7	Conv. (cfs)	55235.4
14287.6 131856.7			
Length Wtd. (ft)	793.96	Wetted Per. (ft)	309.88
20.10 446.19			
Min Ch El (ft)	1308.20	Shear (lb/sq ft)	0.10
0.25 0.13			
Alpha	1.04	Stream Power (lb/ft s)	0.12
0.48 0.20			
Frctn Loss (ft)	0.18	Cum Volume (acre-ft)	879.05
144.82 219.58			
C & E Loss (ft)	0.01	Cum SA (acres)	67.93
22.28 84.30			

Warning - The conveyance ratio (upstream 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

W.S. Elev (ft)	1318.82	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.11	Wt. n-Val.	0.070
0.070 0.058			
E.G. Elev (ft)	1318.93	Reach Len. (ft)	820.00
810.00 770.00			
Crit W.S. (ft)		Flow Area (sq ft)	374.22
170.77 1159.93			
E.G. Slope (ft/ft)	0.000940	Area (sq ft)	374.22
170.77 1159.93			
Q Total (cfs)	4450.00	Flow (cfs)	787.37
462.86 3199.77			
Top Width (ft)	250.00	Top Width (ft)	59.00
19.00 172.00			
Vel Total (ft/s)	2.61	Avg. Vel. (ft/s)	2.10
2.71 2.76			
Max Chl Dpth (ft)	10.62	Hydr. Depth (ft)	6.34

8.99	6.74		
Conv. Total (cfs)	145110.3	Conv. (cfs)	25675.3
15093.6	104341.4		
Length Wtd. (ft)	796.99	Wetted Per. (ft)	64.40
20.10	177.63		
Min Ch El (ft)	1308.20	Shear (lb/sq ft)	0.34
0.50	0.38		
Alpha	1.03	Stream Power (lb/ft s)	0.72
1.35	1.06		
Frctn Loss (ft)	0.38	Cum Volume (acre-ft)	816.78
156.13	151.69		
C & E Loss (ft)	0.02	Cum SA (acres)	28.35
22.29	32.96		

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

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 128

INPUT
Description: 2.057
G&O CROSS SECTION @ STATION 11281

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9400	1326	9560	1324	9740	1322	9910	1320	9950	1319
10000	1317.3	10015	1315.7	10028	1316.6	10100	1315.4	10206	1312
10267	1310.1	10328	1311.8	10400	1311.6	10500	1314.4	10600	1320
11000	1325								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9400	.05	10206	.02	10328	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10206	10328	20	20	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1318.27	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.11	Wt. n-Val.	0.050
0.020	0.050		
E.G. Elev (ft)	1318.37	Reach Len. (ft)	20.00
20.00	20.00		
Crit W.S. (ft)		Flow Area (sq ft)	714.84
886.44	1132.76		

E.G. Slope (ft/ft)	0.000133	Area (sq ft)	714.84
886.44 1132.76			
Q Total (cfs)	4450.00	Flow (cfs)	514.67
2847.04 1088.29			
Top Width (ft)	597.44	Top Width (ft)	234.41
122.00 241.03			
Vel Total (ft/s)	1.63	Avg. Vel. (ft/s)	0.72
3.21 0.96			
Max Chl Dpth (ft)	8.17	Hydr. Depth (ft)	3.05
7.27 4.70			
Conv. Total (cfs)	386050.6	Conv. (cfs)	44649.0
246989.2 94412.4			
Length Wtd. (ft)	20.00	Wetted Per. (ft)	234.60
122.05 241.18			
Min Ch El (ft)	1310.10	Shear (lb/sq ft)	0.03
0.06 0.04			
Alpha	2.60	Stream Power (lb/ft s)	0.02
0.19 0.04			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	863.19
135.04 193.31			
C & E Loss (ft)	0.02	Cum SA (acres)	62.81
20.97 78.23			

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1318.24	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.29	Wt. n-Val.	0.050
0.020			
E.G. Elev (ft)	1318.53	Reach Len. (ft)	20.00
20.00 20.00			
Crit W.S. (ft)		Flow Area (sq ft)	298.88
882.71			
E.G. Slope (ft/ft)	0.000287	Area (sq ft)	298.88
882.71			
Q Total (cfs)	4450.00	Flow (cfs)	436.47
4013.53			
Top Width (ft)	178.00	Top Width (ft)	56.00
122.00			
Vel Total (ft/s)	3.77	Avg. Vel. (ft/s)	1.46
4.55			
Max Chl Dpth (ft)	8.14	Hydr. Depth (ft)	5.34
7.24			
Conv. Total (cfs)	262777.3	Conv. (cfs)	25773.9
237003.4			
Length Wtd. (ft)	20.00	Wetted Per. (ft)	60.47
128.49			
Min Ch El (ft)	1310.10	Shear (lb/sq ft)	0.09
0.12			
Alpha	1.33	Stream Power (lb/ft s)	0.13
0.56			
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	810.44
146.34 141.44			
C & E Loss (ft)	0.03	Cum SA (acres)	27.27
20.97 31.44			

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

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

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 27

INPUT
Description: 2.054
G&O CROSS SECTION @ STATION 11261

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9400	1326	9560	1324	9740	1322	9910	1320	9950	1319
10000	1312.8	10100	1312	10175	1310	10228	1309.1	10236	1308.9
10246	1309	10300	1310.6	10400	1312	10500	1313.1	10580	1320
11000	1325								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9400	.05	10228	.02	10246	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10175	10300	20	20	20 .1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1318.32	Element	Left OB Channel Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.050 0.040 0.050
E.G. Elev (ft)	1318.35	Reach Len. (ft)	20.00 20.00 20.00
Crit W.S. (ft)		Flow Area (sq ft)	1263.88 1093.16 1436.98
E.G. Slope (ft/ft)	0.000110	Area (sq ft)	1263.88 1093.16 1436.98
Q Total (cfs)	4450.00	Flow (cfs)	1261.98 1792.93 1395.09
Top Width (ft)	605.04	Top Width (ft)	219.52 125.00 260.52
Vel Total (ft/s)	1.17	Avg. Vel. (ft/s)	1.00 1.64 0.97
Max Chl Dpth (ft)	9.42	Hydr. Depth (ft)	5.76 8.75 5.52
Conv. Total (cfs)	424983.5	Conv. (cfs)	120521.8 171228.2 133233.6
Length Wtd. (ft)	20.00	Wetted Per. (ft)	219.89 125.03 260.76
Min Ch El (ft)	1308.90	Shear (lb/sq ft)	0.04 0.06 0.04
Alpha	1.21	Stream Power (lb/ft s)	0.04

0.10 0.04			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	862.74
134.58 192.72			
C & E Loss (ft)	0.00	Cum SA (acres)	62.70
20.92 78.11			

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1318.30	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.19	Wt. n-Val.	0.050
0.040			
E.G. Elev (ft)	1318.49	Reach Len. (ft)	20.00
20.00 20.00			
Crit W.S. (ft)		Flow Area (sq ft)	199.08
1090.20			
E.G. Slope (ft/ft)	0.000576	Area (sq ft)	199.08
1090.20			
Q Total (cfs)	4450.00	Flow (cfs)	474.06
3975.94			
Top Width (ft)	150.00	Top Width (ft)	25.00
125.00			
Vel Total (ft/s)	3.45	Avg. Vel. (ft/s)	2.38
3.65			
Max Chl Dpth (ft)	9.40	Hydr. Depth (ft)	7.96
8.72			
Conv. Total (cfs)	185394.1	Conv. (cfs)	19750.2
165643.9			
Length Wtd. (ft)	20.00	Wetted Per. (ft)	32.64
132.73			
Min Ch El (ft)	1308.90	Shear (lb/sq ft)	0.22
0.30			
Alpha	1.05	Stream Power (lb/ft s)	0.52
1.08			
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	810.33
145.88 141.44			
C & E Loss (ft)	0.01	Cum SA (acres)	27.25
20.92 31.44			

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 26

INPUT
Description: 2.05
G&O CROSS SECTION @ STATION 11241

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9400	1326	9560	1324	9740	1322	9910	1320	9950	1316.7
10000	1312.8	10100	1312	10175	1310	10228	1307.9	10236	1307.7
10246	1307.8	10300	1310.6	10400	1312	10500	1313.1	10580	1320

11000 1325

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9400	.05	10228	.02	10246	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10175	10300	5	5	.1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1318.32	Element	Left OB Channel Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.050 0.040 0.050
E.G. Elev (ft)	1318.34	Reach Len. (ft)	5.00 5.00 5.00
Crit W.S. (ft)		Flow Area (sq ft)	1334.97 1178.73 1436.50
E.G. Slope (ft/ft)	0.000096	Area (sq ft)	1334.97 1178.73 1436.50
Q Total (cfs)	4450.00	Flow (cfs)	1206.63 1935.87 1307.50
Top Width (ft)	630.12	Top Width (ft)	244.62 125.00 260.50
Vel Total (ft/s)	1.13	Avg. Vel. (ft/s)	0.90 1.64 0.91
Max Chl Dpth (ft)	10.62	Hydr. Depth (ft)	5.46 9.43 5.51
Conv. Total (cfs)	453225.8	Conv. (cfs)	122893.7 197165.0 133167.1
Length Wtd. (ft)	5.00	Wetted Per. (ft)	244.86 125.12 260.74
Min Ch El (ft)	1307.70	Shear (lb/sq ft)	0.03 0.06 0.03
Alpha	1.29	Stream Power (lb/ft s)	0.03 0.09 0.03
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	862.14 134.06 192.06
C & E Loss (ft)	0.00	Cum SA (acres)	62.59 20.86 77.99

Warning - The conveyance ratio (upstream 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

W.S. Elev (ft)	1318.30	Element	Left OB Channel Right OB
Vel Head (ft)	0.17	Wt. n-Val.	0.050 0.039
E.G. Elev (ft)	1318.47	Reach Len. (ft)	5.00 5.00 5.00
Crit W.S. (ft)		Flow Area (sq ft)	199.22 1176.70

E.G. Slope (ft/ft)	0.000445	Area (sq ft)	199.22
1176.70			
Q Total (cfs)	4450.00	Flow (cfs)	417.02
4032.98			
Top Width (ft)	150.00	Top Width (ft)	25.00
125.00			
Vel Total (ft/s)	3.23	Avg. Vel. (ft/s)	2.09
3.43			
Max Chl Dpth (ft)	10.60	Hydr. Depth (ft)	7.97
9.41			
Conv. Total (cfs)	210979.3	Conv. (cfs)	19771.2
191208.2			
Length Wtd. (ft)	5.00	Wetted Per. (ft)	32.64
132.82			
Min Ch El (ft)	1307.70	Shear (lb/sq ft)	0.17
0.25			
Alpha	1.06	Stream Power (lb/ft s)	0.35
0.84			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	810.24
145.36 141.44			
C & E Loss (ft)	0.00	Cum SA (acres)	27.24
20.86 31.44			

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

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 25

INPUT
Description: 2 049
G&O CROSS SECTION @ STATION 11236

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9400	1326	9560	1324	9740	1322	9910	1320	9950	1316.7
10000	1312.8	10100	1312	10175	1310	10228	1307.9	10236	1306.2
10246	1307.8	10300	1310.6	10400	1312	10500	1313.1	10580	1320
11000	1325								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9400	.05	10175	.02	10300	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.	
10175	10300	5	5	5	.1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1318.29	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.05	Wt. n-Val.	0.050
0.020 0.050			
E.G. Elev (ft)	1318.34	Reach Len. (ft)	5.00
5.00 5.00			
Crit W.S. (ft)		Flow Area (sq ft)	1327.87
1188.60 1428.94			
E.G. Slope (ft/ft)	0.000047	Area (sq ft)	1327.87
1188.60 1428.94			
Q Total (cfs)	4450.00	Flow (cfs)	835.34
2709.49 905.17			
Top Width (ft)	629.43	Top Width (ft)	244.26
125.00 260.16			
Vel Total (ft/s)	1.13	Avg. Vel. (ft/s)	0.63
2.28 0.63			
Max Chl Dpth (ft)	12.09	Hydr. Depth (ft)	5.44
9.51 5.49			
Conv. Total (cfs)	649506.6	Conv. (cfs)	121923.4
395468.3 132114.8			
Length Wtd. (ft)	5.00	Wetted Per. (ft)	244.51
125.42 260.40			
Min Ch El (ft)	1306.20	Shear (lb/sq ft)	0.02
0.03 0.02			
Alpha	2.61	Stream Power (lb/ft s)	0.01
0.06 0.01			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	861.99
133.93 191.89			
C & E Loss (ft)	0.00	Cum SA (acres)	62.57
20.84 77.97			

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

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1318.28	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.19	Wt. n-Val.	0.050
0.020			
E.G. Elev (ft)	1318.47	Reach Len. (ft)	5.00
5.00 5.00			
Crit W.S. (ft)		Flow Area (sq ft)	198.74
1187.79			
E.G. Slope (ft/ft)	0.000124	Area (sq ft)	198.74
1187.79			
Q Total (cfs)	4450.00	Flow (cfs)	219.50
4230.50			
Top Width (ft)	150.00	Top Width (ft)	25.00
125.00			
Vel Total (ft/s)	3.21	Avg. Vel. (ft/s)	1.10
3.56			
Max Chl Dpth (ft)	12.08	Hydr. Depth (ft)	7.95
9.50			
Conv. Total (cfs)	399368.5	Conv. (cfs)	19699.2
379669.3			

Length Wtd. (ft)	5.00	Wetted Per. (ft)	32.62
133.10			
Min Ch El (ft)	1306.20	Shear (lb/sq ft)	0.05
0.07			
Alpha	1.18	Stream Power (lb/ft s)	0.05
0.25			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	810.21
145.23 141.44			
C & E Loss (ft)	0.03	Cum SA (acres)	27.23
20.85 31.44			

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

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 124

INPUT
Description: 2.048
G&O CROSS SECTION @ STATION 11231

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9428	1325	9858	1320	10078	1314.3	10194	1311.4	10229	1309.2
10229	1306.2	10248	1306.2	10248	1308.3	10273	1308.3	10303	1309.3
10378	1311.6	10558	1320	11028	1325				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9428	.05	10229	.02	10248	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10229	10248	25	25	.3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1318.24	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.10	Wt. n-Val.	0.050
0.020 0.050			
E.G. Elev (ft)	1318.34	Reach Len. (ft)	25.00
25.00 25.00			
Crit W.S. (ft)		Flow Area (sq ft)	1201.78
228.70 1587.51			
E.G. Slope (ft/ft)	0.000195	Area (sq ft)	1201.78
228.70 1587.51			
Q Total (cfs)	4450.00	Flow (cfs)	1250.40
1064.43 2135.16			
Top Width (ft)	594.17	Top Width (ft)	302.95

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1318.08	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.25	Wt. n-Val.	0.050
0.020 0.050			
E.G. Elev (ft)	1318.34	Reach Len. (ft)	0.00
0.00 0.00			
Crit W.S. (ft)	1313.32	Flow Area (sq ft)	564.76
222.89 512.20			
E.G. Slope (ft/ft)	0.000661	Area (sq ft)	564.76
222.89 512.20			
Q Total (cfs)	4450.00	Flow (cfs)	1526.37
1310.14 1613.49			
Top Width (ft)	150.00	Top Width (ft)	79.00
19.00 52.00			
Vel Total (ft/s)	3.42	Avg. Vel. (ft/s)	2.70
5.88 3.15			
Max Chl Dpth (ft)	12.18	Hydr. Depth (ft)	7.15
11.73 9.85			
Conv. Total (cfs)	173056.2	Conv. (cfs)	59359.0
50950.0 62747.1			
Length Wtd. (ft)	0.00	Wetted Per. (ft)	84.91
41.30 61.20			
Min Ch El (ft)	1305.90	Shear (lb/sq ft)	0.27
0.22 0.35			
Alpha	1.39	Stream Power (lb/ft s)	0.74
1.31 1.09			
Frctn Loss (ft)		Cum Volume (acre-ft)	809.86
145.02 141.12			
C & E Loss (ft)		Cum SA (acres)	27.18
20.83 31.41			

Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

BRIDGE RIVER: RIVER-1
REACH: Reach-1 RS: 22.5

INPUT
Description: Bridge #4

Distance from Upstream XS = 0
Deck/Roadway Width = 75
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 13

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9428	1325.6	1325	9858	1320.5	1320	10000	1317.8	1316.2
10194	1316.6	1311.1	10229	1316.3	1308.9	10229	1316.3	1314.5
10248	1316.3	1314.5	10248	1316.3	1308	10303	1315.9	1309
10400	1316.3	1312.2	10525	1317.6	1317.6	10578	1320	1320
11028	1325	1325						

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1318.08	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.25	Wt. n-Val.	0.050
0.020 0.050			
E.G. Elev (ft)	1318.34	Reach Len. (ft)	0.00
0.00 0.00			
Crit W.S. (ft)	1313.32	Flow Area (sq ft)	564.76
222.89 512.20			
E.G. Slope (ft/ft)	0.000661	Area (sq ft)	564.76
222.89 512.20			
Q Total (cfs)	4450.00	Flow (cfs)	1526.37
1310.14 1613.49			
Top Width (ft)	150.00	Top Width (ft)	79.00
19.00 52.00			
Vel Total (ft/s)	3.42	Avg. Vel. (ft/s)	2.70
5.88 3.15			
Max Chl Dpth (ft)	12.18	Hydr. Depth (ft)	7.15
11.73 9.85			
Conv. Total (cfs)	173056.2	Conv. (cfs)	59359.0
50950.0 62747.1			
Length Wtd. (ft)	0.00	Wetted Per. (ft)	84.91
41.30 61.20			
Min Ch El (ft)	1305.90	Shear (lb/sq ft)	0.27
0.22 0.35			
Alpha	1.39	Stream Power (lb/ft s)	0.74
1.31 1.09			
Frctn Loss (ft)		Cum Volume (acre-ft)	809.86
145.02 141.12			
C & E Loss (ft)		Cum SA (acres)	27.18
20.83 31.41			

Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

BRIDGE RIVER: RIVER-1
REACH: Reach-1 RS: 22.5

INPUT
Description: Bridge #4

Distance from Upstream XS = 0
Deck/Roadway Width = 75
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 13

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9428	1325.6	1325	9858	1320.5	1320	10000	1317.8	1316.2
10194	1316.6	1311.1	10229	1316.3	1308.9	10229	1316.3	1314.5
10248	1316.3	1314.5	10248	1316.3	1308	10303	1315.9	1309
10400	1316.3	1312.2	10525	1317.6	1317.6	10578	1320	1320
11028	1325	1325						

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9428	1325	9858	1320	10000	1316.2	10194	1311.1	10229	1308.9
10229	1305.9	10238	1305.9	10238	1314.5	10239	1314.5	10239	1305.9
10248	1305.9	10248	1308	10273	1308	10303	1309	10400	1312.2
10525	1317.6	10578	1320	11028	1325				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9428	.05	10229	.02	10248	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10229	10248	75	75	.3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1318.26	Element	Left OB Channel Right OB
Vel Head (ft)	0.05	Wt. n-Val.	0.050 0.020 0.050
E.G. Elev (ft)	1318.31	Reach Len. (ft)	0.00 0.00 0.00
Crit W.S. (ft)	1312.94	Flow Area (sq ft)	1261.85 226.18 1716.29
E.G. Slope (ft/ft)	0.000200	Area (sq ft)	1261.85 226.18 1716.29
Q Total (cfs)	4450.00	Flow (cfs)	1362.77 737.91 2349.31
Top Width (ft)	616.38	Top Width (ft)	305.87 19.00 291.51
Vel Total (ft/s)	1.39	Avg. Vel. (ft/s)	1.08 3.26 1.37
Max Chl Dpth (ft)	12.36	Hydr. Depth (ft)	4.13 11.90 5.89
Conv. Total (cfs)	314864.9	Conv. (cfs)	96424.7 52211.8 166228.4
Length Wtd. (ft)	0.00	Wetted Per. (ft)	306.03 41.30 291.71
Min Ch El (ft)	1305.90	Shear (lb/sq ft)	0.05 0.07 0.07
Alpha	1.61	Stream Power (lb/ft s)	0.06 0.22 0.10
Frctn Loss (ft)		Cum Volume (acre-ft)	861.14 133.72 190.77
C & E Loss (ft)		Cum SA (acres)	62.36 20.83 77.77

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

19.00 272.22			
Vel Total (ft/s)	1.47	Avg. Vel. (ft/s)	1.04
4.65 1.34			
Max Chl Dpth (ft)	12.04	Hydr. Depth (ft)	3.97
12.04 5.83			
Conv. Total (cfs)	318404.6	Conv. (cfs)	89468.4
76162.0 152774.1			
Length Wtd. (ft)	25.00	Wetted Per. (ft)	303.11
24.10 272.43			
Min Ch El (ft)	1306.20	Shear (lb/sq ft)	0.05
0.12 0.07			
Alpha	2.92	Stream Power (lb/ft s)	0.05
0.54 0.10			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	861.85
133.85 191.72			
C & E Loss (ft)	0.03	Cum SA (acres)	62.53
20.84 77.93			

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1318.01	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.44	Wt. n-Val.	0.050
0.020 0.050			
E.G. Elev (ft)	1318.44	Reach Len. (ft)	25.00
25.00 25.00			
Crit W.S. (ft)		Flow Area (sq ft)	536.16
224.31 492.55			
E.G. Slope (ft/ft)	0.000564	Area (sq ft)	536.16
224.31 492.55			
Q Total (cfs)	4450.00	Flow (cfs)	1296.28
1751.57 1402.16			
Top Width (ft)	150.00	Top Width (ft)	79.00
19.00 52.00			
Vel Total (ft/s)	3.55	Avg. Vel. (ft/s)	2.42
7.81 2.85			
Max Chl Dpth (ft)	11.81	Hydr. Depth (ft)	6.79
11.81 9.47			
Conv. Total (cfs)	187344.4	Conv. (cfs)	54573.0
73740.8 59030.6			
Length Wtd. (ft)	25.00	Wetted Per. (ft)	84.59
24.10 60.82			
Min Ch El (ft)	1306.20	Shear (lb/sq ft)	0.22
0.33 0.29			
Alpha	2.24	Stream Power (lb/ft s)	0.54
2.56 0.81			
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	810.17
145.15 141.41			
C & E Loss (ft)	0.09	Cum SA (acres)	27.23
20.84 31.44			

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 23

INPUT
Description: 2.034
G&O BRIDGE TABLE FOR CENTRAL AVENUE @ STATION 11206

Bridge-Central

Upstream Bridge Cross Section Data
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9428	1325	9858	1320	10000	1316.2	10194	1311.1	10229	1308.9
10229	1305.9	10238	1305.9	10238	1314.5	10239	1314.5	10239	1305.9
10248	1305.9	10248	1308	10273	1308	10303	1309	10400	1312.2
10525	1317.6	10578	1320	11028	1325				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9428	.05	10229	.02	10248	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
10229	10248	.3	.5

Downstream Deck/Roadway Coordinates
num= 13

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9428	1325.6	1325	9858	1320.5	1320	10000	1317.8	1316.2
10194	1316.6	1311.1	10229	1316.3	1308.9	10229	1316.3	1314.5
10248	1316.3	1314.5	10248	1316.3	1308	10303	1315.9	1309
10400	1316.3	1312.2	10525	1317.6	1317.6	10578	1320	1320
11028	1325	1325						

Downstream Bridge Cross Section Data
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9428	1325	9858	1320	10000	1316.2	10194	1311.1	10229	1308.9
10229	1305.9	10248	1305.9	10248	1308	10273	1308	10303	1309
10378	1311.3	10578	1320	11028	1325				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9428	.05	10229	.05	10248	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
10229	10248	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9428	10229	1314.6	10248	11028	1314.6

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 1316.3
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Piers = 1

Pier Data
Pier Station Upstream= 10238.5 Downstream= 10238.5

Upstream num= 2

Width	Elev	Width	Elev
1	1305.9	1	1314.5

Downstream num= 2

Width	Elev	Width	Elev
1	1305.9	1	1314.5

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Yarnell KVal = 1.25
Selected Low Flow Methods = Yarnell

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd =.8006408
Max Low Cord = 1314.5

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the downstream end
Criteria to check for pressure flow = Upstream water surface

BRIDGE OUTPUT Profile #PF#1
Opening : Bridge #1

E.G. US. (ft)	1318.31	Element	Inside BR US
Inside BR DS			
W.S. US. (ft)	1318.26	E.G. Elev (ft)	1318.31
1318.31			
Q Total (cfs)	4450.00	W.S. Elev (ft)	1318.26
1317.99			
Q Bridge (cfs)	1633.83	Crit W.S. (ft)	1318.45
1317.99			
Q Weir (cfs)	2816.17	Max Chl Dpth (ft)	12.36
12.09			
Weir Sta Lft (ft)	9973.42	Vel Total (ft/s)	4.57
5.32			
Weir Sta Rgt (ft)	10584.87	Flow Area (sq ft)	974.32
836.29			
Weir Submerg	0.00	Froude # Chl	0.25
0.27			
Weir Max Depth (ft)	2.41	Specif Force (cu ft)	2977.52
2682.56			
Min Top Rd (ft)	1316.30	Hydr Depth (ft)	1.73
1.54			
Min El Prs (ft)	1314.50	W.P. Total (ft)	744.01
905.85			
Delta EG (ft)	2.59	Conv. Total (cfs)	50975.1
25909.9			
Delta WS (ft)	2.65	Top Width (ft)	563.55
542.15			
BR Open Area (sq ft)	154.80	Frctn Loss (ft)	
BR Open Vel (ft/s)	10.55	C & E Loss (ft)	
Coef of Q		Shear Total (lb/sq ft)	0.62
1.70			
Br Sel Mthd	Press/Weir	Power Total (lb/ft s)	2.85

Note - Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow.
The Yarnell answer has been disregarded.
Note - Momentum answer is not valid if the water surface is above the low chord or if there is weir
flow. The momentum answer has been disregarded.
Note - The downstream water surface is above the minimum elevation for pressure flow. The orifice
equations were used for pressure flow.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - For the cross section inside the bridge at the upstream end, the water surface and energy
have been projected from the upstream cross section. The selected bridge modeling
method does not compute answers inside the bridge.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - For the cross section inside the bridge at the downstream end, the water surface is based on
critical depth over the weir. The energy has been projected.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE OUTPUT Profile #PF#2
Opening : Bridge #1

E.G. US. (ft)	1318.34	Element	Inside BR US
Inside BR DS			
W.S. US. (ft)	1318.08	E.G. Elev (ft)	1318.34
1318.34			
Q Total (cfs)	4450.00	W.S. Elev (ft)	1318.08
1317.99			
Q Bridge (cfs)	1556.92	Crit W.S. (ft)	1318.45
1317.99			
Q Weir (cfs)	2893.08	Max Chl Dpth (ft)	12.18
12.09			
Weir Sta Lft (ft)	9971.79	Vel Total (ft/s)	5.07
5.32			
Weir Sta Rgt (ft)	10586.23	Flow Area (sq ft)	877.69
836.29			
Weir Submerg	0.00	Froude # Chl	0.28
0.27			
Weir Max Depth (ft)	2.44	Specif Force (cu ft)	2954.72
2682.56			
Min Top Rd (ft)	1316.30	Hydr Depth (ft)	1.59
1.54			

Min El Prs (ft)	1314.50	W.P. Total (ft)	731.05
905.85			
Delta EG (ft)	2.11	Conv. Total (cfs)	45420.9
25909.9			
Delta WS (ft)	2.19	Top Width (ft)	550.59
542.15			
BR Open Area (sq ft)	154.80	Frctn Loss (ft)	
BR Open Vel (ft/s)	10.06	C & E Loss (ft)	
Coef of Q		Shear Total (lb/sq ft)	0.72
1.70			
Br Sel Mthd	Press/Weir	Power Total (lb/ft s)	3.65
9.05			

Note - Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow.
The Yarnell answer has been disregarded.
Note - Momentum answer is not valid if the water surface is above the low chord or if there is weir
flow. The momentum answer has been disregarded.
Note - The downstream water surface is above the minimum elevation for pressure flow. The orifice
equations were used for pressure flow.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - For the cross section inside the bridge at the upstream end, the water surface and energy
have been projected from the upstream cross section. The selected bridge modeling
method does not compute answers inside the bridge.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - For the cross section inside the bridge at the downstream end, the water surface is based on
critical depth over the weir. The energy has been projected.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 22

INPUT
Description: 2.033
G&O CROSS SECTION @ STATION 11131

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta

Elev

9428	1325	9858	1320	10000	1316.2	10194	1311.1	10229
1308.9								
10229	1305.9	10248	1305.9	10248	1308	10273	1308	10303
1309								
10378	1311.3	10578	1320	11028	1325			

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9428	.05	10229	.05	10248	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10229	10248	75	75	.3
.5				

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9428	10229	1314.6	10248	11028	1314.6

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1315.61	Element	Left OB Channel Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.050 0.050 0.050
E.G. Elev (ft)	1315.72	Reach Len. (ft)	75.00 75.00 75.00
Crit W.S. (ft)	1314.61	Flow Area (sq ft)	582.66 184.44 1025.94
E.G. Slope (ft/ft)	0.001030	Area (sq ft)	582.66 184.44 1025.94
Q Total (cfs)	4450.00	Flow (cfs)	1109.23 683.08 2657.69
Top Width (ft)	454.47	Top Width (ft)	206.46 19.00 229.02
Vel Total (ft/s)	2.48	Avg. Vel. (ft/s)	1.90 3.70 2.59
Max Chl Dpth (ft)	9.71	Hydr. Depth (ft)	2.82 9.71 4.48
Conv. Total (cfs)	138672.3	Conv. (cfs)	34566.2 21286.2 82819.9
Length Wtd. (ft)	75.00	Wetted Per. (ft)	206.58 24.10 229.16
Min Ch El (ft)	1305.90	Shear (lb/sq ft)	0.18 0.49 0.29
Alpha	1.14	Stream Power (lb/ft s)	0.35 1.82 0.75
Frctn Loss (ft)	0.12	Cum Volume (acre-ft)	155.64 133.39 189.95
C & E Loss (ft)	0.01	Cum SA (acres)	61.94 20.79 77.28

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

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1315.89	Element	Left OB
Channel	Right OB		
Vel Head (ft)	0.34	Wt. n-Val.	0.050
0.050	0.050		
E.G. Elev (ft)	1316.23	Reach Len. (ft)	75.00
75.00	75.00		
Crit W.S. (ft)	1314.61	Flow Area (sq ft)	391.55
189.83	398.19		
E.G. Slope (ft/ft)	0.002088	Area (sq ft)	391.55
189.83	398.19		
Q Total (cfs)	4450.00	Flow (cfs)	1498.84
1020.41	1930.75		
Top Width (ft)	150.00	Top Width (ft)	79.00
19.00	52.00		
Vel Total (ft/s)	4.54	Avg. Vel. (ft/s)	3.83
5.38	4.85		
Max Chl Dpth (ft)	9.99	Hydr. Depth (ft)	4.96
9.99	7.66		
Conv. Total (cfs)	97396.1	Conv. (cfs)	32804.7
22333.6	42257.8		
Length Wtd. (ft)	75.00	Wetted Per. (ft)	82.72
24.10	59.01		
Min Ch El (ft)	1305.90	Shear (lb/sq ft)	0.62
1.03	0.88		
Alpha	1.05	Stream Power (lb/ft s)	2.36
5.52	4.26		
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	104.01
144.70	140.35		
C & E Loss (ft)	0.05	Cum SA (acres)	26.77
20.79	30.92		

Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 21

INPUT
Description: 2.02
This is a REPEATED section.
FIS CROSS SECTION H @ STATION
11056

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9350	1325	9780	1320	10000	1314	10116	1311.1	10151	1308.9
10153	1305.4	10163	1305.4	10195	1308	10225	1309	10300	1311.3

10500 1320 10950 1325

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9350	.1	10116	.08	10195	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10116	10195	670	680 710	.3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1315.43	Element	Left OB Channel Right OB
Vel Head (ft)	0.15	Wt. n-Val.	0.100 0.080 0.100
E.G. Elev (ft)	1315.58	Reach Len. (ft)	670.00 680.00 710.00
Crit W.S. (ft)		Flow Area (sq ft)	372.38 586.65 800.91
E.G. Slope (ft/ft)	0.003087	Area (sq ft)	372.38 586.65 800.91
Q Total (cfs)	4450.00	Flow (cfs)	521.26 2262.41 1666.33
Top Width (ft)	447.66	Top Width (ft)	168.61 79.00 200.05
Vel Total (ft/s)	2.53	Avg. Vel. (ft/s)	1.40 3.86 2.08
Max Chl Dpth (ft)	10.03	Hydr. Depth (ft)	2.21 7.43 4.00
Conv. Total (cfs)	80094.3	Conv. (cfs)	9382.0 40720.4 29991.9
Length Wtd. (ft)	691.81	Wetted Per. (ft)	168.67 81.21 200.19
Min Ch El (ft)	1305.40	Shear (lb/sq ft)	0.43 1.39 0.77
Alpha	1.47	Stream Power (lb/ft s)	0.60 5.37 1.60
Frctn Loss (ft)	1.46	Cum Volume (acre-ft)	154.82 132.73 188.38
C & E Loss (ft)	0.02	Cum SA (acres)	61.61 20.71 76.91

Warning - The energy loss was 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

W.S. Elev (ft)	1315.73	Element	Left OB Channel Right OB
Vel Head (ft)	0.24	Wt. n-Val.	0.100 0.080 0.100
E.G. Elev (ft)	1315.97	Reach Len. (ft)	670.00 680.00 710.00
Crit W.S. (ft)		Flow Area (sq ft)	251.23 610.08 375.65

E.G. Slope (ft/ft)	0.003922	Area (sq ft)	251.23
610.08 375.65			
Q Total (cfs)	4450.00	Flow (cfs)	553.29
2722.19 1174.52			
Top Width (ft)	200.00	Top Width (ft)	66.00
79.00 55.00			
Vel Total (ft/s)	3.60	Avg. Vel. (ft/s)	2.20
4.46 3.13			
Max Chl Dpth (ft)	10.33	Hydr. Depth (ft)	3.81
7.72 6.83			
Conv. Total (cfs)	71056.6	Conv. (cfs)	8834.8
43467.3 18754.5			
Length Wtd. (ft)	689.59	Wetted Per. (ft)	69.00
81.21 60.99			
Min Ch El (ft)	1305.40	Shear (lb/sq ft)	0.89
1.84 1.51			
Alpha	1.19	Stream Power (lb/ft s)	1.96
8.21 4.72			
Frctn Loss (ft)	1.41	Cum Volume (acre-ft)	103.46
144.01 139.68			
C & E Loss (ft)	0.05	Cum SA (acres)	26.64
20.71 30.82			

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.
Warning - The energy loss was 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
REACH: Reach-1

RIVER: RIVER-1
RS: 20

INPUT
Description: 1.89
FIS CROSS SECTION G @ STATION 10376

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9350	1323.7	9780	1318.7	10000	1312.7	10116	1309.8	10151	1307.6
10153	1304.1	10163	1304.1	10195	1306.7	10225	1307.7	10300	1310
10500	1318.7	10950	1323.7						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9350	.05	10116	.08	10195	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10116	10195	1200	1270	1130 .1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1313.99	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.11	Wt. n-Val.	0.050
0.080 0.050			
E.G. Elev (ft)	1314.11	Reach Len. (ft)	1200.00
1270.00 1130.00			
Crit W.S. (ft)		Flow Area (sq ft)	348.93
575.49 772.89			
E.G. Slope (ft/ft)	0.001530	Area (sq ft)	348.93
575.49 772.89			
Q Total (cfs)	4450.00	Flow (cfs)	672.33
1542.51 2235.16			
Top Width (ft)	439.24	Top Width (ft)	163.43
79.00 196.81			
Vel Total (ft/s)	2.62	Avg. Vel. (ft/s)	1.93
2.68 2.89			
Max Chl Dpth (ft)	9.89	Hydr. Depth (ft)	2.14
7.28 3.93			
Conv. Total (cfs)	113773.8	Conv. (cfs)	17189.6
39437.6 57146.6			
Length Wtd. (ft)	1217.48	Wetted Per. (ft)	163.49
81.21 196.94			
Min Ch El (ft)	1304.10	Shear (lb/sq ft)	0.20
0.68 0.37			
Alpha	1.06	Stream Power (lb/ft s)	0.39
1.81 1.08			
Frctn Loss (ft)	4.85	Cum Volume (acre-ft)	149.27
123.65 175.56			
C & E Loss (ft)	0.04	Cum SA (acres)	59.06
19.48 73.67			

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

W.S. Elev (ft)	1314.38	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.13	Wt. n-Val.	0.050
0.080 0.050			
E.G. Elev (ft)	1314.51	Reach Len. (ft)	1200.00
1270.00 1130.00			
Crit W.S. (ft)		Flow Area (sq ft)	362.68
605.75 629.79			
E.G. Slope (ft/ft)	0.001250	Area (sq ft)	362.68
605.75 629.79			
Q Total (cfs)	4450.00	Flow (cfs)	806.76
1518.42 2124.82			
Top Width (ft)	300.00	Top Width (ft)	116.00
79.00 105.00			

Vel Total (ft/s)	2.78	Avg. Vel. (ft/s)	2.22
2.51 3.37			
Max Chl Dpth (ft)	10.28	Hydr. Depth (ft)	3.13
7.67 6.00			
Conv. Total (cfs)	125884.9	Conv. (cfs)	22822.2
42954.1 60108.6			
Length Wtd. (ft)	1230.23	Wetted Per. (ft)	117.71
81.21 109.43			
Min Ch El (ft)	1304.10	Shear (lb/sq ft)	0.24
0.58 0.45			
Alpha	1.09	Stream Power (lb/ft s)	0.53
1.46 1.51			
Frctn Loss (ft)	4.23	Cum Volume (acre-ft)	98.74
134.52 131.49			
C & E Loss (ft)	0.07	Cum SA (acres)	25.24
19.48 29.52			

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need
for additional cross sections.
Warning - The conveyance ratio (upstream 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: 19

INPUT
Description: 1.65
FIS CROSS SECTION F @ STATION 9106

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9635	1315	9685	1314	9790	1312	9840	1311	9890	1310
9945	1307.4	10081	1307.4	10130	1304.7	10140	1304	10144	1301.9
10156	1305.1	10186	1304.1	10222	1306	10244	1307.7	10300	1309.3
10400	1310.7	10800	1320						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9635	.05	10081	.09	10222	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10081	10222	670	585	740 .1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1308.65	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.56	Wt. n-Val.	0.050
0.090 0.050			
E.G. Elev (ft)	1309.21	Reach Len. (ft)	670.00
585.00 740.00			
Crit W.S. (ft)	1308.28	Flow Area (sq ft)	186.96
506.48 55.54			
E.G. Slope (ft/ft)	0.026639	Area (sq ft)	186.96
506.48 55.54			
Q Total (cfs)	4450.00	Flow (cfs)	995.61
3184.58 269.81			
Top Width (ft)	358.84	Top Width (ft)	162.50
141.00 55.34			
Vel Total (ft/s)	5.94	Avg. Vel. (ft/s)	5.33
6.29 4.86			
Max Chl Dpth (ft)	6.75	Hydr. Depth (ft)	1.15
3.59 1.00			
Conv. Total (cfs)	27264.8	Conv. (cfs)	6100.0
19511.7 1653.1			
Length Wtd. (ft)	621.96	Wetted Per. (ft)	162.53
142.10 55.42			
Min Ch El (ft)	1301.90	Shear (lb/sq ft)	1.91
5.93 1.67			
Alpha	1.02	Stream Power (lb/ft s)	10.19
37.27 8.10			
Frctn Loss (ft)	3.39	Cum Volume (acre-ft)	141.89
107.88 164.81			
C & E Loss (ft)	0.14	Cum SA (acres)	54.57
16.27 70.40			

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1309.38	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.83	Wt. n-Val.	
0.090			
E.G. Elev (ft)	1310.21	Reach Len. (ft)	670.00
585.00 740.00			
Crit W.S. (ft)		Flow Area (sq ft)	
608.76			
E.G. Slope (ft/ft)	0.029600	Area (sq ft)	
608.76			
Q Total (cfs)	4450.00	Flow (cfs)	
4450.00			

Top Width (ft)	141.00	Top Width (ft)		
141.00				
Vel Total (ft/s)	7.31	Avg. Vel. (ft/s)		
7.31				
Max Chl Dpth (ft)	7.48	Hydr. Depth (ft)		
4.32				
Conv. Total (cfs)	25865.0	Conv. (cfs)		
25865.0				
Length Wtd. (ft)	599.09	Wetted Per. (ft)		
147.46				
Min Ch El (ft)	1301.90	Shear (lb/sq ft)		
7.63				
Alpha	1.00	Stream Power (lb/ft s)		
55.77				
Frctn Loss (ft)	3.90	Cum Volume (acre-ft)	93.74	
116.81 123.32				
C & E Loss (ft)	0.20	Cum SA (acres)	23.64	
16.27 28.16				

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.
Warning - The energy loss was 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: 18

INPUT
Description: 1.54
FIS CROSS SECTION E @ STATION 8521

Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10000	1323	10210	1320	10490	1310	10630	1300	10660	1300
10800	1299.8	10820	1299.8	10860	1300	11000	1310	11310	1320

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
10000	.05	10660	.1	10860	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10660	10860	1030	1060	1000 .1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1305.58	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.11	Wt. n-Val.	0.050
0.100 0.050			
E.G. Elev (ft)	1305.69	Reach Len. (ft)	1030.00
1060.00 1000.00			
Crit W.S. (ft)		Flow Area (sq ft)	385.18
1137.67 217.83			
E.G. Slope (ft/ft)	0.002273	Area (sq ft)	385.18
1137.67 217.83			
Q Total (cfs)	4450.00	Flow (cfs)	1271.51
2568.03 610.46			
Top Width (ft)	386.20	Top Width (ft)	108.10
200.00 78.10			
Vel Total (ft/s)	2.56	Avg. Vel. (ft/s)	3.30
2.26 2.80			
Max Chl Dpth (ft)	5.78	Hydr. Depth (ft)	3.56
5.69 2.79			
Conv. Total (cfs)	93345.6	Conv. (cfs)	26671.9
53868.4 12805.3			
Length Wtd. (ft)	1032.68	Wetted Per. (ft)	108.30
200.00 78.30			
Min Ch El (ft)	1299.80	Shear (lb/sq ft)	0.50
0.81 0.39			
Alpha	1.09	Stream Power (lb/ft s)	1.67
1.82 1.11			
Frctn Loss (ft)	1.34	Cum Volume (acre-ft)	137.49
96.84 162.49			
C & E Loss (ft)	0.02	Cum SA (acres)	52.49
13.98 69.27			

Warning - The conveyance ratio (upstream 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

W.S. Elev (ft)	1305.94	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.17	Wt. n-Val.	0.050
0.100 0.050			
E.G. Elev (ft)	1306.11	Reach Len. (ft)	1030.00
1060.00 1000.00			
Crit W.S. (ft)		Flow Area (sq ft)	234.00
1209.84 55.82			
E.G. Slope (ft/ft)	0.002779	Area (sq ft)	234.00
1209.84 55.82			
Q Total (cfs)	4450.00	Flow (cfs)	1096.19
3146.12 207.69			
Top Width (ft)	250.00	Top Width (ft)	40.00
200.00 10.00			
Vel Total (ft/s)	2.97	Avg. Vel. (ft/s)	4.68
2.60 3.72			

Max Chl Dpth (ft)	6.14	Hydr. Depth (ft)	5.85
6.05 5.58			
Conv. Total (cfs)	84418.3	Conv. (cfs)	20795.1
59683.2 3940.0			
Length Wtd. (ft)	1036.23	Wetted Per. (ft)	45.25
200.00 15.25			
Min Ch El (ft)	1299.80	Shear (lb/sq ft)	0.90
1.05 0.63			
Alpha	1.23	Stream Power (lb/ft s)	4.20
2.73 2.36			
Frctn Loss (ft)	1.23	Cum Volume (acre-ft)	91.94
104.60 122.84			
C & E Loss (ft)	0.03	Cum SA (acres)	23.34
13.98 28.07			

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

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 17

INPUT
Description: 1.34
G&O CROSS SECTION @ STATION 7461

Station Elevation Data num= 9

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10000	1312	10110	1310	10250	1300	10310	1299	10350	1296.3
10370	1296.3	10420	1298	10580	1300	10910	1310		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
10000	.05	10310	.1	10420	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10310	10420	740	1155	810 .1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1304.28	Element	Left OB Channel Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.050 0.100 0.050
E.G. Elev (ft)	1304.34	Reach Len. (ft)	740.00 1155.00 810.00
Crit W.S. (ft)		Flow Area (sq ft)	414.99

781.26 1146.95			
E.G. Slope (ft/ft)	0.000833	Area (sq ft)	414.99
781.26 1146.95			
Q Total (cfs)	4450.00	Flow (cfs)	813.81
1237.33 2398.86			
Top Width (ft)	531.14	Top Width (ft)	119.92
110.00 301.23			
Vel Total (ft/s)	1.90	Avg. Vel. (ft/s)	1.96
1.58 2.09			
Max Chl Dpth (ft)	7.98	Hydr. Depth (ft)	3.46
7.10 3.81			
Conv. Total (cfs)	154152.5	Conv. (cfs)	28191.2
42862.5 83098.9			
Length Wtd. (ft)	866.45	Wetted Per. (ft)	120.08
110.12 301.31			
Min Ch El (ft)	1296.30	Shear (lb/sq ft)	0.18
0.37 0.20			
Alpha	1.04	Stream Power (lb/ft s)	0.35
0.58 0.41			
Frctn Loss (ft)	0.54	Cum Volume (acre-ft)	128.03
73.49 146.82			
C & E Loss (ft)	0.01	Cum SA (acres)	49.79
10.21 64.92			

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1304.78	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.07	Wt. n-Val.	0.050
0.100 0.050			
E.G. Elev (ft)	1304.85	Reach Len. (ft)	740.00
1155.00 810.00			
Crit W.S. (ft)		Flow Area (sq ft)	474.93
836.21 970.94			
E.G. Slope (ft/ft)	0.000656	Area (sq ft)	474.93
836.21 970.94			
Q Total (cfs)	4450.00	Flow (cfs)	900.93
1229.11 2319.96			
Top Width (ft)	400.00	Top Width (ft)	120.00
110.00 170.00			
Vel Total (ft/s)	1.95	Avg. Vel. (ft/s)	1.90
1.47 2.39			
Max Chl Dpth (ft)	8.48	Hydr. Depth (ft)	3.96
7.60 5.71			
Conv. Total (cfs)	173797.4	Conv. (cfs)	35186.4
48003.6 90607.4			
Length Wtd. (ft)	866.11	Wetted Per. (ft)	120.65
110.12 174.49			
Min Ch El (ft)	1296.30	Shear (lb/sq ft)	0.16
0.31 0.23			
Alpha	1.13	Stream Power (lb/ft s)	0.31
0.46 0.54			
Frctn Loss (ft)	0.44	Cum Volume (acre-ft)	83.56
79.71 111.06			
C & E Loss (ft)	0.00	Cum SA (acres)	21.44
10.21 26.01			

CROSS SECTION RIVER: RIVER-1

REACH: Reach-1 RS: 16

INPUT
Description: 1.12
FIS CROSS SECTION D @ STATION 6306

Station Elevation Data num= 15

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
10000	1305.5	10037	1305.4	10100	1302.7	10200	1300.4	10296	1299.8
10338	1299.7	10340	1297	10343	1292.6	10348	1292.4	10357	1292.6
10380	1296	10400	1297.3	10500	1297.5	10600	1299.9	11000	1305

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
10000	.05	10338	.1	10380	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10338	10380	1060	1230	1110 .1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1303.75	Element	Left OB Channel Right OB
Vel Head (ft)	0.03	Wt. n-Val.	0.050 0.100 0.050
E.G. Elev (ft)	1303.79	Reach Len. (ft)	1060.00 1230.00 1110.00
Crit W.S. (ft)		Flow Area (sq ft)	751.97 412.61 1864.67
E.G. Slope (ft/ft)	0.000490	Area (sq ft)	751.97 412.61 1864.67
Q Total (cfs)	4450.00	Flow (cfs)	997.63 586.48 2865.89
Top Width (ft)	826.73	Top Width (ft)	262.56 42.00 522.17
Vel Total (ft/s)	1.47	Avg. Vel. (ft/s)	1.33 1.42 1.54
Max Chl Dpth (ft)	11.35	Hydr. Depth (ft)	2.86 9.82 3.57
Conv. Total (cfs)	201002.0	Conv. (cfs)	45062.0 26490.9 129449.2
Length Wtd. (ft)	1137.05	Wetted Per. (ft)	262.61 45.94 522.27
Min Ch El (ft)	1292.40	Shear (lb/sq ft)	0.09 0.27 0.11
Alpha	1.01	Stream Power (lb/ft s)	0.12 0.39 0.17
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)	118.12 57.67 118.82
C & E Loss (ft)	0.00	Cum SA (acres)	46.55 8.19 57.26

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

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1304.34	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.06	Wt. n-Val.	0.050
0.100 0.050			
E.G. Elev (ft)	1304.40	Reach Len. (ft)	1060.00
1230.00 1110.00			
Crit W.S. (ft)		Flow Area (sq ft)	600.17
437.39 1412.35			
E.G. Slope (ft/ft)	0.000413	Area (sq ft)	600.17
437.39 1412.35			
Q Total (cfs)	4450.00	Flow (cfs)	948.24
593.59 2908.17			
Top Width (ft)	400.00	Top Width (ft)	138.00
42.00 220.00			
Vel Total (ft/s)	1.82	Avg. Vel. (ft/s)	1.58
1.36 2.06			
Max Chl Dpth (ft)	11.94	Hydr. Depth (ft)	4.35
10.41 6.42			
Conv. Total (cfs)	218864.1	Conv. (cfs)	46637.1
29194.4 143032.6			
Length Wtd. (ft)	1150.07	Wetted Per. (ft)	141.94
45.94 224.51			
Min Ch El (ft)	1292.40	Shear (lb/sq ft)	0.11
0.25 0.16			
Alpha	1.08	Stream Power (lb/ft s)	0.17
0.33 0.33			
Frctn Loss (ft)	0.39	Cum Volume (acre-ft)	74.43
62.82 88.90			
C & E Loss (ft)	0.00	Cum SA (acres)	19.25
8.19 22.38			

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 15

INPUT
Description: 0.886

Station Elevation Data num= 10

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9280	1307	9700	1302	9780	1300.3	10115	1300.3	10150	1296.6
10240	1296.6	10275	1300.2	10600	1300.2	10750	1302	10800	1305

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9280	.05	10115	.03	10275	.05

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

Expan.
10115 10275 40 40 40 .3
.5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1303.39	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.05	Wt. n-Val.	0.050
0.030 0.050			
E.G. Elev (ft)	1303.44	Reach Len. (ft)	40.00
40.00 40.00			
Crit W.S. (ft)		Flow Area (sq ft)	1295.49
958.66 1396.38			
E.G. Slope (ft/ft)	0.000208	Area (sq ft)	1295.49
958.66 1396.38			
Q Total (cfs)	4450.00	Flow (cfs)	1005.16
2255.24 1189.59			
Top Width (ft)	1189.93	Top Width (ft)	531.76
160.00 498.17			
Vel Total (ft/s)	1.22	Avg. Vel. (ft/s)	0.78
2.35 0.85			
Max Chl Dpth (ft)	6.79	Hydr. Depth (ft)	2.44
5.99 2.80			
Conv. Total (cfs)	308587.4	Conv. (cfs)	69703.6
156391.0 82492.8			
Length Wtd. (ft)	40.00	Wetted Per. (ft)	531.79
160.38 498.22			
Min Ch El (ft)	1296.60	Shear (lb/sq ft)	0.03
0.08 0.04			
Alpha	2.11	Stream Power (lb/ft s)	0.02
0.18 0.03			
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	93.21
38.31 77.27			
C & E Loss (ft)	0.02	Cum SA (acres)	36.88
5.34 44.26			

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1303.91	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.09	Wt. n-Val.	0.050
0.030 0.050			
E.G. Elev (ft)	1304.01	Reach Len. (ft)	40.00
40.00 40.00			
Crit W.S. (ft)		Flow Area (sq ft)	469.85
1042.54 780.01			
E.G. Slope (ft/ft)	0.000278	Area (sq ft)	469.85
1042.54 780.01			
Q Total (cfs)	4450.00	Flow (cfs)	537.96
2996.53 915.51			
Top Width (ft)	500.00	Top Width (ft)	130.00
160.00 210.00			
Vel Total (ft/s)	1.94	Avg. Vel. (ft/s)	1.14
2.87 1.17			
Max Chl Dpth (ft)	7.31	Hydr. Depth (ft)	3.61
6.52 3.71			
Conv. Total (cfs)	267098.5	Conv. (cfs)	32289.5
179858.2 54950.8			

Length Wtd. (ft)	40.00	Wetted Per. (ft)	133.61
160.38 213.71			
Min Ch El (ft)	1296.60	Shear (lb/sq ft)	0.06
0.11 0.06			
Alpha	1.59	Stream Power (lb/ft s)	0.07
0.32 0.07			
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	61.41
41.93 60.97			
C & E Loss (ft)	0.21	Cum SA (acres)	15.99
5.34 16.90			

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need
for additional cross sections.
Warning - The conveyance ratio (upstream 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: 14

INPUT
Description: 0.879
G&O DAM CROSS SECTION @ STATION 5036

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9280	1307	9700	1302	9780	1300.3	10144	1300.3	10194	1300.1
10194	1296.6	10236	1296.6	10236	1299.2	10240	1300.3	10264	1300.2
10600	1300.2	10750	1302	10800	1305				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9280	.05	10144	.08	10194	.02	10236	.08	10264	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10194	10236	1	1	.3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9280	10194	1296.62	10236	10800	1296.62

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1303.29	Element	Left OB Channel Right OB
Vel Head (ft)	0.11	Wt. n-Val.	0.052 0.020 0.051
E.G. Elev (ft)	1303.41	Reach Len. (ft)	0.00

0.00 0.00			
Crit W.S. (ft) 281.17 1470.19	1301.87	Flow Area (sq ft)	1486.68
E.G. Slope (ft/ft) 281.17 1470.19	0.000379	Area (sq ft)	1486.68
Q Total (cfs) 1319.31 1627.29	4450.00	Flow (cfs)	1503.40
Top Width (ft) 42.00 535.58	1180.32	Top Width (ft)	602.74
Vel Total (ft/s) 4.69 1.11	1.37	Avg. Vel. (ft/s)	1.01
Max Chl Dpth (ft) 6.69 2.75	6.69	Hydr. Depth (ft)	2.47
Conv. Total (cfs) 67788.5 83613.1	228649.3	Conv. (cfs)	77247.6
Length Wtd. (ft) 48.10 535.77	0.00	Wetted Per. (ft)	602.77
Min Ch El (ft) 0.14 0.06	1296.60	Shear (lb/sq ft)	0.06
Alpha 0.65 0.07	3.88	Stream Power (lb/ft s)	0.06
Frctn Loss (ft) 37.74 75.96	0.00	Cum Volume (acre-ft)	91.93
C & E Loss (ft) 5.25 43.79	0.04	Cum SA (acres)	36.36

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft) Channel Right OB	1302.99	Element	Left OB
Vel Head (ft) 0.020 0.052	0.79	Wt. n-Val.	0.063
E.G. Elev (ft) 0.00 0.00	1303.78	Reach Len. (ft)	0.00
Crit W.S. (ft) 268.26 666.72	1302.47	Flow Area (sq ft)	257.58
E.G. Slope (ft/ft) 268.26 666.72	0.001592	Area (sq ft)	257.58
Q Total (cfs) 2500.62 1484.44	4450.00	Flow (cfs)	464.94
Top Width (ft) 42.00 239.00	375.00	Top Width (ft)	94.00
Vel Total (ft/s) 9.32 2.23	3.73	Avg. Vel. (ft/s)	1.81
Max Chl Dpth (ft) 6.39 2.79	6.39	Hydr. Depth (ft)	2.74
Conv. Total (cfs) 62679.0 37208.1	111540.9	Conv. (cfs)	11653.8
Length Wtd. (ft) 48.10 241.94	0.00	Wetted Per. (ft)	96.69
Min Ch El (ft) 0.55 0.27	1296.60	Shear (lb/sq ft)	0.26
Alpha 5.17 0.61	3.65	Stream Power (lb/ft s)	0.48
Frctn Loss (ft) 41.33 60.30	0.00	Cum Volume (acre-ft)	61.07
C & E Loss (ft) 5.25 16.70	0.37	Cum SA (acres)	15.89

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.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

BRIDGE RIVER: RIVER-1
REACH: Reach-1 RS: 13.5

INPUT
Description: Bridge #3

Distance from Upstream XS = 0
Deck/Roadway Width = 1
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 12

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9280	1307	1291.6	9700	1302	1291.6	9780	1300.3	1291.6
10144	1300.3	1291.6	10194	1300.1	1291.6	10194	1296.7	1296.65
10236	1296.7	1296.65	10236	1299.2	1291.6	10240	1300.3	1291.6
10264	1300.2	1291.6	10600	1300.2	1291.6	10750	1302	1291.6

Upstream Bridge Cross Section Data
Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9280	1307	9700	1302	9780	1300.3	10144	1300.3	10194	1300.1
10194	1296.6	10236	1296.6	10236	1299.2	10240	1300.3	10264	1300.2
10600	1300.2	10750	1302	10800	1305				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9280	.05	10144	.08	10194	.02	10236	.08	10264	.05

Bank Sta: Left Right Coeff Contr. Expan.
10194 10236 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9280	10194	1296.62	10236	10800	1296.62

Downstream Deck/Roadway Coordinates
num= 12

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9280	1307	1291.6	9700	1302	1291.6	9780	1300.3	1291.6
10144	1300.3	1291.6	10194	1300.1	1291.6	10194	1296.7	1296.65
10236	1296.7	1296.65	10236	1299.2	1291.6	10240	1300.3	1291.6

```
   10264  1300.2  1291.6   10600  1300.2  1291.6   10750    1302  1291.6

 Downstream Bridge Cross Section Data
 Station Elevation Data    num=      13
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta
Elev
     9290    1307     9700    1302     9780  1300.3   10144  1300.3   10194
1300.1
    10195  1291.6   10235  1291.6   10236  1299.2   10240  1300.3   10264
1300.2
    10600  1300.2   10750    1302   10800    1305

 Manning's n Values        num=       5
      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n Val      Sta   n
Val
     9290     .05    10144     .08   10194     .02   10236     .08   10264
.05

 Bank Sta: Left   Right    Coeff Contr.    Expan.
          10194   10236              .3        .5

 Upstream Embankment side slope                 =       0 horiz. to 1.0 vertical
 Downstream Embankment side slope               =       0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow =      .95
 Elevation at which weir flow begins            =  1296.7
 Energy head used in spillway design            =
 Spillway height used in design                 =
 Weir crest shape                               = Broad Crested

 Number of Piers =  1

 Pier Data
 Pier Station      Upstream=   10215    Downstream=   10215
 Upstream      num=        2
     Width    Elev     Width    Elev
       .1  1296.6        .1 1296.65
 Downstream    num=        2
     Width    Elev     Width    Elev
       .1  1291.6        .1 1296.65

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Yarnell                  KVal =     1.25
Selected Low Flow Methods = Yarnell

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =.8164966
           Max Low Cord                = 1296.65

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

BRIDGE OUTPUT    Profile #PF#1
```

Opening : Bridge #1

E.G. US. (ft)	1303.41	Element	Inside BR US
Inside BR DS			
W.S. US. (ft)	1303.29	E.G. Elev (ft)	1303.37
1303.37			
Q Total (cfs)	4450.00	W.S. Elev (ft)	1303.33
1303.31			
Q Bridge (cfs)	0.26	Crit W.S. (ft)	1301.48
1301.30			
Q Weir (cfs)		Max Chl Dpth (ft)	6.73
11.71			
Weir Sta Lft (ft)		Vel Total (ft/s)	1.36
1.29			
Weir Sta Rgt (ft)		Flow Area (sq ft)	3279.52
3453.13			
Weir Submerg		Froude # Chl	0.09
0.07			
Weir Max Depth (ft)		Specif Force (cu ft)	5482.06
7289.28			
Min Top Rd (ft)	1296.70	Hydr Depth (ft)	2.77
2.93			
Min El Prs (ft)	1296.65	W.P. Total (ft)	1274.16
1285.96			
Delta EG (ft)	0.72	Conv. Total (cfs)	198846.0
240591.5			
Delta WS (ft)	2.94	Top Width (ft)	1184.03
1179.19			
BR Open Area (sq ft)	2.10	Frctn Loss (ft)	0.00
0.00			
BR Open Vel (ft/s)	0.12	C & E Loss (ft)	0.01
0.68			
Coef of Q		Shear Total (lb/sq ft)	0.08
0.06			
Br Sel Mthd	Energy only	Power Total (lb/ft s)	0.11
0.07			

Warning - The pressure/weir method gave an invalid answer. The upstream energy was less than
the downstream energy. The program defaulted to the energy based answer.
Note - Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow.
The Yarnell answer has been disregarded.
Note - Momentum answer is not valid if the water surface is above the low chord or if there is weir
flow. The momentum answer has been disregarded.
Note - The downstream water surface is above the minimum elevation for pressure flow. The orifice
equations were used for pressure flow.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need
for additional cross sections.
Warning - The conveyance ratio (upstream 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 cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE OUTPUT Profile #PF#2
Opening : Bridge #1

E.G. US. (ft)	1303.78	Element	Inside BR US
Inside BR DS			
W.S. US. (ft)	1302.99	E.G. Elev (ft)	1303.40
1303.39			
Q Total (cfs)	4450.00	W.S. Elev (ft)	1303.36
1303.34			
Q Bridge (cfs)	0.25	Crit W.S. (ft)	1301.48
1301.30			
Q Weir (cfs)		Max Chl Dpth (ft)	6.76
11.74			
Weir Sta Lft (ft)		Vel Total (ft/s)	1.34
1.28			
Weir Sta Rgt (ft)		Flow Area (sq ft)	3313.67
3488.01			
Weir Submerg		Froude # Chl	0.09
0.07			
Weir Max Depth (ft)		Specif Force (cu ft)	5574.66
7388.86			
Min Top Rd (ft)	1296.70	Hydr Depth (ft)	2.79
2.95			
Min El Prs (ft)	1296.65	W.P. Total (ft)	1277.06
1288.87			
Delta EG (ft)	1.09	Conv. Total (cfs)	201851.8
243739.8			
Delta WS (ft)	2.72	Top Width (ft)	1186.93
1182.10			
BR Open Area (sq ft)	2.10	Frctn Loss (ft)	0.00
0.00			
BR Open Vel (ft/s)	0.12	C & E Loss (ft)	0.00
0.71			
Coef of Q		Shear Total (lb/sq ft)	0.08
0.06			
Br Sel Mthd	Energy only	Power Total (lb/ft s)	0.11
0.07			

Warning - The pressure/weir method gave an invalid answer. The upstream energy was less than
the downstream energy. The program defaulted to the energy based answer.
Note - Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow.
The Yarnell answer has been disregarded.
Note - Momentum answer is not valid if the water surface is above the low chord or if there is weir

flow. The momentum answer has been disregarded.
Note - The downstream water surface is above the minimum elevation for pressure flow. The orifice
equations were used for pressure flow.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need
for additional cross sections.
Warning - The conveyance ratio (upstream 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 cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 13

INPUT
Description: 0.878
G&O CROSS SECTION @ STATION 5035

Station Elevation Data num= 13

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9290	1307	9700	1302	9780	1300.3	10144	1300.3	10194	1300.1
10195	1291.6	10235	1291.6	10236	1299.2	10240	1300.3	10264	1300.2
10600	1300.2	10750	1302	10800	1305				

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9290	.05	10144	.08	10194	.02	10236	.08	10264	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10194	10236	10	10	.3	.5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1300.36	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.33	Wt. n-Val.	0.059		

0.020 0.052			
E.G. Elev (ft)	1302.69	Reach Len. (ft)	10.00
10.00 10.00			
Crit W.S. (ft)	1298.79	Flow Area (sq ft)	29.59
359.84 59.64			
E.G. Slope (ft/ft)	0.002299	Area (sq ft)	29.59
359.84 59.64			
Q Total (cfs)	4450.00	Flow (cfs)	6.75
4419.24 24.00			
Top Width (ft)	836.06	Top Width (ft)	416.79
42.00 377.27			
Vel Total (ft/s)	9.91	Avg. Vel. (ft/s)	0.23
12.28 0.40			
Max Chl Dpth (ft)	8.76	Hydr. Depth (ft)	0.07
8.57 0.16			
Conv. Total (cfs)	92799.2	Conv. (cfs)	140.9
92157.8 500.5			
Length Wtd. (ft)	10.00	Wetted Per. (ft)	416.79
56.22 377.42			
Min Ch El (ft)	1291.60	Shear (lb/sq ft)	0.01
0.92 0.02			
Alpha	1.53	Stream Power (lb/ft s)	0.00
11.28 0.01			
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	87.06
37.73 71.77			
C & E Loss (ft)	1.13	Cum SA (acres)	36.35
5.25 43.77			

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.
Warning - The energy loss was 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

W.S. Elev (ft)	1300.27	Element	Left OB
Channel Right OB			
Vel Head (ft)	2.42	Wt. n-Val.	0.080
0.020 0.058			
E.G. Elev (ft)	1302.68	Reach Len. (ft)	10.00
10.00 10.00			
Crit W.S. (ft)	1298.79	Flow Area (sq ft)	3.44
355.92 16.52			
E.G. Slope (ft/ft)	0.002413	Area (sq ft)	3.44
355.92 16.52			
Q Total (cfs)	4450.00	Flow (cfs)	0.60
4444.82 4.58			
Top Width (ft)	314.20	Top Width (ft)	41.49
42.00 230.71			
Vel Total (ft/s)	11.84	Avg. Vel. (ft/s)	0.17
12.49 0.28			
Max Chl Dpth (ft)	8.67	Hydr. Depth (ft)	0.08

8.47	0.07				
Conv. Total (cfs)		90597.3	Conv. (cfs)	12.2	
90491.9	93.3				
Length Wtd. (ft)		10.00	Wetted Per. (ft)	41.49	
56.22	230.92				
Min Ch El (ft)		1291.60	Shear (lb/sq ft)	0.01	
0.95	0.01				
Alpha		1.11	Stream Power (lb/ft s)	0.00	
11.91	0.00				
Frctn Loss (ft)		0.01	Cum Volume (acre-ft)	56.20	
41.32	56.12				
C & E Loss (ft)		1.16	Cum SA (acres)	15.87	
5.25	16.68				

Warning - Divided flow computed for this cross-section.
Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need
for additional cross sections.
Warning - The conveyance ratio (upstream 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: 12

INPUT
Description: 0.876
This is a REPEATED section.
FIS CROSS SECTION C @
STATION 5025

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9280	1307	9700	1302	9800	1300	10000	1297.6	10080	1297.3
10125	1291	10160	1290.6	10200	1295.3	10300	1297.3	10580	1300
10750	1302	10800	1305						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9280	.05	10080	.04	10200	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10080	10200	20	20	.3	.5

CROSS SECTION OUTPUT Profile #PF#1

Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	56.15
41.16 56.05			
C & E Loss (ft)	0.00	Cum SA (acres)	15.86
5.23 16.64			

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 11

INPUT
Description: 0.872
G&O CROSS SECTION @ STATION 5005

Station Elevation Data num= 12

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9280	1307	9700	1302	9800	1300	10000	1297.6	10080	1297.3
10125	1291	10160	1290.6	10200	1295.3	10300	1297.3	10580	1300
10750	1302	10800	1305						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9280	.05	10080	.04	10200	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10080	10200	50	50	.3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1301.48	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.05	Wt. n-Val.	0.050
0.040 0.050			
E.G. Elev (ft)	1301.53	Reach Len. (ft)	50.00
50.00 50.00			
Crit W.S. (ft)		Flow Area (sq ft)	914.11
1045.17 1404.83			
E.G. Slope (ft/ft)	0.000224	Area (sq ft)	914.11
1045.17 1404.83			
Q Total (cfs)	4450.00	Flow (cfs)	765.13
2450.50 1234.37			
Top Width (ft)	980.16	Top Width (ft)	354.13
120.00 506.03			
Vel Total (ft/s)	1.32	Avg. Vel. (ft/s)	0.84
2.34 0.88			
Max Chl Dpth (ft)	10.88	Hydr. Depth (ft)	2.58
8.71 2.78			
Conv. Total (cfs)	297285.5	Conv. (cfs)	51115.2
163707.5 82462.8			
Length Wtd. (ft)	50.00	Wetted Per. (ft)	354.16
120.72 506.07			
Min Ch El (ft)	1290.60	Shear (lb/sq ft)	0.04
0.12 0.04			

Alpha	1.92	Stream Power (lb/ft s)	0.03
0.28 0.03			
Frctn Loss (ft)	0.04	Cum Volume (acre-ft)	86.53
37.09 70.96			
C & E Loss (ft)	0.65	Cum SA (acres)	36.09
5.17 43.44			

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 OUTPUT Profile #PF#2

W.S. Elev (ft)	1301.42	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.10	Wt. n-Val.	0.050
0.040 0.050			
E.G. Elev (ft)	1301.51	Reach Len. (ft)	50.00
50.00 50.00			
Crit W.S. (ft)		Flow Area (sq ft)	426.27
1037.07 591.88			
E.G. Slope (ft/ft)	0.000338	Area (sq ft)	426.27
1037.07 591.88			
Q Total (cfs)	4450.00	Flow (cfs)	562.75
2970.37 916.88			
Top Width (ft)	350.00	Top Width (ft)	110.00
120.00 120.00			
Vel Total (ft/s)	2.17	Avg. Vel. (ft/s)	1.32
2.86 1.55			
Max Chl Dpth (ft)	10.82	Hydr. Depth (ft)	3.88
8.64 4.93			
Conv. Total (cfs)	242095.0	Conv. (cfs)	30615.4
161598.2 49881.4			
Length Wtd. (ft)	50.00	Wetted Per. (ft)	113.46
120.72 123.94			
Min Ch El (ft)	1290.60	Shear (lb/sq ft)	0.08
0.18 0.10			
Alpha	1.32	Stream Power (lb/ft s)	0.10
0.52 0.16			
Frctn Loss (ft)	0.05	Cum Volume (acre-ft)	55.95
40.68 55.77			
C & E Loss (ft)	0.60	Cum SA (acres)	15.81
5.17 16.59			

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need
for additional cross sections.
Warning - The conveyance ratio (upstream 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: 10

W.S. Elev (ft)	1301.49	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.05	Wt. n-Val.	0.050
0.040 0.050			
E.G. Elev (ft)	1301.54	Reach Len. (ft)	20.00
20.00 20.00			
Crit W.S. (ft)		Flow Area (sq ft)	915.71
1045.71 1407.12			
E.G. Slope (ft/ft)	0.000223	Area (sq ft)	915.71
1045.71 1407.12			
Q Total (cfs)	4450.00	Flow (cfs)	765.88
2448.90 1235.22			
Top Width (ft)	980.77	Top Width (ft)	354.36
120.00 506.41			
Vel Total (ft/s)	1.32	Avg. Vel. (ft/s)	0.84
2.34 0.88			
Max Chl Dpth (ft)	10.89	Hydr. Depth (ft)	2.58
8.71 2.78			
Conv. Total (cfs)	297736.4	Conv. (cfs)	51242.6
163849.0 82644.8			
Length Wtd. (ft)	20.00	Wetted Per. (ft)	354.39
120.72 506.45			
Min Ch El (ft)	1290.60	Shear (lb/sq ft)	0.04
0.12 0.04			
Alpha	1.92	Stream Power (lb/ft s)	0.03
0.28 0.03			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	86.95
37.57 71.61			
C & E Loss (ft)	0.00	Cum SA (acres)	36.26
5.23 43.67			

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1301.42	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.10	Wt. n-Val.	0.050
0.040 0.050			
E.G. Elev (ft)	1301.52	Reach Len. (ft)	20.00
20.00 20.00			
Crit W.S. (ft)		Flow Area (sq ft)	427.01
1037.87 592.69			
E.G. Slope (ft/ft)	0.000337	Area (sq ft)	427.01
1037.87 592.69			
Q Total (cfs)	4450.00	Flow (cfs)	563.40
2969.22 917.38			
Top Width (ft)	350.00	Top Width (ft)	110.00
120.00 120.00			
Vel Total (ft/s)	2.16	Avg. Vel. (ft/s)	1.32
2.86 1.55			
Max Chl Dpth (ft)	10.82	Hydr. Depth (ft)	3.88
8.65 4.94			
Conv. Total (cfs)	242502.9	Conv. (cfs)	30702.6
161807.5 49992.8			
Length Wtd. (ft)	20.00	Wetted Per. (ft)	113.46
120.72 123.95			
Min Ch El (ft)	1290.60	Shear (lb/sq ft)	0.08
0.18 0.10			
Alpha	1.32	Stream Power (lb/ft s)	0.10
0.52 0.16			

INPUT
Description: 0.848
G&O CROSS SECTION & BRIDGE TABLE @ KELLOGG AVENUE

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9550	1305	10000	1303.5	10200	1303.1	10418	1302.9	10418	1298.8
10444	1292.5	10444	1299.8	10446.5	1299.8	10446.5	1291.8	10455	1289.8
10457	1289.4	10463	1290	10473	1292.5	10479.5	1293.8	10479.5	1299.8
10482	1299.8	10482	1294.3	10508	1299.5	10508	1302.7	10700	1302.1
10900	1302.1	11000	1305						

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9550	.05	10418	.035	10508	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10418	10508	83	83	83 .3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1298.64	Element	Left OB	Channel	Right OB
Vel Head (ft)	2.21	Wt. n-Val.			0.035
E.G. Elev (ft)	1300.85	Reach Len. (ft)	0.00	0.00	0.00
Crit W.S. (ft)	1298.53	Flow Area (sq ft)			373.09
E.G. Slope (ft/ft)	0.014399	Area (sq ft)			373.09
Q Total (cfs)	4450.00	Flow (cfs)			4450.00
Top Width (ft)	80.07	Top Width (ft)			80.07
Vel Total (ft/s)	11.93	Avg. Vel. (ft/s)			11.93
Max Chl Dpth (ft)	9.24	Hydr. Depth (ft)			4.66
Conv. Total (cfs)	37084.6	Conv. (cfs)			37084.6
Length Wtd. (ft)	0.00	Wetted Per. (ft)			104.15
Min Ch El (ft)	1289.40	Shear (lb/sq ft)			3.22
Alpha	1.00	Stream Power (lb/ft s)			38.41
Frctn Loss (ft)		Cum Volume (acre-ft)	86.01	36.27	70.15

C & E Loss (ft)		Cum SA (acres)	35.89
5.06	43.15		

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1298.78	Element	Left OB
Channel	Right OB		
Vel Head (ft)	2.09	Wt. n-Val.	
0.035			
E.G. Elev (ft)	1300.86	Reach Len. (ft)	0.00
0.00	0.00		
Crit W.S. (ft)	1298.53	Flow Area (sq ft)	
383.90			
E.G. Slope (ft/ft)	0.013392	Area (sq ft)	
383.90			
Q Total (cfs)	4450.00	Flow (cfs)	
4450.00			
Top Width (ft)	81.29	Top Width (ft)	
81.29			
Vel Total (ft/s)	11.59	Avg. Vel. (ft/s)	
11.59			
Max Chl Dpth (ft)	9.38	Hydr. Depth (ft)	
4.72			
Conv. Total (cfs)	38453.2	Conv. (cfs)	
38453.2			
Length Wtd. (ft)	0.00	Wetted Per. (ft)	
105.93			
Min Ch El (ft)	1289.40	Shear (lb/sq ft)	
3.03			
Alpha	1.00	Stream Power (lb/ft s)	
35.12			
Frctn Loss (ft)		Cum Volume (acre-ft)	55.71
39.86	55.43		
C & E Loss (ft)		Cum SA (acres)	15.74
5.06	16.52		

BRIDGE RIVER: RIVER-1
REACH: Reach-1 RS: 9.5

INPUT
Description: Bridge #2

Distance from Upstream XS = 0
Deck/Roadway Width = 83
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 9

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9950	1305	1305	10000	1303.4	1303.4	10200	1303.2	1303.2
10418	1302.8	1302.8	10418	1302.8	1299.8	10508	1302.8	1299.8
10508	1302.8	1302.8	10900	1302.2	1302.2	11100	1305	1305

Upstream Bridge Cross Section Data
Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9550	1305	10000	1303.5	10200	1303.1	10418	1302.9	10418	

```
1298.8
   10444  1292.5   10444  1299.8 10446.5  1299.8 10446.5  1291.8   10455
1289.8
   10457  1289.4   10463    1290   10473  1292.5 10479.5  1293.8 10479.5
1299.8
   10482  1299.8   10482  1294.3   10508  1299.5   10508  1302.7   10700
1302.1
   10900  1302.1   11000    1305

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    9550     .05   10418    .035   10508     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         10418   10508             .3       .5

Downstream  Deck/Roadway Coordinates
    num=       9
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
    9950    1305    1305   10000  1303.4  1303.4   10200  1303.2  1303.2
   10418  1302.8  1302.8   10418  1302.8  1299.8   10508  1302.8  1299.8
   10508  1302.8  1302.8   10900  1302.2  1302.2   11100    1305    1305

Downstream Bridge Cross Section Data
Station Elevation Data    num=      14
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta
Elev
    9550     1305   10040     1299   10230  1293.5   10418  1293.5   10422
1293
   10455  1289.9   10457  1289.4   10463  1289.9   10492     1293   10508
1294.5
   10520  1294.5   10585  1294.5   10785     1300   10945  1302.1

Manning's n Values          num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
    9550     .05   10418     .05   10508     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         10418   10508             .3       .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev   Sta L   Sta R    Elev
    9550   10418    1300   10508   10945    1300

Upstream Embankment side slope                =       0 horiz. to 1.0 vertical
Downstream Embankment side slope              =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins           =  1302.8
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Piers =  1

Pier Data
Pier Station     Upstream=   10463    Downstream=   10463
Upstream     num=       2
    Width    Elev    Width    Elev
        5  1289.4        5  1299.8
Downstream     num=       2
    Width    Elev    Width    Elev
```

5 1289.4 5 1299.8

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Yarnell KVal = 1.25
Selected Low Flow Methods = Yarnell

High Flow Method
Pressure and Weir flow
Submerged Inlet Cd =
Submerged Inlet + Outlet Cd =.8006408
Max Low Cord = 1299.8

Additional Bridge Parameters
Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth inside the bridge at the downstream end
Criteria to check for pressure flow = Upstream water surface

BRIDGE OUTPUT Profile #PF#1
Opening : Bridge #1

E.G. US. (ft)	1300.85	Element	Inside BR US
Inside BR DS			
W.S. US. (ft)	1298.64	E.G. Elev (ft)	1301.46
1299.08			
Q Total (cfs)	4450.00	W.S. Elev (ft)	1298.64
1297.90			
Q Bridge (cfs)	4450.00	Crit W.S. (ft)	1299.06
1296.29			
Q Weir (cfs)		Max Chl Dpth (ft)	9.24
8.50			
Weir Sta Lft (ft)		Vel Total (ft/s)	13.47
8.70			
Weir Sta Rgt (ft)		Flow Area (sq ft)	330.34
511.37			
Weir Submerg		Froude # Chl	1.13
0.63			
Weir Max Depth (ft)		Specif Force (cu ft)	2865.63
2814.96			
Min Top Rd (ft)	1302.80	Hydr Depth (ft)	4.40
6.02			
Min El Prs (ft)	1299.80	W.P. Total (ft)	115.97
101.42			
Delta EG (ft)	1.94	Conv. Total (cfs)	28182.5
44685.5			
Delta WS (ft)	0.74	Top Width (ft)	75.07
625.97			
BR Open Area (sq ft)	561.99	Frctn Loss (ft)	
BR Open Vel (ft/s)	13.47	C & E Loss (ft)	
Coef of Q		Shear Total (lb/sq ft)	4.43
3.12			
Br Sel Mthd	Yarnell	Power Total (lb/ft s)	59.73
27.16			

Note - Momentum answer is not valid if the water surface is above the low chord or if there is weir

flow. The momentum answer has been disregarded.
Note - The downstream water surface is below the minimum elevation for pressure flow. The sluice
gate equations were used for pressure flow.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

BRIDGE OUTPUT Profile #PF#2
Opening : Bridge #1

E.G. US. (ft)	1300.86	Element	Inside BR US
Inside BR DS			
W.S. US. (ft)	1298.78	E.G. Elev (ft)	1301.43
1299.25			
Q Total (cfs)	4450.00	W.S. Elev (ft)	1298.78
1298.18			
Q Bridge (cfs)	4450.00	Crit W.S. (ft)	1299.06
1296.29			
Q Weir (cfs)		Max Chl Dpth (ft)	9.38
8.78			
Weir Sta Lft (ft)		Vel Total (ft/s)	13.07
8.32			
Weir Sta Rgt (ft)		Flow Area (sq ft)	340.48
534.66			
Weir Submerg		Froude # Chl	1.09
0.58			
Weir Max Depth (ft)		Specif Force (cu ft)	2855.13
2905.85			
Min Top Rd (ft)	1302.80	Hydr Depth (ft)	4.46
6.29			
Min El Prs (ft)	1299.80	W.P. Total (ft)	118.02
101.97			
Delta EG (ft)	1.76	Conv. Total (cfs)	29293.3
47955.2			
Delta WS (ft)	0.60	Top Width (ft)	76.29
645.39			
BR Open Area (sq ft)	561.99	Frctn Loss (ft)	
BR Open Vel (ft/s)	13.07	C & E Loss (ft)	
Coef of Q		Shear Total (lb/sq ft)	4.16
2.82			
Br Sel Mthd	Yarnell	Power Total (lb/ft s)	54.32
23.46			

Note - Momentum answer is not valid if the water surface is above the low chord or if there is weir
flow. The momentum answer has been disregarded.
Note - The downstream water surface is below the minimum elevation for pressure flow. The sluice
gate equations were used for pressure flow.

Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 9

INPUT
Description: 0.847
G&O CROSS SECTION @ STATION 4872

Station Elevation Data num= 14

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9550	1305	10040	1299	10230	1293.5	10418	1293.5	10422	1293
10455	1289.9	10457	1289.4	10463	1289.9	10492	1293	10508	1294.5
10520	1294.5	10585	1294.5	10785	1300	10945	1302.1		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9550	.05	10418	.05	10508	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10418	10508	360	360	.3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Sta L	Sta R	Elev
9550	10418	1300	10508	10945	1300

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1297.90	Element	Left OB Channel Right OB
Vel Head (ft)	1.01	Wt. n-Val.	0.050
E.G. Elev (ft)	1298.92	Reach Len. (ft)	360.00 360.00
Crit W.S. (ft)	1296.02	Flow Area (sq ft)	551.32
E.G. Slope (ft/ft)	0.006630	Area (sq ft)	1163.19 551.32 472.92
Q Total (cfs)	4450.00	Flow (cfs)	4450.00
Top Width (ft)	630.97	Top Width (ft)	340.16 90.00 200.81

Vel Total (ft/s)	8.07	Avg. Vel. (ft/s)	
8.07			
Max Chl Dpth (ft)	8.50	Hydr. Depth (ft)	
6.13			
Conv. Total (cfs)	54653.3	Conv. (cfs)	
54653.3			
Length Wtd. (ft)	360.00	Wetted Per. (ft)	
90.49			
Min Ch El (ft)	1289.40	Shear (lb/sq ft)	
2.52			
Alpha	1.00	Stream Power (lb/ft s)	
20.35			
Frctn Loss (ft)	1.80	Cum Volume (acre-ft)	84.90
35.47 69.70			
C & E Loss (ft)	0.43	Cum SA (acres)	35.57
4.90 42.96			

Warning - The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need
for additional cross sections.
Warning - The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross
section. This may indicate the need for additional cross sections.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Note - Multiple critical depths were found at this location. The critical depth with the lowest, valid,
energy was used.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1298.18	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.93	Wt. n-Val.	
0.050			
E.G. Elev (ft)	1299.11	Reach Len. (ft)	360.00
360.00 360.00			
Crit W.S. (ft)	1296.02	Flow Area (sq ft)	
575.97			
E.G. Slope (ft/ft)	0.006446	Area (sq ft)	
575.97			
Q Total (cfs)	4450.00	Flow (cfs)	
4450.00			
Top Width (ft)	90.00	Top Width (ft)	
90.00			
Vel Total (ft/s)	7.73	Avg. Vel. (ft/s)	
7.73			
Max Chl Dpth (ft)	8.78	Hydr. Depth (ft)	
6.40			
Conv. Total (cfs)	55425.0	Conv. (cfs)	
55425.0			
Length Wtd. (ft)	360.00	Wetted Per. (ft)	
98.85			
Min Ch El (ft)	1289.40	Shear (lb/sq ft)	
2.34			
Alpha	1.00	Stream Power (lb/ft s)	
18.12			

Frctn Loss (ft)		1.35	Cum Volume (acre-ft)	54.51
39.03	54.93			
C & E Loss (ft)		0.39	Cum SA (acres)	15.41
4.90	16.32			

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

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

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

Warning - The parabolic search method failed to converge on critical depth. The program will try the cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 8

INPUT
Description: 0.78
FIS CROSS SECTION B @ STATION 4512

Station Elevation Data num= 17

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9700	1300	9750	1299.1	9800	1298.2	9900	1296.4	9950	1295.5
10000	1294.6	10040	1294.2	10100	1293.5	10186	1293.4	10213	1288.8
10221	1288	10227	1288.3	10249	1294.6	10300	1294.6	10400	1294.4
10440	1294.2	10700	1298						

Manning's n Values num= 5

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9700	.1	10040	.05	10186	.08	10249	.05	10400	.1

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10186	10249	1200	1200	400 .3 .5

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1296.54	Element	Left OB	Channel Right OB
Vel Head (ft)	0.14	Wt. n-Val.	0.056	0.080 0.063
E.G. Elev (ft)	1296.68	Reach Len. (ft)	1200.00	

1200.00 400.00			
Crit W.S. (ft)		Flow Area (sq ft)	616.76
374.21 579.24			
E.G. Slope (ft/ft)	0.003911	Area (sq ft)	616.76
374.21 579.24			
Q Total (cfs)	4450.00	Flow (cfs)	1830.76
1406.01 1213.24			
Top Width (ft)	707.66	Top Width (ft)	293.68
63.00 350.98			
Vel Total (ft/s)	2.83	Avg. Vel. (ft/s)	2.97
3.76 2.09			
Max Chl Dpth (ft)	8.54	Hydr. Depth (ft)	2.10
5.94 1.65			
Conv. Total (cfs)	71158.7	Conv. (cfs)	29275.1
22483.0 19400.5			
Length Wtd. (ft)	970.55	Wetted Per. (ft)	293.70
64.32 351.00			
Min Ch El (ft)	1288.00	Shear (lb/sq ft)	0.51
1.42 0.40			
Alpha	1.16	Stream Power (lb/ft s)	1.52
5.34 0.84			
Frctn Loss (ft)	2.48	Cum Volume (acre-ft)	77.54
31.65 65.36			
C & E Loss (ft)	0.04	Cum SA (acres)	32.95
4.27 40.68			

Warning - The energy loss was 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

W.S. Elev (ft)	1297.22	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.14	Wt. n-Val.	0.054
0.080 0.050			
E.G. Elev (ft)	1297.37	Reach Len. (ft)	1200.00
1200.00 400.00			
Crit W.S. (ft)		Flow Area (sq ft)	639.44
417.23 405.80			
E.G. Slope (ft/ft)	0.002445	Area (sq ft)	639.44
417.23 405.80			
Q Total (cfs)	4450.00	Flow (cfs)	1978.61
1332.85 1138.54			
Top Width (ft)	400.00	Top Width (ft)	186.00
63.00 151.00			
Vel Total (ft/s)	3.04	Avg. Vel. (ft/s)	3.09
3.19 2.81			
Max Chl Dpth (ft)	9.22	Hydr. Depth (ft)	3.44
6.62 2.69			
Conv. Total (cfs)	89994.3	Conv. (cfs)	40014.3
26954.8 23025.2			
Length Wtd. (ft)	1020.03	Wetted Per. (ft)	188.63
64.32 153.82			
Min Ch El (ft)	1288.00	Shear (lb/sq ft)	0.52
0.99 0.40			
Alpha	1.01	Stream Power (lb/ft s)	1.60
3.16 1.13			

Frctn Loss (ft)		2.36	Cum Volume (acre-ft)	51.87
34.93	53.25			
C & E Loss (ft)		0.00	Cum SA (acres)	14.64
4.27	15.69			

Warning - The energy loss was 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: 7

INPUT
Description: 0.553 .
G&O CROSS SECTION @ STATION 3312 CODED AS RECTANGLE NOT CIRCULAR

Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9530	1295	9890	1291.2	10000	1291.8	10100	1291.8	10200	1291.9
10297	1291.9	10297.1	1286.3	10300.2	1286.3	10300.3	1290.3	10301.9	1290.3
10302	1286.3	10305.1	1286.3	10305.2	1291.9	10400	1291.8	10500	1292.1
10600	1292.6	10700	1293.3	10800	1294.3	11060	1298		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9530	.05	10297	.022	10305.2	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10297	10305.2	32	32	.1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1294.10	Element	Left OB	Channel Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.050	0.022 0.050
E.G. Elev (ft)	1294.17	Reach Len. (ft)	0.00	0.00 0.00
Crit W.S. (ft)	1293.09	Flow Area (sq ft)	1351.17	56.58 749.18
E.G. Slope (ft/ft)	0.001750	Area (sq ft)	1351.17	56.58 749.18
Q Total (cfs)	4175.00	Flow (cfs)	2650.65	261.73 1262.62
Top Width (ft)	1164.28	Top Width (ft)	681.52	8.20 474.56
Vel Total (ft/s)	1.94	Avg. Vel. (ft/s)	1.96	4.63 1.69
Max Chl Dpth (ft)	7.80	Hydr. Depth (ft)	1.98	

6.90 1.58			
Conv. Total (cfs)	99813.0	Conv. (cfs)	63369.9
6257.3 30I85.8			
Length Wtd. (ft)	0.00	Wetted Per. (ft)	681.53
27.01 474.57			
Min Ch El (ft)	1286.30	Shear (lb/sq ft)	0.22
0.23 0.17			
Alpha	1.24	Stream Power (lb/ft s)	0.42
1.06 0.29			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	50.44
25.71 59.26			
C & E Loss (ft)	0.00	Cum SA (acres)	19.52
3.29 36.89			

Warning - The conveyance ratio (upstream 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 parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1294.85	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.16	Wt. n-Val.	0.050
0.022 0.050			
E.G. Elev (ft)	1295.01	Reach Len. (ft)	0.00
0.00 0.00			
Crit W.S. (ft)	1293.50	Flow Area (sq ft)	1050.96
62.76 284.53			
E.G. Slope (ft/ft)	0.002170	Area (sq ft)	1050.96
62.76 284.53			
Q Total (cfs)	4175.00	Flow (cfs)	3026.13
346.45 802.42			
Top Width (ft)	450.00	Top Width (ft)	347.00
8.20 94.80			
Vel Total (ft/s)	2.99	Avg. Vel. (ft/s)	2.88
5.52 2.82			
Max Chl Dpth (ft)	8.55	Hydr. Depth (ft)	3.03
7.65 3.00			
Conv. Total (cfs)	89630.3	Conv. (cfs)	64966.0
7437.6 17226.6			
Length Wtd. (ft)	0.00	Wetted Per. (ft)	350.33
27.01 97.85			
Min Ch El (ft)	1286.30	Shear (lb/sq ft)	0.41
0.31 0.39			
Alpha	1.13	Stream Power (lb/ft s)	1.17
1.74 1.11			
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	28.59
28.32 50.08			
C & E Loss (ft)	0.04	Cum SA (acres)	7.30
3.29 14.57			

Warning - The conveyance ratio (upstream 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 cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

BRIDGE RIVER: RIVER-1
REACH: Reach-1 RS: 6.5

INPUT
Description: Bridge #1

Distance from Upstream XS = 0
Deck/Roadway Width = 32
Weir Coefficient = 2.6
Bridge Deck/Roadway Skew =
Upstream Deck/Roadway Coordinates
num= 13

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9530	1295	1295	9890	1291.2	1291.2	10000	1291.8	1291.8
10297	1291.9	1291.9	10297.1	1291.9	1290.3	10305.1	1291.9	1290.3
10305.2	1291.9	1291.9	10400	1291.8	1291.8	10500	1292.1	1292.1
10600	1292.6	1292.6	10700	1293.3	1293.3	10800	1294.3	1294.3
11060	1298	1298						

Upstream Bridge Cross Section Data
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9530	1295	9890	1291.2	10000	1291.8	10100	1291.8	10200	1291.9
10297	1291.9	10297.1	1286.3	10300.2	1286.3	10300.3	1290.3	10301.9	1290.3
10302	1286.3	10305.1	1286.3	10305.2	1291.9	10400	1291.8	10500	1292.1
10600	1292.6	10700	1293.3	10800	1294.3	11060	1298		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9530	.05	10297	.022	10305.2	.05

Bank Sta: Left	Right	Coeff Contr.	Expan.
10297	10305.2	.1	.3

Downstream Deck/Roadway Coordinates
num= 13

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
9530	1295	1295	9890	1291.2	1291.2	10000	1291.8	1291.8
10297	1291.9	1291.9	10297.1	1291.9	1290.3	10305.1	1291.9	1290.3
10305.2	1291.9	1291.9	10400	1291.8	1291.8	10500	1292.1	1292.1
10600	1292.6	1292.6	10700	1293.3	1293.3	10800	1294.3	1294.3
11060	1298	1298						

Downstream Bridge Cross Section Data
Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9530	1295	9890	1291.2	10000	1291.8	10100	1291.8	10200	1291.9

```
   10275  1291.3   10285  1291.4   10293  1286.3   10309  1286.9   10313
1291.2
   10400  1291.8   10500  1292.1   10600  1292.6   10700  1293.3   10800
1294.3
   11060    1298

Manning's n Values          num=       3
     Sta   n Val      Sta   n Val      Sta   n Val
    9530     .05    10285     .08    10313     .05

Bank Sta: Left   Right    Coeff Contr.   Expan.
         10285   10313             .1       .3

Upstream Embankment side slope                 =       0 horiz. to 1.0 vertical
Downstream Embankment side slope               =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins            =  1291.8
Energy head used in spillway design            =
Spillway height used in design                 =
Weir crest shape                               = Broad Crested

Number of Piers =  1

Pier Data
Pier Station     Upstream= 10301.1    Downstream=   10299
Upstream     num=       2
    Width   Elev    Width   Elev
       2  1286.3       2  1290.3
Downstream     num=       2
    Width   Elev    Width   Elev
       2  1286.3       2  1290.3

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
      Yarnell                KVal =    1.25
Selected Low Flow Methods = Yarnell

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =.8006408
           Max Low Cord                =  1290.3

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
           inside the bridge at the downstream end
       Criteria to check for pressure flow = Upstream water surface

BRIDGE OUTPUT    Profile #PF#1
Opening : Bridge #1

  E.G. US. (ft)                1294.17   Element                  Inside BR US
Inside BR DS
  W.S. US. (ft)                1294.10   E.G. Elev (ft)                1294.17
1294.05
  Q Total (cfs)                4175.00   W.S. Elev (ft)                1294.08
1293.98
```

Q Bridge (cfs)	57.44	Crit W.S. (ft)	1293.02
1292.66			
Q Weir (cfs)		Max Chl Dpth (ft)	7.78
7.68			
Weir Sta Lft (ft)		Vel Total (ft/s)	2.31
2.06			
Weir Sta Rgt (ft)		Flow Area (sq ft)	1803.67
2027.80			
Weir Submerg		Froude # Chl	0.26
0.22			
Weir Max Depth (ft)		Specif Force (cu ft)	2638.77
2849.12			
Min Top Rd (ft)	1291.80	Hydr Depth (ft)	1.55
1.78			
Min El Prs (ft)	1290.30	W.P. Total (ft)	1350.83
1791.62			
Delta EG (ft)	0.13	Conv. Total (cfs)	70474.4
67575.8			
Delta WS (ft)	0.11	Top Width (ft)	1161.11
1141.15			
BR Open Area (sq ft)	26.95	Frctn Loss (ft)	0.12
0.00			
BR Open Vel (ft/s)	2.13	C & E Loss (ft)	0.01
0.00			
Coef of Q		Shear Total (lb/sq ft)	0.29
0.27			
Br Sel Mthd	Energy only	Power Total (lb/ft s)	0.68
0.56			

Warning - The pressure/weir method gave an invalid answer. The upstream energy was less than
the downstream energy. The program defaulted to the energy based answer.
Note - Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow.
The Yarnell answer has been disregarded.
Note - Momentum answer is not valid if the water surface is above the low chord or if there is weir
flow. The momentum answer has been disregarded.
Note - The downstream water surface is above the minimum elevation for pressure flow. The orifice
equations were used for pressure flow.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Warning - The conveyance ratio (upstream 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 cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

BRIDGE OUTPUT Profile #PF#2
Opening : Bridge #1

E.G. US. (ft)	1295.01	Element	Inside BR US
Inside BR DS			
W.S. US. (ft)	1294.85	E.G. Elev (ft)	1294.97
1294.94			
Q Total (cfs)	4175.00	W.S. Elev (ft)	1294.93
1294.91			
Q Bridge (cfs)	31.83	Crit W.S. (ft)	1293.02
1292.66			
Q Weir (cfs)		Max Chl Dpth (ft)	8.63
8.61			
Weir Sta Lft (ft)		Vel Total (ft/s)	1.53
1.34			
Weir Sta Rgt (ft)		Flow Area (sq ft)	2734.68
3117.49			
Weir Submerg		Froude # Chl	0.15
0.13			
Weir Max Depth (ft)		Specif Force (cu ft)	4788.48
5261.79			
Min Top Rd (ft)	1291.80	Hydr Depth (ft)	2.09
2.39			
Min El Prs (ft)	1290.30	W.P. Total (ft)	1498.15
1954.52			
Delta EG (ft)	0.08	Conv. Total (cfs)	129609.6
130487.1			
Delta WS (ft)	0.04	Top Width (ft)	1308.43
1304.04			
BR Open Area (sq ft)	26.95	Frctn Loss (ft)	0.03
0.00			
BR Open Vel (ft/s)	1.18	C & E Loss (ft)	0.00
0.01			
Coef of Q		Shear Total (lb/sq ft)	0.12
0.10			
Br Sel Mthd	Energy only	Power Total (lb/ft s)	0.18
0.14			

Warning - The pressure/weir method gave an invalid answer. The upstream energy was less than
the downstream energy. The program defaulted to the energy based answer.
Note - Yarnell answer is not valid if the water surface is above the low chord or if there is weir flow.
The Yarnell answer has been disregarded.
Note - Momentum answer is not valid if the water surface is above the low chord or if there is weir
flow. The momentum answer has been disregarded.
Note - The downstream water surface is above the minimum elevation for pressure flow. The orifice
equations were used for pressure flow.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.
Warning - The cross section had to be extended vertically during the critical depth calculations.
Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 6

INPUT
Description: 0.547
G&O CROSS SECTION @ STATION 3280

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9530	1295	9890	1291.2	10000	1291.8	10100	1291.8	10200	1291.9
10275	1291.3	10285	1291.4	10293	1286.3	10309	1286.9	10313	1291.2
10400	1291.8	10500	1292.1	10600	1292.6	10700	1293.3	10800	1294.3
11060	1298								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9530	.05	10285	.08	10313	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10285	10313	10	300	600 .1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1293.98	Element	Left OB Channel Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.050 0.080 0.050
E.G. Elev (ft)	1294.04	Reach Len. (ft)	300.00 600.00
Crit W.S. (ft)		Flow Area (sq ft)	178.93 709.37 1276.84
E.G. Slope (ft/ft)	0.001817	Area (sq ft)	178.93 709.37 1276.84
Q Total (cfs)	4175.00	Flow (cfs)	452.30 1207.79 2514.92
Top Width (ft)	1142.00	Top Width (ft)	28.00 455.32 658.68
Vel Total (ft/s)	1.93	Avg. Vel. (ft/s)	2.53 1.70 1.97
Max Chl Dpth (ft)	7.68	Hydr. Depth (ft)	6.39 1.56 1.94
Conv. Total (cfs)	97932.1	Conv. (cfs)	10609.4 28330.8 58991.9
Length Wtd. (ft)	206.25	Wetted Per. (ft)	31.37 455.33 658.70
Min Ch El (ft)	1286.30	Shear (lb/sq ft)	0.65 0.18 0.22
Alpha	1.04	Stream Power (lb/ft s)	1.64 0.30 0.43
Frctn Loss (ft)	0.35	Cum Volume (acre-ft)	49.48

25.64 58.19

C & E Loss (ft)	0.00	Cum SA (acres)	19.02

3.28 36.55

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1294.81	Element	Left OB

Channel Right OB

Vel Head (ft)	0.12	Wt. n-Val.	0.050

0.080 0.050

E.G. Elev (ft)	1294.93	Reach Len. (ft)	10.00

300.00 600.00

Crit W.S. (ft)		Flow Area (sq ft)	1029.76

202.09 288.00

E.G. Slope (ft/ft)	0.001897	Area (sq ft)	1029.76

202.09 288.00

Q Total (cfs)	4175.00	Flow (cfs)	2799.59

566.00 809.41

Top Width (ft)	450.00	Top Width (ft)	335.00

28.00 87.00

Vel Total (ft/s)	2.75	Avg. Vel. (ft/s)	2.72

2.80 2.81

Max Chl Dpth (ft)	8.51	Hydr. Depth (ft)	3.07

7.22 3.31

Conv. Total (cfs)	95856.8	Conv. (cfs)	64277.7

12995.2 18583.8

Length Wtd. (ft)	254.14	Wetted Per. (ft)	338.29

31.37 90.01

Min Ch El (ft)	1286.30	Shear (lb/sq ft)	0.36

0.76 0.38

Alpha	1.00	Stream Power (lb/ft s)	0.98

2.14 1.06

Frctn Loss (ft)	0.52	Cum Volume (acre-ft)	27.16

28.23 48.36

C & E Loss (ft)	0.00	Cum SA (acres)	6.75

3.28 14.17

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 5

INPUT
Description: 0.49
FIS CROSS SECTION A @ STATION 2980

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta
Elev								
9836	1300	9837	1298	9838	1296	9839	1294	9840
1293								
10000	1290.4	10100	1290.3	10207	1288.8	10225	1286.2	10244
1291								
10256	1291.6	10276	1291.6	10288	1291.7	10400	1291.2	10760
1294								
11160	1295							

Manning's n Values	num=	3			
Sta	n Val	Sta	n Val	Sta	n Val
9836	.05	10207	.08	10244	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10207	10244	1400	1800	1200	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1293.61	Element	Left OB Channel Right OB
Vel Head (ft)	0.08	Wt. n-Val.	0.050 0.080 0.050
E.G. Elev (ft)	1293.69	Reach Len. (ft)	1400.00 1800.00 1200.00
Crit W.S. (ft)		Flow Area (sq ft)	1067.40 205.29 708.28
E.G. Slope (ft/ft)	0.001608	Area (sq ft)	1067.40 205.29 708.28
Q Total (cfs)	4175.00	Flow (cfs)	2587.30 472.51 1115.19
Top Width (ft)	870.89	Top Width (ft)	367.61 37.00 466.28
Vel Total (ft/s)	2.11	Avg. Vel. (ft/s)	2.42 2.30 1.57
Max Chl Dpth (ft)	7.41	Hydr. Depth (ft)	2.90 5.55 1.52
Conv. Total (cfs)	104126.9	Conv. (cfs)	64528.6 11784.8 27813.5
Length Wtd. (ft)	1400.90	Wetted Per. (ft)	367.90 37.78 466.31
Min Ch El (ft)	1286.20	Shear (lb/sq ft)	0.29 0.55 0.15
Alpha	1.10	Stream Power (lb/ft s)	0.71 1.26 0.24
Frctn Loss (ft)	2.27	Cum Volume (acre-ft)	49.21 24.32 48.43
C & E Loss (ft)	0.00	Cum SA (acres)	18.91 3.05 30.20

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

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1294.24	Element	Left OB Channel Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.050 0.080 0.050
E.G. Elev (ft)	1294.40	Reach Len. (ft)	1400.00 1800.00 1200.00
Crit W.S. (ft)		Flow Area (sq ft)	377.70 228.67 762.56
E.G. Slope (ft/ft)	0.002215	Area (sq ft)	377.70 228.67 762.56

Q Total (cfs)	4175.00	Flow (cfs)	1470.02
663.85 2041.12			
Top Width (ft)	400.00	Top Width (ft)	77.00
37.00 286.00			
Vel Total (ft/s)	3.05	Avg. Vel. (ft/s)	3.89
2.90 2.68			
Max Chl Dpth (ft)	8.05	Hydr. Depth (ft)	4.91
6.18 2.67			
Conv. Total (cfs)	88705.8	Conv. (cfs)	31233.4
14104.9 43367.6			
Length Wtd. (ft)	1371.74	Wetted Per. (ft)	81.37
37.78 288.05			
Min Ch El (ft)	1286.20	Shear (lb/sq ft)	0.64
0.84 0.37			
Alpha	1.09	Stream Power (lb/ft s)	2.50
2.43 0.98			
Frctn Loss (ft)	2.14	Cum Volume (acre-ft)	27.00
26.75 41.13			
C & E Loss (ft)	0.02	Cum SA (acres)	6.70
3.05 11.60			

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

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 4

INPUT
Description: 0.15

Station Elevation Data num= 16

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9500	1300	9600	1297.5	9700	1295	9800	1292.8	9900	1290.4
10000	1287.9	10100	1288.8	10130	1288.4	10152	1282.9	10170	1280
10182	1286	10211	1287.1	10300	1288.8	10400	1288.8	10480	1290
11000	1292								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
9500	.05	10130	.09	10182	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10130	10182	670	1160	850	.1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1291.35	Element	Left OB Channel Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.050 0.090 0.050
E.G. Elev (ft)	1291.41	Reach Len. (ft)	670.00

1160.00 850.00			
Crit W.S. (ft)		Flow Area (sq ft)	620.23
403.59 1087.17			
E.G. Slope (ft/ft)	0.001639	Area (sq ft)	620.23
403.59 1087.17			
Q Total (cfs)	4175.00	Flow (cfs)	1300.95
1027.16 1846.88			
Top Width (ft)	969.40	Top Width (ft)	269.42
52.00 647.98			
Vel Total (ft/s)	1.98	Avg. Vel. (ft/s)	2.10
2.55 1.70			
Max Chl Dpth (ft)	11.35	Hydr. Depth (ft)	2.30
7.76 1.68			
Conv. Total (cfs)	103119.8	Conv. (cfs)	32132.7
25370.3 45616.8			
Length Wtd. (ft)	831.48	Wetted Per. (ft)	269.47
54.33 648.03			
Min Ch El (ft)	1280.00	Shear (lb/sq ft)	0.24
0.76 0.17			
Alpha	1.08	Stream Power (lb/ft s)	0.49
1.93 0.29			
Frctn Loss (ft)	1.29	Cum Volume (acre-ft)	22.09
11.74 23.70			
C & E Loss (ft)	0.00	Cum SA (acres)	8.67
1.22 14.85			

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.
Warning - The energy loss was 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

W.S. Elev (ft)	1292.15	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.09	Wt. n-Val.	0.050
0.090 0.050			
E.G. Elev (ft)	1292.24	Reach Len. (ft)	670.00
1160.00 850.00			
Crit W.S. (ft)		Flow Area (sq ft)	285.54
445.59 1020.93			
E.G. Slope (ft/ft)	0.001159	Area (sq ft)	285.54
445.59 1020.93			
Q Total (cfs)	4175.00	Flow (cfs)	654.00
1018.46 2502.55			
Top Width (ft)	400.00	Top Width (ft)	80.00
52.00 268.00			
Vel Total (ft/s)	2.38	Avg. Vel. (ft/s)	2.29
2.29 2.45			
Max Chl Dpth (ft)	12.15	Hydr. Depth (ft)	3.57
8.57 3.81			
Conv. Total (cfs)	122656.8	Conv. (cfs)	19213.8
29921.0 73521.9			
Length Wtd. (ft)	845.80	Wetted Per. (ft)	83.81
54.33 270.65			

Min Ch El (ft)	1280.00	Shear (lb/sq ft)	0.25
0.59 0.27			
Alpha	1.00	Stream Power (lb/ft s)	0.56
1.36 0.67			
Frctn Loss (ft)	1.08	Cum Volume (acre-ft)	16.34
12.82 16.56			
C & E Loss (ft)	0.00	Cum SA (acres)	4.18
1.22 3.97			

Warning - The conveyance ratio (upstream conveyance divided by downstream conveyance) is less
than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning - The energy loss was 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: 3

INPUT
Description: 17.814
This is a REPEATED section.

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9330	1300	9800	1290	9850	1289.2	9900	1288.5	9950	1287.8
10000	1287	10100	1286.9	10200	1287.4	10300	1288.1	10400	1286.9
10434	1288.4	10500	1288.8	10608	1280.8	10624	1276.8	10633	1276
10642	1276.8	10646	1284.9	10700	1286.2	10800	1287.2	10900	1288.4
11480	1290	11750	1300						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9330	.05	10434	.06	10608	.08	10646	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
10608	10646	10	10	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1290.03	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.09	Wt. n-Val.	0.053
0.080 0.050			
E.G. Elev (ft)	1290.12	Reach Len. (ft)	10.00
10.00 10.00			
Crit W.S. (ft)		Flow Area (sq ft)	2125.74
461.86 1282.01			
E.G. Slope (ft/ft)	0.001512	Area (sq ft)	2125.74
461.86 1282.01			

Q Total (cfs)	8080.00	Flow (cfs)	4499.72
1608.80 1971.48			
Top Width (ft)	1682.46	Top Width (ft)	809.56
38.00 834.90			
Vel Total (ft/s)	2.09	Avg. Vel. (ft/s)	2.12
3.48 1.54			
Max Chl Dpth (ft)	14.03	Hydr. Depth (ft)	2.63
12.15 1.54			
Conv. Total (cfs)	207823.4	Conv. (cfs)	115736.1
41379.4 50708.0			
Length Wtd. (ft)	10.00	Wetted Per. (ft)	809.92
43.60 834.93			
Min Ch El (ft)	1276.00	Shear (lb/sq ft)	0.25
1.00 0.14			
Alpha	1.26	Stream Power (lb/ft s)	0.52
3.48 0.22			
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.97
0.21 0.58			
C & E Loss (ft)	0.00	Cum SA (acres)	0.37
0.02 0.38			

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1291.03	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.13	Wt. n-Val.	0.055
0.080 0.050			
E.G. Elev (ft)	1291.16	Reach Len. (ft)	10.00
10.00 10.00			
Crit W.S. (ft)		Flow Area (sq ft)	1735.88
499.68 646.10			
E.G. Slope (ft/ft)	0.001347	Area (sq ft)	1735.88
499.68 646.10			
Q Total (cfs)	8080.00	Flow (cfs)	4367.48
1731.44 1981.07			
Top Width (ft)	608.00	Top Width (ft)	437.00
38.00 133.00			
Vel Total (ft/s)	2.80	Avg. Vel. (ft/s)	2.52
3.47 3.07			
Max Chl Dpth (ft)	15.03	Hydr. Depth (ft)	3.97
13.15 4.86			
Conv. Total (cfs)	220171.9	Conv. (cfs)	119009.5
47180.1 53982.3			
Length Wtd. (ft)	10.00	Wetted Per. (ft)	441.11
43.60 137.06			
Min Ch El (ft)	1276.00	Shear (lb/sq ft)	0.33
0.96 0.40			
Alpha	1.06	Stream Power (lb/ft s)	0.83
3.34 1.22			
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.79
0.23 0.30			
C & E Loss (ft)	0.00	Cum SA (acres)	0.20
0.02 0.06			

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 2

INPUT

Description: 17.812
This is a REPEATED section.

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9330	1300	9800	1290	9850	1289.2	9900	1288.5	9950	1287.8
10000	1287	10100	1286.9	10200	1287.4	10300	1288.1	10400	1286.9
10434	1288.4	10500	1288.8	10608	1280.8	10624	1276.8	10633	1276
10642	1276.8	10646	1284.9	10700	1286.2	10800	1287.2	10900	1288.4
11480	1290	11750	1300						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9330	.05	10434	.06	10608	.08	10646	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10608	10646	10	10	.1 .3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1290.02	Element	Left OB Channel Right OB
Vel Head (ft)	0.09	Wt. n-Val.	0.053 0.080 0.050
E.G. Elev (ft)	1290.10	Reach Len. (ft)	10.00 10.00 10.00
Crit W.S. (ft)		Flow Area (sq ft)	2112.51 461.24 1268.35
E.G. Slope (ft/ft)	0.001542	Area (sq ft)	2112.51 461.24 1268.35
Q Total (cfs)	8080.00	Flow (cfs)	4501.48 1621.51 1957.00
Top Width (ft)	1681.25	Top Width (ft)	808.79 38.00 834.46
Vel Total (ft/s)	2.10	Avg. Vel. (ft/s)	2.13 3.52 1.54
Max Chl Dpth (ft)	14.02	Hydr. Depth (ft)	2.61 12.14 1.52
Conv. Total (cfs)	205730.9	Conv. (cfs)	114615.6 41286.6 49828.7
Length Wtd. (ft)	10.00	Wetted Per. (ft)	809.16 43.60 834.49
Min Ch El (ft)	1276.00	Shear (lb/sq ft)	0.25 1.02 0.15
Alpha	1.26	Stream Power (lb/ft s)	0.54 3.58 0.23
Frctn Loss (ft)	0.02	Cum Volume (acre-ft)	0.48 0.11 0.29
C & E Loss (ft)	0.00	Cum SA (acres)	0.19 0.01 0.19

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1291.01	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.13	Wt. n-Val.	0.055
0.080 0.050			
E.G. Elev (ft)	1291.14	Reach Len. (ft)	10.00
10.00 10.00			
Crit W.S. (ft)		Flow Area (sq ft)	1729.69
499.15 644.21			
E.G. Slope (ft/ft)	0.001360	Area (sq ft)	1729.69
499.15 644.21			
Q Total (cfs)	8080.00	Flow (cfs)	4362.44
1736.57 1980.99			
Top Width (ft)	608.00	Top Width (ft)	437.00
38.00 133.00			
Vel Total (ft/s)	2.81	Avg. Vel. (ft/s)	2.52
3.48 3.08			
Max Chl Dpth (ft)	15.01	Hydr. Depth (ft)	3.96
13.14 4.84			
Conv. Total (cfs)	219127.7	Conv. (cfs)	118308.2
47095.4 53724.0			
Length Wtd. (ft)	10.00	Wetted Per. (ft)	441.10
43.60 137.04			
Min Ch El (ft)	1276.00	Shear (lb/sq ft)	0.33
0.97 0.40			
Alpha	1.06	Stream Power (lb/ft s)	0.84
3.38 1.23			
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	0.40
0.11 0.15			
C & E Loss (ft)	0.00	Cum SA (acres)	0.10
0.01 0.03			

CROSS SECTION RIVER: RIVER-1
REACH: Reach-1 RS: 1

INPUT
Description: 17.81

Station Elevation Data num= 22

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
9330	1300	9800	1290	9850	1289.2	9900	1288.5	9950	1287.8
10000	1287	10100	1286.9	10200	1287.4	10300	1288.1	10400	1286.9
10434	1288.4	10500	1288.8	10608	1280.8	10624	1276.8	10633	1276
10642	1276.8	10646	1284.9	10700	1286.2	10800	1287.2	10900	1288.4
11480	1290	11750	1300						

Manning's n Values num= 4

Sta	n Val	Sta	n Val	Sta	n Val	Sta	n Val
9330	.05	10434	.06	10608	.08	10646	.05

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr. Expan.
10608	10646	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #PF#1

W.S. Elev (ft)	1290.00	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.09	Wt. n-Val.	0.053
0.080 0.050			
E.G. Elev (ft)	1290.09	Reach Len. (ft)	
Crit W.S. (ft)	1287.97	Flow Area (sq ft)	2098.89
460.60 1254.30			
E.G. Slope (ft/ft)	0.001575	Area (sq ft)	2098.89
460.60 1254.30			
Q Total (cfs)	8080.00	Flow (cfs)	4503.28
1634.80 1941.93			
Top Width (ft)	1680.00	Top Width (ft)	808.00
38.00 834.00			
Vel Total (ft/s)	2.12	Avg. Vel. (ft/s)	2.15
3.55 1.55			
Max Chl Dpth (ft)	14.00	Hydr. Depth (ft)	2.60
12.12 1.50			
Conv. Total (cfs)	203587.7	Conv. (cfs)	113466.8
41191.1 48929.7			
Length Wtd. (ft)		Wetted Per. (ft)	808.36
43.60 834.03			
Min Ch El (ft)	1276.00	Shear (lb/sq ft)	0.26
1.04 0.15			
Alpha	1.27	Stream Power (lb/ft s)	0.55
3.69 0.23			
Frctn Loss (ft)		Cum Volume (acre-ft)	
C & E Loss (ft)		Cum SA (acres)	

Warning - The parabolic search method failed to converge on critical depth. The program will try the
cross section slice/secant method to find critical depth.

CROSS SECTION OUTPUT Profile #PF#2

W.S. Elev (ft)	1291.00	Element	Left OB
Channel Right OB			
Vel Head (ft)	0.13	Wt. n-Val.	0.055
0.080 0.050			
E.G. Elev (ft)	1291.13	Reach Len. (ft)	
Crit W.S. (ft)	1287.93	Flow Area (sq ft)	1723.39
498.60 642.30			
E.G. Slope (ft/ft)	0.001373	Area (sq ft)	1723.39
498.60 642.30			
Q Total (cfs)	8080.00	Flow (cfs)	4357.27
1741.83 1980.90			
Top Width (ft)	608.00	Top Width (ft)	437.00
38.00 133.00			
Vel Total (ft/s)	2.82	Avg. Vel. (ft/s)	2.53
3.49 3.08			
Max Chl Dpth (ft)	15.00	Hydr. Depth (ft)	3.94
13.12 4.83			
Conv. Total (cfs)	218067.7	Conv. (cfs)	117596.5
47009.4 53461.7			
Length Wtd. (ft)		Wetted Per. (ft)	441.09
43.60 137.03			
Min Ch El (ft)	1276.00	Shear (lb/sq ft)	0.33

0.98	0.40				
Alpha			1.06	Stream Power (lb/ft s)	0.85
3.42	1.24				
Frctn Loss (ft)				Cum Volume (acre-ft)	
C & E Loss (ft)				Cum SA (acres)	

SUMMARY OF MANNING'S N VALUES

River:RIVER-1

Reach	River Sta.	n1	n2	n3	n4	n5
Reach-1	41	.06	.04	.05		
Reach-1	40	.06	.04	.05		
Reach-1	39	.06	.04	.05		
Reach-1	38	.05	.04	.05		
Reach-1	37	.05	.04	.05		
Reach-1	36	.05	.06	.05		
Reach-1	35	.05	.06	.05		
Reach-1	34	.05	.06	.05		
Reach-1	33	.05	.06	.05		
Reach-1	32	.05	.02	.05		
Reach-1	31.5	Bridge				
Reach-1	31	.05	.06	.05		
Reach-1	30	.1	.05	.06	.05	.1
Reach-1	29	.05	.07	.05		
Reach-1	28	.05	.02	.05		
Reach-1	27	.05	.02	.05		
Reach-1	26	.05	.02	.05		
Reach-1	25	.05	.02	.05		
Reach-1	24	.05	.02	.05		
Reach-1	23	.05	.02	.05		
Reach-1	22.5	Bridge				
Reach-1	22	.05	.05	.05		
Reach-1	21	.1	.08	.1		
Reach-1	20	.05	.08	.05		
Reach-1	19	.05	.09	.05		
Reach-1	18	.05	.1	.05		
Reach-1	17	.05	.1	.05		
Reach-1	16	.05	.1	.05		
Reach-1	15	.05	.03	.05		
Reach-1	14	.05	.08	.02	.08	.05
Reach-1	13.5	Bridge				
Reach-1	13	.05	.08	.02	.08	.05
Reach-1	12	.05	.04	.05		
Reach-1	11	.05	.04	.05		
Reach-1	10	.05	.035	.05		
Reach-1	9.5	Bridge				
Reach-1	9	.05	.05	.05		
Reach-1	8	.1	.05	.08	.05	.1
Reach-1	7	.05	.022	.05		
Reach-1	6.5	Bridge				

Reach-1	6	.05	.08	.05	
Reach-1	5	.05	.08	.05	
Reach-1	4	.05	.09	.05	
Reach-1	3	.05	.06	.08	.05
Reach-1	2	.05	.06	.08	.05
Reach-1	1	.05	.06	.08	.05

SUMMARY OF REACH LENGTHS

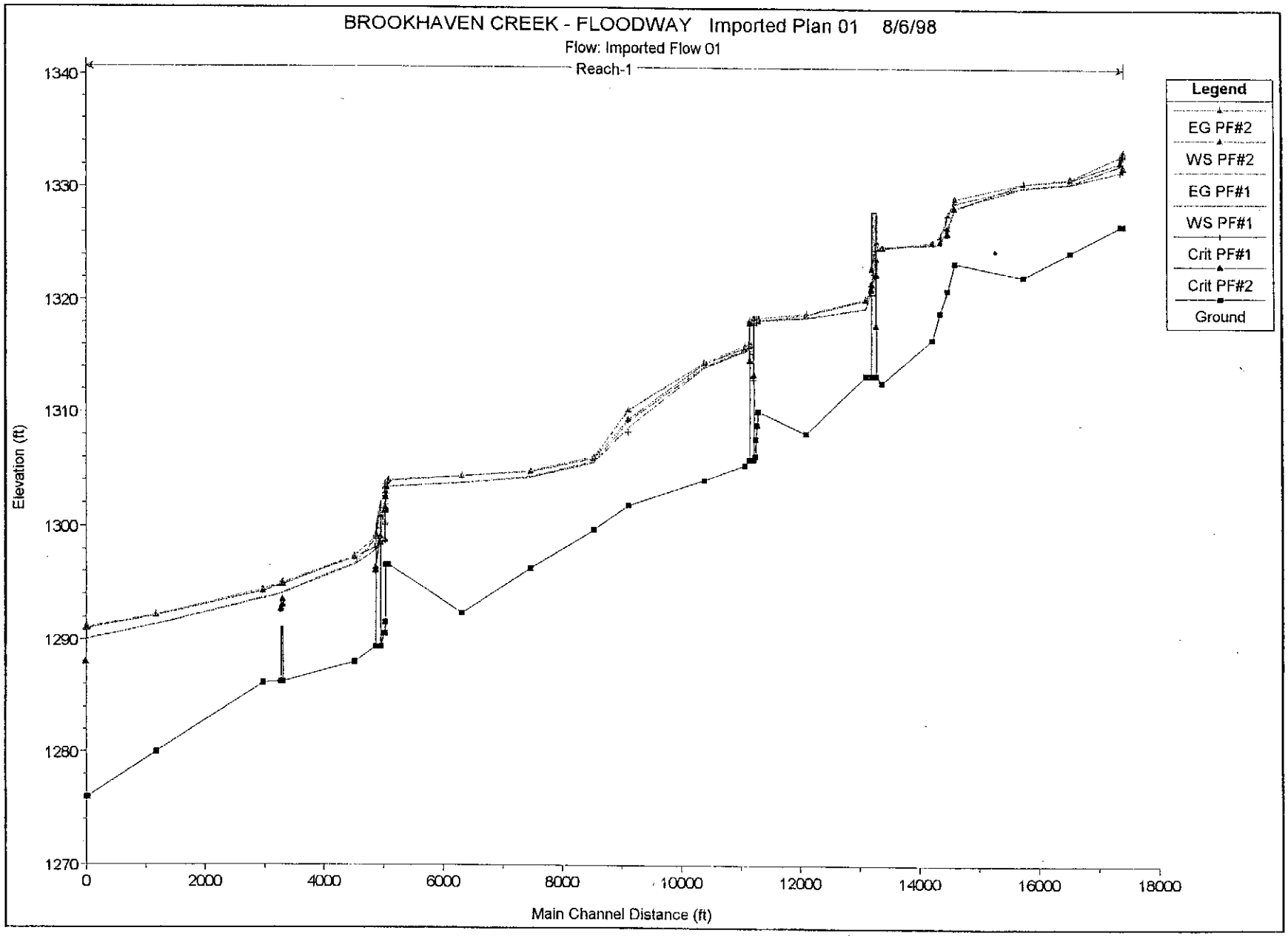
River: RIVER-1

Reach	River Sta.	Left	Channel	Right
Reach-1	41	45	45	45
Reach-1	40	600	840	700
Reach-1	39	580	790	580
Reach-1	38	980	1160	1350
Reach-1	37	80	120	150
Reach-1	36	90	120	160
Reach-1	35	90	130	160
Reach-1	34	800	840	790
Reach-1	33	100	100	100
Reach-1	32	83	83	83
Reach-1	31.5	Bridge		
Reach-1	31	105	85	75
Reach-1	30	1000	1000	960
Reach-1	29	820	810	770
Reach-1	28	20	20	20
Reach-1	27	20	20	20
Reach-1	26	5	5	5
Reach-1	25	5	5	5
Reach-1	24	25	25	25
Reach-1	23	75	75	75
Reach-1	22.5	Bridge		
Reach-1	22	75	75	75
Reach-1	21	670	680	710
Reach-1	20	1200	1270	1130
Reach-1	19	670	585	740
Reach-1	18	1030	1060	1000
Reach-1	17	740	1155	810
Reach-1	16	1060	1230	1110
Reach-1	15	40	40	40
Reach-1	14	1	1	1
Reach-1	13.5	Bridge		
Reach-1	13	10	10	10
Reach-1	12	20	20	20
Reach-1	11	50	50	50
Reach-1	10	83	83	83
Reach-1	9.5	Bridge		
Reach-1	9	360	360	360
Reach-1	8	1200	1200	400
Reach-1	7	32	32	32
Reach-1	6.5	Bridge		
Reach-1	6	10	300	600
Reach-1	5	1400	1800	1200
Reach-1	4	670	1160	850
Reach-1	3	10	10	10

Reach-1	2	10	10	10
Reach-1	1	0	0	0

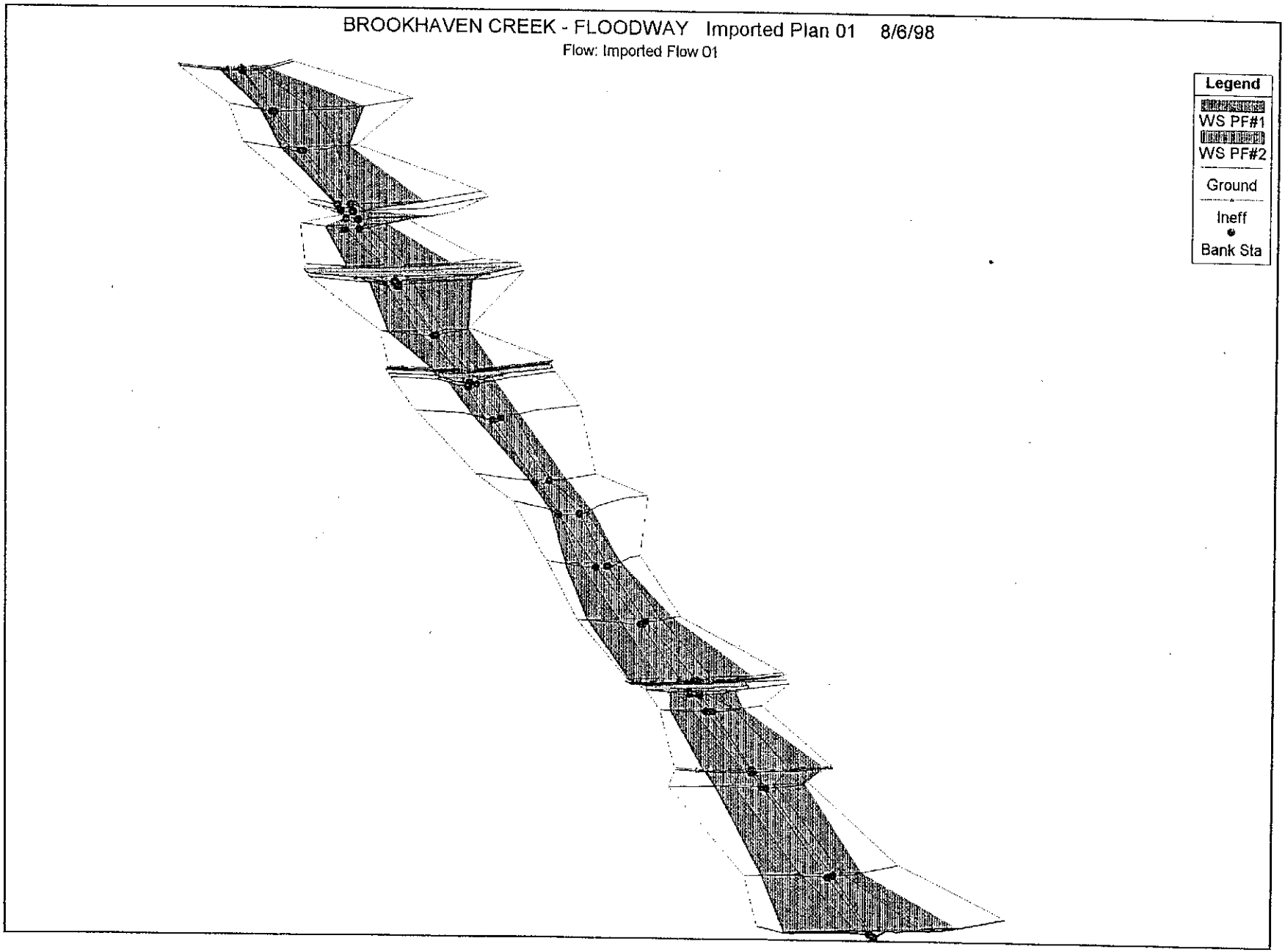
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: RIVER-1

Reach	River Sta.		Contr.	Expan.
Reach-1	41		.3	.5
Reach-1	40		.3	.5
Reach-1	39		.3	.5
Reach-1	38		.1	.3
Reach-1	37		.1	.3
Reach-1	36		.1	.3
Reach-1	35		.1	.3
Reach-1	34		.1	.3
Reach-1	33		.3	.5
Reach-1	32		.3	.5
Reach-1	31.5	Bridge		
Reach-1	31		.3	.5
Reach-1	30		.3	.5
Reach-1	29		.1	.3
Reach-1	28		.1	.3
Reach-1	27		.1	.3
Reach-1	26		.1	.3
Reach-1	25		.1	.3
Reach-1	24		.3	.5
Reach-1	23		.3	.5
Reach-1	22.5	Bridge		
Reach-1	22		.3	.5
Reach-1	21		.3	.5
Reach-1	20		.1	.3
Reach-1	19		.1	.3
Reach-1	18		.1	.3
Reach-1	17		.1	.3
Reach-1	16		.1	.3
Reach-1	15		.3	.5
Reach-1	14		.3	.5
Reach-1	13.5	Bridge		
Reach-1	13		.3	.5
Reach-1	12		.3	.5
Reach-1	11		.3	.5
Reach-1	10		.3	.5
Reach-1	9.5	Bridge		
Reach-1	9		.3	.5
Reach-1	8		.3	.5
Reach-1	7		.1	.3
Reach-1	6.5	Bridge		
Reach-1	6		.1	.3
Reach-1	5		.1	.3
Reach-1	4		.1	.3
Reach-1	3		.1	.3
Reach-1	2		.1	.3
Reach-1	1		.1	.3


BROOKHAVEN CREEK - FLOODWAY Imported Plan 01 8/6/98
Flow: Imported Flow 01
Reach-1
Legend
EG PF#2
WS PF#2
EG PF#1
WS PF#1
Crit PF#1
Crit PF#2
Ground
Elevation (ft)
1340
1330
1320
1310
1300
1290
1280
1270
0
2000
4000
6000
8000
10000
12000
14000
16000
18000
Main Channel Distance (ft)

BROOKHAVEN CREEK - FLOODWAY Imported Plan 01 8/6/98

Flow: Imported Flow 01



CHECK-2 Program: Floodway Module
Encroachment Method, Starting WSEL, Floodway Width, and Surcharge Review

eport File = D:\HECEXE\BRKHVN1.FL2
llowable Surcharge Value: 1
ate: 8/6/98
ne: 08:15:17

ECNO	Method	Surcharge	NTOPWID	FTOPWID	FWIDTH	CHWID	Structure
17.81	9.10	1.00	1680.00	608.00	608.00	38.00	
17.812	9.10	1.00	1680.92	608.00	608.00	38.00	
17.814	9.10	1.00	1681.90	608.00	608.00	38.00	
0.15	7.10	0.99	904.25	400.00	400.00	52.00	
0.49	7.10	0.76	851.99	400.00	400.00	37.00	
0.547	7.10	0.93	1118.90	450.00	450.00	28.00	
0.553	7.10	0.91	1112.98	450.00	450.00	8.20	SB+X2+BT
0.78	7.10	0.61	717.94	400.00	400.00	63.00	
0.847	7.10	0.26	90.00	82.00	82.00	90.00	
0.848	7.10	1.41	76.51	85.00	90.00	90.00	SB+X2+BT
0.872	7.10	-0.14	1000.50	350.00	350.00	120.00	
0.876	7.10	-0.14	1001.29	350.00	350.00	120.00	
0.878	7.10	-0.50	906.29	375.00	375.00	42.00	
0.879	7.10	0.78	1032.06	375.00	375.00	42.00	SB+X2+BT
0.886	7.10	1.29	1109.50	500.00	500.00	160.00	
.12	7.10	1.11	770.01	400.00	400.00	42.00	
.34	7.10	0.91	510.42	400.00	400.00	110.00	
.54	7.10	0.53	380.04	250.00	250.00	200.00	
.65	7.10	0.68	361.46	141.00	141.00	141.00	
.89	7.10	0.56	427.87	300.00	300.00	79.00	
.02	7.10	0.48	435.83	200.00	200.00	79.00	
1.033	7.10	0.48	441.92	150.00	150.00	19.00	
1.034	7.10	-0.16	616.19	150.00	150.00	19.00	SB+X2+BT
1.048	7.10	-0.22	594.30	150.00	150.00	19.00	
1.049	7.10	0.01	629.05	150.00	150.00	125.00	
1.05	7.10	0.01	629.69	150.00	150.00	125.00	
1.054	7.10	0.01	604.68	150.00	150.00	125.00	
.057	7.10	-0.12	596.85	150.00	150.00	122.00	
.21	7.10	0.52	772.82	250.00	250.00	19.00	
.4	7.10	0.95	961.41	250.00	250.00	21.00	
.418	7.10	0.15	1238.26	250.00	250.00	21.00	
.419	7.10	-0.01	1958.81	250.00	250.00	21.00	SB+X2+BT
.46	7.10	-0.01	1532.34	200.00	200.00	64.00	
.62	7.10	0.09	932.40	200.00	200.00	138.00	
.645	7.10	0.09	1003.85	200.00	200.00	120.00	
.668	7.10	0.16	879.93	200.00	200.00	115.00	
.69	7.10	0.34	881.98	200.00	200.00	132.00	
.91	7.10	0.65	647.62	450.00	450.00	19.00	
.06	7.10	0.64	987.62	450.00	450.00	30.00	
.22	7.10	0.87	471.04	250.00	250.00	13.00	
.229	7.10	0.60	539.12	250.00	250.00	13.00	

--Encroachment Method----

CNO: 0.553
EM 08 ET record does not have a bridge encroachment option.

FW EM 08 ET record does not have a bridge encroachment option.

SECNO: 0.879
FW EM 08 ET record does not have a bridge encroachment option.

SECNO: 2.034
FW EM 08 ET record does not have a bridge encroachment option.

SECNO: 2.419
FW EM 08 ET record does not have a bridge encroachment option.

----Starting Water Surface Elevation----

----X5 Record(s)----

----Floodway Width----

SECNO: 0.847
FW FW 02 Right encroachment station 10500 is less than
          right channel bank station 10508 .

SECNO: 0.848
FW FW 00 The floodway is contained within the channel.

SECNO: 2.057
FW FW 02 Right encroachment station 10300 is less than
          right channel bank station 10328 .

SECNO: 2.645
FW FW 02 Right encroachment station 10800 is less than
          right channel bank station 10820 .

SECNO: 2.668
FW FW 02 Right encroachment station 10850 is less than
          right channel bank station 10875 .

SECNO: 1.34
FW FW 07 Left encroachment station 10190 is outside 1% chance floodplain.
          Starting station of 1% chance floodplain is 10196.26 .

--- Surcharge Value ---

SECNO: 0.848
FW SC 02 The surcharge value is greater than the maximum
          allowable value of 1 foot.

SECNO: 0.872
FW SC 01 The surcharge value is negative.

SECNO: 0.876
FW SC 01 The surcharge value is negative.

SECNO: 0.878
FW SC 01 The surcharge value is negative.

SECNO: 0.886
FW SC 02 The surcharge value is greater than the maximum

```
ECNO:  1.12
W SC 02  The surcharge value is greater than the maximum
         allowable value of  1  foot.

ECNO:  2.034
W SC 01  The surcharge value is negative.

ECNO:  2.048
W SC 01  The surcharge value is negative.

ECNO:  2.057
W SC 01  The surcharge value is negative.

---Floodway Discharge----


--End Program---
```