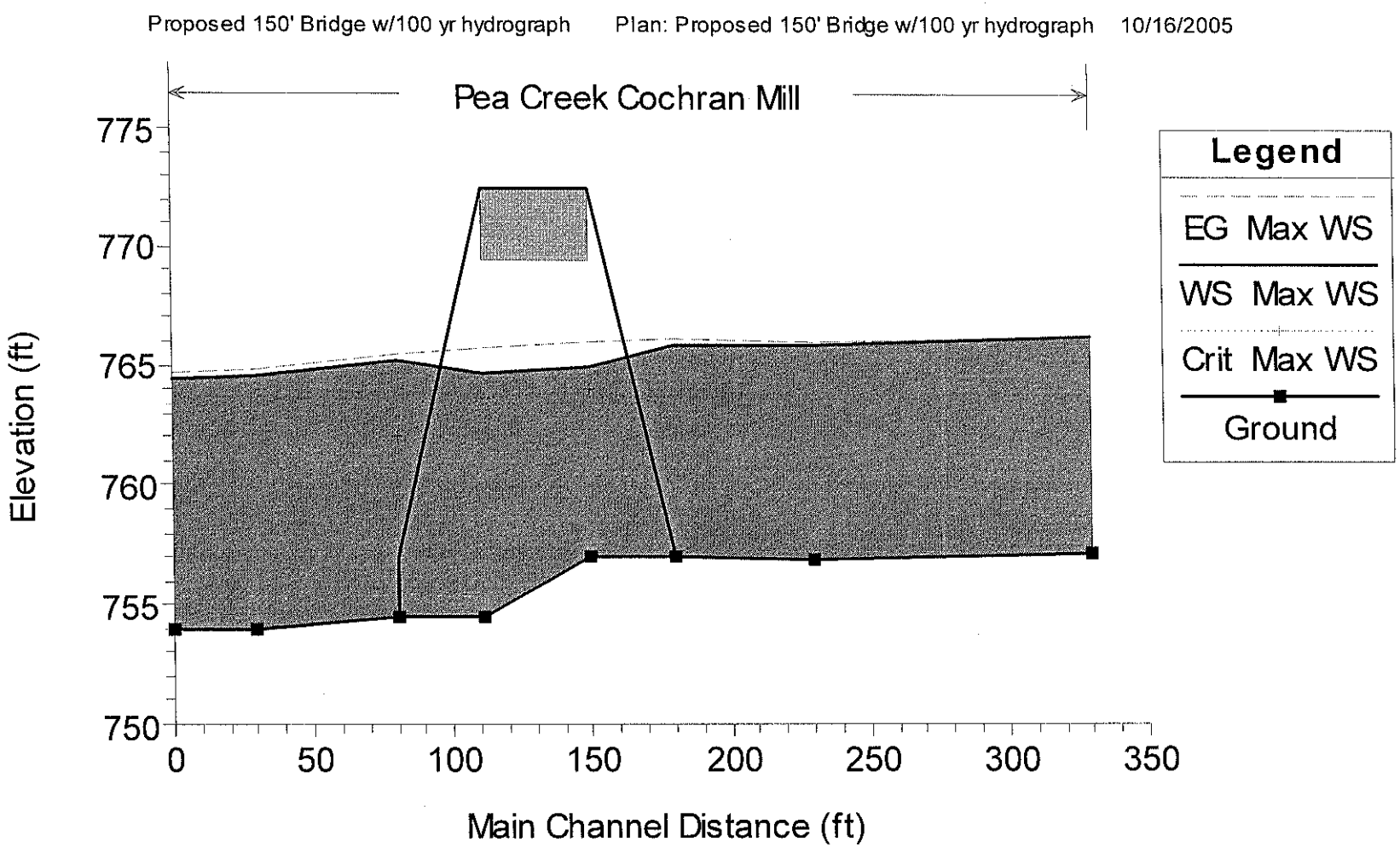
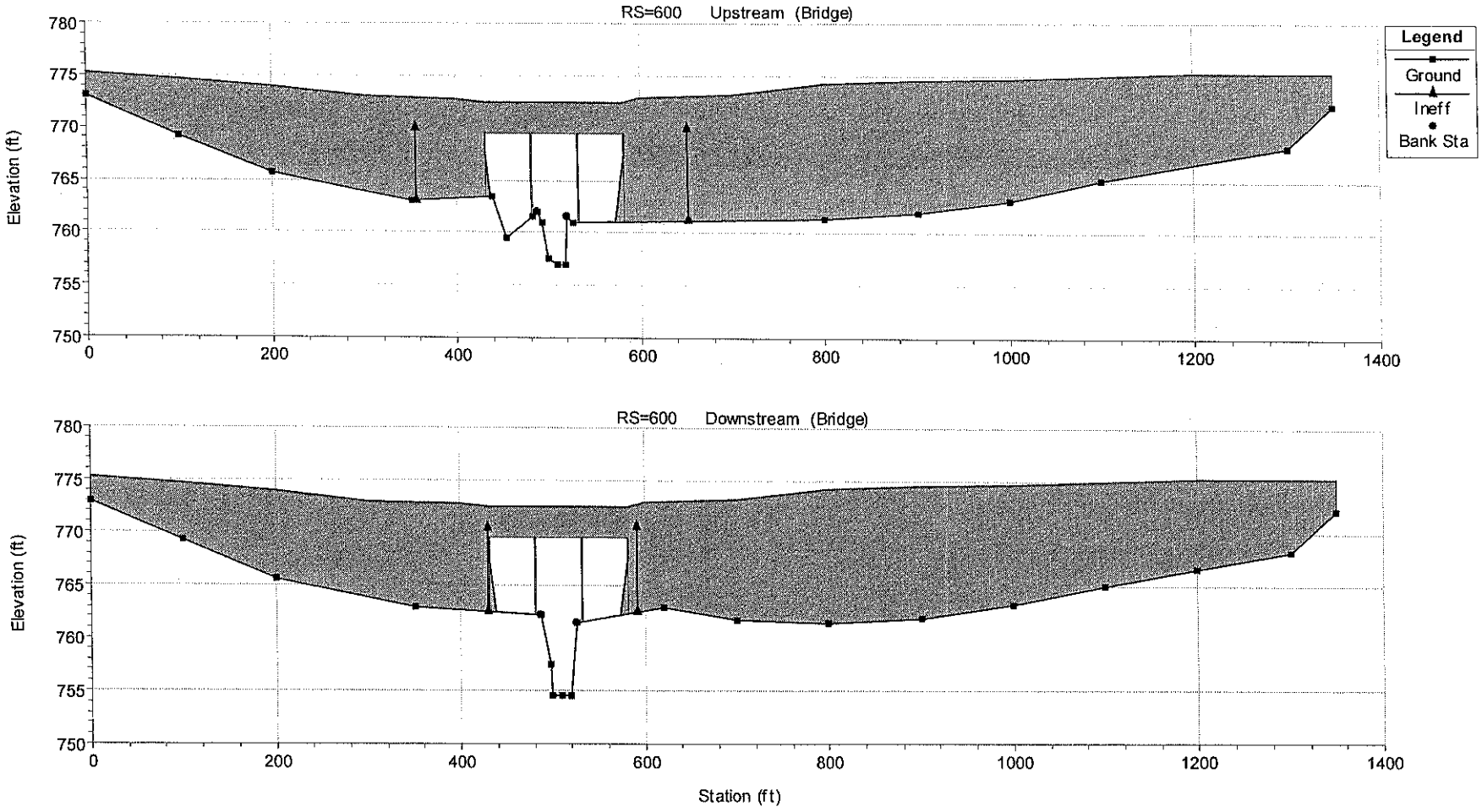
15.0 CHARTS, TABLES AND GRAPHS FROM HYDRAULIC MODELS




RS=600 Upstream (Bridge)
Legend
Ground
Ineff
Bank Sta
Elevation (ft)
780
775
770
765
760
755
750
0
200
400
600
800
1000
1200
1400
RS=600 Downstream (Bridge)
Elevation (ft)
780
775
770
765
760
755
750
0
200
400
600
800
1000
1200
1400
Station (ft)

150Bridge RIVER-1 Reach-1 RS: 600 Profile: 50 yr Opening: Single

E.G. US. (ft)	765.99	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	765.48	E.G. Elev (ft)	765.86	765.52
Q Total (cfs)	3314.08	W.S. Elev (ft)	764.80	764.63
Q Bridge (cfs)	3314.08	Crit W.S. (ft)	763.90	763.34
Q Weir (cfs)		Max Chl Dpth (ft)	7.80	10.13
Weir Sta Lft (ft)		Vel Total (ft/s)	5.56	5.96
Weir Sta Rgt (ft)		Flow Area (sq ft)	596.23	556.47
Weir Submerg		Froude # Chl	0.70	0.56
Weir Max Depth (ft)		Specif Force (cu ft)	2240.90	2487.58
Min El Weir Flow (ft)	772.51	Hydr Depth (ft)	4.28	4.00
Min El Prs (ft)	769.50	W.P. Total (ft)	159.72	157.38
Delta EG (ft)	0.85	Conv. Total (cfs)	31254.8	39701.3
Delta WS (ft)	0.99	Top Width (ft)	139.42	138.96
BR Open Area (sq ft)	1260.59	Frctn Loss (ft)	0.34	0.22
BR Open Vel (ft/s)	5.96	C & E Loss (ft)	0.00	0.00
Coef of Q	0.79	Shear Total (lb/sq ft)	2.62	1.54
Br Sel Method	WSPRO	Power Total (lb/ft s)	14.56	9.16

150Bridge RIVER-1 Reach-1 RS: 600 Profile: 100 yr Opening: Single

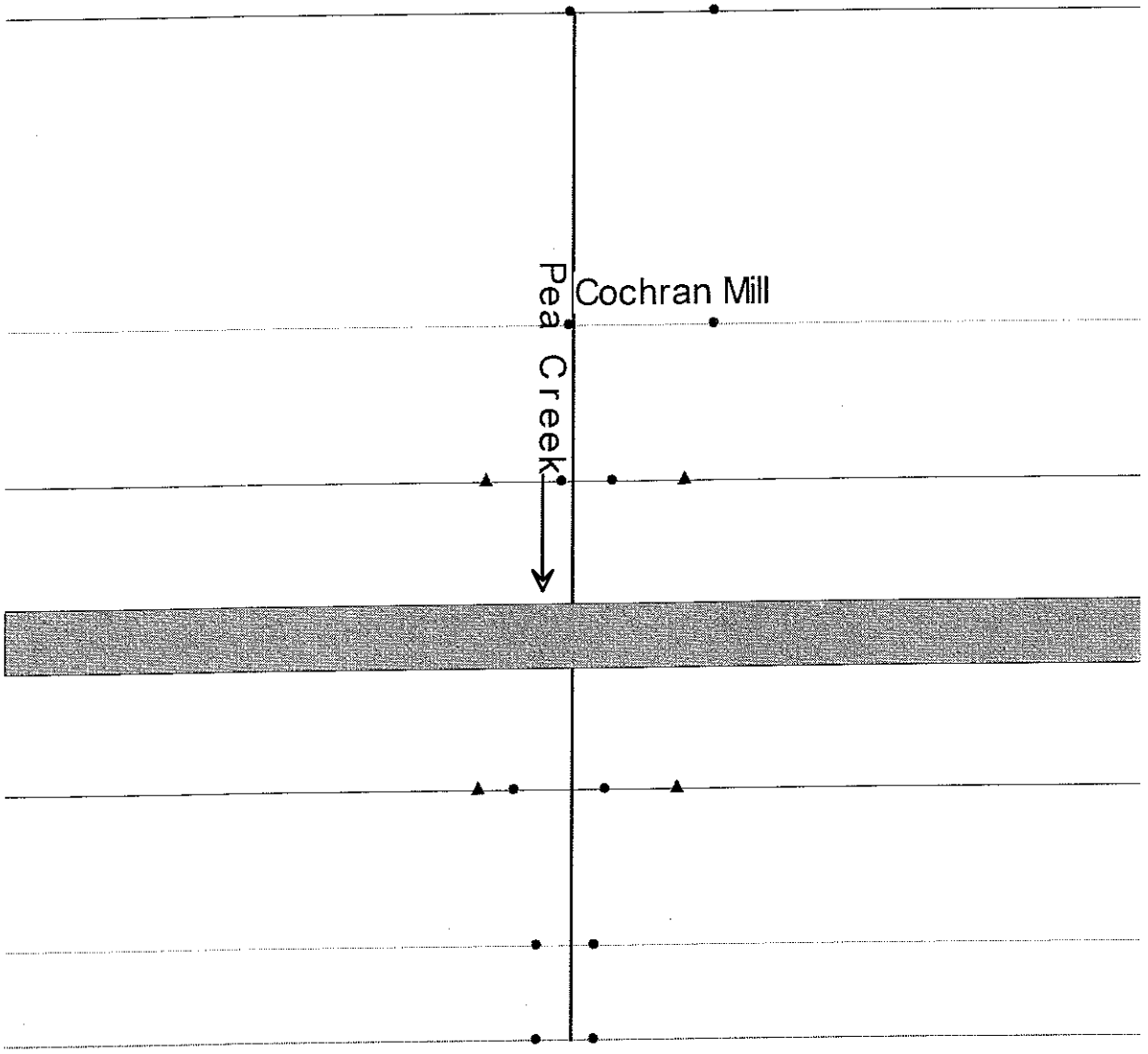
E.G. US. (ft)	766.25	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	765.72	E.G. Elev (ft)	766.10	765.74
Q Total (cfs)	3566.79	W.S. Elev (ft)	764.96	764.77
Q Bridge (cfs)	3566.79	Crit W.S. (ft)	764.08	763.60
Q Weir (cfs)		Max Chl Dpth (ft)	7.96	10.27
Weir Sta Lft (ft)		Vel Total (ft/s)	5.76	6.19
Weir Sta Rgt (ft)		Flow Area (sq ft)	619.69	576.28
Weir Submerg		Froude # Chl	0.72	0.58
Weir Max Depth (ft)		Specif Force (cu ft)	2430.87	2665.14
Min El Weir Flow (ft)	772.51	Hydr Depth (ft)	4.43	4.14
Min El Prs (ft)	769.50	W.P. Total (ft)	160.97	158.44
Delta EG (ft)	0.91	Conv. Total (cfs)	32947.3	41212.1
Delta WS (ft)	1.10	Top Width (ft)	139.89	139.36
BR Open Area (sq ft)	1260.59	Frctn Loss (ft)	0.36	0.23
BR Open Vel (ft/s)	6.19	C & E Loss (ft)	0.00	0.00
Coef of Q	0.78	Shear Total (lb/sq ft)	2.82	1.70
Br Sel Method	WSPRO	Power Total (lb/ft s)	16.21	10.53

150Bridge RIVER-1 Reach-1 RS: 600 Profile: 500 yr Opening: Single

E.G. US. (ft)	767.18	Element	Inside BR US	Inside BR DS
W.S. US. (ft)	766.57	E.G. Elev (ft)	766.99	766.57
Q Total (cfs)	4522.88	W.S. Elev (ft)	765.59	765.31
Q Bridge (cfs)	4522.88	Crit W.S. (ft)	764.70	764.42
Q Weir (cfs)		Max Chl Dpth (ft)	8.59	10.81
Weir Sta Lft (ft)		Vel Total (ft/s)	6.39	6.95
Weir Sta Rgt (ft)		Flow Area (sq ft)	708.02	651.05
Weir Submerg		Froude # Chl	0.77	0.65
Weir Max Depth (ft)		Specif Force (cu ft)	3195.14	3383.98
Min El Weir Flow (ft)	772.51	Hydr Depth (ft)	5.00	4.62
Min El Prs (ft)	769.50	W.P. Total (ft)	165.65	162.42
Delta EG (ft)	1.10	Conv. Total (cfs)	39581.7	47125.9
Delta WS (ft)	1.45	Top Width (ft)	141.65	140.85
BR Open Area (sq ft)	1260.59	Frctn Loss (ft)	0.42	0.28
BR Open Vel (ft/s)	6.95	C & E Loss (ft)	0.00	0.00
Coef of Q	0.77	Shear Total (lb/sq ft)	3.48	2.31
Br Sel Method	WSPRO	Power Total (lb/ft s)	22.26	16.01

16.0 COMPUTER DATA

Existing Conditions Plan



HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X     X
X     X  X        X           X   X    X    X    X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X           X  X      X    X        X
X     X  X        X    X      X   X     X    X        X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
```

PROJECT DATA
Project Title: Existing 29' Bridge w/100 yr hydrograph
Project File : 100yrexist.prj
Run Date and Time: 10/18/2005 10:36:12 AM

Project in English units

Project Description:
Existing 29 ft Bridge

PLAN DATA

Plan Title: Existing 29' Bridge w/100 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\100yrexist.p04

Geometry Title: Existing 29' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\100yrexist.g06

Flow Title :
Flow File :

Plan Summary Information:
Number of: Cross Sections = 6 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 1 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

GEOMETRY DATA

Geometry Title: Existing 29' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\100yrexist.g06

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT

Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	100	100	100	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	770.12	Element			
Vel Head (ft)	0.01	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	770.11	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	1493.67	975.98	4338.96
E.G. Slope (ft/ft)	0.000105	Area (sq ft)	1493.67	975.98	4338.96
Q Total (cfs)	3569.57	Flow (cfs)	572.30	1117.93	1879.34
Top Width (ft)	1204.96	Top Width (ft)	324.80	95.00	785.16
Vel Total (ft/s)	0.52	Avg. Vel. (ft/s)	0.38	1.15	0.43
Max Chl Dpth (ft)	12.91	Hydr. Depth (ft)	4.60	10.27	5.53
Conv. Total (cfs)	347949.7	Conv. (cfs)	55785.8	108972.0	183191.9
Length Wtd. (ft)	100.00	Wetted Per. (ft)	324.90	101.95	785.25
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.03	0.06	0.04
Alpha	1.94	Stream Power (lb/ft s)	0.01	0.07	0.02
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	6.96	4.49	21.94
C & E Loss (ft)		Cum SA (acres)	2.06	0.46	4.79

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	28	50	58	.3	.5

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	770.11	Element			
Vel Head (ft)	0.01	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	770.10	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)		Flow Area (sq ft)	1589.32	1003.61	4567.88
E.G. Slope (ft/ft)	0.000091	Area (sq ft)	1589.32	1003.61	4567.88
Q Total (cfs)	3566.44	Flow (cfs)	580.53	1088.63	1897.29
Top Width (ft)	1216.52	Top Width (ft)	332.73	95.00	788.79
Vel Total (ft/s)	0.50	Avg. Vel. (ft/s)	0.37	1.08	0.42
Max Chl Dpth (ft)	13.20	Hydr. Depth (ft)	4.78	10.56	5.79
Conv. Total (cfs)	374008.7	Conv. (cfs)	60879.0	114162.9	198966.8
Length Wtd. (ft)	50.45	Wetted Per. (ft)	332.84	101.95	788.90
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.03	0.06	0.03
Alpha	1.91	Stream Power (lb/ft s)	0.01	0.06	0.01
Frctn Loss (ft)	0.00	Cum Volume (acre-ft)	3.42	2.22	11.72
C & E Loss (ft)		Cum SA (acres)	1.30	0.24	2.98

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
487 520 104 100 86 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	770.01	Element			
Vel Head (ft)	0.00	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	770.00	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)	763.86	Flow Area (sq ft)	2163.72	380.36	5334.88
E.G. Slope (ft/ft)	0.000085	Area (sq ft)	2163.72	380.36	5334.88
Q Total (cfs)	3565.10	Flow (cfs)	815.93	407.26	2341.90
Top Width (ft)	1243.69	Top Width (ft)	408.14	33.00	802.54
Vel Total (ft/s)	0.45	Avg. Vel. (ft/s)	0.38	1.07	0.44
Max Chl Dpth (ft)	13.00	Hydr. Depth (ft)	5.30	11.53	6.65
Conv. Total (cfs)	387790.8	Conv. (cfs)	88752.5	44299.5	254738.8
Length Wtd. (ft)	40.00	Wetted Per. (ft)	408.92	37.30	802.74
Min Ch El (ft)	757.00	Shear (lb/sq ft)	0.03	0.05	0.04
Alpha	1.42	Stream Power (lb/ft s)	0.01	0.06	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	2.21	1.43	5.12
C & E Loss (ft)		Cum SA (acres)	1.06	0.17	1.92

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Pea Creek
REACH: Cochran Mill RS: 600

INPUT
Description: Bridge #3

Distance from Upstream XS = 40
Deck/Roadway Width = 20
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.6	773	100	772.5	769.2	200	770.5	765.6
300	769.6	762.8	400	769.3	762	490	768.7	0
490	768.7	765.7	520	768.7	765.7	520	768.7	0
600	769.2	0	700	769.9	0	800	770.2	0
900	770.4	761.9	1000	770.6	763.2	1100	770.8	765
1200	771.3	766.6	1300	773.4	768.2	1350	775.2	772.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	761.9	492	761	500	757.5
510	757	518	757	520	761.5	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.05	520	.11

```
Bank Sta: Left   Right    Coeff Contr.   Expan.
          487     520          .3          .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     441     770       F
     571    1350     770       F
Sediment Elevation = 0

Downstream  Deck/Roadway Coordinates
    num=      18
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
       0   775.6     773      100   772.5   769.2      200   770.5   765.6
     300   769.6   762.8      400   769.3     762      490   768.7       0
     490   768.7   765.7      520   768.7   765.7      520   768.7       0
     600   769.2       0      700   769.9       0      800   770.2       0
     900   770.4   761.9     1000   770.6   763.2     1100   770.8     765
    1200   771.3   766.6     1300   773.4   768.2     1350   775.2   772.2

Downstream Bridge Cross Section Data
Station Elevation Data    num=      19
      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
        0     773      100   769.2      200   765.6      350     763    487.5   762.2
      497   757.5      499   754.5      510   754.5      519   754.5      520   761.5
      620     763      700   761.8      800   761.4      900   761.9     1000   763.2
     1100     765     1200   766.6     1300   768.2     1350   772.2

Manning's n Values        num=       3
      Sta   n Val      Sta   n Val      Sta   n Val
        0     .11    487.5     .05      520     .11

Bank Sta: Left   Right    Coeff Contr.   Expan.
        487.5     520          .3          .5
Ineffective Flow     num=       2
   Sta L   Sta R    Elev  Permanent
       0     441     770       F
     571    1350     770       F
Sediment Elevation = 0

Upstream Embankment side slope                 =       2 horiz. to 1.0 vertical
Downstream Embankment side slope               =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins            =
Energy head used in spillway design            =
Spillway height used in design                 =
Weir crest shape                               = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       W.S. Pro Method

  W.S.Pro Data
    Left Embankment
       El of the top of the embankment = 765.9
       El of the toe of the abutment   = 761
    Right Embankment
       El of the top of the embankment = 765.9
       El of the toe of the abutment   = 761.5
    Abtument Type                      = 2 Vert. abutments and sloping embankments
    Slope of abutments                 = 2
    Top with of embankment             = 35
    Centroid station of bridge opening =
    Wing Wall Type                     = No wing walls present
       Width                           =
       Angle                           =
       Radius                          =
    Guide Banks Type                   = No Guide Bank present
       Length                          =
       Offset                          =
       Angle                           =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .5
           Max Low Cord                =

Additional Bridge Parameters
```

Add Friction component to Momentum
Do not add Weight component to Momentum
Class B flow critical depth computations use critical depth
inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #Max WS

			Inside BR US	Inside BR DS
E.G. US. (ft)	770.01	Element		
W.S. US. (ft)	770.00	E.G. Elev (ft)	770.11	770.11
Q Total (cfs)	3565.10	W.S. Elev (ft)	770.10	770.04
Q Bridge (cfs)	2596.64	Crit W.S. (ft)	770.71	763.41
Q Weir (cfs)	968.46	Max Chl Dpth (ft)	13.10	15.54
Weir Sta Lft (ft)	243.86	Vel Total (ft/s)	5.93	5.56
Weir Sta Rgt (ft)	768.40	Flow Area (sq ft)	601.66	641.60
Weir Submerg	0.00	Froude # Chl	0.30	0.26
Weir Max Depth (ft)	1.41	Specif Force (cu ft)	3083.34	3888.60
Min El Weir Flow (ft)	768.71	Hydr Depth (ft)	1.15	1.29
Min El Prs (ft)	765.70	W.P. Total (ft)	594.86	574.95
Delta EG (ft)	4.74	Conv. Total (cfs)		
Delta WS (ft)	5.65	Top Width (ft)	522.61	497.52
BR Open Area (sq ft)	227.64	Frctn Loss (ft)		
BR Open Vel (ft/s)	11.41	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
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.
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: Pea Creek
REACH: Cochran Mill RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.37	Element			
Vel Head (ft)	0.92	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.45	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	98.17	419.21	24.14
E.G. Slope (ft/ft)	0.008440	Area (sq ft)	314.23	419.21	1047.52
Q Total (cfs)	3565.10	Flow (cfs)	200.48	3334.11	30.51
Top Width (ft)	802.69	Top Width (ft)	220.95	60.00	521.74
Vel Total (ft/s)	6.58	Avg. Vel. (ft/s)	2.04	7.95	1.26
Max Chl Dpth (ft)	9.95	Hydr. Depth (ft)	2.11	6.99	1.03
Conv. Total (cfs)	38806.3	Conv. (cfs)	2182.2	36292.0	332.1
Length Wtd. (ft)	50.00	Wetted Per. (ft)	46.50	64.14	23.50
Min Ch El (ft)	754.50	Shear (lb/sq ft)	1.11	3.44	0.54
Alpha	1.37	Stream Power (lb/ft s)	2.27	27.39	0.68

Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	0.85	0.64	1.99
C & E Loss (ft)		Cum SA (acres)	0.44	0.08	0.99

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	30 .1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.76	Element			
Vel Head (ft)	0.19	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.58	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	533.52	311.05	1115.59
E.G. Slope (ft/ft)	0.003056	Area (sq ft)	533.52	311.05	1115.59
Q Total (cfs)	3564.35	Flow (cfs)	656.26	1569.69	1338.40
Top Width (ft)	836.04	Top Width (ft)	252.29	36.00	547.75
Vel Total (ft/s)	1.82	Avg. Vel. (ft/s)	1.23	5.05	1.20
Max Chl Dpth (ft)	10.58	Hydr. Depth (ft)	2.11	8.64	2.04
Conv. Total (cfs)	64481.3	Conv. (cfs)	11872.1	28396.6	24212.5
Length Wtd. (ft)	30.00	Wetted Per. (ft)	252.34	43.95	547.78
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.40	1.35	0.39
Alpha	3.64	Stream Power (lb/ft s)	0.50	6.81	0.47
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.36	0.22	0.75
C & E Loss (ft)		Cum SA (acres)	0.17	0.03	0.37

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	532.5	0	0	0 .1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.68	Element			
Vel Head (ft)	0.21	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.47	Reach Len. (ft)			
Crit W.S. (ft)	763.38	Flow Area (sq ft)	508.25	319.65	1060.08
E.G. Slope (ft/ft)	0.003221	Area (sq ft)	508.25	319.65	1060.08

Q Total (cfs)	3563.88	Flow (cfs)	628.40	1663.35	1272.12
Top Width (ft)	826.78	Top Width (ft)	248.08	37.50	541.20
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	1.24	5.20	1.20
Max Chl Dpth (ft)	10.47	Hydr. Depth (ft)	2.05	8.52	1.96
Conv. Total (cfs)	62800.2	Conv. (cfs)	11073.2	29310.4	22416.5
Length Wtd. (ft)		Wetted Per. (ft)	248.13	44.87	541.25
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.41	1.43	0.39
Alpha	3.77	Stream Power (lb/ft s)	0.51	7.45	0.47
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	600	Bridge		
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	600	Bridge		
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.1	.3
Cochran Mill	700	.3	.5
Cochran Mill	650	.3	.5
Cochran Mill	600	Bridge	
Cochran Mill	550	.3	.5
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	3569.57	757.20	770.11		770.12	0.000105	1.15	6808.60	1204.96	0.06
Cochran Mill	700	Max WS	3566.44	756.90	770.10		770.11	0.000091	1.08	7160.82	1216.52	0.06
Cochran Mill	650	Max WS	3565.10	757.00	770.00	763.86	770.01	0.000085	1.07	7878.96	1243.69	0.06
Cochran Mill	600		Bridge									
Cochran Mill	550	Max WS	3565.10	754.50	764.45		765.37	0.008440	7.95	541.52	802.69	0.53
Cochran Mill	500	Max WS	3564.35	754.00	764.58		764.76	0.003056	5.05	1960.16	836.04	0.30
Cochran Mill	470	Max WS	3563.88	754.00	764.47	763.38	764.68	0.003221	5.20	1887.98	826.78	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)

Cochran Mill	800	Max WS	770.12	770.11	0.01	0.01	572.30	1117.93	1879.34	1204.96
Cochran Mill	700	Max WS	770.11	770.10	0.01	0.00	580.53	1088.63	1897.29	1216.52
Cochran Mill	650	Max WS	770.01	770.00	0.00		815.93	407.26	2341.90	1243.69
Cochran Mill	600		Bridge							
Cochran Mill	550	Max WS	765.37	764.45	0.92	0.24	200.48	3334.11	30.51	802.69
Cochran Mill	500	Max WS	764.76	764.58	0.19	0.09	656.26	1569.69	1338.40	836.04
Cochran Mill	470	Max WS	764.68	764.47	0.21		628.40	1663.35	1272.12	826.78

Profile Output Table - Six XS Bridge

Reach	River Sta		Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Cochran Mill	700		Max WS	770.11	770.10		0.00		1216.52	580.53	1088.63	1897.29	1.08
Cochran Mill	650		Max WS	770.01	770.00	763.86			1243.69	815.93	407.26	2341.90	1.07
Cochran Mill	600	BR U	Max WS	770.11	770.10	770.71			522.61	704.81	2262.04	595.48	8.26
Cochran Mill	600	BR D	Max WS	770.11	770.04	763.41			497.52	623.04	2407.84	531.44	7.08
Cochran Mill	550		Max WS	765.37	764.45		0.24		802.69	200.48	3334.11	30.51	7.95
Cochran Mill	500		Max WS	764.76	764.58		0.09		836.04	656.26	1569.69	1338.40	5.05

Profile Output Table - Bridge Only

Reach	River Sta	Profile	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs Q WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)
Cochran Mill	600	Max WS	770.01	765.70	227.64	777.11	3565.10	768.71	968.46	4.74

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X    X
X     X  X        X           X   X     X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX   XXXX
X     X  X        X           X  X      X    X       X
X     X  X        X    X      X   X     X    X       X
X     X  XXXXXX    XXXX       X    X    X    X   XXXXX
```

PROJECT DATA
Project Title: Existing 29' Bridge w/10 yr hydrograph
Project File : 10yrexisting.prj
Run Date and Time: 10/16/2005 12:16:34 PM

Project in English units

Project Description:
Existing 29 ft Bridge

PLAN DATA

Plan Title: 10 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\10yrexisting.p10

Geometry Title: Existing 29' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\10yrexisting.g06

Flow Title :
Flow File :

Plan Summary Information:
Number of: Cross Sections = 6 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 1 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

GEOMETRY DATA

Geometry Title: Existing 29' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\10yrexisting.g06

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	100	100	100	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	767.22	Element			
Vel Head (ft)	0.01	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	767.21	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	668.05	700.28	2222.13
E.G. Slope (ft/ft)	0.000150	Area (sq ft)	668.05	700.28	2222.13
Q Total (cfs)	1824.43	Flow (cfs)	216.37	768.21	839.85
Top Width (ft)	983.59	Top Width (ft)	244.18	95.00	644.41
Vel Total (ft/s)	0.51	Avg. Vel. (ft/s)	0.32	1.10	0.38
Max Chl Dpth (ft)	10.01	Hydr. Depth (ft)	2.74	7.37	3.45
Conv. Total (cfs)	148826.6	Conv. (cfs)	17650.0	62666.2	68510.4
Length Wtd. (ft)	100.00	Wetted Per. (ft)	244.24	101.95	644.45
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.03	0.06	0.03
Alpha	2.27	Stream Power (lb/ft s)	0.01	0.07	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.30	3.36	11.95
C & E Loss (ft)		Cum SA (acres)	1.38	0.46	3.88

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	28	50	58	.3	.5

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	767.14	Element			
Vel Head (ft)	0.01	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	767.13	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)	761.53	Flow Area (sq ft)	722.20	721.08	2364.75
E.G. Slope (ft/ft)	0.000116	Area (sq ft)	722.20	721.08	2364.75
Q Total (cfs)	1819.82	Flow (cfs)	231.44	708.52	879.86
Top Width (ft)	1003.37	Top Width (ft)	250.27	95.00	658.10
Vel Total (ft/s)	0.48	Avg. Vel. (ft/s)	0.32	0.98	0.37

Max Chl Dpth (ft)	10.23	Hydr. Depth (ft)	2.89	7.59	3.59
Conv. Total (cfs)	169005.5	Conv. (cfs)	21493.7	65799.7	81712.1
Length Wtd. (ft)	86.25	Wetted Per. (ft)	250.32	101.95	658.14
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.02	0.05	0.03
Alpha	2.00	Stream Power (lb/ft s)	0.01	0.05	0.01
Frctn Loss (ft)	0.03	Cum Volume (acre-ft)	1.71	1.73	6.68
C & E Loss (ft)	0.00	Cum SA (acres)	0.81	0.24	2.38

Warning: The conveyance ratio (upstream 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: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
487 520 104 100 86 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	767.23	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.10	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	767.13	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)	762.60	Flow Area (sq ft)	292.16	285.53	307.69
E.G. Slope (ft/ft)	0.001106	Area (sq ft)	1102.59	285.53	3108.77
Q Total (cfs)	1817.71	Flow (cfs)	446.51	913.50	457.69
Top Width (ft)	1075.59	Top Width (ft)	329.49	33.00	713.10
Vel Total (ft/s)	2.05	Avg. Vel. (ft/s)	1.53	3.20	1.49
Max Chl Dpth (ft)	10.13	Hydr. Depth (ft)	6.35	8.65	6.03
Conv. Total (cfs)	54654.4	Conv. (cfs)	13425.5	27467.0	13761.8
Length Wtd. (ft)	40.00	Wetted Per. (ft)	46.57	37.30	51.07
Min Ch El (ft)	757.00	Shear (lb/sq ft)	0.43	0.53	0.42
Alpha	1.49	Stream Power (lb/ft s)	0.66	1.69	0.62
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	1.12	1.15	3.04
C & E Loss (ft)	0.00	Cum SA (acres)	0.63	0.16	1.47

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Pea Creek
REACH: Cochran Mill RS: 600

INPUT
Description: Bridge #3

Distance from Upstream XS = 40
Deck/Roadway Width = 20
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 18
Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord Sta Hi Cord Lo Cord

```
     0   775.6     773     100   772.5   769.2     200   770.5   765.6
   300   769.6   762.8     400   769.3     762     490   768.7       0
   490   768.7   765.7     520   768.7   765.7     520   768.7       0
   600   769.2       0     700   769.9       0     800   770.2       0
   900   770.4   761.9    1000   770.6   763.2    1100   770.8     765
  1200   771.3   766.6    1300   773.4   768.2    1350   775.2   772.2

Upstream Bridge Cross Section Data
Station Elevation Data     num=       20
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0     773      100   769.2      200   765.6      350     763      438   763.5
     453   759.5      483   761.5      487   761.9      492     761      500   757.5
     510     757      518     757      520   761.5      527     761      800   761.4
     900   761.9     1000   763.2     1100     765     1300   768.2     1350   772.2

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
       0     .11      487     .05      520     .11

Bank Sta: Left   Right    Coeff Contr.   Expan.
          487     520              .3       .5
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0     441     770          F
     571    1350     770          F
Sediment Elevation = 0

Downstream  Deck/Roadway Coordinates
    num=       18
     Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord      Sta Hi Cord Lo Cord
       0   775.6     773      100   772.5   769.2      200   770.5   765.6
     300   769.6   762.8      400   769.3     762      490   768.7       0
     490   768.7   765.7      520   768.7   765.7      520   768.7       0
     600   769.2       0      700   769.9       0      800   770.2       0
     900   770.4   761.9     1000   770.6   763.2     1100   770.8     765
    1200   771.3   766.6     1300   773.4   768.2     1350   775.2   772.2

Downstream Bridge Cross Section Data
Station Elevation Data     num=       19
     Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev      Sta    Elev
       0     773      100   769.2      200   765.6      350     763    487.5   762.2
     497   757.5      499   754.5      510   754.5      519   754.5      520   761.5
     620     763      700   761.8      800   761.4      900   761.9     1000   763.2
    1100     765     1200   766.6     1300   768.2     1350   772.2

Manning's n Values         num=        3
     Sta   n Val      Sta   n Val      Sta   n Val
       0     .11    487.5     .05      520     .11

Bank Sta: Left   Right    Coeff Contr.   Expan.
        487.5     520              .3       .5
Ineffective Flow     num=        2
   Sta L   Sta R    Elev  Permanent
       0     441     770          F
     571    1350     770          F
Sediment Elevation = 0

Upstream Embankment side slope                =     2 horiz. to 1.0 vertical
Downstream Embankment side slope              =     2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =    .95
Elevation at which weir flow begins           =
Energy head used in spillway design           =
Spillway height used in design                =
Weir crest shape                              = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       W.S. Pro Method

  W.S.Pro Data
    Left Embankment
       El of the top of the embankment = 765.9
       El of the toe of the abutment   = 761
    Right Embankment
```

```
      El of the top of the embankment = 765.9
      El of the toe of the abutment   = 761.5
    Abtument Type                     = 2 Vert. abutments and sloping embankments
    Slope of abutments                = 2
    Top with of embankment            = 35
    Centroid station of bridge opening =
    Wing Wall Type                    = No wing walls present
       Width                          =
       Angle                          =
       Radius                         =
    Guide Banks Type                  = No Guide Bank present
       Length                         =
       Offset                         =
       Angle                          =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd         =
           Submerged Inlet + Outlet Cd =      .5
           Max Low Cord               =

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

BRIDGE OUTPUT  Profile #Max WS

  E.G. US. (ft)                767.23    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)                767.13    E.G. Elev (ft)            765.39        764.74
  Q Total (cfs)               1817.71    W.S. Elev (ft)            762.96        763.35
  Q Bridge (cfs)              1817.71    Crit W.S. (ft)            762.96        760.62
  Q Weir (cfs)                           Max Chl Dpth (ft)           5.96          8.85
  Weir Sta Lft (ft)                      Vel Total (ft/s)           12.51          8.05
  Weir Sta Rgt (ft)                      Flow Area (sq ft)         145.31        225.77
  Weir Submerg                           Froude # Chl                1.00          0.52
  Weir Max Depth (ft)                    Specif Force (cu ft)     1088.50       1450.46
  Min El Weir Flow (ft)        768.71    Hydr Depth (ft)             4.84          7.53
  Min El Prs (ft)              765.70    W.P. Total (ft)            33.70         38.49
  Delta EG (ft)                  3.44    Conv. Total (cfs)       11440.0       21824.4
  Delta WS (ft)                  2.81    Top Width (ft)             30.00         30.00
  BR Open Area (sq ft)         227.64    Frctn Loss (ft)             0.26          0.16
  BR Open Vel (ft/s)            12.51    C & E Loss (ft)             0.00          0.00
  Coef of Q                      0.85    Shear Total (lb/sq ft)      6.80          2.54
  Br Sel Method                WSPRO     Power Total (lb/ft s)      85.01         20.45


 Note:    The downstream water surface is below the minimum elevation for pressure flow.  The sluice
          gate equations were used for pressure flow.
 Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
          energy was used.
 Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
          energy was used.

 CROSS SECTION


 RIVER: Pea Creek
 REACH: Cochran Mill       RS: 550

 INPUT
 Description: Downstream of Bridge
 Station Elevation Data    num=      19
      Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
        0     773     100   769.2     200   765.6     350     763   487.5   762.2
      497   757.5     499   754.5     510   754.5     520   754.5   547.5   763.5
      620     763     700   761.8     800   761.4     900   761.9    1000   763.2
     1100     765    1200   766.6    1300   768.2    1350   772.2

 Manning's n Values        num=       3
      Sta   n Val      Sta   n Val      Sta   n Val
        0     .11    487.5     .06    547.5     .11
```

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	764.57	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.26	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.32	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	759.75	Flow Area (sq ft)	92.13	411.42	21.09
E.G. Slope (ft/ft)	0.002362	Area (sq ft)	286.02	411.42	980.23
Q Total (cfs)	1817.71	Flow (cfs)	95.40	1709.42	12.88
Top Width (ft)	787.98	Top Width (ft)	213.45	60.00	514.53
Vel Total (ft/s)	3.46	Avg. Vel. (ft/s)	1.04	4.15	0.61
Max Chl Dpth (ft)	9.82	Hydr. Depth (ft)	1.98	6.86	0.90
Conv. Total (cfs)	37402.7	Conv. (cfs)	1963.1	35174.5	265.1
Length Wtd. (ft)	50.00	Wetted Per. (ft)	46.50	64.14	23.50
Min Ch El (ft)	754.50	Shear (lb/sq ft)	0.29	0.95	0.13
Alpha	1.38	Stream Power (lb/ft s)	0.30	3.93	0.08
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.48	0.58	1.16
C & E Loss (ft)	0.85	Cum SA (acres)	0.38	0.08	0.91

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	763.59	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.22	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.36	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	258.67	267.48	489.23
E.G. Slope (ft/ft)	0.003064	Area (sq ft)	258.67	267.48	489.23
Q Total (cfs)	1817.13	Flow (cfs)	228.15	1222.21	366.78
Top Width (ft)	725.09	Top Width (ft)	201.86	36.00	487.23
Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)	0.88	4.57	0.75
Max Chl Dpth (ft)	9.36	Hydr. Depth (ft)	1.28	7.43	1.00
Conv. Total (cfs)	32829.7	Conv. (cfs)	4121.9	22081.3	6626.5
Length Wtd. (ft)	30.00	Wetted Per. (ft)	201.89	43.95	487.25
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.25	1.16	0.19
Alpha	4.45	Stream Power (lb/ft s)	0.22	5.32	0.14
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.17	0.19	0.32
C & E Loss (ft)		Cum SA (acres)	0.14	0.03	0.33

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	532.5	0	0	0 .1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	763.51	Element			
Vel Head (ft)	0.25	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.26	Reach Len. (ft)			
Crit W.S. (ft)	759.70	Flow Area (sq ft)	237.57	274.09	439.42
E.G. Slope (ft/ft)	0.003242	Area (sq ft)	237.57	274.09	439.42
Q Total (cfs)	1816.72	Flow (cfs)	206.69	1291.59	318.44
Top Width (ft)	715.41	Top Width (ft)	197.46	37.50	480.45
Vel Total (ft/s)	1.91	Avg. Vel. (ft/s)	0.87	4.71	0.72
Max Chl Dpth (ft)	9.26	Hydr. Depth (ft)	1.20	7.31	0.91
Conv. Total (cfs)	31906.0	Conv. (cfs)	3630.0	22683.5	5592.5
Length Wtd. (ft)		Wetted Per. (ft)	197.49	44.87	480.49
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.24	1.24	0.19
Alpha	4.38	Stream Power (lb/ft s)	0.21	5.83	0.13
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	600	Bridge		
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	600	Bridge		
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS

River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.1	.3
Cochran Mill	700	.3	.5
Cochran Mill	650	.3	.5
Cochran Mill	600	Bridge	
Cochran Mill	550	.3	.5
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	1824.43	757.20	767.21		767.22	0.000150	1.10	3590.46	983.59	0.07
Cochran Mill	700	Max WS	1819.82	756.90	767.13	761.53	767.14	0.000116	0.98	3808.03	1003.37	0.06
Cochran Mill	650	Max WS	1817.71	757.00	767.13	762.60	767.23	0.001106	3.20	885.38	1075.59	0.19
Cochran Mill	600		Bridge									
Cochran Mill	550	Max WS	1817.71	754.50	764.32	759.75	764.57	0.002362	4.15	524.64	787.98	0.28
Cochran Mill	500	Max WS	1817.13	754.00	763.36		763.59	0.003064	4.57	1015.37	725.09	0.30
Cochran Mill	470	Max WS	1816.72	754.00	763.26	759.70	763.51	0.003242	4.71	951.08	715.41	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	767.22	767.21	0.01	0.01		216.37	768.21	839.85	983.59
Cochran Mill	700	Max WS	767.14	767.13	0.01	0.03	0.00	231.44	708.52	879.86	1003.37
Cochran Mill	650	Max WS	767.23	767.13	0.10	0.21	0.00	446.51	913.50	457.69	1075.59
Cochran Mill	600		Bridge								
Cochran Mill	550	Max WS	764.57	764.32	0.26	0.13	0.85	95.40	1709.42	12.88	787.98
Cochran Mill	500	Max WS	763.59	763.36	0.22	0.09		228.15	1222.21	366.78	725.09
Cochran Mill	470	Max WS	763.51	763.26	0.25			206.69	1291.59	318.44	715.41

Profile Output Table - Six XS Bridge

Reach	River Sta		Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Cochran Mill	700		Max WS	767.14	767.13	761.53	0.03	0.00	1003.37	231.44	708.52	879.86	0.98
Cochran Mill	650		Max WS	767.23	767.13	762.60	0.21	0.00	1075.59	446.51	913.50	457.69	3.20
Cochran Mill	600	BR U	Max WS	765.39	762.96	762.96	0.26	0.00	30.00		1817.71		12.51
Cochran Mill	600	BR D	Max WS	764.74	763.35	760.62	0.16	0.00	30.00		1817.71		8.05
Cochran Mill	550		Max WS	764.57	764.32	759.75	0.13	0.85	787.98	95.40	1709.42	12.88	4.15
Cochran Mill	500		Max WS	763.59	763.36		0.09		725.09	228.15	1222.21	366.78	4.57

Profile Output Table - Bridge Only

Reach	River Sta	Profile	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs O WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)
Cochran Mill	600	Max WS	767.23	765.70	227.64	767.07	1817.71	768.71		3.44

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X       X
X     X  X        X    X       X   X    X    X       X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Existing 29' Bridge w/500 yr hydrograph
Project File : 500yrexist.prj
Run Date and Time: 10/16/2005 12:41:16 PM

Project in English units

Project Description:
Existing 29 ft Bridge

PLAN DATA

Plan Title: Existing 29' Bridge w/500 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\500yrexist.p04

Geometry Title: Existing 29' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\500yrexist.g06

Flow Title :
Flow File :

Plan Summary Information:

Number of:	Cross Sections	= 6	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 1	Lateral Structures	=	0

Computational Information

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

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

GEOMETRY DATA

Geometry Title: Existing 29' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\500yrexist.g06

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT

Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	100	100	100	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	770.56	Element			
Vel Head (ft)	0.01	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	770.54	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	1636.41	1016.99	4679.03
E.G. Slope (ft/ft)	0.000137	Area (sq ft)	1636.41	1016.99	4679.03
Q Total (cfs)	4528.97	Flow (cfs)	742.58	1366.01	2420.38
Top Width (ft)	1221.98	Top Width (ft)	336.43	95.00	790.55
Vel Total (ft/s)	0.62	Avg. Vel. (ft/s)	0.45	1.34	0.52
Max Chl Dpth (ft)	13.34	Hydr. Depth (ft)	4.86	10.71	5.92
Conv. Total (cfs)	386946.0	Conv. (cfs)	63444.5	116709.1	206792.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)	336.54	101.95	790.66
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.04	0.09	0.05
Alpha	1.89	Stream Power (lb/ft s)	0.02	0.11	0.03
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	7.94	4.70	24.23
C & E Loss (ft)		Cum SA (acres)	2.22	0.46	5.14

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	28	50	58	.3	.5

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	770.54	Element			
Vel Head (ft)	0.01	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	770.53	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)		Flow Area (sq ft)	1734.36	1044.34	4907.15
E.G. Slope (ft/ft)	0.000120	Area (sq ft)	1734.36	1044.34	4907.15
Q Total (cfs)	4526.26	Flow (cfs)	752.86	1333.54	2439.85
Top Width (ft)	1233.16	Top Width (ft)	344.01	95.00	794.15
Vel Total (ft/s)	0.59	Avg. Vel. (ft/s)	0.43	1.28	0.50
Max Chl Dpth (ft)	13.63	Hydr. Depth (ft)	5.04	10.99	6.18
Conv. Total (cfs)	414044.5	Conv. (cfs)	68869.1	121987.2	223188.3
Length Wtd. (ft)	50.40	Wetted Per. (ft)	344.13	101.95	794.27
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.04	0.08	0.05
Alpha	1.86	Stream Power (lb/ft s)	0.02	0.10	0.02
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	4.07	2.33	13.23
C & E Loss (ft)		Cum SA (acres)	1.44	0.24	3.32

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487	520	104	100	86	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	770.53	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.01	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	770.52	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)	764.44	Flow Area (sq ft)	2380.08	397.57	5755.00
E.G. Slope (ft/ft)	0.000107	Area (sq ft)	2380.08	397.57	5755.00
Q Total (cfs)	4525.04	Flow (cfs)	1053.92	493.88	2977.24
Top Width (ft)	1263.92	Top Width (ft)	421.86	33.00	809.06
Vel Total (ft/s)	0.53	Avg. Vel. (ft/s)	0.44	1.24	0.52
Max Chl Dpth (ft)	13.52	Hydr. Depth (ft)	5.64	12.05	7.11
Conv. Total (cfs)	436939.8	Conv. (cfs)	101766.5	47689.3	287484.0
Length Wtd. (ft)	40.00	Wetted Per. (ft)	422.65	37.30	809.28
Min Ch El (ft)	757.00	Shear (lb/sq ft)	0.04	0.07	0.05
Alpha	1.39	Stream Power (lb/ft s)	0.02	0.09	0.02
Frctn Loss (ft)		Cum Volume (acre-ft)	2.75	1.51	6.13
C & E Loss (ft)		Cum SA (acres)	1.19	0.17	2.26

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Pea Creek
REACH: Cochran Mill RS: 600

INPUT
Description: Bridge #3

Distance from Upstream XS = 40
Deck/Roadway Width = 20
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.6	773	100	772.5	769.2	200	770.5	765.6
300	769.6	762.8	400	769.3	762	490	768.7	0
490	768.7	765.7	520	768.7	765.7	520	768.7	0
600	769.2	0	700	769.9	0	800	770.2	0
900	770.4	761.9	1000	770.6	763.2	1100	770.8	765
1200	771.3	766.6	1300	773.4	768.2	1350	775.2	772.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	761.9	492	761	500	757.5
510	757	518	757	520	761.5	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.05	520	.11

Bank Sta: Left	Right	Coeff Contr.	Expan.
487	520	.3	.5

```
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
      0     441     770       F
     571    1350    770       F
Sediment Elevation = 0

Downstream  Deck/Roadway Coordinates
    num=      18
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0   775.6     773     100   772.5   769.2     200   770.5   765.6
     300   769.6   762.8     400   769.3     762     490   768.7       0
     490   768.7   765.7     520   768.7   765.7     520   768.7       0
     600   769.2       0     700   769.9       0     800   770.2       0
     900   770.4   761.9    1000   770.6   763.2    1100   770.8     765
    1200   771.3   766.6    1300   773.4   768.2    1350   775.2   772.2

Downstream Bridge Cross Section Data
Station Elevation Data     num=      19
     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev     Sta     Elev
       0      773     100    769.2     200    765.6     350      763   487.5    762.2
     497    757.5     499    754.5     510    754.5     519    754.5     520    761.5
     620      763     700    761.8     800    761.4     900    761.9    1000    763.2
    1100      765    1200    766.6    1300    768.2    1350    772.2

Manning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0     .11   487.5     .05     520     .11

Bank Sta: Left   Right    Coeff Contr.   Expan.
         487.5     520            .3       .5
Ineffective Flow      num=       2
   Sta L   Sta R    Elev  Permanent
      0     441     770       F
     571    1350    770       F
Sediment Elevation = 0

Upstream Embankment side slope              =       2 horiz. to 1.0 vertical
Downstream Embankment side slope            =       2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       W.S. Pro Method

  W.S.Pro Data
    Left Embankment
       El of the top of the embankment = 765.9
       El of the toe of the abutment   = 761
    Right Embankment
       El of the top of the embankment = 765.9
       El of the toe of the abutment   = 761.5
    Abtument Type                      = 2 Vert. abutments and sloping embankments
    Slope of abutments                 = 2
    Top with of embankment             = 35
    Centroid station of bridge opening =
    Wing Wall Type                     = No wing walls present
       Width                           =
       Angle                           =
       Radius                          =
    Guide Banks Type                   = No Guide Bank present
       Length                          =
       Offset                          =
       Angle                           =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =       .5
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add Weight component to Momentum
       Class B flow critical depth computations use critical depth
```

inside the bridge at the upstream end
Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT Profile #Max WS

			Inside BR US	Inside BR DS
E.G. US. (ft)	770.53	Element		
W.S. US. (ft)	770.52	E.G. Elev (ft)	770.53	770.53
Q Total (cfs)	4525.04	W.S. Elev (ft)	770.52	770.49
Q Bridge (cfs)	2673.65	Crit W.S. (ft)	771.05	764.74
Q Weir (cfs)	1851.39	Max Chl Dpth (ft)	13.52	15.99
Weir Sta Lft (ft)	198.75	Vel Total (ft/s)	5.22	4.95
Weir Sta Rgt (ft)	962.48	Flow Area (sq ft)	867.42	914.58
Weir Submerg	0.00	Froude # Chl	0.26	0.23
Weir Max Depth (ft)	1.82	Specif Force (cu ft)	3584.58	4463.15
Min El Weir Flow (ft)	768.71	Hydr Depth (ft)	1.14	1.23
Min El Prs (ft)	765.70	W.P. Total (ft)	832.66	821.47
Delta EG (ft)	4.39	Conv. Total (cfs)		
Delta WS (ft)	5.63	Top Width (ft)	760.41	744.03
BR Open Area (sq ft)	227.64	Frctn Loss (ft)		
BR Open Vel (ft/s)	11.75	C & E Loss (ft)		
Coef of Q		Shear Total (lb/sq ft)		
Br Sel Method	Press/Weir	Power Total (lb/ft s)		

Note: The downstream water surface is below the minimum elevation for pressure flow. The sluice gate equations were used for pressure flow.
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.
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: Pea Creek
REACH: Cochran Mill RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	766.13	Element			
Vel Head (ft)	1.24	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.89	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	118.83	445.87	34.59
E.G. Slope (ft/ft)	0.010662	Area (sq ft)	418.08	445.87	1284.81
Q Total (cfs)	4525.04	Flow (cfs)	309.78	4152.84	62.41
Top Width (ft)	853.01	Top Width (ft)	246.58	60.00	546.43
Vel Total (ft/s)	7.55	Avg. Vel. (ft/s)	2.61	9.31	1.80
Max Chl Dpth (ft)	10.39	Hydr. Depth (ft)	2.56	7.43	1.47
Conv. Total (cfs)	43823.8	Conv. (cfs)	3000.2	40219.1	604.5
Length Wtd. (ft)	50.00	Wetted Per. (ft)	46.50	64.14	23.50
Min Ch El (ft)	754.50	Shear (lb/sq ft)	1.70	4.63	0.98
Alpha	1.41	Stream Power (lb/ft s)	4.43	43.10	1.77
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	1.08	0.68	2.50
C & E Loss (ft)		Cum SA (acres)	0.49	0.08	1.04

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream 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: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
495 531 30 30 30 .1 .3
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	765.28	Wt. n-Val.	0.110	0.060	0.110
Vel Head (ft)	0.18	Reach Len. (ft)	30.00	30.00	30.00
W.S. Elev (ft)	765.10	Flow Area (sq ft)	672.47	330.05	1411.71
Crit W.S. (ft)		Area (sq ft)	672.47	330.05	1411.71
E.G. Slope (ft/ft)	0.003004	Flow (cfs)	905.19	1718.09	1901.22
Q Total (cfs)	4524.50	Top Width (ft)	274.28	36.00	575.42
Top Width (ft)	885.71	Avg. Vel. (ft/s)	1.35	5.21	1.35
Vel Total (ft/s)	1.87	Hydr. Depth (ft)	2.45	9.17	2.45
Max Chl Dpth (ft)	11.10	Conv. (cfs)	16514.8	31346.0	34687.0
Conv. Total (cfs)	82547.8	Wetted Per. (ft)	274.34	43.95	575.46
Length Wtd. (ft)	30.00	Shear (lb/sq ft)	0.46	1.41	0.46
Min Ch El (ft)	754.00	Stream Power (lb/ft s)	0.62	7.33	0.62
Alpha	3.25	Cum Volume (acre-ft)	0.45	0.23	0.95
Frctn Loss (ft)	0.09	Cum SA (acres)	0.19	0.03	0.39
C & E Loss (ft)					

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
495 532.5 0 0 0 .1 .3
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

		Element	Left OB	Channel	Right OB
E.G. Elev (ft)	765.20	Wt. n-Val.	0.110	0.060	0.110
Vel Head (ft)	0.20	Reach Len. (ft)			
W.S. Elev (ft)	765.00	Flow Area (sq ft)	645.06	339.45	1352.85
Crit W.S. (ft)	763.76	Area (sq ft)	645.06	339.45	1352.85
E.G. Slope (ft/ft)	0.003153	Flow (cfs)	874.18	1819.36	1830.90
Q Total (cfs)	4524.44	Top Width (ft)	270.09	37.50	567.63
Top Width (ft)	875.22	Avg. Vel. (ft/s)	1.36	5.36	1.35
Vel Total (ft/s)	1.94	Hydr. Depth (ft)	2.39	9.05	2.38
Max Chl Dpth (ft)	11.00	Conv. (cfs)	15567.4	32398.9	32604.5
Conv. Total (cfs)	80570.8				

Length Wtd. (ft)		Wetted Per. (ft)	270.14	44.87	567.69
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.47	1.49	0.47
Alpha	3.38	Stream Power (lb/ft s)	0.64	7.98	0.63
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	600	Bridge		
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	600	Bridge		
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.1	.3
Cochran Mill	700	.3	.5
Cochran Mill	650	.3	.5
Cochran Mill	600	Bridge	
Cochran Mill	550	.3	.5
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	4528.97	757.20	770.54		770.56	0.000137	1.34	7332.42	1221.98	0.07
Cochran Mill	700	Max WS	4526.26	756.90	770.53		770.54	0.000120	1.28	7685.85	1233.16	0.07
Cochran Mill	650	Max WS	4525.04	757.00	770.52	764.44	770.53	0.000107	1.24	8532.65	1263.92	0.06
Cochran Mill	600		Bridge									
Cochran Mill	550	Max WS	4525.04	754.50	764.89		766.13	0.010662	9.31	599.28	853.01	0.60
Cochran Mill	500	Max WS	4524.50	754.00	765.10		765.28	0.003004	5.21	2414.23	885.71	0.30
Cochran Mill	470	Max WS	4524.44	754.00	765.00	763.76	765.20	0.003153	5.36	2337.36	875.22	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	770.56	770.54	0.01	0.01		742.58	1366.01	2420.38	1221.98
Cochran Mill	700	Max WS	770.54	770.53	0.01	0.01		752.86	1333.54	2439.85	1233.16
Cochran Mill	650	Max WS	770.53	770.52	0.01			1053.92	493.88	2977.24	1263.92
Cochran Mill	600		Bridge								
Cochran Mill	550	Max WS	766.13	764.89	1.24	0.26			309.78	4152.84	62.41	853.01

Cochran Mill	500	Max WS	765.28	765.10	0.18	0.09	905.19	1718.09	1901.22	885.71
Cochran Mill	470	Max WS	765.20	765.00	0.20		874.18	1819.36	1830.90	875.22

Profile Output Table - Six XS Bridge

Reach	River Sta		Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Cochran Mill	700		Max WS	770.54	770.53		0.01		1233.16	752.86	1333.54	2439.85	1.28
Cochran Mill	650		Max WS	770.53	770.52	764.44			1263.92	1053.92	493.88	2977.24	1.24
Cochran Mill	600	BR U	Max WS	770.53	770.52	771.05			760.41	1280.55	2093.94	1152.44	7.28
Cochran Mill	600	BR D	Max WS	770.53	770.49	764.74			744.03	1179.13	2278.75	1069.05	6.43
Cochran Mill	550		Max WS	766.13	764.89		0.26		853.01	309.78	4152.84	62.41	9.31
Cochran Mill	500		Max WS	765.28	765.10		0.09		885.71	905.19	1718.09	1901.22	5.21

Profile Output Table - Bridge Only

Reach	River Sta	Profile	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs Q WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)
Cochran Mill	600	Max WS	770.53	765.70	227.64	786.47	4525.04	768.71	1851.39	4.39

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X     X      X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Existing 29' Bridge w/50 yr hydrograph
Project File : 50yrexisting.prj
Run Date and Time: 10/16/2005 12:27:07 PM

Project in English units

Project Description:
Existing 29 ft Bridge

PLAN DATA

Plan Title: Existing 29' Bridge w/50 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\50yrexisting.p10

Geometry Title: Existing 29' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\50yrexisting.g06

Flow Title :
Flow File :

Plan Summary Information:

Number of: Cross Sections	=	6	Multiple Openings	=	0
Culverts	=	0	Inline Structures	=	0
Bridges	=	1	Lateral Structures	=	0

Computational Information

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

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

GEOMETRY DATA

Geometry Title: Existing 29' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\50yrexisting.g06

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
430 525 100 100 100 .1 .3
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	769.94	Element			
Vel Head (ft)	0.01	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	769.94	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	1436.98	959.27	4201.09
E.G. Slope (ft/ft)	0.000099	Area (sq ft)	1436.98	959.27	4201.09
Q Total (cfs)	3317.27	Flow (cfs)	526.89	1055.92	1734.45
Top Width (ft)	1197.87	Top Width (ft)	319.91	95.00	782.96
Vel Total (ft/s)	0.50	Avg. Vel. (ft/s)	0.37	1.10	0.41
Max Chl Dpth (ft)	12.74	Hydr. Depth (ft)	4.49	10.10	5.37
Conv. Total (cfs)	332633.8	Conv. (cfs)	52833.5	105881.1	173919.2
Length Wtd. (ft)	100.00	Wetted Per. (ft)	320.01	101.95	783.04
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.03	0.06	0.03
Alpha	1.96	Stream Power (lb/ft s)	0.01	0.06	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	6.62	4.42	21.17
C & E Loss (ft)		Cum SA (acres)	1.99	0.46	4.68

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
430 525 28 50 58 .3 .5
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	769.93	Element			
Vel Head (ft)	0.01	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	769.93	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)	763.26	Flow Area (sq ft)	1531.34	986.94	4429.66
E.G. Slope (ft/ft)	0.000076	Area (sq ft)	1531.34	986.94	4429.66
Q Total (cfs)	3316.90	Flow (cfs)	559.25	969.08	1788.56
Top Width (ft)	1209.60	Top Width (ft)	328.00	95.00	786.60
Vel Total (ft/s)	0.48	Avg. Vel. (ft/s)	0.37	0.98	0.40

Max Chl Dpth (ft)	13.03	Hydr. Depth (ft)	4.67	10.39	5.63
Conv. Total (cfs)	379990.7	Conv. (cfs)	64069.1	111020.0	204901.6
Length Wtd. (ft)	48.57	Wetted Per. (ft)	328.11	101.95	786.70
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.02	0.05	0.03
Alpha	1.72	Stream Power (lb/ft s)	0.01	0.05	0.01
Frctn Loss (ft)	0.01	Cum Volume (acre-ft)	3.21	2.18	11.26
C & E Loss (ft)	0.00	Cum SA (acres)	1.25	0.24	2.87

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487	520	104	100	86	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	770.00	Element			
Vel Head (ft)	0.16	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	769.85	Reach Len. (ft)	40.00	40.00	40.00
Crit W.S. (ft)	763.72	Flow Area (sq ft)	417.19	375.22	446.31
E.G. Slope (ft/ft)	0.001267	Area (sq ft)	2100.42	375.22	5209.94
Q Total (cfs)	3316.77	Flow (cfs)	865.18	1541.25	910.34
Top Width (ft)	1237.63	Top Width (ft)	404.04	33.00	800.59
Vel Total (ft/s)	2.68	Avg. Vel. (ft/s)	2.07	4.11	2.04
Max Chl Dpth (ft)	12.85	Hydr. Depth (ft)	9.07	11.37	8.75
Conv. Total (cfs)	93193.6	Conv. (cfs)	24309.7	43305.5	25578.4
Length Wtd. (ft)	40.00	Wetted Per. (ft)	46.57	37.30	51.07
Min Ch El (ft)	757.00	Shear (lb/sq ft)	0.71	0.80	0.69
Alpha	1.41	Stream Power (lb/ft s)	1.47	3.27	1.41
Frctn Loss (ft)		Cum Volume (acre-ft)	2.04	1.40	4.84
C & E Loss (ft)		Cum SA (acres)	1.01	0.17	1.82

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Pea Creek
REACH: Cochran Mill RS: 600

INPUT
Description: Bridge #3

Distance from Upstream XS = 40
Deck/Roadway Width = 20
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.6	773	100	772.5	769.2	200	770.5	765.6
300	769.6	762.8	400	769.3	762	490	768.7	0
490	768.7	765.7	520	768.7	765.7	520	768.7	0

600	769.2	0	700	769.9	0	800	770.2	0
900	770.4	761.9	1000	770.6	763.2	1100	770.8	765
1200	771.3	766.6	1300	773.4	768.2	1350	775.2	772.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	761.9	492	761	500	757.5
510	757	518	757	520	761.5	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.05	520	.11

Bank Sta: Left Right Coeff Contr. Expan.
487 520 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.6	773	100	772.5	769.2	200	770.5	765.6
300	769.6	762.8	400	769.3	762	490	768.7	0
490	768.7	765.7	520	768.7	765.7	520	768.7	0
600	769.2	0	700	769.9	0	800	770.2	0
900	770.4	761.9	1000	770.6	763.2	1100	770.8	765
1200	771.3	766.6	1300	773.4	768.2	1350	775.2	772.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	519	754.5	520	761.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.05	520	.11

Bank Sta: Left Right Coeff Contr. Expan.
487.5 520 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = 2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Bridge Coefficient Sets = 1

Low Flow Methods and Data
Energy
W.S. Pro Method

W.S.Pro Data
Left Embankment
El of the top of the embankment = 765.9
El of the toe of the abutment = 761
Right Embankment
El of the top of the embankment = 765.9
El of the toe of the abutment = 761.5
Abtument Type = 2 Vert. abutments and sloping embankments

```
    Slope of abutments                  = 2
    Top with of embankment              = 35
    Centroid station of bridge opening  =
    Wing Wall Type                      = No wing walls present
       Width                            =
       Angle                            =
       Radius                           =
    Guide Banks Type                    = No Guide Bank present
       Length                           =
       Offset                           =
       Angle                            =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd           =
           Submerged Inlet + Outlet Cd  =       .5
           Max Low Cord                 =

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

BRIDGE OUTPUT  Profile #Max WS

  E.G. US. (ft)               770.00    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)               769.85    E.G. Elev (ft)           770.00        770.00
  Q Total (cfs)              3316.77    W.S. Elev (ft)           769.85        769.85
  Q Bridge (cfs)             2574.72    Crit W.S. (ft)           765.36        763.08
  Q Weir (cfs)                765.25    Max Chl Dpth (ft)         12.85         15.35
  Weir Sta Lft (ft)           255.06    Vel Total (ft/s)           9.20          7.72
  Weir Sta Rgt (ft)           734.81    Flow Area (sq ft)        360.69        429.43
  Weir Submerg                  0.00    Froude # Chl               0.47          0.36
  Weir Max Depth (ft)           1.30    Specif Force (cu ft)    3019.37       3749.64
  Min El Weir Flow (ft)       768.71    Hydr Depth (ft)            2.77          3.30
  Min El Prs (ft)             765.70    W.P. Total (ft)          202.24        207.43
  Delta EG (ft)                 4.84    Conv. Total (cfs)
  Delta WS (ft)                 5.52    Top Width (ft)           420.01        420.01
  BR Open Area (sq ft)        227.64    Frctn Loss (ft)
  BR Open Vel (ft/s)           11.31    C & E Loss (ft)
  Coef of Q                             Shear Total (lb/sq ft)
  Br Sel Method          Press/Weir     Power Total (lb/ft s)


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.
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.
Note:    For the cross section inside the bridge at the downstream end, the water surface and energy
         have been projected from the downstream cross section.  The selected bridge modeling
         method does not compute answers inside the bridge.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

CROSS SECTION


RIVER: Pea Creek
REACH: Cochran Mill       RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data    num=      19
      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev      Sta     Elev
        0      773      100    769.2      200    765.6      350      763    487.5    762.2
      497    757.5      499    754.5      510    754.5      520    754.5    547.5    763.5
      620      763      700    761.8      800    761.4      900    761.9     1000    763.2
```

1100	765	1200	766.6	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	441	770	F
571	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	765.16	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.84	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.33	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	92.55	411.97	21.31
E.G. Slope (ft/ft)	0.007823	Area (sq ft)	287.97	411.97	984.94
Q Total (cfs)	3316.77	Flow (cfs)	174.97	3117.95	23.85
Top Width (ft)	789.02	Top Width (ft)	213.98	60.00	515.04
Vel Total (ft/s)	6.31	Avg. Vel. (ft/s)	1.89	7.57	1.12
Max Chl Dpth (ft)	9.83	Hydr. Depth (ft)	1.99	6.87	0.91
Conv. Total (cfs)	37500.7	Conv. (cfs)	1978.2	35252.8	269.6
Length Wtd. (ft)	50.00	Wetted Per. (ft)	46.50	64.14	23.50
Min Ch El (ft)	754.50	Shear (lb/sq ft)	0.97	3.14	0.44
Alpha	1.36	Stream Power (lb/ft s)	1.84	23.74	0.50
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	0.79	0.63	1.86
C & E Loss (ft)		Cum SA (acres)	0.43	0.08	0.98

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

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

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	764.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.43	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	497.96	305.92	1037.97
E.G. Slope (ft/ft)	0.003052	Area (sq ft)	497.96	305.92	1037.97
Q Total (cfs)	3316.50	Flow (cfs)	594.03	1525.90	1196.58
Top Width (ft)	822.97	Top Width (ft)	246.35	36.00	540.62
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)	1.19	4.99	1.15
Max Chl Dpth (ft)	10.43	Hydr. Depth (ft)	2.02	8.50	1.92
Conv. Total (cfs)	60030.7	Conv. (cfs)	10752.3	27619.6	21658.8
Length Wtd. (ft)	30.00	Wetted Per. (ft)	246.39	43.95	540.65
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.39	1.33	0.37
Alpha	3.76	Stream Power (lb/ft s)	0.46	6.62	0.42

Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.33	0.21	0.70
C & E Loss (ft)		Cum SA (acres)	0.17	0.03	0.37

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	532.5	0	0	0	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.54	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.21	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.33	Reach Len. (ft)			
Crit W.S. (ft)	763.33	Flow Area (sq ft)	473.16	314.28	983.13
E.G. Slope (ft/ft)	0.003221	Area (sq ft)	473.16	314.28	983.13
Q Total (cfs)	3316.26	Flow (cfs)	566.96	1617.21	1132.09
Top Width (ft)	813.66	Top Width (ft)	242.12	37.50	534.04
Vel Total (ft/s)	1.87	Avg. Vel. (ft/s)	1.20	5.15	1.15
Max Chl Dpth (ft)	10.33	Hydr. Depth (ft)	1.95	8.38	1.84
Conv. Total (cfs)	58431.4	Conv. (cfs)	9989.7	28494.8	19947.0
Length Wtd. (ft)		Wetted Per. (ft)	242.16	44.87	534.10
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.39	1.41	0.37
Alpha	3.88	Stream Power (lb/ft s)	0.47	7.25	0.43
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	600	Bridge		
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	600	Bridge		
Cochran Mill	550	50	50	50

Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.1	.3
Cochran Mill	700	.3	.5
Cochran Mill	650	.3	.5
Cochran Mill	600	Bridge	
Cochran Mill	550	.3	.5
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	3317.27	757.20	769.94		769.94	0.000099	1.10	6597.35	1197.87	0.06
Cochran Mill	700	Max WS	3316.90	756.90	769.93	763.26	769.93	0.000076	0.98	6947.95	1209.60	0.05
Cochran Mill	650	Max WS	3316.77	757.00	769.85	763.72	770.00	0.001267	4.11	1238.71	1237.63	0.21
Cochran Mill	600		Bridge									
Cochran Mill	550	Max WS	3316.77	754.50	764.33		765.16	0.007823	7.57	525.83	789.02	0.51
Cochran Mill	500	Max WS	3316.50	754.00	764.43		764.62	0.003052	4.99	1841.84	822.97	0.30
Cochran Mill	470	Max WS	3316.26	754.00	764.33	763.33	764.54	0.003221	5.15	1770.58	813.66	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	769.94	769.94	0.01	0.01		526.89	1055.92	1734.45	1197.87
Cochran Mill	700	Max WS	769.93	769.93	0.01	0.01	0.00	559.25	969.08	1788.56	1209.60
Cochran Mill	650	Max WS	770.00	769.85	0.16			865.18	1541.25	910.34	1237.63
Cochran Mill	600		Bridge								
Cochran Mill	550	Max WS	765.16	764.33	0.84	0.23		174.97	3117.95	23.85	789.02
Cochran Mill	500	Max WS	764.62	764.43	0.19	0.09		594.03	1525.90	1196.58	822.97
Cochran Mill	470	Max WS	764.54	764.33	0.21			566.96	1617.21	1132.09	813.66

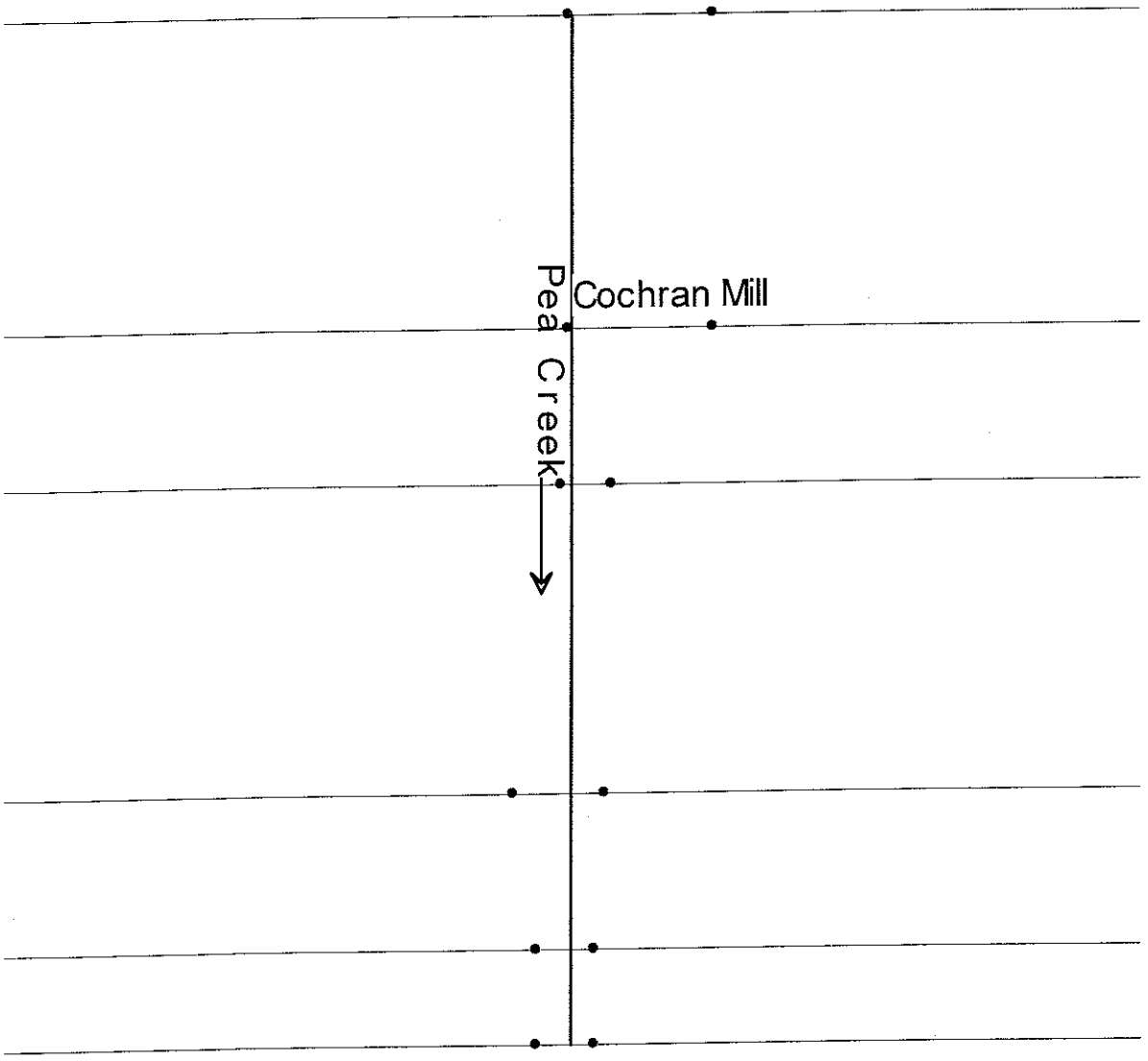
Profile Output Table - Six XS Bridge

Reach	River Sta		Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Cochran Mill	700		Max WS	769.93	769.93	763.26	0.01	0.00	1209.60	559.25	969.08	1788.56	0.98
Cochran Mill	650		Max WS	770.00	769.85	763.72			1237.63	865.18	1541.25	910.34	4.11
Cochran Mill	600	BR U	Max WS	770.00	769.85	765.36			420.01	463.53	2489.58	427.14	9.38
Cochran Mill	600	BR D	Max WS	770.00	769.85	763.08			420.01	437.51	2546.22	396.52	7.63
Cochran Mill	550		Max WS	765.16	764.33		0.23		789.02	174.97	3117.95	23.85	7.57
Cochran Mill	500		Max WS	764.62	764.43		0.09		822.97	594.03	1525.90	1196.58	4.99

Profile Output Table - Bridge Only

Reach	River Sta	Profile	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs O WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)
Cochran Mill	600	Max WS	770.00	765.70	227.64	775.11	3316.77	768.71	765.25	4.84

Natural Conditions Plan



HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X     X
X     X  X        X            X   X    X    X    X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
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PROJECT DATA
Project Title: Natural Condition w/100 yr hydrograph
Project File : 100yrnatural.prj
Run Date and Time: 10/16/2005 12:33:10 PM

Project in English units

Project Description:
Natural Condition at Pea Creek

PLAN DATA

Plan Title: Natural Condition w/100 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\100yrnatural.p09

Geometry Title: Natural Condition
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\100yrnatural.g07

Flow Title :
Flow File :

Plan Summary Information:

Number of:	Cross Sections	= 6	Multiple Openings	=	0
	Culverts	= 0	Inline Structures	=	0
	Bridges	= 0	Lateral Structures	=	0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

GEOMETRY DATA

Geometry Title: Natural Condition
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\100yrnatural.g07

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	100	100	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.46	Element			
Vel Head (ft)	0.14	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.32	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	263.92	520.84	1114.32
E.G. Slope (ft/ft)	0.002797	Area (sq ft)	263.92	520.84	1114.32
Q Total (cfs)	3569.57	Flow (cfs)	242.61	2023.42	1303.54
Top Width (ft)	807.54	Top Width (ft)	180.77	95.00	531.76
Vel Total (ft/s)	1.88	Avg. Vel. (ft/s)	0.92	3.88	1.17
Max Chl Dpth (ft)	8.12	Hydr. Depth (ft)	1.46	5.48	2.10
Conv. Total (cfs)	67496.8	Conv. (cfs)	4587.6	38260.7	24648.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	180.80	101.95	531.79
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.25	0.89	0.37
Alpha	2.58	Stream Power (lb/ft s)	0.23	3.47	0.43
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	2.73	3.01	9.42
C & E Loss (ft)		Cum SA (acres)	1.59	0.48	4.06

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	28	50	58	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.19	Element			
Vel Head (ft)	0.14	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.05	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)		Flow Area (sq ft)	268.84	523.42	1128.78
E.G. Slope (ft/ft)	0.002720	Area (sq ft)	268.84	523.42	1128.78
Q Total (cfs)	3568.55	Flow (cfs)	245.85	2011.81	1310.88
Top Width (ft)	810.02	Top Width (ft)	181.75	95.00	533.27
Vel Total (ft/s)	1.86	Avg. Vel. (ft/s)	0.91	3.84	1.16
Max Chl Dpth (ft)	8.15	Hydr. Depth (ft)	1.48	5.51	2.12
Conv. Total (cfs)	68427.9	Conv. (cfs)	4714.3	38577.1	25136.5
Length Wtd. (ft)	51.90	Wetted Per. (ft)	181.77	101.95	533.30
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.25	0.87	0.36
Alpha	2.57	Stream Power (lb/ft s)	0.23	3.35	0.42
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	2.12	1.82	6.84
C & E Loss (ft)		Cum SA (acres)	1.17	0.26	2.84

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487	520	104	100	86	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.05	Element			
Vel Head (ft)	0.07	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.98	Reach Len. (ft)	104.00	100.00	86.00
Crit W.S. (ft)		Flow Area (sq ft)	464.47	214.62	1720.82
E.G. Slope (ft/ft)	0.002291	Area (sq ft)	464.47	214.62	1720.82
Q Total (cfs)	3568.02	Flow (cfs)	451.45	816.88	2299.68
Top Width (ft)	863.22	Top Width (ft)	251.28	33.00	578.94
Vel Total (ft/s)	1.49	Avg. Vel. (ft/s)	0.97	3.81	1.34
Max Chl Dpth (ft)	7.98	Hydr. Depth (ft)	1.85	6.50	2.97
Conv. Total (cfs)	74550.7	Conv. (cfs)	9432.7	17068.1	48049.9
Length Wtd. (ft)	93.31	Wetted Per. (ft)	251.97	37.30	579.04
Min Ch El (ft)	757.00	Shear (lb/sq ft)	0.26	0.82	0.42
Alpha	2.08	Stream Power (lb/ft s)	0.26	3.13	0.57
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	1.88	1.39	4.94
C & E Loss (ft)		Cum SA (acres)	1.03	0.19	2.10

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	50	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.88	Element			
Vel Head (ft)	0.16	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.71	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	375.33	435.24	1188.93
E.G. Slope (ft/ft)	0.002399	Area (sq ft)	375.33	435.24	1188.93
Q Total (cfs)	3566.81	Flow (cfs)	337.95	1892.11	1336.75
Top Width (ft)	832.95	Top Width (ft)	236.36	60.00	536.59
Vel Total (ft/s)	1.78	Avg. Vel. (ft/s)	0.90	4.35	1.12
Max Chl Dpth (ft)	10.21	Hydr. Depth (ft)	1.59	7.25	2.22
Conv. Total (cfs)	72830.0	Conv. (cfs)	6900.5	38634.7	27294.8
Length Wtd. (ft)	50.00	Wetted Per. (ft)	236.38	64.14	536.62
Min Ch El (ft)	754.50	Shear (lb/sq ft)	0.24	1.02	0.33
Alpha	3.32	Stream Power (lb/ft s)	0.21	4.42	0.37
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.88	0.65	2.07
C & E Loss (ft)		Cum SA (acres)	0.45	0.08	1.00

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.76	Element			
Vel Head (ft)	0.19	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.58	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	533.80	311.09	1116.20
E.G. Slope (ft/ft)	0.003055	Area (sq ft)	533.80	311.09	1116.20
Q Total (cfs)	3566.17	Flow (cfs)	656.73	1569.97	1339.47
Top Width (ft)	836.14	Top Width (ft)	252.34	36.00	547.81
Vel Total (ft/s)	1.82	Avg. Vel. (ft/s)	1.23	5.05	1.20
Max Chl Dpth (ft)	10.58	Hydr. Depth (ft)	2.12	8.64	2.04
Conv. Total (cfs)	64516.3	Conv. (cfs)	11881.0	28402.6	24232.7
Length Wtd. (ft)	30.00	Wetted Per. (ft)	252.38	43.95	547.84
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.40	1.35	0.39
Alpha	3.64	Stream Power (lb/ft s)	0.50	6.81	0.47
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.36	0.22	0.75
C & E Loss (ft)		Cum SA (acres)	0.17	0.03	0.38

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	532.5	0	0	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.68	Element			
Vel Head (ft)	0.21	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.48	Reach Len. (ft)			
Crit W.S. (ft)	763.38	Flow Area (sq ft)	508.52	319.69	1060.68
E.G. Slope (ft/ft)	0.003220	Area (sq ft)	508.52	319.69	1060.68
Q Total (cfs)	3565.78	Flow (cfs)	628.88	1663.69	1273.21
Top Width (ft)	826.88	Top Width (ft)	248.13	37.50	541.25
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	1.24	5.20	1.20
Max Chl Dpth (ft)	10.48	Hydr. Depth (ft)	2.05	8.53	1.96
Conv. Total (cfs)	62834.4	Conv. (cfs)	11081.8	29316.7	22435.9
Length Wtd. (ft)		Wetted Per. (ft)	248.17	44.87	541.31
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.41	1.43	0.39
Alpha	3.77	Stream Power (lb/ft s)	0.51	7.46	0.47
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.1	.3
Cochran Mill	700	.1	.3
Cochran Mill	650	.1	.3
Cochran Mill	550	.1	.3
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	3569.57	757.20	765.32		765.46	0.002797	3.88	1899.07	807.54	0.29
Cochran Mill	700	Max WS	3568.55	756.90	765.05		765.19	0.002720	3.84	1921.04	810.02	0.29
Cochran Mill	650	Max WS	3568.02	757.00	764.98		765.05	0.002291	3.81	2399.92	863.22	0.26
Cochran Mill	550	Max WS	3566.81	754.50	764.71		764.88	0.002399	4.35	1999.50	832.95	0.28
Cochran Mill	500	Max WS	3566.17	754.00	764.58		764.76	0.003055	5.05	1961.08	836.14	0.30
Cochran Mill	470	Max WS	3565.78	754.00	764.48	763.38	764.68	0.003220	5.20	1888.89	826.88	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	765.46	765.32	0.14	0.28		242.61	2023.42	1303.54	807.54
Cochran Mill	700	Max WS	765.19	765.05	0.14	0.13		245.85	2011.81	1310.88	810.02
Cochran Mill	650	Max WS	765.05	764.98	0.07	0.22		451.45	816.88	2299.68	863.22
Cochran Mill	550	Max WS	764.88	764.71	0.16	0.13		337.95	1892.11	1336.75	832.95
Cochran Mill	500	Max WS	764.76	764.58	0.19	0.09		656.73	1569.97	1339.47	836.14
Cochran Mill	470	Max WS	764.68	764.48	0.21			628.88	1663.69	1273.21	826.88

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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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: Natural Condition w/10 yr hydrograph
Project File : 10yrnatural.prj
Run Date and Time: 10/16/2005 12:06:48 PM

Project in English units

Project Description:
Natural Condition at Pea Creek

PLAN DATA

Plan Title: Natural Condition w/10 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\10yrnatural.p09

Geometry Title: Natural Condition
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\10yrnatural.g07

Flow Title :
Flow File :

Plan Summary Information:
Number of: Cross Sections = 6 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

GEOMETRY DATA

Geometry Title: Natural Condition
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\10yrnatural.g07

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
430 525 100 100 100 .1 .3
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.26	Element			
Vel Head (ft)	0.14	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.12	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	72.01	406.36	514.23
E.G. Slope (ft/ft)	0.003002	Area (sq ft)	72.01	406.36	514.23
Q Total (cfs)	1830.13	Flow (cfs)	34.59	1386.14	409.40
Top Width (ft)	693.64	Top Width (ft)	137.74	95.00	460.90
Vel Total (ft/s)	1.84	Avg. Vel. (ft/s)	0.48	3.41	0.80
Max Chl Dpth (ft)	6.92	Hydr. Depth (ft)	0.52	4.28	1.12
Conv. Total (cfs)	33402.4	Conv. (cfs)	631.3	25299.0	7472.2
Length Wtd. (ft)	100.00	Wetted Per. (ft)	137.75	101.95	460.92
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.10	0.75	0.21
Alpha	2.64	Stream Power (lb/ft s)	0.05	2.55	0.17
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	1.06	2.44	4.82
C & E Loss (ft)		Cum SA (acres)	1.19	0.48	3.56

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
430 525 28 50 58 .1 .3
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	763.98	Element			
Vel Head (ft)	0.14	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.84	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)		Flow Area (sq ft)	75.26	408.59	525.08
E.G. Slope (ft/ft)	0.002909	Area (sq ft)	75.26	408.59	525.08
Q Total (cfs)	1829.57	Flow (cfs)	36.49	1376.91	416.17
Top Width (ft)	696.29	Top Width (ft)	138.58	95.00	462.71
Vel Total (ft/s)	1.81	Avg. Vel. (ft/s)	0.48	3.37	0.79

Max Chl Dpth (ft)	6.94	Hydr. Depth (ft)	0.54	4.30	1.13
Conv. Total (cfs)	33924.4	Conv. (cfs)	676.7	25531.0	7716.7
Length Wtd. (ft)	52.28	Wetted Per. (ft)	138.59	101.95	462.72
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.10	0.73	0.21
Alpha	2.64	Stream Power (lb/ft s)	0.05	2.45	0.16
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.89	1.50	3.63
C & E Loss (ft)		Cum SA (acres)	0.87	0.26	2.50

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487	520	104	100	86 .1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	763.84	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.06	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.77	Reach Len. (ft)	104.00	100.00	86.00
Crit W.S. (ft)		Flow Area (sq ft)	203.31	174.81	1062.81
E.G. Slope (ft/ft)	0.002265	Area (sq ft)	203.31	174.81	1062.81
Q Total (cfs)	1829.30	Flow (cfs)	140.52	577.00	1111.78
Top Width (ft)	726.60	Top Width (ft)	181.68	33.00	511.91
Vel Total (ft/s)	1.27	Avg. Vel. (ft/s)	0.69	3.30	1.05
Max Chl Dpth (ft)	6.77	Hydr. Depth (ft)	1.12	5.30	2.08
Conv. Total (cfs)	38439.6	Conv. (cfs)	2952.8	12124.7	23362.2
Length Wtd. (ft)	94.34	Wetted Per. (ft)	182.36	37.30	512.00
Min Ch El (ft)	757.00	Shear (lb/sq ft)	0.16	0.66	0.29
Alpha	2.57	Stream Power (lb/ft s)	0.11	2.19	0.31
Frctn Loss (ft)	0.21	Cum Volume (acre-ft)	0.80	1.17	2.57
C & E Loss (ft)		Cum SA (acres)	0.77	0.19	1.85

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	50 .1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	763.67	Element			
Vel Head (ft)	0.15	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.52	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	134.45	363.68	588.43
E.G. Slope (ft/ft)	0.002150	Area (sq ft)	134.45	363.68	588.43
Q Total (cfs)	1828.62	Flow (cfs)	72.72	1327.97	427.93
Top Width (ft)	697.88	Top Width (ft)	167.55	60.00	470.33
Vel Total (ft/s)	1.68	Avg. Vel. (ft/s)	0.54	3.65	0.73
Max Chl Dpth (ft)	9.02	Hydr. Depth (ft)	0.80	6.06	1.25
Conv. Total (cfs)	39435.6	Conv. (cfs)	1568.2	28638.6	9228.7
Length Wtd. (ft)	50.00	Wetted Per. (ft)	167.56	64.14	470.35
Min Ch El (ft)	754.50	Shear (lb/sq ft)	0.11	0.76	0.17
Alpha	3.47	Stream Power (lb/ft s)	0.06	2.78	0.12
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.40	0.55	0.94
C & E Loss (ft)		Cum SA (acres)	0.35	0.08	0.88

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	763.59	Element			
Vel Head (ft)	0.22	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.37	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	260.46	267.80	493.54
E.G. Slope (ft/ft)	0.003067	Area (sq ft)	260.46	267.80	493.54
Q Total (cfs)	1828.23	Flow (cfs)	230.64	1225.39	372.19
Top Width (ft)	725.90	Top Width (ft)	202.23	36.00	487.67
Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)	0.89	4.58	0.75
Max Chl Dpth (ft)	9.37	Hydr. Depth (ft)	1.29	7.44	1.01
Conv. Total (cfs)	33009.7	Conv. (cfs)	4164.4	22125.2	6720.1
Length Wtd. (ft)	30.00	Wetted Per. (ft)	202.26	43.95	487.69
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.25	1.17	0.19
Alpha	4.45	Stream Power (lb/ft s)	0.22	5.34	0.15
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.17	0.19	0.32
C & E Loss (ft)		Cum SA (acres)	0.14	0.03	0.33

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0 .11 495 .06 532.5 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
495 532.5 0 0 0 .1 .3
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	763.52	Element			
Vel Head (ft)	0.25	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.27	Reach Len. (ft)			
Crit W.S. (ft)	759.72	Flow Area (sq ft)	239.36	274.43	443.76
E.G. Slope (ft/ft)	0.003246	Area (sq ft)	239.36	274.43	443.76
Q Total (cfs)	1827.98	Flow (cfs)	209.16	1295.11	323.71
Top Width (ft)	716.23	Top Width (ft)	197.83	37.50	480.90
Vel Total (ft/s)	1.91	Avg. Vel. (ft/s)	0.87	4.72	0.73
Max Chl Dpth (ft)	9.27	Hydr. Depth (ft)	1.21	7.32	0.92
Conv. Total (cfs)	32082.5	Conv. (cfs)	3670.9	22730.3	5681.4
Length Wtd. (ft)		Wetted Per. (ft)	197.86	44.87	480.94
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.25	1.24	0.19
Alpha	4.38	Stream Power (lb/ft s)	0.21	5.85	0.14
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.1	.3
Cochran Mill	700	.1	.3
Cochran Mill	650	.1	.3
Cochran Mill	550	.1	.3
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl

			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Cochran Mill	800	Max WS	1830.13	757.20	764.12		764.26	0.003002	3.41	992.60	693.64	0.29
Cochran Mill	700	Max WS	1829.57	756.90	763.84		763.98	0.002909	3.37	1008.93	696.29	0.29
Cochran Mill	650	Max WS	1829.30	757.00	763.77		763.84	0.002265	3.30	1440.92	726.60	0.25
Cochran Mill	550	Max WS	1828.62	754.50	763.52		763.67	0.002150	3.65	1086.55	697.88	0.26
Cochran Mill	500	Max WS	1828.23	754.00	763.37		763.59	0.003067	4.58	1021.79	725.90	0.30
Cochran Mill	470	Max WS	1827.98	754.00	763.27	759.72	763.52	0.003246	4.72	957.54	716.23	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	764.26	764.12	0.14	0.30		34.59	1386.14	409.40	693.64
Cochran Mill	700	Max WS	763.98	763.84	0.14	0.13		36.49	1376.91	416.17	696.29
Cochran Mill	650	Max WS	763.84	763.77	0.06	0.21		140.52	577.00	1111.78	726.60
Cochran Mill	550	Max WS	763.67	763.52	0.15	0.13		72.72	1327.97	427.93	697.88
Cochran Mill	500	Max WS	763.59	763.37	0.22	0.09		230.64	1225.39	372.19	725.90
Cochran Mill	470	Max WS	763.52	763.27	0.25			209.16	1295.11	323.71	716.23

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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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: Natural Condition w/500 yr hydrograph
Project File : 500yrnatural.prj
Run Date and Time: 10/16/2005 12:43:07 PM

Project in English units

Project Description:
Natural Condition at Pea Creek

PLAN DATA

Plan Title: Natural Condition w/500 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\500yrnatural.p09

Geometry Title: Natural Condition
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\500yrnatural.g07

Flow Title :
Flow File :

Plan Summary Information:

Number of: Cross Sections	= 6	Multiple Openings	= 0
Culverts	= 0	Inline Structures	= 0
Bridges	= 0	Lateral Structures	= 0

Computational Information

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

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

GEOMETRY DATA

Geometry Title: Natural Condition
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\500yrnatural.g07

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT

Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	100	100	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.99	Element			
Vel Head (ft)	0.15	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.84	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	362.46	570.10	1397.54
E.G. Slope (ft/ft)	0.002737	Area (sq ft)	362.46	570.10	1397.54
Q Total (cfs)	4524.21	Flow (cfs)	381.60	2326.90	1815.71
Top Width (ft)	854.87	Top Width (ft)	199.29	95.00	560.57
Vel Total (ft/s)	1.94	Avg. Vel. (ft/s)	1.05	4.08	1.30
Max Chl Dpth (ft)	8.64	Hydr. Depth (ft)	1.82	6.00	2.49
Conv. Total (cfs)	86483.3	Conv. (cfs)	7294.4	44480.3	34708.6
Length Wtd. (ft)	100.00	Wetted Per. (ft)	199.33	101.95	560.60
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.31	0.96	0.43
Alpha	2.48	Stream Power (lb/ft s)	0.33	3.90	0.55
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	3.61	3.26	11.61
C & E Loss (ft)		Cum SA (acres)	1.77	0.48	4.28

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	28	50	58	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.72	Element			
Vel Head (ft)	0.14	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.58	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)		Flow Area (sq ft)	369.89	573.63	1418.38
E.G. Slope (ft/ft)	0.002647	Area (sq ft)	369.89	573.63	1418.38
Q Total (cfs)	4524.04	Flow (cfs)	386.45	2311.90	1825.69
Top Width (ft)	858.25	Top Width (ft)	200.62	95.00	562.63
Vel Total (ft/s)	1.92	Avg. Vel. (ft/s)	1.04	4.03	1.29
Max Chl Dpth (ft)	8.68	Hydr. Depth (ft)	1.84	6.04	2.52
Conv. Total (cfs)	87940.1	Conv. (cfs)	7511.9	44939.7	35488.6
Length Wtd. (ft)	51.69	Wetted Per. (ft)	200.65	101.95	562.66
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.30	0.93	0.42
Alpha	2.47	Stream Power (lb/ft s)	0.32	3.75	0.54
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	2.77	1.95	8.38
C & E Loss (ft)		Cum SA (acres)	1.31	0.26	3.00

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487	520	104	100	86	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.58	Element			
Vel Head (ft)	0.08	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.51	Reach Len. (ft)	104.00	100.00	86.00
Crit W.S. (ft)		Flow Area (sq ft)	605.20	232.04	2035.15
E.G. Slope (ft/ft)	0.002302	Area (sq ft)	605.20	232.04	2035.15
Q Total (cfs)	4523.91	Flow (cfs)	651.98	932.76	2939.17
Top Width (ft)	926.55	Top Width (ft)	281.75	33.00	611.81
Vel Total (ft/s)	1.57	Avg. Vel. (ft/s)	1.08	4.02	1.44
Max Chl Dpth (ft)	8.51	Hydr. Depth (ft)	2.15	7.03	3.33
Conv. Total (cfs)	94282.2	Conv. (cfs)	13587.8	19439.6	61254.8
Length Wtd. (ft)	93.09	Wetted Per. (ft)	282.44	37.30	611.91
Min Ch El (ft)	757.00	Shear (lb/sq ft)	0.31	0.89	0.48
Alpha	1.96	Stream Power (lb/ft s)	0.33	3.59	0.69
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	2.46	1.49	6.08
C & E Loss (ft)		Cum SA (acres)	1.15	0.19	2.21

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	50	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.40	Element			
Vel Head (ft)	0.17	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.24	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	506.73	466.60	1477.12
E.G. Slope (ft/ft)	0.002436	Area (sq ft)	506.73	466.60	1477.12
Q Total (cfs)	4523.52	Flow (cfs)	518.46	2141.20	1863.86
Top Width (ft)	893.78	Top Width (ft)	266.51	60.00	567.26
Vel Total (ft/s)	1.85	Avg. Vel. (ft/s)	1.02	4.59	1.26
Max Chl Dpth (ft)	10.74	Hydr. Depth (ft)	1.90	7.78	2.60
Conv. Total (cfs)	91653.3	Conv. (cfs)	10504.9	43383.9	37764.6
Length Wtd. (ft)	50.00	Wetted Per. (ft)	266.53	64.14	567.30
Min Ch El (ft)	754.50	Shear (lb/sq ft)	0.29	1.11	0.40
Alpha	3.15	Stream Power (lb/ft s)	0.30	5.08	0.50
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	1.13	0.69	2.61
C & E Loss (ft)		Cum SA (acres)	0.50	0.08	1.05

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.28	Element			
Vel Head (ft)	0.18	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.10	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	672.31	330.03	1411.36
E.G. Slope (ft/ft)	0.003004	Area (sq ft)	672.31	330.03	1411.36
Q Total (cfs)	4523.28	Flow (cfs)	904.87	1717.90	1900.51
Top Width (ft)	885.64	Top Width (ft)	274.26	36.00	575.39
Vel Total (ft/s)	1.87	Avg. Vel. (ft/s)	1.35	5.21	1.35
Max Chl Dpth (ft)	11.10	Hydr. Depth (ft)	2.45	9.17	2.45
Conv. Total (cfs)	82525.7	Conv. (cfs)	16509.0	31342.5	34674.2
Length Wtd. (ft)	30.00	Wetted Per. (ft)	274.31	43.95	575.42
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.46	1.41	0.46
Alpha	3.25	Stream Power (lb/ft s)	0.62	7.33	0.62
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.45	0.23	0.95
C & E Loss (ft)		Cum SA (acres)	0.19	0.03	0.39

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	532.5	0	0	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.20	Element			
Vel Head (ft)	0.20	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.00	Reach Len. (ft)			
Crit W.S. (ft)	763.76	Flow Area (sq ft)	644.91	339.43	1352.54
E.G. Slope (ft/ft)	0.003153	Area (sq ft)	644.91	339.43	1352.54
Q Total (cfs)	4523.14	Flow (cfs)	873.86	1819.09	1830.19
Top Width (ft)	875.16	Top Width (ft)	270.06	37.50	567.60
Vel Total (ft/s)	1.94	Avg. Vel. (ft/s)	1.35	5.36	1.35
Max Chl Dpth (ft)	11.00	Hydr. Depth (ft)	2.39	9.05	2.38
Conv. Total (cfs)	80551.2	Conv. (cfs)	15562.3	32395.6	32593.3
Length Wtd. (ft)		Wetted Per. (ft)	270.11	44.87	567.65
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.47	1.49	0.47
Alpha	3.38	Stream Power (lb/ft s)	0.64	7.98	0.63
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.1	.3
Cochran Mill	700	.1	.3
Cochran Mill	650	.1	.3
Cochran Mill	550	.1	.3
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	4524.21	757.20	765.84		765.99	0.002737	4.08	2330.10	854.87	0.29
Cochran Mill	700	Max WS	4524.04	756.90	765.58		765.72	0.002647	4.03	2361.89	858.25	0.29
Cochran Mill	650	Max WS	4523.91	757.00	765.51		765.58	0.002302	4.02	2872.40	926.55	0.27
Cochran Mill	550	Max WS	4523.52	754.50	765.24		765.40	0.002436	4.59	2450.44	893.78	0.29
Cochran Mill	500	Max WS	4523.28	754.00	765.10		765.28	0.003004	5.21	2413.69	885.64	0.30
Cochran Mill	470	Max WS	4523.14	754.00	765.00	763.76	765.20	0.003153	5.36	2336.88	875.16	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	765.99	765.84	0.15	0.27		381.60	2326.90	1815.71	854.87
Cochran Mill	700	Max WS	765.72	765.58	0.14	0.13		386.45	2311.90	1825.69	858.25
Cochran Mill	650	Max WS	765.58	765.51	0.08	0.22		651.98	932.76	2939.17	926.55
Cochran Mill	550	Max WS	765.40	765.24	0.17	0.13		518.46	2141.20	1863.86	893.78
Cochran Mill	500	Max WS	765.28	765.10	0.18	0.09		904.87	1717.90	1900.51	885.64
Cochran Mill	470	Max WS	765.20	765.00	0.20			873.86	1819.09	1830.19	875.16

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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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: Natural Condition w/50 yr hydrograph
Project File : 50yrnatural.prj
Run Date and Time: 10/16/2005 12:29:29 PM

Project in English units

Project Description:
Natural Condition at Pea Creek

PLAN DATA

Plan Title: Natural Condition w/50 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\50yrnatural.p09

Geometry Title: Natural Condition
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\50yrnatural.g07

Flow Title :
Flow File :

Plan Summary Information:
Number of: Cross Sections = 6 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

GEOMETRY DATA

Geometry Title: Natural Condition
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\50yrnatural.g07

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	100	100	100 .1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.32	Element			
Vel Head (ft)	0.14	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.17	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	237.71	506.86	1036.70
E.G. Slope (ft/ft)	0.002810	Area (sq ft)	237.71	506.86	1036.70
Q Total (cfs)	3317.27	Flow (cfs)	208.35	1938.38	1170.54
Top Width (ft)	794.11	Top Width (ft)	175.52	95.00	523.59
Vel Total (ft/s)	1.86	Avg. Vel. (ft/s)	0.88	3.82	1.13
Max Chl Dpth (ft)	7.97	Hydr. Depth (ft)	1.35	5.34	1.98
Conv. Total (cfs)	62576.3	Conv. (cfs)	3930.3	36565.1	22080.8
Length Wtd. (ft)	100.00	Wetted Per. (ft)	175.54	101.95	523.62
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.24	0.87	0.35
Alpha	2.61	Stream Power (lb/ft s)	0.21	3.34	0.39
Frctn Loss (ft)	0.28	Cum Volume (acre-ft)	2.50	2.94	8.83
C & E Loss (ft)		Cum SA (acres)	1.54	0.48	4.00

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description:
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	28	50	58 .1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.04	Element			
Vel Head (ft)	0.14	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.90	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)		Flow Area (sq ft)	242.72	509.57	1051.61
E.G. Slope (ft/ft)	0.002726	Area (sq ft)	242.72	509.57	1051.61
Q Total (cfs)	3316.19	Flow (cfs)	211.66	1926.20	1178.33
Top Width (ft)	796.71	Top Width (ft)	176.54	95.00	525.17
Vel Total (ft/s)	1.84	Avg. Vel. (ft/s)	0.87	3.78	1.12

Max Chl Dpth (ft)	8.00	Hydr. Depth (ft)	1.37	5.36	2.00
Conv. Total (cfs)	63511.7	Conv. (cfs)	4053.7	36890.6	22567.4
Length Wtd. (ft)	51.95	Wetted Per. (ft)	176.56	101.95	525.20
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.23	0.85	0.34
Alpha	2.60	Stream Power (lb/ft s)	0.20	3.22	0.38
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	1.95	1.78	6.43
C & E Loss (ft)		Cum SA (acres)	1.14	0.26	2.80

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487	520	104	100	86	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	764.90	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.07	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.83	Reach Len. (ft)	104.00	100.00	86.00
Crit W.S. (ft)		Flow Area (sq ft)	428.36	209.80	1636.79
E.G. Slope (ft/ft)	0.002277	Area (sq ft)	428.36	209.80	1636.79
Q Total (cfs)	3315.64	Flow (cfs)	402.32	784.15	2129.17
Top Width (ft)	846.67	Top Width (ft)	242.85	33.00	570.82
Vel Total (ft/s)	1.46	Avg. Vel. (ft/s)	0.94	3.74	1.30
Max Chl Dpth (ft)	7.83	Hydr. Depth (ft)	1.76	6.36	2.87
Conv. Total (cfs)	69486.3	Conv. (cfs)	8431.5	16433.5	44621.3
Length Wtd. (ft)	93.39	Wetted Per. (ft)	243.54	37.30	570.91
Min Ch El (ft)	757.00	Shear (lb/sq ft)	0.25	0.80	0.41
Alpha	2.12	Stream Power (lb/ft s)	0.23	2.99	0.53
Frctn Loss (ft)	0.22	Cum Volume (acre-ft)	1.73	1.36	4.64
C & E Loss (ft)		Cum SA (acres)	1.00	0.19	2.07

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	50	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	764.73	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.16	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.57	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)		Flow Area (sq ft)	341.56	426.52	1111.47
E.G. Slope (ft/ft)	0.002373	Area (sq ft)	341.56	426.52	1111.47
Q Total (cfs)	3314.32	Flow (cfs)	294.28	1819.55	1200.49
Top Width (ft)	816.48	Top Width (ft)	227.97	60.00	528.51
Vel Total (ft/s)	1.76	Avg. Vel. (ft/s)	0.86	4.27	1.08
Max Chl Dpth (ft)	10.07	Hydr. Depth (ft)	1.50	7.11	2.10
Conv. Total (cfs)	68037.2	Conv. (cfs)	6041.0	37352.2	24643.9
Length Wtd. (ft)	50.00	Wetted Per. (ft)	227.99	64.14	528.54
Min Ch El (ft)	754.50	Shear (lb/sq ft)	0.22	0.99	0.31
Alpha	3.37	Stream Power (lb/ft s)	0.19	4.20	0.34
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	0.82	0.63	1.93
C & E Loss (ft)		Cum SA (acres)	0.44	0.08	0.98

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	764.62	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.19	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.43	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	497.55	305.86	1037.08
E.G. Slope (ft/ft)	0.003052	Area (sq ft)	497.55	305.86	1037.08
Q Total (cfs)	3313.63	Flow (cfs)	593.31	1525.36	1194.95
Top Width (ft)	822.82	Top Width (ft)	246.28	36.00	540.54
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)	1.19	4.99	1.15
Max Chl Dpth (ft)	10.43	Hydr. Depth (ft)	2.02	8.50	1.92
Conv. Total (cfs)	59980.3	Conv. (cfs)	10739.7	27610.7	21630.0
Length Wtd. (ft)	30.00	Wetted Per. (ft)	246.32	43.95	540.57
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.38	1.33	0.37
Alpha	3.76	Stream Power (lb/ft s)	0.46	6.61	0.42
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.33	0.21	0.70
C & E Loss (ft)		Cum SA (acres)	0.17	0.03	0.37

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

0 .11 495 .06 532.5 .11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
495 532.5 0 0 0 .1 .3
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.54	Element			
Vel Head (ft)	0.21	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.33	Reach Len. (ft)			
Crit W.S. (ft)	763.33	Flow Area (sq ft)	472.77	314.22	982.25
E.G. Slope (ft/ft)	0.003221	Area (sq ft)	472.77	314.22	982.25
Q Total (cfs)	3313.21	Flow (cfs)	566.23	1616.56	1130.42
Top Width (ft)	813.51	Top Width (ft)	242.05	37.50	533.96
Vel Total (ft/s)	1.87	Avg. Vel. (ft/s)	1.20	5.14	1.15
Max Chl Dpth (ft)	10.33	Hydr. Depth (ft)	1.95	8.38	1.84
Conv. Total (cfs)	58382.2	Conv. (cfs)	9977.5	28485.4	19919.3
Length Wtd. (ft)		Wetted Per. (ft)	242.09	44.87	534.01
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.39	1.41	0.37
Alpha	3.88	Stream Power (lb/ft s)	0.47	7.24	0.43
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.1	.3
Cochran Mill	700	.1	.3
Cochran Mill	650	.1	.3
Cochran Mill	550	.1	.3
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

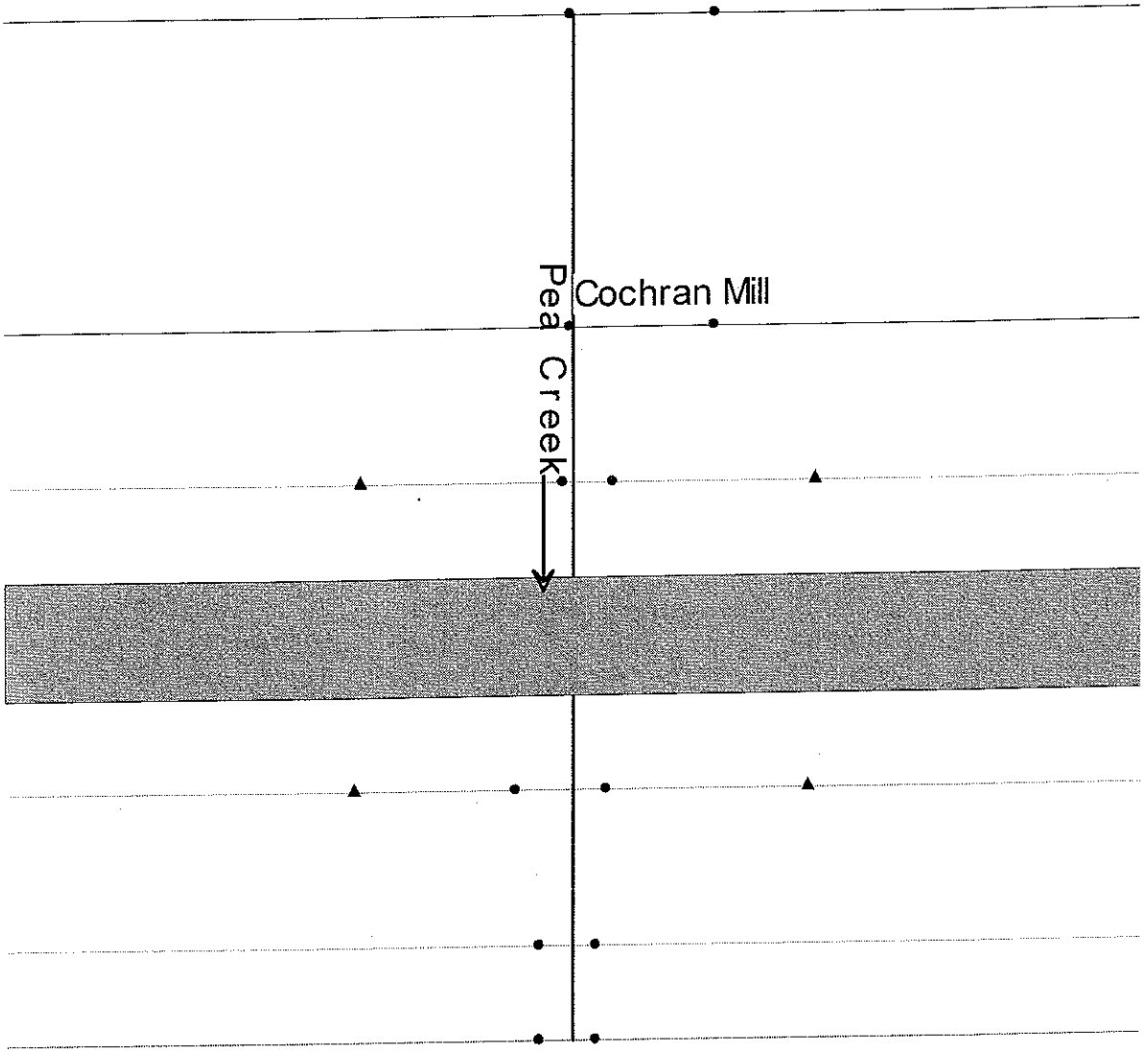
Reach	River Sta	Profile	Q Total	Min Ch El	W.S. Elev	Crit W.S.	E.G. Elev	E.G. Slope	Vel Chnl	Flow Area	Top Width	Froude # Chl

			(cfs)	(ft)	(ft)	(ft)	(ft)	(ft/ft)	(ft/s)	(sq ft)	(ft)	
Cochran Mill	800	Max WS	3317.27	757.20	765.17		765.32	0.002810	3.82	1781.28	794.11	0.29
Cochran Mill	700	Max WS	3316.19	756.90	764.90		765.04	0.002726	3.78	1803.90	796.71	0.29
Cochran Mill	650	Max WS	3315.64	757.00	764.83		764.90	0.002277	3.74	2274.94	846.67	0.26
Cochran Mill	550	Max WS	3314.32	754.50	764.57		764.73	0.002373	4.27	1879.55	816.48	0.28
Cochran Mill	500	Max WS	3313.63	754.00	764.43		764.62	0.003052	4.99	1840.49	822.82	0.30
Cochran Mill	470	Max WS	3313.21	754.00	764.33	763.33	764.54	0.003221	5.14	1769.24	813.51	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	765.32	765.17	0.14	0.28		208.35	1938.38	1170.54	794.11
Cochran Mill	700	Max WS	765.04	764.90	0.14	0.13		211.66	1926.20	1178.33	796.71
Cochran Mill	650	Max WS	764.90	764.83	0.07	0.22		402.32	784.15	2129.17	846.67
Cochran Mill	550	Max WS	764.73	764.57	0.16	0.13		294.28	1819.55	1200.49	816.48
Cochran Mill	500	Max WS	764.62	764.43	0.19	0.09		593.31	1525.36	1194.95	822.82
Cochran Mill	470	Max WS	764.54	764.33	0.21			566.23	1616.56	1130.42	813.51

Proposed Conditions Plan



HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X      X   X     X  X     X
X     X  X        X           X   X     X   X    X
XXXXXXX  XXXX     X       XXX  XXXX      XXXXX    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: Proposed 150' Bridge w/100 yr hydrograph
Project File : 100yrprop.prj
Run Date and Time: 10/25/2005 4:48:39 PM

Project in English units

Project Description:
Proposed 150 ft 3-Span Bridge Model

PLAN DATA

Plan Title: Proposed 150' Bridge w/100 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\100yrprop.p10

Geometry Title: Proposed 150' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\100yrprop.g08

Flow Title :
Flow File :

Plan Summary Information:
Number of: Cross Sections = 6 Multiple Openings = 0
Culverts = 0 Inline Structures = 0
Bridges = 1 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

GEOMETRY DATA

Geometry Title: Proposed 150' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\100yrprop.g08

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	100	100	.3	.5

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	766.32	Element			
Vel Head (ft)	0.07	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	766.25	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	447.31	609.11	1632.49
E.G. Slope (ft/ft)	0.001194	Area (sq ft)	447.31	609.11	1632.49
Q Total (cfs)	3569.57	Flow (cfs)	341.40	1716.58	1511.59
Top Width (ft)	893.39	Top Width (ft)	213.96	95.00	584.43
Vel Total (ft/s)	1.33	Avg. Vel. (ft/s)	0.76	2.82	0.93
Max Chl Dpth (ft)	9.05	Hydr. Depth (ft)	2.09	6.41	2.79
Conv. Total (cfs)	103283.1	Conv. (cfs)	9878.2	49668.0	43736.9
Length Wtd. (ft)	100.00	Wetted Per. (ft)	214.00	101.95	584.47
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.16	0.45	0.21
Alpha	2.40	Stream Power (lb/ft s)	0.12	1.26	0.19
Frctn Loss (ft)	0.13	Cum Volume (acre-ft)	2.80	3.15	9.53
C & E Loss (ft)		Cum SA (acres)	1.36	0.46	3.61

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	28	50	58	.3	.5

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.80	Element			
Vel Head (ft)	0.07	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.72	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)	763.41	Flow Area (sq ft)	399.48	587.46	1500.90
E.G. Slope (ft/ft)	0.001355	Area (sq ft)	399.48	587.46	1500.90
Q Total (cfs)	3567.65	Flow (cfs)	330.16	1721.01	1516.48
Top Width (ft)	871.55	Top Width (ft)	205.82	95.00	570.72
Vel Total (ft/s)	1.43	Avg. Vel. (ft/s)	0.83	2.93	1.01
Max Chl Dpth (ft)	8.82	Hydr. Depth (ft)	1.94	6.18	2.63
Conv. Total (cfs)	96934.5	Conv. (cfs)	8970.6	46760.5	41203.4
Length Wtd. (ft)	79.82	Wetted Per. (ft)	205.86	101.95	570.76
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.16	0.49	0.22
Alpha	2.25	Stream Power (lb/ft s)	0.14	1.43	0.22
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	1.82	1.78	5.94
C & E Loss (ft)	0.00	Cum SA (acres)	0.88	0.24	2.29

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: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
487 520 104 100 86 .3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	766.25	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.53	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.72	Reach Len. (ft)	31.00	31.00	31.00
Crit W.S. (ft)	763.89	Flow Area (sq ft)	251.03	239.11	287.11
E.G. Slope (ft/ft)	0.007814	Area (sq ft)	666.62	239.11	2167.58
Q Total (cfs)	3566.79	Flow (cfs)	808.50	1806.51	951.78
Top Width (ft)	948.61	Top Width (ft)	290.42	33.00	625.19
Vel Total (ft/s)	4.59	Avg. Vel. (ft/s)	3.22	7.56	3.32
Max Chl Dpth (ft)	8.72	Hydr. Depth (ft)	4.48	7.25	4.63
Conv. Total (cfs)	40349.3	Conv. (cfs)	9146.2	20436.1	10767.0
Length Wtd. (ft)	31.00	Wetted Per. (ft)	56.67	37.30	62.07
Min Ch El (ft)	757.00	Shear (lb/sq ft)	2.16	3.13	2.26
Alpha	1.62	Stream Power (lb/ft s)	6.96	23.63	7.48
Frctn Loss (ft)	0.30	Cum Volume (acre-ft)	1.48	1.30	3.49
C & E Loss (ft)	0.00	Cum SA (acres)	0.72	0.17	1.49

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Pea Creek
REACH: Cochran Mill RS: 600

INPUT
Description: Bridge #3

Distance from Upstream XS = 31
Deck/Roadway Width = 38
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.3	773	100	774.7	769.2	200	774	765.6
300	773	762.8	400	772.8	762	431.5	772.5	0
431.5	772.5	769.5	581.5	772.5	769.5	581.5	772.5	0
600	772.9	0	700	773.2	0	800	774.2	0
900	774.5	761.9	1000	774.7	763.2	1100	775	765
1200	775.3	766.6	1300	775.3	768.2	1350	775.3	772.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	761.9	492	761	500	757.5
510	757	518	757	520	761.5	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.05	520	.11

Bank Sta: Left Right Coeff Contr. Expan.
487 520 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.3	773	100	774.7	769.2	200	774	765.6
300	773	762.8	400	772.8	762	431.5	772.5	0
431.5	772.5	769.5	581.5	772.5	769.5	581.5	772.5	0
600	772.9	0	700	773.2	0	800	774.2	0
900	774.5	761.9	1000	774.7	763.2	1100	775	765
1200	775.3	766.6	1300	775.3	768.2	1350	775.3	772.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	525.5	761.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.05	525.5	.11

Bank Sta: Left Right Coeff Contr. Expan.
487.5 525.5 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = 2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
431.5	767.5	441.5	759.6

Downstream num= 2

Sta	Elev	Sta	Elev
431.5	767.5	441.5	759.6

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
571.5	761	581.5	767.5

Downstream num= 2

Sta	Elev	Sta	Elev
571.5	761	581.5	767.5

Number of Piers = 2

Pier Data
Pier Station Upstream= 481.5 Downstream= 481.5
Upstream num= 2

Width	Elev	Width	Elev
1.5	0	1.5	770

Downstream num= 2

Width	Elev	Width	Elev
1.5	0	1.5	770

Pier Data
Pier Station Upstream= 531.5 Downstream= 531.5
Upstream num= 2

Width	Elev	Width	Elev

```
    1.5       0     1.5     770
Downstream     num=        2
    Width   Elev    Width   Elev
     1.5       0     1.5     770

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       W.S. Pro Method

  W.S.Pro Data
    Left Embankment
       El of the top of the embankment = 767.5
       El of the toe of the abutment   = 761
    Right Embankment
       El of the top of the embankment = 767.5
       El of the toe of the abutment   = 761.5
    Abtument Type                      = 3 Sloping abutments and sloping embankments
    Slope of abutments                 = 2
    Top with of embankment             = 55
    Centroid station of bridge opening =
    Wing Wall Type                     = No wing walls present
       Width                           =
       Angle                           =
       Radius                          =
    Guide Banks Type                   = No Guide Bank present
       Length                          =
       Offset                          =
       Angle                           =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =       .5
           Max Low Cord                =

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

BRIDGE OUTPUT  Profile #Max WS

  E.G. US. (ft)              766.25    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              765.72    E.G. Elev (ft)              766.10        765.74
  Q Total (cfs)             3566.79    W.S. Elev (ft)              764.96        764.77
  Q Bridge (cfs)            3566.79    Crit W.S. (ft)              764.08        763.60
  Q Weir (cfs)                         Max Chl Dpth (ft)             7.96         10.27
  Weir Sta Lft (ft)                    Vel Total (ft/s)              5.76          6.19
  Weir Sta Rgt (ft)                    Flow Area (sq ft)           619.69        576.28
  Weir Submerg                         Froude # Chl                  0.72          0.58
  Weir Max Depth (ft)                  Specif Force (cu ft)       2430.87       2665.14
  Min El Weir Flow (ft)      772.51    Hydr Depth (ft)               4.43          4.14
  Min El Prs (ft)            769.50    W.P. Total (ft)             160.97        158.44
  Delta EG (ft)                0.91    Conv. Total (cfs)         32947.3       41212.1
  Delta WS (ft)                1.10    Top Width (ft)              139.89        139.36
  BR Open Area (sq ft)      1260.59    Frctn Loss (ft)               0.36          0.23
  BR Open Vel (ft/s)           6.19    C & E Loss (ft)               0.00          0.00
  Coef of Q                    0.78    Shear Total (lb/sq ft)        2.82          1.70
  Br Sel Method               WSPRO    Power Total (lb/ft s)        16.21         10.53


 Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
 Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
          energy was used.
 Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
          energy was used.

 CROSS SECTION


 RIVER: Pea Creek
 REACH: Cochran Mill       RS: 550

 INPUT
 Description: Downstream of Bridge
 Station Elevation Data    num=      19
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.51	Element			
Vel Head (ft)	0.89	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.62	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	762.07	Flow Area (sq ft)	127.46	429.64	42.75
E.G. Slope (ft/ft)	0.007409	Area (sq ft)	353.51	429.64	1139.06
Q Total (cfs)	3566.79	Flow (cfs)	254.91	3254.53	57.35
Top Width (ft)	822.38	Top Width (ft)	230.98	60.00	531.40
Vel Total (ft/s)	5.95	Avg. Vel. (ft/s)	2.00	7.58	1.34
Max Chl Dpth (ft)	10.12	Hydr. Depth (ft)	2.26	7.16	1.24
Conv. Total (cfs)	41436.9	Conv. (cfs)	2961.4	37809.3	666.3
Length Wtd. (ft)	50.00	Wetted Per. (ft)	56.50	64.14	34.50
Min Ch El (ft)	754.50	Shear (lb/sq ft)	1.04	3.10	0.57
Alpha	1.63	Stream Power (lb/ft s)	2.09	23.47	0.77
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	0.87	0.64	2.04
C & E Loss (ft)	0.51	Cum SA (acres)	0.45	0.08	0.99

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.76	Element			
Vel Head (ft)	0.19	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.58	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	533.76	311.09	1116.13
E.G. Slope (ft/ft)	0.003056	Area (sq ft)	533.76	311.09	1116.13
Q Total (cfs)	3566.14	Flow (cfs)	656.71	1570.02	1339.42
Top Width (ft)	836.13	Top Width (ft)	252.33	36.00	547.80
Vel Total (ft/s)	1.82	Avg. Vel. (ft/s)	1.23	5.05	1.20
Max Chl Dpth (ft)	10.58	Hydr. Depth (ft)	2.12	8.64	2.04
Conv. Total (cfs)	64512.4	Conv. (cfs)	11880.0	28402.0	24230.4
Length Wtd. (ft)	30.00	Wetted Per. (ft)	252.38	43.95	547.83
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.40	1.35	0.39
Alpha	3.64	Stream Power (lb/ft s)	0.50	6.82	0.47
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.36	0.22	0.75
C & E Loss (ft)		Cum SA (acres)	0.17	0.03	0.38

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	532.5	0	0	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.68	Element			
Vel Head (ft)	0.21	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.48	Reach Len. (ft)			
Crit W.S. (ft)	763.38	Flow Area (sq ft)	508.52	319.69	1060.68
E.G. Slope (ft/ft)	0.003220	Area (sq ft)	508.52	319.69	1060.68
Q Total (cfs)	3565.73	Flow (cfs)	628.87	1663.67	1273.20
Top Width (ft)	826.88	Top Width (ft)	248.13	37.50	541.25
Vel Total (ft/s)	1.89	Avg. Vel. (ft/s)	1.24	5.20	1.20
Max Chl Dpth (ft)	10.48	Hydr. Depth (ft)	2.05	8.53	1.96
Conv. Total (cfs)	62834.4	Conv. (cfs)	11081.8	29316.7	22435.9
Length Wtd. (ft)		Wetted Per. (ft)	248.17	44.87	541.31
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.41	1.43	0.39
Alpha	3.77	Stream Power (lb/ft s)	0.51	7.45	0.47
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	600	Bridge		
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	600	Bridge		
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.3	.5
Cochran Mill	700	.3	.5
Cochran Mill	650	.3	.5
Cochran Mill	600	Bridge	
Cochran Mill	550	.3	.5
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	3569.57	757.20	766.25		766.32	0.001194	2.82	2688.92	893.39	0.20
Cochran Mill	700	Max WS	3567.65	756.90	765.72	763.41	765.80	0.001355	2.93	2487.84	871.55	0.21
Cochran Mill	650	Max WS	3566.79	757.00	765.72	763.89	766.25	0.007814	7.56	777.25	948.61	0.49
Cochran Mill	600		Bridge									
Cochran Mill	550	Max WS	3566.79	754.50	764.62	762.07	765.51	0.007409	7.58	599.85	822.38	0.50
Cochran Mill	500	Max WS	3566.14	754.00	764.58		764.76	0.003056	5.05	1960.98	836.13	0.30
Cochran Mill	470	Max WS	3565.73	754.00	764.48	763.38	764.68	0.003220	5.20	1888.89	826.88	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	766.32	766.25	0.07	0.13		341.40	1716.58	1511.59	893.39
Cochran Mill	700	Max WS	765.80	765.72	0.07	0.26	0.00	330.16	1721.01	1516.48	871.55
Cochran Mill	650	Max WS	766.25	765.72	0.53	0.30	0.00	808.50	1806.51	951.78	948.61
Cochran Mill	600		Bridge								
Cochran Mill	550	Max WS	765.51	764.62	0.89	0.24	0.51	254.91	3254.53	57.35	822.38
Cochran Mill	500	Max WS	764.76	764.58	0.19	0.09		656.71	1570.02	1339.42	836.13
Cochran Mill	470	Max WS	764.68	764.48	0.21			628.87	1663.67	1273.20	826.88

Profile Output Table - Six XS Bridge

Reach	River Sta		Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Cochran Mill	700		Max WS	765.80	765.72	763.41	0.26	0.00	871.55	330.16	1721.01	1516.48	2.93
Cochran Mill	650		Max WS	766.25	765.72	763.89	0.30	0.00	948.61	808.50	1806.51	951.78	7.56
Cochran Mill	600	BR U	Max WS	766.10	764.96	764.08	0.36	0.00	139.89	655.07	2255.56	656.16	10.46
Cochran Mill	600	BR D	Max WS	765.74	764.77	763.60	0.23	0.00	139.36	231.80	3041.87	293.12	9.59
Cochran Mill	550		Max WS	765.51	764.62	762.07	0.24	0.51	822.38	254.91	3254.53	57.35	7.58
Cochran Mill	500		Max WS	764.76	764.58		0.09		836.13	656.71	1570.02	1339.42	5.05

Profile Output Table - Bridge Only

Reach	River Sta	Profile	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs O WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)
Cochran Mill	600	Max WS	766.25	769.50	1260.59		3566.79	772.51		0.91

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Proposed 150' Bridge w/10 yr hydrograph
Project File : 10yrproposed.prj
Run Date and Time: 10/25/2005 4:45:35 PM

Project in English units

Project Description:
Proposed 150 ft 3-Span Bridge Model

PLAN DATA

Plan Title: Proposed w/hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\10yrproposed.p10

Geometry Title: Proposed 150' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\10yrproposed.g08

Flow Title :
Flow File :

Plan Summary Information:

Number of: Cross Sections	=	6	Multiple Openings	=	0
Culverts	=	0	Inline Structures	=	0
Bridges	=	1	Lateral Structures	=	0

Computational Information

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

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

GEOMETRY DATA

Geometry Title: Proposed 150' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\10yrproposed.g08

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	100	100	100	.3	.5

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.51	Element			
Vel Head (ft)	0.10	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.41	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	114.08	434.31	653.02
E.G. Slope (ft/ft)	0.002055	Area (sq ft)	114.08	434.31	653.02
Q Total (cfs)	1830.13	Flow (cfs)	58.66	1281.30	490.17
Top Width (ft)	724.41	Top Width (ft)	148.25	95.00	481.16
Vel Total (ft/s)	1.52	Avg. Vel. (ft/s)	0.51	2.95	0.75
Max Chl Dpth (ft)	7.21	Hydr. Depth (ft)	0.77	4.57	1.36
Conv. Total (cfs)	40371.7	Conv. (cfs)	1294.0	28264.9	10812.8
Length Wtd. (ft)	100.00	Wetted Per. (ft)	148.26	101.95	481.18
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.10	0.55	0.17
Alpha	2.69	Stream Power (lb/ft s)	0.05	1.61	0.13
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	0.98	2.40	4.15
C & E Loss (ft)		Cum SA (acres)	0.99	0.46	3.05

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	28	50	58	.3	.5

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	763.98	Element			
Vel Head (ft)	0.13	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.85	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)	761.56	Flow Area (sq ft)	77.22	409.93	531.61
E.G. Slope (ft/ft)	0.002761	Area (sq ft)	77.22	409.93	531.61
Q Total (cfs)	1829.20	Flow (cfs)	38.01	1348.82	442.37
Top Width (ft)	697.88	Top Width (ft)	139.08	95.00	463.79
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)	0.49	3.29	0.83

Max Chl Dpth (ft)	6.95	Hydr. Depth (ft)	0.56	4.32	1.15
Conv. Total (cfs)	34813.2	Conv. (cfs)	723.4	25670.6	8419.2
Length Wtd. (ft)	69.09	Wetted Per. (ft)	139.09	101.95	463.81
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.10	0.69	0.20
Alpha	2.53	Stream Power (lb/ft s)	0.05	2.28	0.16
Frctn Loss (ft)	0.32	Cum Volume (acre-ft)	0.76	1.43	2.79
C & E Loss (ft)	0.00	Cum SA (acres)	0.66	0.24	1.96

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: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
487 520 104 100 86 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.24	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.39	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.85	Reach Len. (ft)	31.00	31.00	31.00
Crit W.S. (ft)	762.58	Flow Area (sq ft)	146.38	177.44	171.25
E.G. Slope (ft/ft)	0.007802	Area (sq ft)	217.99	177.44	1103.86
Q Total (cfs)	1828.78	Flow (cfs)	328.81	1098.01	401.95
Top Width (ft)	735.64	Top Width (ft)	186.29	33.00	516.35
Vel Total (ft/s)	3.69	Avg. Vel. (ft/s)	2.25	6.19	2.35
Max Chl Dpth (ft)	6.85	Hydr. Depth (ft)	2.61	5.38	2.76
Conv. Total (cfs)	20703.9	Conv. (cfs)	3722.5	12430.8	4550.6
Length Wtd. (ft)	31.00	Wetted Per. (ft)	56.67	37.30	62.07
Min Ch El (ft)	757.00	Shear (lb/sq ft)	1.26	2.32	1.34
Alpha	1.84	Stream Power (lb/ft s)	2.83	14.34	3.15
Frctn Loss (ft)	0.25	Cum Volume (acre-ft)	0.67	1.09	1.70
C & E Loss (ft)	0.00	Cum SA (acres)	0.55	0.17	1.31

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Pea Creek
REACH: Cochran Mill RS: 600

INPUT
Description: Bridge #3

Distance from Upstream XS = 31
Deck/Roadway Width = 38
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 18

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord

0	775.3	773	100	774.7	769.2	200	774	765.6
300	773	762.8	400	772.8	762	431.5	772.5	0
431.5	772.5	769.5	581.5	772.5	769.5	581.5	772.5	0
600	772.9	0	700	773.2	0	800	774.2	0
900	774.5	761.9	1000	774.7	763.2	1100	775	765
1200	775.3	766.6	1300	775.3	768.2	1350	775.3	772.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	761.9	492	761	500	757.5
510	757	518	757	520	761.5	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.05	520	.11

Bank Sta: Left Right Coeff Contr. Expan.
487 520 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.3	773	100	774.7	769.2	200	774	765.6
300	773	762.8	400	772.8	762	431.5	772.5	0
431.5	772.5	769.5	581.5	772.5	769.5	581.5	772.5	0
600	772.9	0	700	773.2	0	800	774.2	0
900	774.5	761.9	1000	774.7	763.2	1100	775	765
1200	775.3	766.6	1300	775.3	768.2	1350	775.3	772.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	525.5	761.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.05	525.5	.11

Bank Sta: Left Right Coeff Contr. Expan.
487.5 525.5 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = 2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
431.5	767.5	441.5	759.6

Downstream num= 2

Sta	Elev	Sta	Elev
431.5	767.5	441.5	759.6

Abutment Data

```
Upstream      num=        2
     Sta     Elev      Sta     Elev
   571.5      761    581.5    767.5
Downstream    num=        2
     Sta     Elev      Sta     Elev
   571.5      761    581.5    767.5

Number of Piers =  2

Pier Data
Pier Station      Upstream=    481.5    Downstream=    481.5
Upstream      num=        2
    Width    Elev    Width    Elev
      1.5       0      1.5     770
Downstream    num=        2
    Width    Elev    Width    Elev
      1.5       0      1.5     770

Pier Data
Pier Station      Upstream=    531.5    Downstream=    531.5
Upstream      num=        2
    Width    Elev    Width    Elev
      1.5       0      1.5     770
Downstream    num=        2
    Width    Elev    Width    Elev
      1.5       0      1.5     770

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
        Energy
        W.S. Pro Method

  W.S.Pro Data
    Left Embankment
       El of the top of the embankment = 767.5
       El of the toe of the abutment   = 761
    Right Embankment
       El of the top of the embankment = 767.5
       El of the toe of the abutment   = 761.5
    Abtument Type                      = 3 Sloping abutments and sloping embankments
    Slope of abutments                 = 2
    Top with of embankment             = 55
    Centroid station of bridge opening =
    Wing Wall Type                     = No wing walls present
       Width                           =
       Angle                           =
       Radius                          =
    Guide Banks Type                   = No Guide Bank present
       Length                          =
       Offset                          =
       Angle                           =

 Selected Low Flow Methods = W.S.Pro Method

 High Flow Method
        Pressure and Weir flow
            Submerged Inlet Cd         =
            Submerged Inlet + Outlet Cd =      .5
            Max Low Cord               =

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

 BRIDGE OUTPUT  Profile #Max WS

   E.G. US. (ft)               764.24    Element                Inside BR US  Inside BR DS
   W.S. US. (ft)               763.85    E.G. Elev (ft)              764.19        763.97
   Q Total (cfs)              1828.78    W.S. Elev (ft)              763.55        763.58
   Q Bridge (cfs)             1828.78    Crit W.S. (ft)              762.63        760.29
   Q Weir (cfs)                          Max Chl Dpth (ft)             6.55          9.08
   Weir Sta Lft (ft)                     Vel Total (ft/s)              4.31          4.44
```

Weir Sta Rgt (ft)		Flow Area (sq ft)	424.61	411.47
Weir Submerg		Froude # Chl	0.59	0.41
Weir Max Depth (ft)		Specif Force (cu ft)	1164.65	1486.51
Min El Weir Flow (ft)	772.51	Hydr Depth (ft)	3.12	3.03
Min El Prs (ft)	769.50	W.P. Total (ft)	150.44	149.53
Delta EG (ft)	0.45	Conv. Total (cfs)	19864.4	29457.3
Delta WS (ft)	0.37	Top Width (ft)	135.92	136.00
BR Open Area (sq ft)	1260.59	Frctn Loss (ft)	0.22	0.12
BR Open Vel (ft/s)	4.44	C & E Loss (ft)	0.00	0.00
Coef of Q	0.88	Shear Total (lb/sq ft)	1.49	0.66
Br Sel Method	WSPRO	Power Total (lb/ft s)	6.43	2.94

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	50	.3 .5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	763.85	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.37	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.49	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	759.77	Flow Area (sq ft)	63.41	361.62	3.66
E.G. Slope (ft/ft)	0.003891	Area (sq ft)	128.74	361.62	572.37
Q Total (cfs)	1828.78	Flow (cfs)	57.70	1770.36	0.72
Top Width (ft)	692.02	Top Width (ft)	165.58	59.96	466.49
Vel Total (ft/s)	4.27	Avg. Vel. (ft/s)	0.91	4.90	0.20
Max Chl Dpth (ft)	8.99	Hydr. Depth (ft)	1.12	6.03	0.11
Conv. Total (cfs)	29318.7	Conv. (cfs)	925.0	28382.2	11.5
Length Wtd. (ft)	50.00	Wetted Per. (ft)	56.50	64.10	32.56
Min Ch El (ft)	754.50	Shear (lb/sq ft)	0.27	1.37	0.03
Alpha	1.29	Stream Power (lb/ft s)	0.25	6.71	0.01
Frctn Loss (ft)	0.17	Cum Volume (acre-ft)	0.40	0.55	0.93
C & E Loss (ft)	0.08	Cum SA (acres)	0.35	0.08	0.88

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	763.60	Element			
Vel Head (ft)	0.22	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.37	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	260.50	267.80	493.66
E.G. Slope (ft/ft)	0.003068	Area (sq ft)	260.50	267.80	493.66
Q Total (cfs)	1828.52	Flow (cfs)	230.71	1225.47	372.34
Top Width (ft)	725.92	Top Width (ft)	202.24	36.00	487.69
Vel Total (ft/s)	1.79	Avg. Vel. (ft/s)	0.89	4.58	0.75
Max Chl Dpth (ft)	9.37	Hydr. Depth (ft)	1.29	7.44	1.01
Conv. Total (cfs)	33014.7	Conv. (cfs)	4165.6	22126.4	6722.7
Length Wtd. (ft)	30.00	Wetted Per. (ft)	202.27	43.95	487.71
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.25	1.17	0.19
Alpha	4.45	Stream Power (lb/ft s)	0.22	5.34	0.15
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.17	0.19	0.32
C & E Loss (ft)		Cum SA (acres)	0.14	0.03	0.33

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	532.5	0	0	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	763.52	Element			
Vel Head (ft)	0.25	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	763.27	Reach Len. (ft)			
Crit W.S. (ft)	759.72	Flow Area (sq ft)	239.39	274.43	443.85
E.G. Slope (ft/ft)	0.003247	Area (sq ft)	239.39	274.43	443.85
Q Total (cfs)	1828.29	Flow (cfs)	209.22	1295.24	323.83
Top Width (ft)	716.25	Top Width (ft)	197.84	37.50	480.91
Vel Total (ft/s)	1.91	Avg. Vel. (ft/s)	0.87	4.72	0.73
Max Chl Dpth (ft)	9.27	Hydr. Depth (ft)	1.21	7.32	0.92
Conv. Total (cfs)	32086.1	Conv. (cfs)	3671.7	22731.2	5683.2
Length Wtd. (ft)		Wetted Per. (ft)	197.87	44.87	480.95
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.25	1.24	0.19
Alpha	4.38	Stream Power (lb/ft s)	0.21	5.85	0.14
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	600	Bridge		
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	600	Bridge		
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.3	.5
Cochran Mill	700	.3	.5
Cochran Mill	650	.3	.5
Cochran Mill	600	Bridge	
Cochran Mill	550	.3	.5
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	1830.13	757.20	764.41		764.51	0.002055	2.95	1201.41	724.41	0.24
Cochran Mill	700	Max WS	1829.20	756.90	763.85	761.56	763.98	0.002761	3.29	1018.76	697.88	0.28
Cochran Mill	650	Max WS	1828.78	757.00	763.85	762.58	764.24	0.007802	6.19	495.07	735.64	0.47
Cochran Mill	600		Bridge									
Cochran Mill	550	Max WS	1828.78	754.50	763.49	759.77	763.85	0.003891	4.90	428.69	692.02	0.35
Cochran Mill	500	Max WS	1828.52	754.00	763.37		763.60	0.003068	4.58	1021.97	725.92	0.30
Cochran Mill	470	Max WS	1828.29	754.00	763.27	759.72	763.52	0.003247	4.72	957.67	716.25	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	764.51	764.41	0.10	0.24		58.66	1281.30	490.17	724.41
Cochran Mill	700	Max WS	763.98	763.85	0.13	0.32	0.00	38.01	1348.82	442.37	697.88
Cochran Mill	650	Max WS	764.24	763.85	0.39	0.25	0.00	328.81	1098.01	401.95	735.64
Cochran Mill	600		Bridge								
Cochran Mill	550	Max WS	763.85	763.49	0.37	0.17	0.08	57.70	1770.36	0.72	692.02
Cochran Mill	500	Max WS	763.60	763.37	0.22	0.09		230.71	1225.47	372.34	725.92
Cochran Mill	470	Max WS	763.52	763.27	0.25			209.22	1295.24	323.83	716.25

Profile Output Table - Six XS Bridge

Reach	River Sta		Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Cochran Mill	700		Max WS	763.98	763.85	761.56	0.32	0.00	697.88	38.01	1348.82	442.37	3.29
Cochran Mill	650		Max WS	764.24	763.85	762.58	0.25	0.00	735.64	328.81	1098.01	401.95	6.19
Cochran Mill	600	BR U	Max WS	764.19	763.55	762.63	0.22	0.00	135.92	282.30	1277.09	269.39	7.56
Cochran Mill	600	BR D	Max WS	763.97	763.58	760.29	0.12	0.00	136.00	54.85	1686.02	87.91	6.20
Cochran Mill	550		Max WS	763.85	763.49	759.77	0.17	0.08	692.02	57.70	1770.36	0.72	4.90
Cochran Mill	500		Max WS	763.60	763.37		0.09		725.92	230.71	1225.47	372.34	4.58

Profile Output Table - Bridge Only

Reach	River Sta	Profile	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs O WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)
Cochran Mill	600	Max WS	764.24	769.50	1260.59		1828.78	772.51		0.45

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

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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: Proposed 150' Bridge w/500 yr hydrograph
Project File : 500yrprop.prj
Run Date and Time: 10/25/2005 4:51:33 PM

Project in English units

Project Description:
Proposed 150 ft 3-Span Bridge Model

PLAN DATA

Plan Title: Proposed 150' Bridge w/500 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\500yrprop.p10

Geometry Title: Proposed 150' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\500yrprop.g08

Flow Title :
Flow File :

Plan Summary Information:

Number of: Cross Sections	= 6	Multiple Openings	= 0
Culverts	= 0	Inline Structures	= 0
Bridges	= 1	Lateral Structures	= 0

Computational Information
Water surface calculation tolerance = 0.01
Critical depth calculation tolerance = 0.01
Maximum number of iterations = 20
Maximum difference tolerance = 0.3
Flow tolerance factor = 0.001

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

GEOMETRY DATA

Geometry Title: Proposed 150' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\500yrprop.g08

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT

Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	100	100	.3	.5

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	767.17	Element			
Vel Head (ft)	0.06	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	767.11	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	642.88	690.43	2155.64
E.G. Slope (ft/ft)	0.000995	Area (sq ft)	642.88	690.43	2155.64
Q Total (cfs)	4524.21	Flow (cfs)	526.25	1930.16	2067.80
Top Width (ft)	974.23	Top Width (ft)	241.30	95.00	637.93
Vel Total (ft/s)	1.30	Avg. Vel. (ft/s)	0.82	2.80	0.96
Max Chl Dpth (ft)	9.91	Hydr. Depth (ft)	2.66	7.27	3.38
Conv. Total (cfs)	143459.4	Conv. (cfs)	16687.1	61203.8	65568.5
Length Wtd. (ft)	100.00	Wetted Per. (ft)	241.35	101.95	637.97
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.17	0.42	0.21
Alpha	2.28	Stream Power (lb/ft s)	0.14	1.18	0.20
Frctn Loss (ft)	0.10	Cum Volume (acre-ft)	3.80	3.49	12.29
C & E Loss (ft)		Cum SA (acres)	1.50	0.46	3.88

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
430	525	28	50	58	.3	.5

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	766.63	Element			
Vel Head (ft)	0.06	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	766.57	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)	763.86	Flow Area (sq ft)	586.39	667.88	2005.98
E.G. Slope (ft/ft)	0.001081	Area (sq ft)	586.39	667.88	2005.98
Q Total (cfs)	4523.27	Flow (cfs)	516.54	1903.93	2102.80
Top Width (ft)	952.80	Top Width (ft)	234.71	95.00	623.10
Vel Total (ft/s)	1.39	Avg. Vel. (ft/s)	0.88	2.85	1.05
Max Chl Dpth (ft)	9.67	Hydr. Depth (ft)	2.50	7.03	3.22
Conv. Total (cfs)	137576.8	Conv. (cfs)	15710.6	57908.6	63957.6
Length Wtd. (ft)	83.16	Wetted Per. (ft)	234.76	101.95	623.13
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.17	0.44	0.22
Alpha	2.09	Stream Power (lb/ft s)	0.15	1.26	0.23
Frctn Loss (ft)	0.24	Cum Volume (acre-ft)	2.39	1.93	7.51
C & E Loss (ft)	0.00	Cum SA (acres)	0.96	0.24	2.44

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

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

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487	520	104	100	86	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	767.18	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.61	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	766.57	Reach Len. (ft)	31.00	31.00	31.00
Crit W.S. (ft)	764.40	Flow Area (sq ft)	298.43	267.04	339.59
E.G. Slope (ft/ft)	0.007861	Area (sq ft)	922.41	267.04	2719.20
Q Total (cfs)	4522.88	Flow (cfs)	1081.86	2178.21	1262.81
Top Width (ft)	1025.03	Top Width (ft)	313.93	33.00	678.09
Vel Total (ft/s)	5.00	Avg. Vel. (ft/s)	3.63	8.16	3.72
Max Chl Dpth (ft)	9.57	Hydr. Depth (ft)	5.33	8.09	5.48
Conv. Total (cfs)	51013.9	Conv. (cfs)	12202.3	24568.3	14243.3
Length Wtd. (ft)	31.00	Wetted Per. (ft)	56.67	37.30	62.07
Min Ch El (ft)	757.00	Shear (lb/sq ft)	2.58	3.51	2.68
Alpha	1.56	Stream Power (lb/ft s)	9.37	28.66	9.98
Frctn Loss (ft)	0.31	Cum Volume (acre-ft)	1.91	1.40	4.36
C & E Loss (ft)	0.00	Cum SA (acres)	0.78	0.17	1.57

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Pea Creek
REACH: Cochran Mill RS: 600

INPUT
Description: Bridge #3

Distance from Upstream XS = 31
Deck/Roadway Width = 38
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.3	773	100	774.7	769.2	200	774	765.6
300	773	762.8	400	772.8	762	431.5	772.5	0
431.5	772.5	769.5	581.5	772.5	769.5	581.5	772.5	0
600	772.9	0	700	773.2	0	800	774.2	0
900	774.5	761.9	1000	774.7	763.2	1100	775	765
1200	775.3	766.6	1300	775.3	768.2	1350	775.3	772.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	761.9	492	761	500	757.5
510	757	518	757	520	761.5	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.05	520	.11

Bank Sta: Left Right Coeff Contr. Expan.
487 520 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.3	773	100	774.7	769.2	200	774	765.6
300	773	762.8	400	772.8	762	431.5	772.5	0
431.5	772.5	769.5	581.5	772.5	769.5	581.5	772.5	0
600	772.9	0	700	773.2	0	800	774.2	0
900	774.5	761.9	1000	774.7	763.2	1100	775	765
1200	775.3	766.6	1300	775.3	768.2	1350	775.3	772.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	525.5	761.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.05	525.5	.11

Bank Sta: Left Right Coeff Contr. Expan.
487.5 525.5 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = 2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
431.5	767.5	441.5	759.6

Downstream num= 2

Sta	Elev	Sta	Elev
431.5	767.5	441.5	759.6

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
571.5	761	581.5	767.5

Downstream num= 2

Sta	Elev	Sta	Elev
571.5	761	581.5	767.5

Number of Piers = 2

Pier Data
Pier Station Upstream= 481.5 Downstream= 481.5
Upstream num= 2

Width	Elev	Width	Elev
1.5	0	1.5	770

Downstream num= 2

Width	Elev	Width	Elev
1.5	0	1.5	770

Pier Data
Pier Station Upstream= 531.5 Downstream= 531.5
Upstream num= 2

Width	Elev	Width	Elev

```
    1.5       0     1.5     770
Downstream     num=        2
    Width   Elev    Width   Elev
    1.5       0     1.5     770

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       W.S. Pro Method

  W.S.Pro Data
    Left Embankment
       El of the top of the embankment = 767.5
       El of the toe of the abutment   = 761
    Right Embankment
       El of the top of the embankment = 767.5
       El of the toe of the abutment   = 761.5
    Abtument Type                      = 3 Sloping abutments and sloping embankments
    Slope of abutments                 = 2
    Top with of embankment             = 55
    Centroid station of bridge opening =
    Wing Wall Type                     = No wing walls present
       Width                           =
       Angle                           =
       Radius                          =
    Guide Banks Type                   = No Guide Bank present
       Length                          =
       Offset                          =
       Angle                           =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =       .5
           Max Low Cord                =

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

BRIDGE OUTPUT  Profile #Max WS

  E.G. US. (ft)              767.18    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)              766.57    E.G. Elev (ft)              766.99        766.57
  Q Total (cfs)             4522.88    W.S. Elev (ft)              765.59        765.31
  Q Bridge (cfs)            4522.88    Crit W.S. (ft)              764.70        764.42
  Q Weir (cfs)                         Max Chl Dpth (ft)             8.59         10.81
  Weir Sta Lft (ft)                    Vel Total (ft/s)              6.39          6.95
  Weir Sta Rgt (ft)                    Flow Area (sq ft)           708.02        651.05
  Weir Submerg                         Froude # Chl                  0.77          0.65
  Weir Max Depth (ft)                  Specif Force (cu ft)        3195.14       3383.98
  Min El Weir Flow (ft)      772.51    Hydr Depth (ft)               5.00          4.62
  Min El Prs (ft)            769.50    W.P. Total (ft)             165.65        162.42
  Delta EG (ft)                1.10    Conv. Total (cfs)         39581.7       47125.9
  Delta WS (ft)                1.45    Top Width (ft)              141.65        140.85
  BR Open Area (sq ft)       1260.59    Frctn Loss (ft)               0.42          0.28
  BR Open Vel (ft/s)            6.95    C & E Loss (ft)               0.00          0.00
  Coef of Q                     0.77    Shear Total (lb/sq ft)        3.48          2.31
  Br Sel Method                WSPRO    Power Total (lb/ft s)        22.26         16.01


Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.
Note:    Multiple critical depths were found at this location.  The critical depth with the lowest, valid,
         energy was used.

CROSS SECTION


RIVER: Pea Creek
REACH: Cochran Mill       RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data    num=      19
```

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	766.29	Element			
Vel Head (ft)	1.18	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.12	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	763.54	Flow Area (sq ft)	155.41	459.33	59.82
E.G. Slope (ft/ft)	0.009047	Area (sq ft)	474.86	459.33	1408.85
Q Total (cfs)	4522.88	Flow (cfs)	392.01	4019.92	110.94
Top Width (ft)	879.21	Top Width (ft)	259.52	60.00	559.69
Vel Total (ft/s)	6.70	Avg. Vel. (ft/s)	2.52	8.75	1.85
Max Chl Dpth (ft)	10.62	Hydr. Depth (ft)	2.75	7.66	1.73
Conv. Total (cfs)	47551.0	Conv. (cfs)	4121.4	42263.3	1166.4
Length Wtd. (ft)	50.00	Wetted Per. (ft)	56.50	64.14	34.50
Min Ch El (ft)	754.50	Shear (lb/sq ft)	1.55	4.04	0.98
Alpha	1.68	Stream Power (lb/ft s)	3.92	35.40	1.82
Frctn Loss (ft)	0.26	Cum Volume (acre-ft)	1.11	0.68	2.57
C & E Loss (ft)	0.75	Cum SA (acres)	0.49	0.08	1.05

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:
Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.28	Element			
Vel Head (ft)	0.18	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.10	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	672.24	330.02	1411.22
E.G. Slope (ft/ft)	0.003004	Area (sq ft)	672.24	330.02	1411.22
Q Total (cfs)	4522.69	Flow (cfs)	904.72	1717.78	1900.19
Top Width (ft)	885.62	Top Width (ft)	274.25	36.00	575.37
Vel Total (ft/s)	1.87	Avg. Vel. (ft/s)	1.35	5.21	1.35
Max Chl Dpth (ft)	11.10	Hydr. Depth (ft)	2.45	9.17	2.45
Conv. Total (cfs)	82516.8	Conv. (cfs)	16506.7	31341.1	34669.0
Length Wtd. (ft)	30.00	Wetted Per. (ft)	274.30	43.95	575.41
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.46	1.41	0.46
Alpha	3.25	Stream Power (lb/ft s)	0.62	7.33	0.62
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.45	0.23	0.95
C & E Loss (ft)		Cum SA (acres)	0.19	0.03	0.39

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	532.5	0	0	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.20	Element			
Vel Head (ft)	0.20	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.00	Reach Len. (ft)			
Crit W.S. (ft)	763.76	Flow Area (sq ft)	644.83	339.42	1352.36
E.G. Slope (ft/ft)	0.003153	Area (sq ft)	644.83	339.42	1352.36
Q Total (cfs)	4522.48	Flow (cfs)	873.69	1818.97	1829.82
Top Width (ft)	875.13	Top Width (ft)	270.05	37.50	567.58
Vel Total (ft/s)	1.94	Avg. Vel. (ft/s)	1.35	5.36	1.35
Max Chl Dpth (ft)	11.00	Hydr. Depth (ft)	2.39	9.05	2.38
Conv. Total (cfs)	80540.3	Conv. (cfs)	15559.5	32393.8	32587.0
Length Wtd. (ft)		Wetted Per. (ft)	270.10	44.87	567.64
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.47	1.49	0.47
Alpha	3.38	Stream Power (lb/ft s)	0.64	7.98	0.63
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	600	Bridge		
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	600	Bridge		
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.3	.5
Cochran Mill	700	.3	.5
Cochran Mill	650	.3	.5
Cochran Mill	600	Bridge	
Cochran Mill	550	.3	.5
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	4524.21	757.20	767.11		767.17	0.000995	2.80	3488.95	974.23	0.18
Cochran Mill	700	Max WS	4523.27	756.90	766.57	763.86	766.63	0.001081	2.85	3260.24	952.80	0.19
Cochran Mill	650	Max WS	4522.88	757.00	766.57	764.40	767.18	0.007861	8.16	905.07	1025.03	0.51
Cochran Mill	600		Bridge									
Cochran Mill	550	Max WS	4522.88	754.50	765.12	763.54	766.29	0.009047	8.75	674.56	879.21	0.56
Cochran Mill	500	Max WS	4522.69	754.00	765.10		765.28	0.003004	5.21	2413.48	885.62	0.30
Cochran Mill	470	Max WS	4522.48	754.00	765.00	763.76	765.20	0.003153	5.36	2336.62	875.13	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	767.17	767.11	0.06	0.10		526.25	1930.16	2067.80	974.23
Cochran Mill	700	Max WS	766.63	766.57	0.06	0.24	0.00	516.54	1903.93	2102.80	952.80
Cochran Mill	650	Max WS	767.18	766.57	0.61	0.31	0.00	1081.86	2178.21	1262.81	1025.03
Cochran Mill	600		Bridge								
Cochran Mill	550	Max WS	766.29	765.12	1.18	0.26	0.75	392.01	4019.92	110.94	879.21
Cochran Mill	500	Max WS	765.28	765.10	0.18	0.09		904.72	1717.78	1900.19	885.62
Cochran Mill	470	Max WS	765.20	765.00	0.20			873.69	1818.97	1829.82	875.13

Profile Output Table - Six XS Bridge

Reach	River Sta		Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Cochran Mill	700		Max WS	766.63	766.57	763.86	0.24	0.00	952.80	516.54	1903.93	2102.80	2.85
Cochran Mill	650		Max WS	767.18	766.57	764.40	0.31	0.00	1025.03	1081.86	2178.21	1262.81	8.16
Cochran Mill	600	BR U	Max WS	766.99	765.59	764.70	0.42	0.00	141.65	868.40	2774.03	880.44	11.74
Cochran Mill	600	BR D	Max WS	766.57	765.31	764.42	0.28	0.00	140.85	354.73	3740.10	428.05	11.08
Cochran Mill	550		Max WS	766.29	765.12	763.54	0.26	0.75	879.21	392.01	4019.92	110.94	8.75
Cochran Mill	500		Max WS	765.28	765.10		0.09		885.62	904.72	1717.78	1900.19	5.21

Profile Output Table - Bridge Only

Reach	River Sta	Profile	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs Q WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)
Cochran Mill	600	Max WS	767.18	769.50	1260.59		4522.88	772.51		1.10

HEC-RAS Version 3.1.3 May 2005
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street
Davis, California

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X       X
X     X  X        X    X       X   X    X    X       X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
```

PROJECT DATA
Project Title: Proposed 150' Bridge w/50 yr hydrograph
Project File : 50yrproposed.prj
Run Date and Time: 10/25/2005 4:29:46 PM

Project in English units

Project Description:
Proposed 150 ft 3-Span Bridge Model

PLAN DATA

Plan Title: Proposed 150' Bridge w/50 yr hydrograph
Plan File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\50yrproposed.p10

Geometry Title: Proposed 150' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\50yrproposed.g08

Flow Title :
Flow File :

Plan Summary Information:

Number of: Cross Sections	= 6	Multiple Openings	= 0
Culverts	= 0	Inline Structures	= 0
Bridges	= 1	Lateral Structures	= 0

Computational Information

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

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

GEOMETRY DATA

Geometry Title: Proposed 150' Bridge
Geometry File : C:\Data\HEC-RAS Projects\Pea Creek\Hydrograph Runs\50yrproposed.g08

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 800

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	774.1	100	770.3	200	766.7	300	763.9	350	763.3
430	763.8	438	759.3	442.5	758.8	485	762.8	498	757.8
510	757.5	522	757.2	524.5	760.8	525	764	660	762.6
800	762.5	900	763	1000	764.3	1100	766.1	1300	769.3
1350	773.3								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
430 525 100 100 100 .3 .5
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	766.08	Element			
Vel Head (ft)	0.07	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	766.01	Reach Len. (ft)	100.00	100.00	100.00
Crit W.S. (ft)		Flow Area (sq ft)	396.87	586.26	1493.66
E.G. Slope (ft/ft)	0.001265	Area (sq ft)	396.87	586.26	1493.66
Q Total (cfs)	3317.27	Flow (cfs)	295.80	1657.49	1363.97
Top Width (ft)	870.39	Top Width (ft)	205.37	95.00	570.02
Vel Total (ft/s)	1.34	Avg. Vel. (ft/s)	0.75	2.83	0.91
Max Chl Dpth (ft)	8.81	Hydr. Depth (ft)	1.93	6.17	2.62
Conv. Total (cfs)	93265.4	Conv. (cfs)	8316.4	46600.7	38348.3
Length Wtd. (ft)	100.00	Wetted Per. (ft)	205.40	101.95	570.05
Min Ch El (ft)	757.20	Shear (lb/sq ft)	0.15	0.45	0.21
Alpha	2.45	Stream Power (lb/ft s)	0.11	1.28	0.19
Frctn Loss (ft)	0.14	Cum Volume (acre-ft)	2.53	3.05	8.80
C & E Loss (ft)		Cum SA (acres)	1.31	0.46	3.54

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 700

INPUT
Description: Begin Reach
Station Elevation Data num= 21

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773.8	100	770	200	766.4	300	763.6	350	763
430	763.5	438	759	442.5	758.5	485	762.5	498	757.5
510	757.2	522	756.9	524.5	760.5	525	763.7	660	762.3
800	762.2	900	762.7	1000	764	1100	765.8	1300	769
1350	773								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	430	.06	525	.11

Bank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.
430 525 28 50 58 .3 .5
Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.56	Element			
Vel Head (ft)	0.08	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.48	Reach Len. (ft)	28.00	50.00	58.00
Crit W.S. (ft)	763.28	Flow Area (sq ft)	350.84	564.53	1364.75
E.G. Slope (ft/ft)	0.001457	Area (sq ft)	350.84	564.53	1364.75
Q Total (cfs)	3315.07	Flow (cfs)	283.09	1670.25	1361.72
Top Width (ft)	849.51	Top Width (ft)	197.20	95.00	557.31
Vel Total (ft/s)	1.45	Avg. Vel. (ft/s)	0.81	2.96	1.00

Max Chl Dpth (ft)	8.58	Hydr. Depth (ft)	1.78	5.94	2.45
Conv. Total (cfs)	86849.8	Conv. (cfs)	7416.6	43758.0	35675.1
Length Wtd. (ft)	78.72	Wetted Per. (ft)	197.23	101.95	557.34
Min Ch El (ft)	756.90	Shear (lb/sq ft)	0.16	0.50	0.22
Alpha	2.31	Stream Power (lb/ft s)	0.13	1.49	0.22
Frctn Loss (ft)	0.27	Cum Volume (acre-ft)	1.68	1.73	5.52
C & E Loss (ft)	0.00	Cum SA (acres)	0.85	0.24	2.25

Warning: The conveyance ratio (upstream 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: Pea Creek
REACH: Cochran Mill RS: 650

INPUT
Description: Upstream of Bridge
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	762.3	492	761	500	757.5
510	757	518	757	520	762	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.06	520	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487	520	104	100	86	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

E.G. Elev (ft)	765.99	Element	Left OB	Channel	Right OB
Vel Head (ft)	0.51	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	765.48	Reach Len. (ft)	31.00	31.00	31.00
Crit W.S. (ft)	763.74	Flow Area (sq ft)	237.51	231.14	272.15
E.G. Slope (ft/ft)	0.007809	Area (sq ft)	597.53	231.14	2018.49
Q Total (cfs)	3314.08	Flow (cfs)	737.02	1706.79	870.27
Top Width (ft)	923.27	Top Width (ft)	280.17	33.00	610.10
Vel Total (ft/s)	4.47	Avg. Vel. (ft/s)	3.10	7.38	3.20
Max Chl Dpth (ft)	8.48	Hydr. Depth (ft)	4.24	7.00	4.39
Conv. Total (cfs)	37502.1	Conv. (cfs)	8340.1	19314.0	9847.9
Length Wtd. (ft)	31.00	Wetted Per. (ft)	56.67	37.30	62.07
Min Ch El (ft)	757.00	Shear (lb/sq ft)	2.04	3.02	2.14
Alpha	1.64	Stream Power (lb/ft s)	6.34	22.31	6.84
Frctn Loss (ft)	0.29	Cum Volume (acre-ft)	1.37	1.28	3.26
C & E Loss (ft)	0.00	Cum SA (acres)	0.70	0.17	1.47

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

BRIDGE

RIVER: Pea Creek
REACH: Cochran Mill RS: 600

INPUT
Description: Bridge #3

Distance from Upstream XS = 31
Deck/Roadway Width = 38
Weir Coefficient = 2.7
Upstream Deck/Roadway Coordinates
num= 18

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord

0	775.3	773	100	774.7	769.2	200	774	765.6
300	773	762.8	400	772.8	762	431.5	772.5	0
431.5	772.5	769.5	581.5	772.5	769.5	581.5	772.5	0
600	772.9	0	700	773.2	0	800	774.2	0
900	774.5	761.9	1000	774.7	763.2	1100	775	765
1200	775.3	766.6	1300	775.3	768.2	1350	775.3	772.2

Upstream Bridge Cross Section Data
Station Elevation Data num= 20

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	438	763.5
453	759.5	483	761.5	487	761.9	492	761	500	757.5
510	757	518	757	520	761.5	527	761	800	761.4
900	761.9	1000	763.2	1100	765	1300	768.2	1350	772.2

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487	.05	520	.11

Bank Sta: Left Right Coeff Contr. Expan.
487 520 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

Downstream Deck/Roadway Coordinates
num= 18

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	775.3	773	100	774.7	769.2	200	774	765.6
300	773	762.8	400	772.8	762	431.5	772.5	0
431.5	772.5	769.5	581.5	772.5	769.5	581.5	772.5	0
600	772.9	0	700	773.2	0	800	774.2	0
900	774.5	761.9	1000	774.7	763.2	1100	775	765
1200	775.3	766.6	1300	775.3	768.2	1350	775.3	772.2

Downstream Bridge Cross Section Data
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	525.5	761.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.05	525.5	.11

Bank Sta: Left Right Coeff Contr. Expan.
487.5 525.5 .3 .5
Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

Upstream Embankment side slope = 2 horiz. to 1.0 vertical
Downstream Embankment side slope = 2 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins =
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Abutments = 2

Abutment Data
Upstream num= 2

Sta	Elev	Sta	Elev
431.5	767.5	441.5	759.6

Downstream num= 2

Sta	Elev	Sta	Elev
431.5	767.5	441.5	759.6

Abutment Data

```
Upstream      num=        2
     Sta     Elev      Sta     Elev
   571.5      761   581.5   767.5
Downstream      num=        2
     Sta     Elev      Sta     Elev
   571.5      761   581.5   767.5

Number of Piers =  2

Pier Data
Pier Station      Upstream=   481.5    Downstream=   481.5
Upstream      num=        2
    Width    Elev     Width    Elev
      1.5       0       1.5     770
Downstream      num=        2
    Width    Elev     Width    Elev
      1.5       0       1.5     770

Pier Data
Pier Station      Upstream=   531.5    Downstream=   531.5
Upstream      num=        2
    Width    Elev     Width    Elev
      1.5       0       1.5     770
Downstream      num=        2
    Width    Elev     Width    Elev
      1.5       0       1.5     770

Number of Bridge Coefficient Sets =  1

Low Flow Methods and Data
       Energy
       W.S. Pro Method

  W.S.Pro Data
    Left Embankment
       El of the top of the embankment = 767.5
       El of the toe of the abutment   = 761
    Right Embankment
       El of the top of the embankment = 767.5
       El of the toe of the abutment   = 761.5
    Abtument Type                      = 3 Sloping abutments and sloping embankments
    Slope of abutments                 = 2
    Top with of embankment             = 55
    Centroid station of bridge opening =
    Wing Wall Type                     = No wing walls present
       Width                           =
       Angle                           =
       Radius                          =
    Guide Banks Type                   = No Guide Bank present
       Length                          =
       Offset                          =
       Angle                           =

Selected Low Flow Methods = W.S.Pro Method

High Flow Method
       Pressure and Weir flow
           Submerged Inlet Cd          =
           Submerged Inlet + Outlet Cd =      .5
           Max Low Cord                =

Additional Bridge Parameters
       Add Friction component to Momentum
       Do not add weight component to Momentum
       Class B flow critical depth computations use critical depth
          inside the bridge at the upstream end
       Criteria to check for pressure flow = Upstream energy grade line

BRIDGE OUTPUT  Profile #Max WS

  E.G. US. (ft)               765.99    Element                Inside BR US  Inside BR DS
  W.S. US. (ft)               765.48    E.G. Elev (ft)              765.86        765.52
  Q Total (cfs)              3314.08    W.S. Elev (ft)              764.80        764.63
  Q Bridge (cfs)             3314.08    Crit W.S. (ft)              763.90        763.34
  Q Weir (cfs)                          Max Chl Dpth (ft)             7.80         10.13
  Weir Sta Lft (ft)                     Vel Total (ft/s)              5.56          5.96
```

Weir Sta Rgt (ft)		Flow Area (sq ft)	596.23	556.47
Weir Submerg		Froude # Chl	0.70	0.56
Weir Max Depth (ft)		Specif Force (cu ft)	2240.90	2487.58
Min El Weir Flow (ft)	772.51	Hydr Depth (ft)	4.28	4.00
Min El Prs (ft)	769.50	W.P. Total (ft)	159.72	157.38
Delta EG (ft)	0.85	Conv. Total (cfs)	31254.8	39701.3
Delta WS (ft)	0.99	Top Width (ft)	139.42	138.96
BR Open Area (sq ft)	1260.59	Frctn Loss (ft)	0.34	0.22
BR Open Vel (ft/s)	5.96	C & E Loss (ft)	0.00	0.00
Coef of Q	0.79	Shear Total (lb/sq ft)	2.62	1.54
Br Sel Method	WSPRO	Power Total (lb/ft s)	14.56	9.16

Warning: Pier drag coefficient of 2.0 assumed for Class B flow.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.
Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 550

INPUT
Description: Downstream of Bridge
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	763	487.5	762.2
497	757.5	499	754.5	510	754.5	520	754.5	547.5	763.5
620	763	700	761.8	800	761.4	900	761.9	1000	763.2
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	487.5	.06	547.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
487.5	547.5	50	50	.3	.5

Ineffective Flow num= 2

Sta L	Sta R	Elev	Permanent
0	431	770	F
582	1350	770	F

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	765.30	Element			
Vel Head (ft)	0.82	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.49	Reach Len. (ft)	50.00	50.00	50.00
Crit W.S. (ft)	761.78	Flow Area (sq ft)	119.94	421.66	38.16
E.G. Slope (ft/ft)	0.006908	Area (sq ft)	323.28	421.66	1068.84
Q Total (cfs)	3314.08	Flow (cfs)	222.42	3045.83	45.83
Top Width (ft)	807.31	Top Width (ft)	223.30	60.00	524.01
Vel Total (ft/s)	5.72	Avg. Vel. (ft/s)	1.85	7.22	1.20
Max Chl Dpth (ft)	9.99	Hydr. Depth (ft)	2.12	7.03	1.11
Conv. Total (cfs)	39873.0	Conv. (cfs)	2676.1	36645.6	551.4
Length Wtd. (ft)	50.00	Wetted Per. (ft)	56.50	64.14	34.50
Min Ch El (ft)	754.50	Shear (lb/sq ft)	0.92	2.84	0.48
Alpha	1.61	Stream Power (lb/ft s)	1.70	20.48	0.57
Frctn Loss (ft)	0.23	Cum Volume (acre-ft)	0.81	0.63	1.90
C & E Loss (ft)	0.46	Cum SA (acres)	0.44	0.08	0.98

Note: Multiple critical depths were found at this location. The critical depth with the lowest, valid, energy was used.

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 500

INPUT
Description:

Station Elevation Data num= 18

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	531	762.8
660	763	800	761.4	900	761.9	1000	763	1100	765
1200	766.6	1300	768.2	1350	772.2				

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	531	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	531	30	30	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.62	Element			
Vel Head (ft)	0.19	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.43	Reach Len. (ft)	30.00	30.00	30.00
Crit W.S. (ft)		Flow Area (sq ft)	497.49	305.85	1036.95
E.G. Slope (ft/ft)	0.003052	Area (sq ft)	497.49	305.85	1036.95
Q Total (cfs)	3313.38	Flow (cfs)	593.24	1525.36	1194.78
Top Width (ft)	822.79	Top Width (ft)	246.27	36.00	540.52
Vel Total (ft/s)	1.80	Avg. Vel. (ft/s)	1.19	4.99	1.15
Max Chl Dpth (ft)	10.43	Hydr. Depth (ft)	2.02	8.50	1.92
Conv. Total (cfs)	59972.9	Conv. (cfs)	10737.8	27609.4	21625.7
Length Wtd. (ft)	30.00	Wetted Per. (ft)	246.31	43.95	540.55
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.38	1.33	0.37
Alpha	3.76	Stream Power (lb/ft s)	0.46	6.61	0.42
Frctn Loss (ft)	0.09	Cum Volume (acre-ft)	0.33	0.21	0.70
C & E Loss (ft)		Cum SA (acres)	0.17	0.03	0.37

CROSS SECTION

RIVER: Pea Creek
REACH: Cochran Mill RS: 470

INPUT
Description: End of Reach
Station Elevation Data num= 19

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	773	100	769.2	200	765.6	350	762	380	761.3
495	762.5	500	754	510	754	520	754	532.5	762.3
538	762.8	660	763	800	761.4	900	761.9	1000	763
1100	765	1200	766.6	1300	768.2	1350	772.2		

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.11	495	.06	532.5	.11

Bank Sta: Left	Right	Lengths: Left Channel	Right	Coeff Contr.	Expan.
495	532.5	0	0	.1	.3

Sediment Elevation = 0

CROSS SECTION OUTPUT Profile #Max WS

			Left OB	Channel	Right OB
E.G. Elev (ft)	764.54	Element			
Vel Head (ft)	0.21	Wt. n-Val.	0.110	0.060	0.110
W.S. Elev (ft)	764.33	Reach Len. (ft)			
Crit W.S. (ft)	763.33	Flow Area (sq ft)	472.71	314.21	982.12
E.G. Slope (ft/ft)	0.003221	Area (sq ft)	472.71	314.21	982.12
Q Total (cfs)	3312.94	Flow (cfs)	566.15	1616.55	1130.24
Top Width (ft)	813.49	Top Width (ft)	242.04	37.50	533.95
Vel Total (ft/s)	1.87	Avg. Vel. (ft/s)	1.20	5.14	1.15
Max Chl Dpth (ft)	10.33	Hydr. Depth (ft)	1.95	8.38	1.84
Conv. Total (cfs)	58375.0	Conv. (cfs)	9975.7	28484.1	19915.2
Length Wtd. (ft)		Wetted Per. (ft)	242.08	44.87	534.00
Min Ch El (ft)	754.00	Shear (lb/sq ft)	0.39	1.41	0.37
Alpha	3.88	Stream Power (lb/ft s)	0.47	7.24	0.43
Frctn Loss (ft)		Cum Volume (acre-ft)			
C & E Loss (ft)		Cum SA (acres)			

SUMMARY OF MANNING'S N VALUES

River:Pea Creek

Reach	River Sta.	n1	n2	n3
Cochran Mill	800	.11	.06	.11
Cochran Mill	700	.11	.06	.11
Cochran Mill	650	.11	.06	.11
Cochran Mill	600	Bridge		
Cochran Mill	550	.11	.06	.11
Cochran Mill	500	.11	.06	.11
Cochran Mill	470	.11	.06	.11

SUMMARY OF REACH LENGTHS

River: Pea Creek

Reach	River Sta.	Left	Channel	Right
Cochran Mill	800	100	100	100
Cochran Mill	700	28	50	58
Cochran Mill	650	104	100	86
Cochran Mill	600	Bridge		
Cochran Mill	550	50	50	50
Cochran Mill	500	30	30	30
Cochran Mill	470	0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: Pea Creek

Reach	River Sta.	Contr.	Expan.
Cochran Mill	800	.3	.5
Cochran Mill	700	.3	.5
Cochran Mill	650	.3	.5
Cochran Mill	600	Bridge	
Cochran Mill	550	.3	.5
Cochran Mill	500	.1	.3
Cochran Mill	470	.1	.3

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (ft)	W.S. Elev (ft)	Crit W.S. (ft)	E.G. Elev (ft)	E.G. Slope (ft/ft)	Vel Chnl (ft/s)	Flow Area (sq ft)	Top Width (ft)	Froude # Chl
Cochran Mill	800	Max WS	3317.27	757.20	766.01		766.08	0.001265	2.83	2476.78	870.39	0.20
Cochran Mill	700	Max WS	3315.07	756.90	765.48	763.28	765.56	0.001457	2.96	2280.12	849.51	0.21
Cochran Mill	650	Max WS	3314.08	757.00	765.48	763.74	765.99	0.007809	7.38	740.80	923.27	0.49
Cochran Mill	600		Bridge									
Cochran Mill	550	Max WS	3314.08	754.50	764.49	761.78	765.30	0.006908	7.22	579.76	807.31	0.48
Cochran Mill	500	Max WS	3313.38	754.00	764.43		764.62	0.003052	4.99	1840.28	822.79	0.30
Cochran Mill	470	Max WS	3312.94	754.00	764.33	763.33	764.54	0.003221	5.14	1769.04	813.49	0.31

Profile Output Table - Standard Table 2

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Vel Head (ft)	Frctn Loss (ft)	C & E Loss (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Top Width (ft)
Cochran Mill	800	Max WS	766.08	766.01	0.07	0.14		295.80	1657.49	1363.97	870.39
Cochran Mill	700	Max WS	765.56	765.48	0.08	0.27	0.00	283.09	1670.25	1361.72	849.51
Cochran Mill	650	Max WS	765.99	765.48	0.51	0.29	0.00	737.02	1706.79	870.27	923.27
Cochran Mill	600		Bridge								
Cochran Mill	550	Max WS	765.30	764.49	0.82	0.23	0.46	222.42	3045.83	45.83	807.31
Cochran Mill	500	Max WS	764.62	764.43	0.19	0.09		593.24	1525.36	1194.78	822.79

Cochran Mill	470	Max WS	764.54	764.33	0.21		566.15	1616.55	1130.24	813.49

Profile Output Table - Six XS Bridge

Reach	River Sta	Profile	E.G. Elev (ft)	W.S. Elev (ft)	Crit W.S. (ft)	Frctn Loss (ft)	C & E Loss (ft)	Top Width (ft)	Q Left (cfs)	Q Channel (cfs)	Q Right (cfs)	Vel Chnl (ft/s)
Cochran Mill	700	Max WS	765.56	765.48	763.28	0.27	0.00	849.51	283.09	1670.25	1361.72	2.96
Cochran Mill	650	Max WS	765.99	765.48	763.74	0.29	0.00	923.27	737.02	1706.79	870.27	7.38
Cochran Mill	600 BR U	Max WS	765.86	764.80	763.90	0.34	0.00	139.42	600.03	2115.37	598.68	10.07
Cochran Mill	600 BR D	Max WS	765.52	764.63	763.34	0.22	0.00	138.96	202.66	2851.00	260.42	9.14
Cochran Mill	550	Max WS	765.30	764.49	761.78	0.23	0.46	807.31	222.42	3045.83	45.83	7.22
Cochran Mill	500	Max WS	764.62	764.43		0.09		822.79	593.24	1525.36	1194.78	4.99

Profile Output Table - Bridge Only

Reach	River Sta	Profile	E.G. US. (ft)	Min El Prs (ft)	BR Open Area (sq ft)	Prs O WS (ft)	Q Total (cfs)	Min El Weir Flow (ft)	Q Weir (cfs)	Delta EG (ft)
Cochran Mill	600	Max WS	765.99	769.50	1260.59		3314.08	772.51		0.85