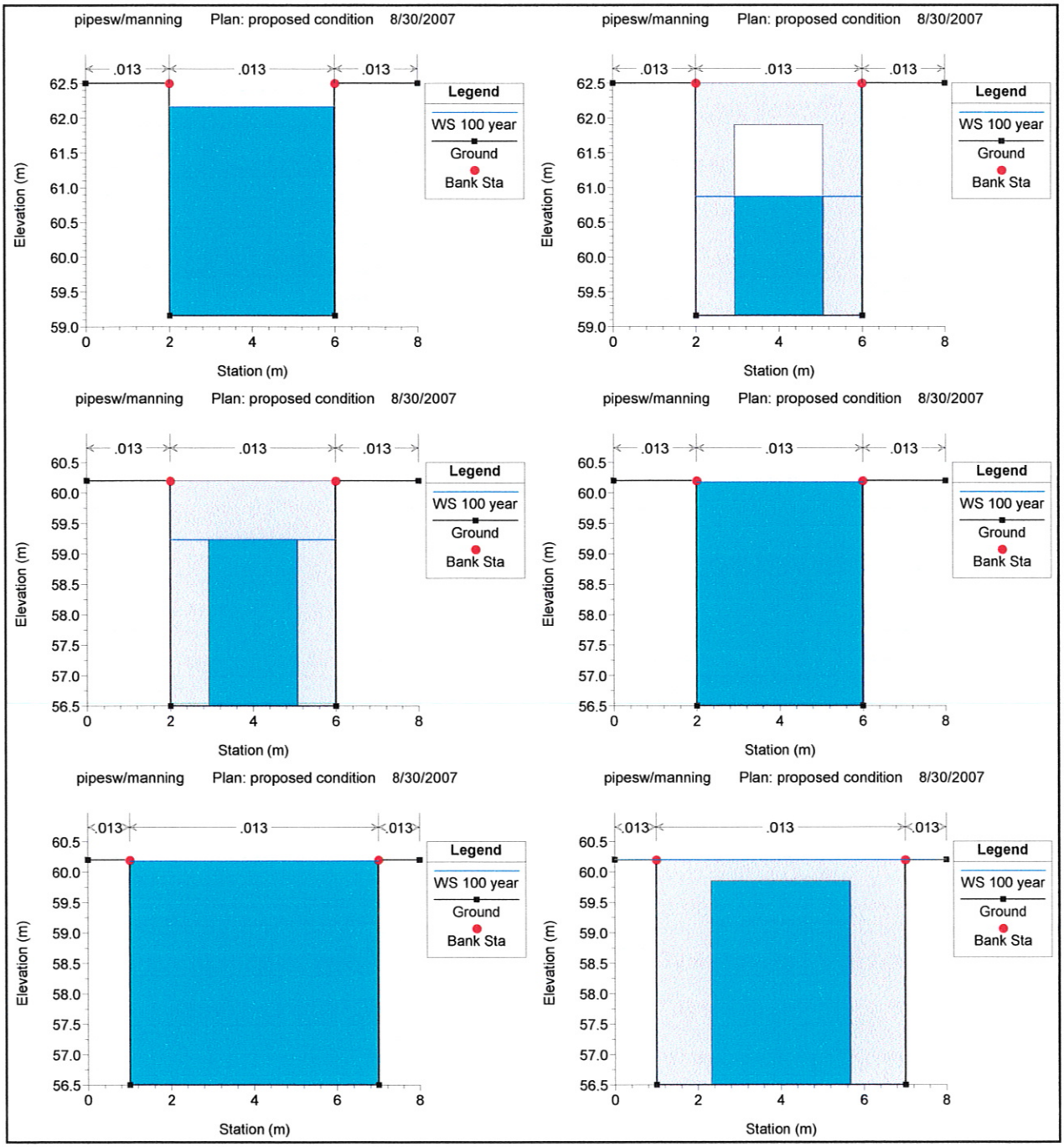
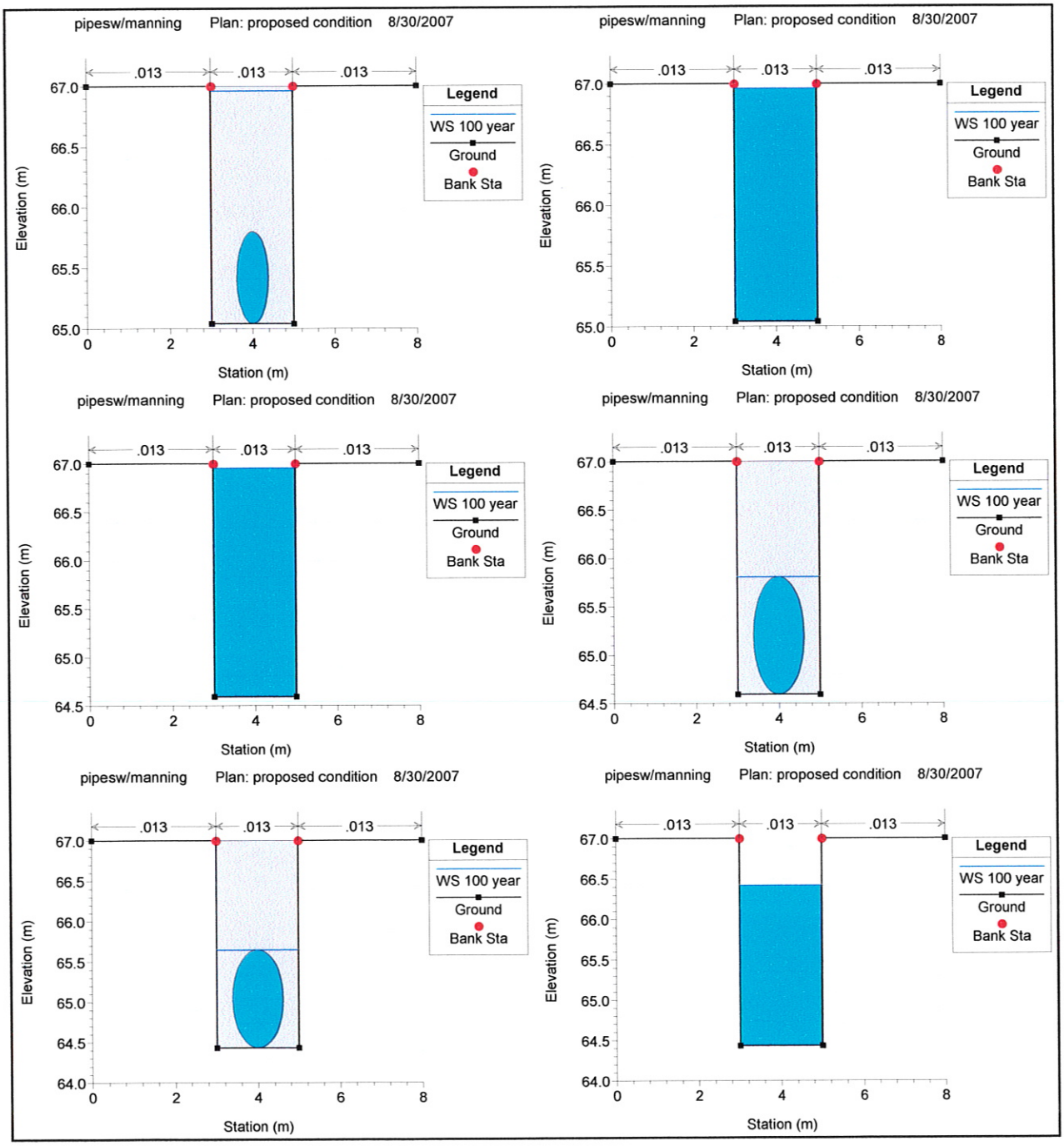
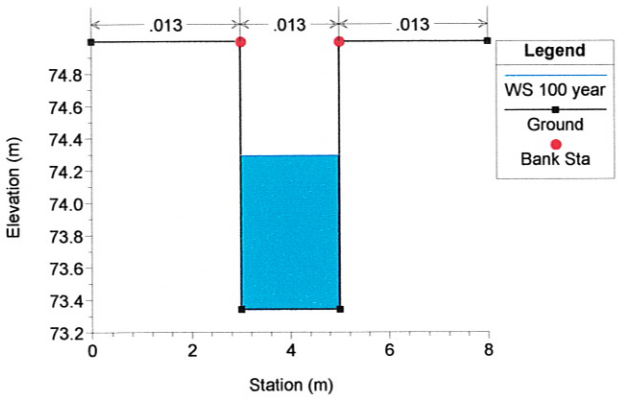
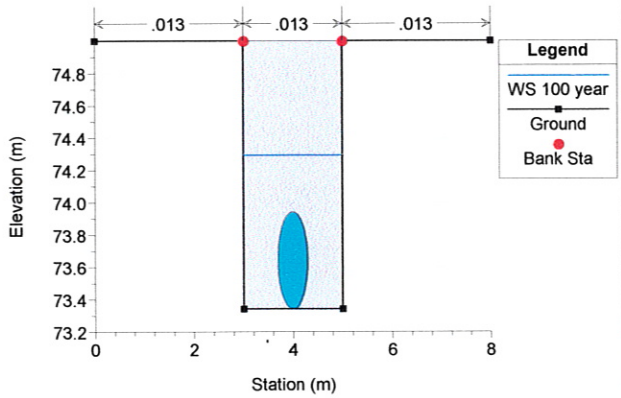

pipesw/manning Plan: proposed condition 8/30/2007
.013
Legend
WS 100 year
Ground
Bank Sta
Elevation (m)
Station (m)


pipesw/manning Plan: proposed condition 8/30/2007
.013
.013
.013
Legend
WS 100 year
Ground
Bank Sta
Elevation (m)
Station (m)
67.0
66.5
66.0
65.5
65.0
64.5
64.0
0
2
4
6
8

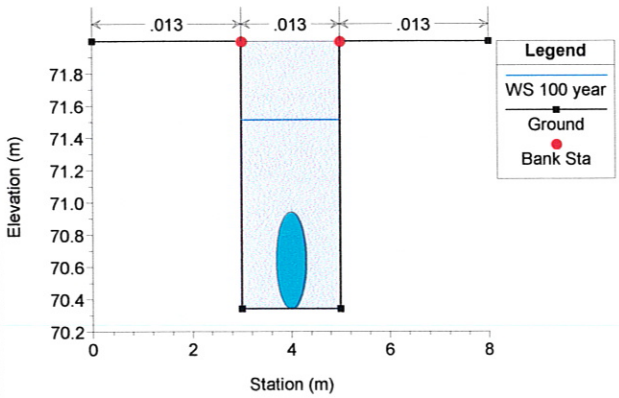
pipesw/manning Plan: proposed condition 8/30/2007



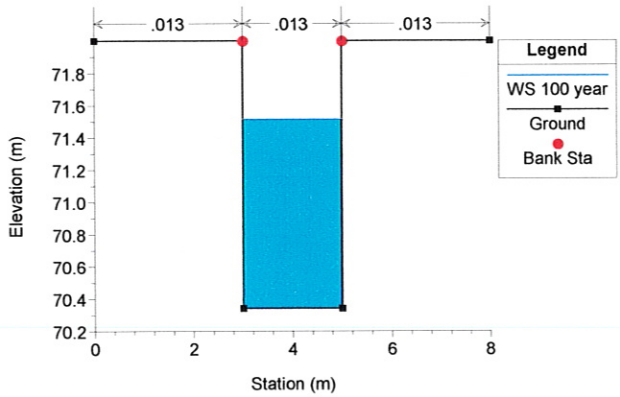
pipesw/manning Plan: proposed condition 8/30/2007



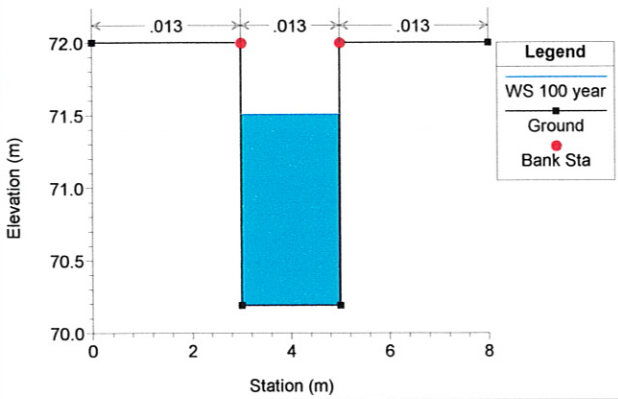
pipesw/manning Plan: proposed condition 8/30/2007



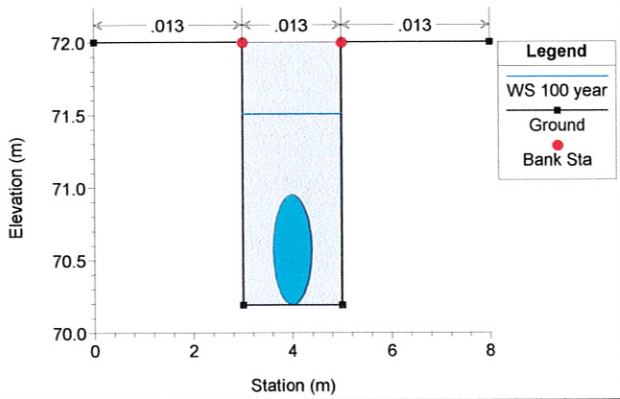
pipesw/manning Plan: proposed condition 8/30/2007



pipesw/manning Plan: proposed condition 8/30/2007



pipesw/manning Plan: proposed condition 8/30/2007



HEC-RAS Version 3.1.1 May 2003
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
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PROJECT DATA
Project Title: P2G
Project File : P2G.prj
Run Date and Time: 8/9/2007 4:50:27 PM

Project in SI units

PLAN DATA

Plan Title: proposed condition
Plan File : p:\414-La Sabana, Vega Baja\hecras\P2G.p01

Geometry Title: proposed condition
Geometry File : p:\414-La Sabana, Vega Baja\hecras\P2G.g01

Flow Title : proposed condition
Flow File : p:\414-La Sabana, Vega Baja\hecras\P2G.f01

Plan Summary Information:
Number of: Cross Sections = 6 Multiple Openings = 0
Culverts = 3 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculation tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
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: Mixed Flow

FLOW DATA

Flow Title: proposed condition
Flow File : p:\414-La Sabana, Vega Baja\hecras\P2G.f01

Flow Data (m3/s)

River	Reach	RS	100y
P2G	ONE	35	1.75
P2G	ONE	34	2.91
P2G	ONE	33	5.83

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
P2G	ONE	100y	Critical	Normal S = 0.008

GEOMETRY DATA

Geometry Title: proposed condition
Geometry File : p:\414-La Sabana, Vega Baja\hecras\P2G.g01

CROSS SECTION

RIVER: P2G
REACH: ONE RS: 35

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	65.5	3	65.5	3	63.83	5	63.83	5	65.5
8	65.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	5	128	128	128	.1	.3

CROSS SECTION OUTPUT Profile #100y

E.G. Elev (m)	65.92	Element	Left OB	Channel	Right OB
Vel Head (m)	0.02	Wt. n-Val.		0.013	
W.S. Elev (m)	65.91	Reach Len. (m)	128.00	128.00	128.00
Crit W.S. (m)	64.26	Flow Area (m2)		2.95	
E.G. Slope (m/m)	0.000119	Area (m2)		2.95	
Q Total (m3/s)	1.75	Flow (m3/s)		1.75	
Top Width (m)	2.00	Top Width (m)		2.00	
Vel Total (m/s)	0.59	Avg. Vel. (m/s)		0.59	
Max Chl Dpth (m)	1.48	Hyd. Depth (m)		1.48	
Conv. Total (m3/s)	160.7	Conv. (m3/s)		160.7	
Length Wtd. (m)	128.00	Wetted Per. (m)		4.95	
Min Ch El (m)	63.83	Shear (N/m2)		0.69	
Alpha	1.00	Stream Power (N/m s)		0.41	
Frctn Loss (m)		Cum Volume (1000 m3)		0.98	
C & E Loss (m)		Cum SA (1000 m2)		0.62	

CULVERT

RIVER: P2G
REACH: ONE RS: 34.5

INPUT
Description:
Distance from Upstream XS = .5
Deck/Roadway Width = 127
Weir Coefficient = 1.44
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	65.5		8	65.5	

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	65.5	3	65.5	3	63.83	5	63.83	5	65.5
8	65.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
3	5	.1	.3

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	63.5		8	63.5	

Downstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	63.5	3	63.5	3	61.33	5	61.33	5	63.5
8	63.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
3	5	.1	.3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 65.5

Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	.91	

FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest W.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	.5	127	.013	.013	0	.6	1

Upstream Elevation = 63.83
Centerline Station = 4
Downstream Elevation = 61.83
Centerline Station = 4

CULVERT OUTPUT Profile #100y Culv Group: Culvert #1

Q Culv Group (m3/s)	1.75	Culv Full Len (m)	16.75
# Barrels	1	Culv Vel DS (m/s)	2.69
Q Barrel (m3/s)	1.75	Culv Vel US (m/s)	2.69
E.G. US. (m)	63.83	Culv Inv El Up (m)	63.83
W.S. US. (m)	63.31	Culv Inv El Dn (m)	61.53
E.G. DS (m)	62.63	Culv Frict Ls (m)	2.14
W.S. DS (m)	62.63	Culv Exit Loss (m)	0.33
Delta EG (m)	1.63	Culv Entr Loss (m)	0.22
Delta WS (m)	1.11	Q Weir (m3/s)	
E.G. IC (m)	63.49	Weir Sta Lft (m)	
E.G. OC (m)	63.32	Weir Sta Rgt (m)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	64.71	Weir Max Depth (m)	
Culv WS Outlet (m)	63.44	Weir Avg Depth (m)	
Culv Nml Depth (m)	0.98	Weir Flow Area (m2)	
Culv Crt Depth (m)	0.97	Min El Weir Flow (m)	65.50

CROSS SECTION

RIVER: P2G
REACH: ONE RS: 84.1

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	63.5	3	63.5	3	61.53	5	61.53	5	63.5
8	63.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

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

CROSS SECTION OUTPUT Profile #100y

			Left OB	Channel	Right OB
E.G. Elev (m)	63.63	Element			
Vel Head (m)	0.03	Wt. n-Val.		0.013	
W.S. Elev (m)	63.60	Reach Len. (m)	1.00	1.00	1.00
Crit W.S. (m)		Flow Area (m2)		2.13	
E.G. Slope (m/m)	0.000773	Area (m2)		2.13	
Q Total (m3/s)	1.75	Flow (m3/s)		1.75	
Top Width (m)	1.50	Top Width (m)		2.00	
Vel Total (m/s)	0.82	Avg. Vel. (m/s)		0.82	
Max Chl Dpth (m)	1.07	Hydr. Depth (m)		1.07	
Conv. Total (m3/s)	105.5	Conv. (m3/s)		105.5	
Length Wtd. (m)	1.00	Wetted Per. (m)		4.13	
Min Ch El (m)	61.53	Shear (N/m2)		1.09	
Alpha	1.11	Stream Power (N/m s)		1.14	
Frctn Loss (m)	0.00	Cum Volume (1000 m3)		0.65	
C & E Loss (m)	0.00	Cum SA (1000 m2)		0.37	

Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.3. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: P2G
REACH: ONE RS: 74

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	63.5	3	63.5	3	61.08	5	61.08	5	63.5
8	63.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	5	[illegible]	130	130	.1	.3

CROSS SECTION OUTPUT Profile #100y

E.G. Elev (m)	61.63	Element	Left OB	Channel	Right OB
Vel Head (m)	0.05	Ht. n-Val.		0.013	
W.S. Elev (m)	61.58	Reach Len. (m)	130.00	130.00	130.00
Crit W.S. (m)	61.58	Flow Area (m2)		3.00	
E.G. Slope (m/m)	0.0[illegible]	Area (m2)		3.00	
Q Total (m3/s)	[illegible]	Flow (m3/s)		2.91	
Top Width (m)	[illegible]	Top Width (m)		2.00	
Vel Total (m/s)	[illegible]	Avg. Vel. (m/s)		0.97	
Max Chl Dpth (m)	[illegible]	Hyd. Depth (m)		1.50	
Conv. Total (m3/s)	164.2	Conv. (m3/s)		164.2	
Length Wtd. (m)	130.00	Wetted Per. (m)		5.00	
Min Ch El (m)	61.08	Shear (N/m2)		1.85	
Alpha	1.00	Stream Power (N/m s)		1.79	
Frctn Loss (m)		Cum Volume (1000 m3)		0.65	
C & E Loss (m)		Cum Ch Area (1000 m2)		0.37	

CULVERT

RIVER: P2G
REACH: ONE RS: 63.5

INPUT
Description:
Distance from Upstream XS = .5
Deck/Roadway Width = 129
Weir Coefficient = 1.44
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	63.5		8	63.5	

Upstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	63.5	3	63.5	3	61.08	5	61.08	5	63.5
8	63.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

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

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	61.5		8	61.5	

Downstream Bridge Cross Section Data
Station Elevation Data num= 8

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	61.5	3	61.5	3	59.08	5	59.08	5	61.5
8	61.5								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
3	8	.1	.3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 63.5
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	1.37	

FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest Tok. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	.5	129	.013	.013	0	.8	1

Upstream Elevation = 61.08
Centerline Station = 4
Downstream Elevation = 59.08
Centerline Station = 4

CULVERT OUTPUT Profile #100y Culv Group: Culvert #1

Q Culv Group (m3/s)	[illegible]	Culv Full Len (m)	74.74
# Barrels	1	Culv Vel US (m/s)	2.80
Q Barrel (m3/s)	[illegible]	Culv Vel DS (m/s)	1.97
E.G. US. (m)	[illegible]	Culv Inv El Up (m)	61.08
W.S. US. (m)	[illegible]	Culv Inv El Dn (m)	59.08
E.G. DS (m)	[illegible]	Culv Frict Ls (m)	0.79
W.S. DS (m)	[illegible]	Culv Exit Loss (m)	0.13
Delta EG (m)	[illegible]	Culv Entr Loss (m)	0.04
Delta WS (m)	[illegible]	Q Weir (m3/s)	
E.G. IC (m)	[illegible]	Weir Sta Lft (m)	
E.G. OC (m)	[illegible]	Weir Sta Rgt (m)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	[illegible]	Weir Max Depth (m)	
Culv WS Outlet (m)	[illegible]	Weir Avg Depth (m)	
Culv Nml Depth (m)	[illegible]	Flow Area (m2)	
Culv Crit Depth (m)	[illegible]	Min El Weir Flow (m)	63.50

CROSS SECTION

RIVER: P2G
REACH: ONE RS: 33.1

INPUT
Description:
Station Elevation Data num= [illegible]

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	61.5	3	[illegible]	[illegible]	[illegible]	5	59.08	5	61.5
8	61.5								

Manning's n Values num= [illegible]

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	[illegible]	[illegible]

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	8	[illegible]	[illegible]	1	.1	.3

CROSS SECTION OUTPUT Profile #100y

			Left OB	Channel	Right OB
E.G. Elev (m)	[illegible]	Wt. n-Val.		0.013	
Vel Head (m)	[illegible]	W.P. Total		[illegible]	
W.S. Elev (m)	[illegible]	Conv. Total (m3/s)	1.00	1.00	1.00
Crit W.S. (m)		Flow Area (m2)		4.85	
E.G. Slope (m/m)	[illegible]	Area (m2)		4.85	
Q Total (m3/s)	[illegible]	Flow (m3/s)		2.91	
Top Width (m)	[illegible]	Top Width (m)		2.00	
Vel Total (m/s)	[illegible]	Avg. Vel. (m/s)		0.63	
Max Chl Dpth (m)	[illegible]	Hy. Depth (m)		2.32	
Conv. Total (m3/s)	[illegible]	Conv. (%)		[illegible]	
Length Wtd. (m)	[illegible]	Wetted Per. (m)		6.65	
Min Ch El (m)	[illegible]	Shear (N/m2)		0.73	
Alpha	[illegible]	Stream Power (N/m s)		0.46	
Frctn Loss (m)	[illegible]	Cum Vol (1000 m3)		0.15	
C & E Loss (m)	[illegible]	Cum Area (m2)		0.11	

CROSS SECTION

RIVER: P2G
REACH: ONE RS: [illegible]

INPUT
Description:
Station Elevation Data num= [illegible]

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	61.5	3	[illegible]	[illegible]	[illegible]	5	59.08	5	61.5
8	61.5								

Manning's n Values num= [illegible]

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	[illegible]	[illegible]

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	8	[illegible]	[illegible]	82	.1	.3

CROSS SECTION OUTPUT Profile #100y

			Left OB	Channel	Right OB
E.G. Elev (m)	61.41	Element			
Vel Head (m)	0.09	Wt. n-Val.		0.013	
W.S. Elev (m)	61.32	Reach Len. (m)	52.00	52.00	52.00
Crit W.S. (m)	60.83	Flow Area (m2)		4.50	
E.G. Slope (m/m)	0.002487	Area (m2)		4.50	
Q Total (m3/s)	[illegible]	Flow (m3/s)		5.83	
Top Width (m)	[illegible]	Top Width (m)		2.00	
Vel Total (m/s)	[illegible]	Avg. Vel. (m/s)		1.29	
Max Chl Dpth (m)	[illegible]	Hydr. Depth (m)		2.25	
Conv. Total (m3/s)	271.0	Conv. (m3/s)		271.0	
Length Wtd. (m)	[illegible]	Wetted Per. (m)		6.50	
Min Ch El (m)	[illegible]	Shear (N/m2)		3.14	
Alpha	[illegible]	Stream Pwr. (N/m s)		4.07	
Frctn Loss (m)		Cum Vol. (1000 m3)		0.15	
C & E Loss (m)		Cum Ch (1000 m2)		0.10	

CULVERT

RIVER: PIG
REACH: ONE RS: [illegible]

INPUT
Description:
Distance from Upstream XS = .5
Deck/Roadway Width = 51
Weir Coefficient = 1.44
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	61.5		[illegible]	61.5	

Upstream Bridge Cross Section Data
Station Elevation Data num= [illegible]

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	61.5	3	61.5	[illegible]	[illegible]	5	53.08	5	61.5
5	61.5								

Manning's n Values num= [illegible]

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	[illegible]	[illegible]

Bank Sta: Left Right Coeff Contr. Expan.
[illegible] 3 . [illegible]

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	57.39		[illegible]	[illegible]	

Downstream Bridge Cross Section Data
Station Elevation Data num= [illegible]

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	57.39	3	[illegible]	[illegible]	[illegible]	5	53.75	5	57.39
5	57.39								

Manning's n Values num= [illegible]

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	[illegible]	[illegible]	[illegible]

Bank Sta: Left Right Coeff Contr. Expan.
[illegible] 3 5 . [illegible]

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow .95
Elevation at which weir flow begins 61.5
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape Broad Crested

Number of Culverts = 1

Culvert Name Shape Width Rise
Culvert #1 Circular [illegible]
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest W.S. EG

Culvert	Upstream Dist	Length	Top n	Bott n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	.5	51	.013	[illegible]	0	.6	1

Upstream Elevation = 59.[illegible]
Centerline Station = 4
Downstream Elevation = 53.[illegible]
Centerline Station = 4

CULVERT OUTPUT Profile #100y Culv Group: [illegible] Culvert #1

Q Culv Group (m3/s)	[illegible]	[illegible] (m)	
# Barrels	[illegible]	[illegible] (m/s)	3.66
Q Barrel (m3/s)	[illegible]	[illegible] (m/s)	9.38
E.G. US. (m)	[illegible]	[illegible] (m)	59.08
W.S. US. (m)	[illegible]	[illegible] (m)	53.75
E.G. DS (m)	[illegible]	[illegible] (m)	2.21
W.S. DS (m)	[illegible]	[illegible] (m)	[illegible]
Delta EG (m)	[illegible]	[illegible] (m)	0.41
Delta WS (m)	[illegible]	[illegible]	
E.G. IC (m)	[illegible]	[illegible] (m)	
E.G. OC (m)	[illegible]	[illegible] (m)	
Culvert Control	Outlet	[illegible]	
Culv WS Inlet (m)	[illegible]	[illegible] (m)	
Culv WS Outlet (m)	[illegible]	[illegible] (m)	
Culv Nml Depth (m)	[illegible]	[illegible] (m2)	
Culv Crt Depth (m)	[illegible]	[illegible] (m)	61.60

CROSS SECTION

RIVER: P2G
REACH: ONE RS: [illegible]

INPUT
Description:
Station Elevation Data num= [illegible]

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	57.39	3	[illegible]	[illegible]	[illegible]	5	53.75	5	57.39
8	57.39								

Manning's n Values num= [illegible]

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	[illegible]	[illegible]

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	5	[illegible]	[illegible]	0	.1	.3

CROSS SECTION OUTPUT Profile #100y

			Left OB	Channel	Right OB
E.G. Elev (m)	[illegible]	[illegible]			
Vel Head (m)	[illegible]	[illegible]		0.01	
W.S. Elev (m)	[illegible]	[illegible] (m)	0.00	0.00	0.00
Crit W.S. (m)	[illegible]	[illegible] (m)		1.18	
E.G. Slope (m/m)	0.01[illegible]	[illegible]		1.15	
Q Total (m3/s)	[illegible]	[illegible]		5.83	
Top Width (m)	[illegible]	[illegible] (m)		2.00	
Vel Total (m/s)	[illegible]	[illegible] (m/s)		5.09	
Max Chl Dpth (m)	[illegible]	[illegible] (m)		0.87	
Conv. Total (m3/s)	[illegible]	[illegible] (m3/s)		46.0	
length Wtd. (m)	[illegible]	[illegible] (m)		3.15	
Min Ch El (m)	[illegible]	[illegible] (m)		60.33	
Alpha	[illegible]	[illegible] N/m s		305.29	
Frctn Loss (m)		[illegible] 1000 m3/			
C & E Loss (m)		[illegible]			

SUMMARY OF MANNING'S N VALUES

River:P2G

Reach	River Sta.	n1	n2	n3
ONE	35		.013	.013
ONE	34.5	Culvert		
ONE	34.1		.013	.013
ONE	34		.013	.013
ONE	33.5	Culvert		
ONE	33.1		.013	.013
ONE	33		.013	.013
ONE	32.5	Culvert		
ONE	32		.013	.013

SUMMARY OF REACH LENGTHS

River: P2G

Reach	River Sta.	Left	Channel	Right
ONE	35		128	128
ONE	34.5	Culvert		
ONE	34.1		1	1
ONE	34		130	130

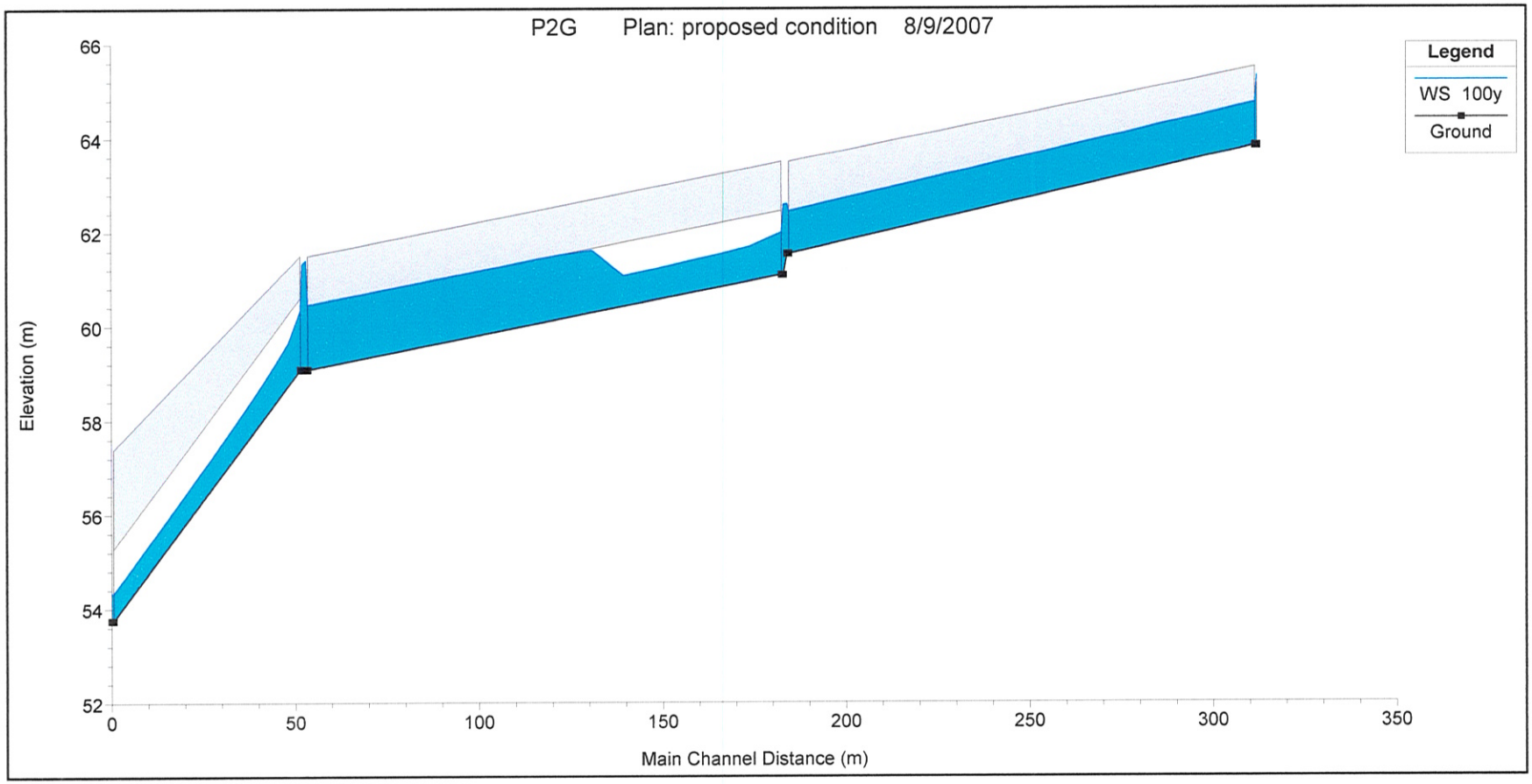
ONE	33.5	Culvert		
ONE	33.1	[illegible]	1	1
ONE	33	[illegible]	52	52
ONE	32.5	Culvert		
ONE	32	[illegible]	0	0

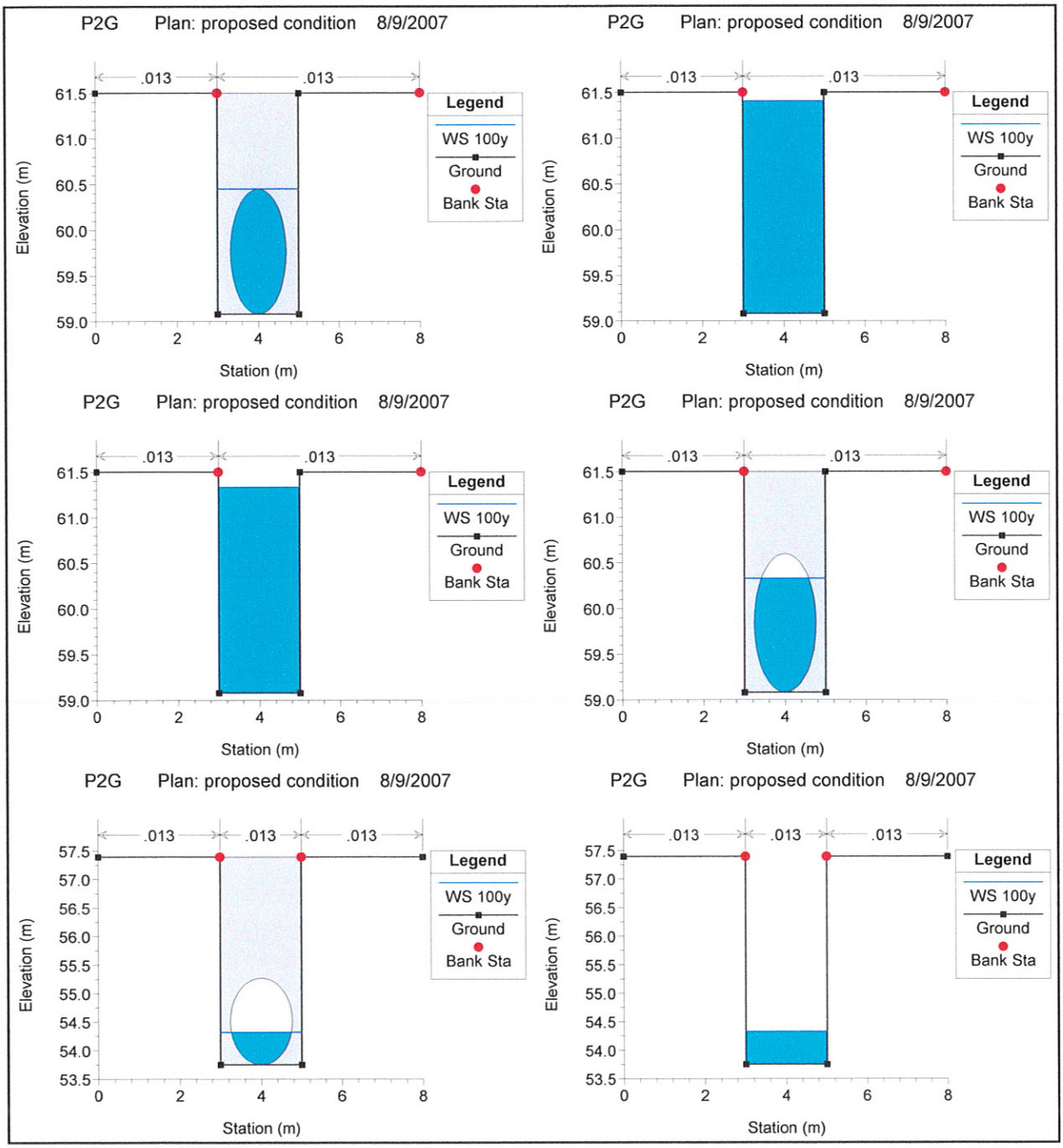
SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: FDG

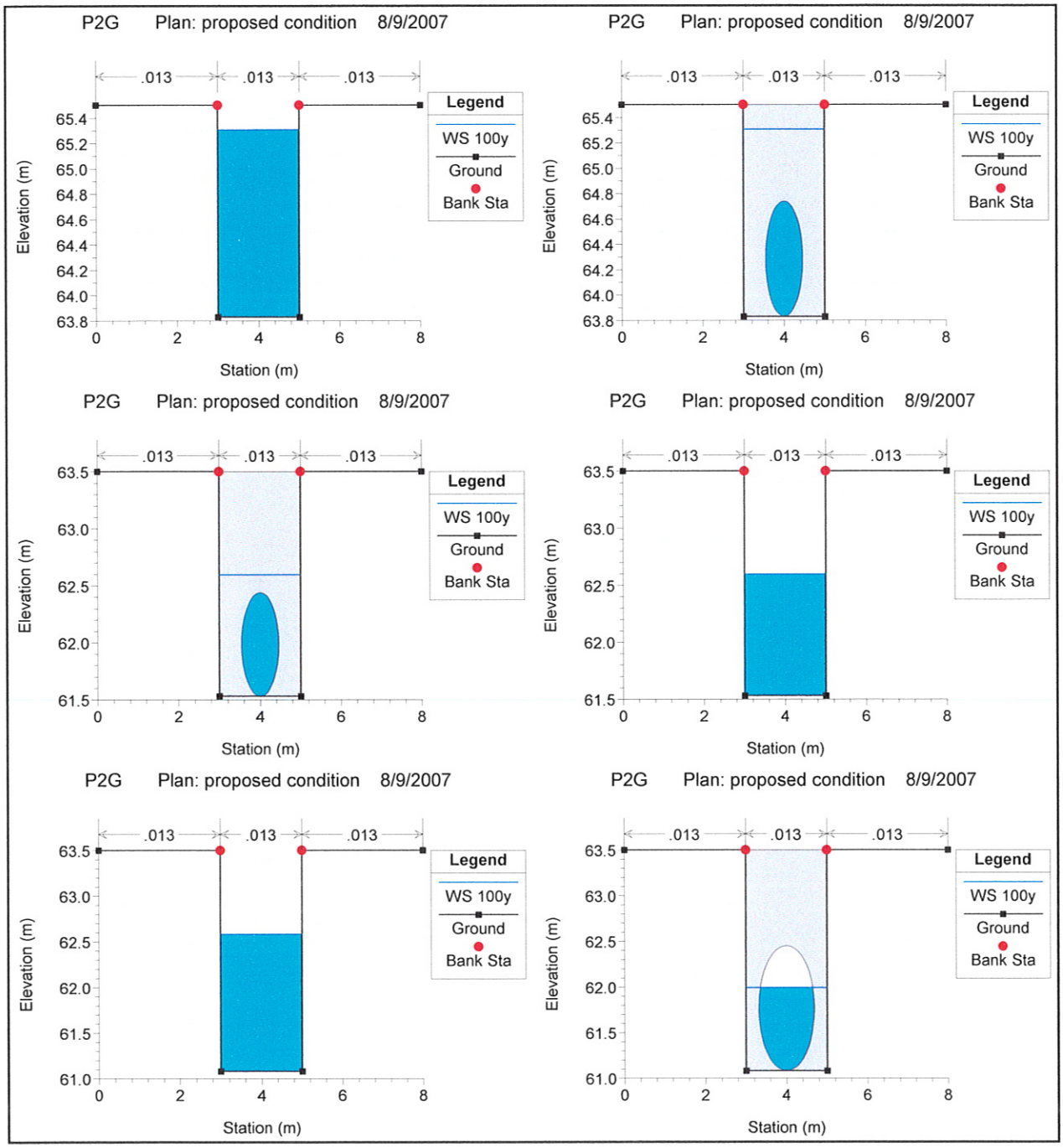
Reach	River Sta.	Contr.	Expan.
ONE	35	[illegible]	[illegible]
ONE	34.5	Culvert	
ONE	34.1	[illegible]	[illegible]
ONE	34	[illegible]	[illegible]
ONE	33.5	Culvert	
ONE	33.1	[illegible]	[illegible]
ONE	33	[illegible]	[illegible]
ONE	32.5	Culvert	
ONE	32	[illegible]	[illegible]

Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (cfs)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
ONE	35	100yr	[illegible]	63.53	63.81	64.26	65.32	0.000119	0.59	2.95	2.00	0.16
ONE	34.5		Culvert									
ONE	34.1	100yr	[illegible]	61.53	62.60		62.63	0.000275	0.82	2.13	2.00	0.25
ONE	34	100yr	[illegible]	61.08	62.39	61.68	62.63	0.000314	0.97	3.00	2.00	0.25
ONE	33.5		Culvert									
ONE	33.1	100yr	[illegible]	59.08	61.40		61.42	0.000107	0.63	4.65	2.00	0.13
ONE	33	100yr	[illegible]	59.08	61.33	60.03	61.42	0.000463	1.29	4.50	2.00	0.28
ONE	32.5		Culvert									
ONE	32	100yr	[illegible]	53.75	54.32	54.70	55.64	0.016800	5.09	1.15	2.00	0.28


P2G Plan: proposed condition 8/9/2007
Legend
WS 100y
Ground
Elevation (m)
66
64
62
60
58
56
54
52
0
50
100
150
200
250
300
350
Main Channel Distance (m)


P2G Plan: proposed condition 8/9/2007
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)


P2G Plan: proposed condition 8/9/2007
.013
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)
P2G Plan: proposed condition 8/9/2007
.013
.013
.013
Legend
WS 100y
Ground
Bank Sta
Elevation (m)
Station (m)

HEC-RAS Version 3.1.1 May 2003
U.S. Army Corp of Engineers
Hydrologic Engineering Center
609 Second Street, Suite D
Davis, California 95616-4687
(916) 756-1104

```
X     X  XXXXXX    XXXX        XXXX       XX      XXXX
X     X  X        X    X       X   X     X  X    X
X     X  X        X            X   X    X    X   X
XXXXXXX  XXXX     X       XXX  XXXX     XXXXXX    XXXX
X     X  X        X            X  X     X    X        X
X     X  X        X    X       X   X    X    X        X
X     X  XXXXXX    XXXX        X    X   X    X   XXXXX
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PROJECT DATA
Project Title: P2E
Project File : P2E.prj
Run Date and Time: 8/30/2007 2:09:14 PM

Project in SI units

PLAN DATA

Plan Title: proposed condition
Plan File : p:\414-La Sabana, Vega Baja\hecras\P2E.p01

Geometry Title: proposed condition
Geometry File : p:\414-La Sabana, Vega Baja\hecras\P2E.g01

Flow Title : proposed condition
Flow File : p:\414-La Sabana, Vega Baja\hecras\P2E.f01

Plan Summary Information:
Number of: Cross Sections = 18 Mulitple Openings = 0
Culverts = 7 Inline Structures = 0
Bridges = 0 Lateral Structures = 0

Computational Information
Water surface calculation tolerance = 0.003
Critical depth calculaton tolerance = 0.003
Maximum number of interations = 20
Maximum difference tolerance = 0.1
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: Mixed Flow

FLOW DATA

Flow Title: proposed condition
Flow File : p:\414-La Sabana, Vega Baja\hecras\P2E.f01

Flow Data (m3/s)

River	Reach	RS	100y
PIPE P2E	ONE	31	1.99
PIPE P2E	ONE	29	3.99
PIPE P2E	ONE	26	6.65
chann	two	6	.87
chann	two	5	15.12
chann	two	4	17.36
chann	one	3	28.8
chann	one	2	39.53

Boundary Conditions

River	Reach	Profile	Upstream	Downstream
PIPE P2E	ONE	100y	Critical	
chann	two	100y	Critical	
chann	one	100y		Normal S = 0.026

GEOMETRY DATA

Geometry Title: proposed condition
Geometry File : p:\414-La Sabana, Vega Baja\hecras\P2E.g01

Reach Connection Table

River	Reach	Upstream Boundary	Downstream Boundary
PIPE P2E	ONE		A
chann	two		A
chann	one	A	

JUNCTION INFORMATION

Name: A
Description:
Energy computation Method

Length across Junction River	Reach		Tributary River	Reach	Length	Angle
chann	two	to chann	one		0	0
PIPE P2E	ONE	to chann	one		0	0

CROSS SECTION

RIVER: PIPE P2E
REACH: ONE RS: 31

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	81	3	81	3	79.03	5	79.03	5	81
8	81								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	5	189	189	189	.1	.3

CROSS SECTION OUTPUT Profile #100y

E.G. Elev (m)	80.70	Element	Left OB	Channel	Right OB
Vel Head (m)	0.02	Wt. n-Val.		0.013	
W.S. Elev (m)	80.68	Reach Len. (m)	189.00	189.00	189.00
Crit W.S. (m)	79.49	Flow Area (m2)		3.31	
E.G. Slope (m/m)	0.000115	Area (m2)		3.31	
Q Total (m3/s)	1.99	Flow (m3/s)		1.99	
Top Width (m)	2.00	Top Width (m)		2.00	
Vel Total (m/s)	0.60	Avg. Vel. (m/s)		0.60	
Max Chl Dpth (m)	1.65	Hydr. Depth (m)		1.65	
Conv. Total (m3/s)	185.6	Conv. (m3/s)		185.6	
Length Wtd. (m)	189.00	Wetted Per. (m)		5.31	
Min Ch El (m)	79.03	Shear (N/m2)		0.70	
Alpha	1.00	Stream Power (N/m s)		0.42	
Frctn Loss (m)		Cum Volume (1000 m3)		3.35	
C & E Loss (m)		Cum SA (1000 m2)		1.66	

CULVERT

RIVER: PIPE P2E
REACH: ONE RS: 30.5

INPUT
Description:
Distance from Upstream XS = .5
Deck/Roadway Width = 188
Weir Coefficient = 1.44
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
0	81	8	81

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	81	3	81	3	79.03	5	79.03	5	81
8	81								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val

```
      0    .013       3    .013       5    .013

Bank Sta: Left   Right    Coeff Contr.   Expan.
             3       5             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0      78               8      78

Downstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      78       3      78       3   76.03       5   76.03       5      78
       8      78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       3    .013       5    .013

Bank Sta: Left   Right    Coeff Contr.   Expan.
             3       5             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =      81
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular     .91
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 .5     188     .013     .013        0                  .6                 1
Upstream   Elevation =  79.03
           Centerline Station =  4
Downstream Elevation =  76.03
           Centerline Station =  4

CULVERT OUTPUT  Profile #100y  Culv Group:  Culvert #1

  Q Culv Group (m3/s)        1.99    Culv Full Len (m)       108.25
  # Barrels                     1    Culv Vel US (m/s)         3.06
  Q Barrel (m3/s)            1.99    Culv Vel DS (m/s)         3.06
  E.G. US. (m)              80.70    Culv Inv El Up (m)       79.03
  W.S. US. (m)              80.68    Culv Inv El Dn (m)       76.03
  E.G. DS (m)               77.46    Culv Frctn Ls (m)         2.50
  W.S. DS (m)               77.44    Culv Exit Loss (m)        0.45
  Delta EG (m)               3.24    Culv Entr Loss (m)        0.29
  Delta WS (m)               3.25    Q Weir (m3/s)
  E.G. IC (m)               80.85    Weir Sta Lft (m)
  E.G. OC (m)               80.70    Weir Sta Rgt (m)
  Culvert Control          Outlet    Weir Submerg
  Culv WS Inlet (m)         79.94    Weir Max Depth (m)
  Culv WS Outlet (m)        76.94    Weir Avg Depth (m)
  Culv Nml Depth (m)         0.64    Weir Flow Area (m2)
  Culv Crt Depth (m)         0.81    Min El Weir Flow (m)     81.00


CROSS SECTION


RIVER: PIPE P2E
REACH: ONE                RS: 30

INPUT
Description:
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      78       3      78       3   76.03       5   76.03       5      78
       8      78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       3    .013       5    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             3       5              122     122     122             .1       .3

CROSS SECTION OUTPUT  Profile #100y

  E.G. Elev (m)             77.46    Element                 Left OB    Channel   Right OB
  Vel Head (m)               0.03    Wt. n-Val.                          0.013
```

W.S. Elev (m)	77.44	Reach Len. (m)	122.00	122.00	122.00
Crit W.S. (m)	76.49	Flow Area (m2)		2.81	
E.G. Slope (m/m)	0.000173	Area (m2)		2.81	
Q Total (m3/s)	1.99	Flow (m3/s)		1.99	
Top Width (m)	2.00	Top Width (m)		2.00	
Vel Total (m/s)	0.71	Avg. Vel. (m/s)		0.71	
Max Chl Dpth (m)	1.41	Hydr. Depth (m)		1.41	
Conv. Total (m3/s)	151.1	Conv. (m3/s)		151.1	
Length Wtd. (m)	122.00	Wetted Per. (m)		4.81	
Min Ch El (m)	76.03	Shear (N/m2)		0.99	
Alpha	1.00	Stream Power (N/m s)		0.70	
Frctn Loss (m)		Cum Volume (1000 m3)		2.77	
C & E Loss (m)		Cum SA (1000 m2)		1.28	

CULVERT

RIVER: PIPE P2E
REACH: ONE RS: 29.5

INPUT
Description:
Distance from Upstream XS = .5
Deck/Roadway Width = 121
Weir Coefficient = 1.44
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	78		8	78	

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	78	3	78	3	76.03	5	76.03	5	78
8	78								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left Right Coeff Contr. Expan.
3 5 .1 .3

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	76		8	76	

Downstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	76	3	76	3	73.73	5	73.73	5	76
8	76								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left Right Coeff Contr. Expan.
3 5 .1 .3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 78
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	1.06	

FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	.5	121	.013	.013	0	.6	1

Upstream Elevation = 76.03
Centerline Station = 4
Downstream Elevation = 73.73
Centerline Station = 4

CULVERT OUTPUT Profile #100y Culv Group: Culvert #1

Q Culv Group (m3/s)	1.99	Culv Full Len (m)	78.04
# Barrels	1	Culv Vel US (m/s)	2.78
Q Barrel (m3/s)	1.99	Culv Vel DS (m/s)	2.25

E.G. US. (m)	77.46	Culv Inv El Up (m)	76.03
W.S. US. (m)	77.44	Culv Inv El Dn (m)	73.73
E.G. DS (m)	75.92	Culv Frctn Ls (m)	1.09
W.S. DS (m)	75.88	Culv Exit Loss (m)	0.22
Delta EG (m)	1.54	Culv Entr Loss (m)	0.24
Delta WS (m)	1.56	Q Weir (m3/s)	
E.G. IC (m)	77.39	Weir Sta Lft (m)	
E.G. OC (m)	77.46	Weir Sta Rgt (m)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	76.83	Weir Max Depth (m)	
Culv WS Outlet (m)	74.79	Weir Avg Depth (m)	
Culv Nml Depth (m)	0.54	Weir Flow Area (m2)	
Culv Crt Depth (m)	0.80	Min El Weir Flow (m)	78.00

CROSS SECTION

RIVER: PIPE P2E
REACH: ONE RS: 29

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	76	3	76	3	73.73	5	73.73	5	76
8	76								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	5	18	18	18	.1	.3

CROSS SECTION OUTPUT Profile #100y

			Left OB	Channel	Right OB
E.G. Elev (m)	75.92	Element			
Vel Head (m)	0.04	Wt. n-Val.		0.013	
W.S. Elev (m)	75.88	Reach Len. (m)	18.00	18.00	18.00
Crit W.S. (m)	74.47	Flow Area (m2)		4.30	
E.G. Slope (m/m)	0.000242	Area (m2)		4.30	
Q Total (m3/s)	3.99	Flow (m3/s)		3.99	
Top Width (m)	2.00	Top Width (m)		2.00	
Vel Total (m/s)	0.93	Avg. Vel. (m/s)		0.93	
Max Chl Dpth (m)	2.15	Hydr. Depth (m)		2.15	
Conv. Total (m3/s)	256.3	Conv. (m3/s)		256.3	
Length Wtd. (m)	18.00	Wetted Per. (m)		6.30	
Min Ch El (m)	73.73	Shear (N/m2)		1.62	
Alpha	1.00	Stream Power (N/m s)		1.51	
Frctn Loss (m)		Cum Volume (1000 m3)		2.33	
C & E Loss (m)		Cum SA (1000 m2)		1.04	

CULVERT

RIVER: PIPE P2E
REACH: ONE RS: 28.5

INPUT
Description:
Distance from Upstream XS = .5
Deck/Roadway Width = 17
Weir Coefficient = 1.44
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	76		8	76	

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	76	3	76	3	73.73	5	73.73	5	76
8	76								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
3	5	.1	.3

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	75.9		8	75.9	

Downstream Bridge Cross Section Data

Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	75.9	3	75.9	3	73.63	5	73.63	5	75.9
8	75.9								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
3	5	.1	.3

Upstream Embankment side slope = 0 horiz. to 1.0 vertical
Downstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 76
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

Culvert Name	Shape	Rise	Span
Culvert #1	Circular	1.52	

FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG

Culvert	Upstrm Dist	Length	Top n	Bottom n	Depth Blocked	Entrance Loss Coef	Exit Loss Coef
	.5	17	.013	.013	0	.6	1

Upstream Elevation = 73.73
Centerline Station = 4
Downstream Elevation = 73.63
Centerline Station = 4

CULVERT OUTPUT Profile #100y Culv Group: Culvert #1

Q Culv Group (m3/s)	3.99	Culv Full Len (m)	17.00
# Barrels	1	Culv Vel US (m/s)	2.20
Q Barrel (m3/s)	3.99	Culv Vel DS (m/s)	2.20
E.G. US. (m)	75.92	Culv Inv El Up (m)	73.73
W.S. US. (m)	75.88	Culv Inv El Dn (m)	73.63
E.G. DS (m)	75.54	Culv Frctn Ls (m)	0.05
W.S. DS (m)	75.48	Culv Exit Loss (m)	0.19
Delta EG (m)	0.39	Culv Entr Loss (m)	0.15
Delta WS (m)	0.40	Q Weir (m3/s)	
E.G. IC (m)	75.38	Weir Sta Lft (m)	
E.G. OC (m)	75.92	Weir Sta Rgt (m)	
Culvert Control	Outlet	Weir Submerg	
Culv WS Inlet (m)	75.25	Weir Max Depth (m)	
Culv WS Outlet (m)	75.15	Weir Avg Depth (m)	
Culv Nml Depth (m)		Weir Flow Area (m2)	
Culv Crt Depth (m)	1.04	Min El Weir Flow (m)	76.00

CROSS SECTION

RIVER: PIPE P2E
REACH: ONE RS: 28

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	75.9	3	75.9	3	73.63	5	73.63	5	75.9
8	75.9								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	5	90	90	90	.1	.3

CROSS SECTION OUTPUT Profile #100y

E.G. Elev (m)	75.54	Element	Left OB	Channel	Right OB
Vel Head (m)	0.06	Wt. n-Val.		0.013	
W.S. Elev (m)	75.48	Reach Len. (m)	90.00	90.00	90.00
Crit W.S. (m)	74.37	Flow Area (m2)		3.70	
E.G. Slope (m/m)	0.000350	Area (m2)		3.70	
Q Total (m3/s)	3.99	Flow (m3/s)		3.99	
Top Width (m)	2.00	Top Width (m)		2.00	
Vel Total (m/s)	1.08	Avg. Vel. (m/s)		1.08	
Max Chl Dpth (m)	1.85	Hydr. Depth (m)		1.85	
Conv. Total (m3/s)	213.3	Conv. (m3/s)		213.3	
Length Wtd. (m)	90.00	Wetted Per. (m)		5.70	
Min Ch El (m)	73.63	Shear (N/m2)		2.23	
Alpha	1.00	Stream Power (N/m s)		2.40	

```
  Frctn Loss (m)                    Cum Volume (1000 m3)                2.26
  C & E Loss (m)                    Cum SA (1000 m2)                    1.00


CULVERT


RIVER: PIPE P2E
REACH: ONE                RS: 27.5

INPUT
Description:
Distance from Upstream XS =      .5
Deck/Roadway Width        =      89
Weir Coefficient          =    1.44
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0    75.9               8    75.9

Upstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    75.9       3    75.9       3   73.63       5   73.63       5    75.9
       8    75.9

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       3    .013       5    .013

Bank Sta: Left   Right    Coeff Contr.   Expan.
             3       5             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0      75               8      75

Downstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      75       3      75       3   72.73       5   72.73       5      75
       8      75

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       3    .013       5    .013

Bank Sta: Left   Right    Coeff Contr.   Expan.
             3       5             .1       .3

Upstream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins         =    75.9
Energy head used in spillway design         =
Spillway height used in design              =
Weir crest shape                            = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular    1.52
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 .5      89     .013     .013        0                  .6                 1
Upstream   Elevation =  73.63
           Centerline Station =  4
Downstream Elevation =  72.73
           Centerline Station =  4

CULVERT OUTPUT  Profile #100y  Culv Group:  Culvert #1

  Q Culv Group (m3/s)        3.99    Culv Full Len (m)        89.00
  # Barrels                     1    Culv Vel US (m/s)         2.20
  Q Barrel (m3/s)            3.99    Culv Vel DS (m/s)         2.20
  E.G. US. (m)              75.54    Culv Inv El Up (m)       73.63
  W.S. US. (m)              75.48    Culv Inv El Dn (m)       72.73
  E.G. DS (m)               74.93    Culv Frctn Ls (m)         0.27
  W.S. DS (m)               74.88    Culv Exit Loss (m)        0.20
  Delta EG (m)               0.61    Culv Entr Loss (m)        0.15
  Delta WS (m)               0.60    Q Weir (m3/s)
  E.G. IC (m)               75.28    Weir Sta Lft (m)
  E.G. OC (m)               75.54    Weir Sta Rgt (m)
  Culvert Control          Outlet    Weir Submerg
  Culv WS Inlet (m)         75.15    Weir Max Depth (m)
  Culv WS Outlet (m)        74.25    Weir Avg Depth (m)
```

Culv Nml Depth (m)		Weir Flow Area (m2)	
Culv Crt Depth (m)	1.04	Min El Weir Flow (m)	75.90

CROSS SECTION

RIVER: PIPE P2E
REACH: ONE RS: 27

INPUT
Description:
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	75	3	75	3	72.73	5	72.73	5	75
8	75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	5	80	80	80	.1	.3

CROSS SECTION OUTPUT Profile #100y

			Left OB	Channel	Right OB
E.G. Elev (m)	74.93	Element			
Vel Head (m)	0.04	Wt. n-Val.		0.013	
W.S. Elev (m)	74.88	Reach Len. (m)	80.00	80.00	80.00
Crit W.S. (m)	73.47	Flow Area (m2)		4.30	
E.G. Slope (m/m)	0.000242	Area (m2)		4.30	
Q Total (m3/s)	3.99	Flow (m3/s)		3.99	
Top Width (m)	2.00	Top Width (m)		2.00	
Vel Total (m/s)	0.93	Avg. Vel. (m/s)		0.93	
Max Chl Dpth (m)	2.15	Hydr. Depth (m)		2.15	
Conv. Total (m3/s)	256.6	Conv. (m3/s)		256.6	
Length Wtd. (m)	80.00	Wetted Per. (m)		6.30	
Min Ch El (m)	72.73	Shear (N/m2)		1.62	
Alpha	1.00	Stream Power (N/m s)		1.50	
Frctn Loss (m)		Cum Volume (1000 m3)		1.90	
C & E Loss (m)		Cum SA (1000 m2)		0.82	

CULVERT

RIVER: PIPE P2E
REACH: ONE RS: 26.5

INPUT
Description:
Distance from Upstream XS = .5
Deck/Roadway Width = 79
Weir Coefficient = 1.44
Upstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	75		8	75	

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	75	3	75	3	72.73	5	72.73	5	75
8	75								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
3	5	.1	.3

Downstream Deck/Roadway Coordinates
num= 2

Sta	Hi Cord	Lo Cord	Sta	Hi Cord	Lo Cord
0	78		8	78	

Downstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	78	3	78	3	72.25	5	72.25	5	78
8	78								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
3	5	.1	.3

```
ostream Embankment side slope              =       0 horiz. to 1.0 vertical
Downstream Embankment side slope           =       0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow =     .95
Elevation at which weir flow begins        =      78
Energy head used in spillway design        =
Spillway height used in design             =
Weir crest shape                           = Broad Crested

Number of Culverts =  1

Culvert Name     Shape      Rise    Span
Culvert #1      Circular    1.67
FHWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 .5      79     .013     .013        0                .6                 1
Upstream   Elevation =  72.73
           Centerline Station =  4
Downstream Elevation =  72.25
           Centerline Station =  4

CULVERT OUTPUT  Profile #100y  Culv Group:  Culvert #1

  Q Culv Group (m3/s)        3.99    Culv Full Len (m)        79.00
  # Barrels                     1    Culv Vel US (m/s)         1.82
  Q Barrel (m3/s)            3.99    Culv Vel DS (m/s)         1.82
  E.G. US. (m)              74.93    Culv Inv El Up (m)       72.73
  W.S. US. (m)              74.88    Culv Inv El Dn (m)       72.25
  E.G. DS (m)               74.62    Culv Frctn Ls (m)         0.14
  W.S. DS (m)               74.51    Culv Exit Loss (m)        0.06
  Delta EG (m)               0.30    Culv Entr Loss (m)        0.10
  Delta WS (m)               0.37    Q Weir (m3/s)
  E.G. IC (m)               74.26    Weir Sta Lft (m)
  E.G. OC (m)               74.93    Weir Sta Rgt (m)
  Culvert Control          Outlet    Weir Submerg
  Culv WS Inlet (m)         74.40    Weir Max Depth (m)
  Culv WS Outlet (m)        73.92    Weir Avg Depth (m)
  Culv Nml Depth (m)                 Weir Flow Area (m2)
  Culv Crt Depth (m)         1.01    Min El Weir Flow (m)     78.00


CROSS SECTION


RIVER: PIPE P2E
REACH: ONE                RS: 26

INPUT
Description:
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      78       3      78       3   72.25       5   72.25       5      78
       8      78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       3    .013       5    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             3       5              316     316     316            .1        .3

CROSS SECTION OUTPUT  Profile #100y

  E.G. Elev (m)            74.62    Element                  Left OB    Channel   Right OB
  Vel Head (m)              0.11    Wt. n-Val.                          0.013
  W.S. Elev (m)            74.51    Reach Len. (m)          316.00     316.00     316.00
  Crit W.S. (m)            73.29    Flow Area (m2)                       4.53
  E.G. Slope (m/m)       0.000594    Area (m2)                            4.53
  Q Total (m3/s)            6.65    Flow (m3/s)                          6.65
  Top Width (m)             2.00    Top Width (m)                        2.00
  Vel Total (m/s)           1.47    Avg. Vel. (m/s)                      1.47
  Max Chl Dpth (m)          2.26    Hydr. Depth (m)                      2.26
  Conv. Total (m3/s)       272.8    Conv. (m3/s)                        272.8
  Length Wtd. (m)         316.00    Wetted Per. (m)                      6.53
  Min Ch El (m)            72.25    Shear (N/m2)                         4.04
  Alpha                     1.00    Stream Power (N/m s)                 5.94
  Frctn Loss (m)                    Cum Volume (1000 m3)                 1.55
  C & E Loss (m)                    Cum SA (1000 m2)                     0.66


CULVERT


RIVER: PIPE P2E
REACH: ONE                RS: 25.5

INPUT
```

```
Description:
 istance from Upstream XS =      .5
 eck/Roadway Width        =     315
Weir Coefficient          =    1.44
Upstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0      78               8      78

Upstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      78       3      78       3   72.25       5   72.25       5      78
       8      78

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       3    .013       5    .013

Bank Sta: Left   Right    Coeff Contr.   Expan.
             3       5             .1       .3

Downstream  Deck/Roadway Coordinates
    num=       2
     Sta Hi Cord Lo Cord     Sta Hi Cord Lo Cord
       0      68               8      68

Downstream Bridge Cross Section Data
Station Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      68       3      68       3   65.43       5   65.43       5      68
       8      68

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       3    .013       5    .013

Bank Sta: Left   Right    Coeff Contr.   Expan.
             3       5             .1       .3

 'pstream Embankment side slope              =       0 horiz. to 1.0 vertical
 Downstream Embankment side slope            =       0 horiz. to 1.0 vertical
 Maximum allowable submergence for weir flow =     .95
 Elevation at which weir flow begins         =      78
 Energy head used in spillway design         =
 Spillway height used in design              =
 Weir crest shape                            = Broad Crested

 Number of Culverts =  1

 Culvert Name     Shape      Rise    Span
 Culvert #1      Circular    1.67
 FHWA Chart # 1 - Concrete Pipe Culvert
 FHWA Scale # 1 - Square edge entrance with headwall
 Solution Criteria = Highest U.S. EG
 Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 .5     315     .013     .013        0                   .6                 1
 Upstream   Elevation =  72.25
            Centerline Station =  4
 Downstream Elevation =  65.43
            Centerline Station =  4

 CULVERT OUTPUT  Profile #100y  Culv Group:  Culvert #1

   Q Culv Group (m3/s)       6.65    Culv Full Len (m)        44.50
   # Barrels                    1    Culv Vel US (m/s)         3.62
   Q Barrel (m3/s)           6.65    Culv Vel DS (m/s)         3.04
   E.G. US. (m)             74.62    Culv Inv El Up (m)       72.25
   W.S. US. (m)             74.51    Culv Inv El Dn (m)       65.43
   E.G. DS (m)              67.94    Culv Frctn Ls (m)         5.91
   W.S. DS (m)              67.84    Culv Exit Loss (m)        0.37
   Delta EG (m)              6.68    Culv Entr Loss (m)        0.40
   Delta WS (m)              6.67    Q Weir (m3/s)
   E.G. IC (m)              74.55    Weir Sta Lft (m)
   E.G. OC (m)              74.62    Weir Sta Rgt (m)
   Culvert Control         Outlet    Weir Submerg
   Culv WS Inlet (m)        73.56    Weir Max Depth (m)
   Culv WS Outlet (m)       67.10    Weir Avg Depth (m)
   Culv Nml Depth (m)        0.82    Weir Flow Area (m2)
   Culv Crt Depth (m)        1.31    Min El Weir Flow (m)     78.00


 CROSS SECTION


 RIVER: PIPE P2E
 REACH: ONE                RS: 25

 INPUT
```

Description:
tation Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	68	3	68	3	65.43	5	65.43	5	68
8	68								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
3	5	16	16	16	.1	.3

CROSS SECTION OUTPUT Profile #100y

E.G. Elev (m)	67.94	Element	Left OB	Channel	Right OB
Vel Head (m)	0.10	Wt. n-Val.		0.013	
W.S. Elev (m)	67.84	Reach Len. (m)	16.00	16.00	16.00
Crit W.S. (m)	66.47	Flow Area (m2)		4.82	
E.G. Slope (m/m)	0.000510	Area (m2)		4.82	
Q Total (m3/s)	6.65	Flow (m3/s)		6.65	
Top Width (m)	2.00	Top Width (m)		2.00	
Vel Total (m/s)	1.38	Avg. Vel. (m/s)		1.38	
Max Chl Dpth (m)	2.41	Hydr. Depth (m)		2.41	
Conv. Total (m3/s)	294.3	Conv. (m3/s)		294.3	
Length Wtd. (m)	16.00	Wetted Per. (m)		6.82	
Min Ch El (m)	65.43	Shear (N/m2)		3.54	
Alpha	1.00	Stream Power (N/m s)		4.88	
Frctn Loss (m)		Cum Volume (1000 m3)		0.07	
C & E Loss (m)		Cum SA (1000 m2)		0.03	

CULVERT

RIVER: PIPE P2E
REACH: ONE RS: 24.5

INPUT
Description:
istance from Upstream XS = .5
eck/Roadway Width = 15
Weir Coefficient = 1.44
Upstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
0	68	8	68

Upstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	68	3	68	3	65.43	5	65.43	5	68
8	68								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
3	5	.1	.3

Downstream Deck/Roadway Coordinates
num= 2

Sta Hi Cord	Lo Cord	Sta Hi Cord	Lo Cord
0	67.42	8	67.42

Downstream Bridge Cross Section Data
Station Elevation Data num= 6

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	67.42	3	67.42	3	65	5	65	5	67.42
8	67.42								

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	3	.013	5	.013

Bank Sta: Left	Right	Coeff Contr.	Expan.
3	5	.1	.3

pstream Embankment side slope = 0 horiz. to 1.0 vertical
ownstream Embankment side slope = 0 horiz. to 1.0 vertical
Maximum allowable submergence for weir flow = .95
Elevation at which weir flow begins = 68
Energy head used in spillway design =
Spillway height used in design =
Weir crest shape = Broad Crested

Number of Culverts = 1

```
Culvert Name      Shape       Rise    Span
 ulvert #1       Circular    1.67
 HWA Chart # 1 - Concrete Pipe Culvert
FHWA Scale # 1 - Square edge entrance with headwall
Solution Criteria = Highest U.S. EG
Culvert Upstrm Dist  Length    Top n  Bottom n  Depth Blocked  Entrance Loss Coef   Exit Loss Coef
                 .5      15     .013     .013        0                  .6                 1
Upstream   Elevation =  65.43
           Centerline Station =  4
Downstream Elevation =  65
           Centerline Station =  4

CULVERT OUTPUT  Profile #100y  Culv Group:  Culvert #1

  Q Culv Group (m3/s)       6.65    Culv Full Len (m)        15.00
  # Barrels                    1    Culv Vel US (m/s)         3.04
  Q Barrel (m3/s)           6.65    Culv Vel DS (m/s)         3.04
  E.G. US. (m)             67.94    Culv Inv El Up (m)       65.43
  W.S. US. (m)             67.84    Culv Inv El Dn (m)       65.00
  E.G. DS (m)              67.24    Culv Frctn Ls (m)         0.07
  W.S. DS (m)              67.11    Culv Exit Loss (m)        0.34
  Delta EG (m)              0.70    Culv Entr Loss (m)        0.28
  Delta WS (m)              0.73    Q Weir (m3/s)
  E.G. IC (m)              67.73    Weir Sta Lft (m)
  E.G. OC (m)              67.94    Weir Sta Rgt (m)
  Culvert Control         Outlet    Weir Submerg
  Culv WS Inlet (m)        67.10    Weir Max Depth (m)
  Culv WS Outlet (m)       66.67    Weir Avg Depth (m)
  Culv Nml Depth (m)                Weir Flow Area (m2)
  Culv Crt Depth (m)        1.31    Min El Weir Flow (m)     68.00


CROSS SECTION


RIVER: PIPE P2E
REACH: ONE                RS: 24

INPUT
Description:
'tation Elevation Data    num=       6
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0   67.42       3   67.42       3      65       5      65       5   67.42
       8   67.42

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       3    .013       5    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             3       5                0       0       0             .1       .3

CROSS SECTION OUTPUT  Profile #100y

  E.G. Elev (m)            67.24    Element                 Left OB    Channel   Right OB
  Vel Head (m)              0.13    Wt. n-Val.                         0.013
  W.S. Elev (m)            67.11    Reach Len. (m)            0.00      0.00       0.00
  Crit W.S. (m)                     Flow Area (m2)                      4.23
  E.G. Slope (m/m)      0.000701    Area (m2)                           4.23
  Q Total (m3/s)            6.65    Flow (m3/s)                         6.65
  Top Width (m)             2.00    Top Width (m)                       2.00
  Vel Total (m/s)           1.57    Avg. Vel. (m/s)                     1.57
  Max Chl Dpth (m)          2.11    Hydr. Depth (m)                     2.11
  Conv. Total (m3/s)       251.2    Conv. (m3/s)                       251.2
  Length Wtd. (m)           0.00    Wetted Per. (m)                     6.23
  Min Ch El (m)            65.00    Shear (N/m2)                        4.67
  Alpha                     1.00    Stream Power (N/m s)                7.34
  Frctn Loss (m)            0.00    Cum Volume (1000 m3)
  C & E Loss (m)            0.04    Cum SA (1000 m2)


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

CROSS SECTION


RIVER: chann
REACH: two                RS: 6

 NPUT
Description:
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    85.5       3      84       5      84       8    85.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       0    .013       8    .013
```

```
ank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0       8              245     245     245             .1       .3

CROSS SECTION OUTPUT  Profile #100y

  E.G. Elev (m)            84.35    Element                  Left OB    Channel   Right OB
  Vel Head (m)              0.10    Wt. n-Val.                           0.013
  W.S. Elev (m)            84.25    Reach Len. (m)          245.00     245.00     245.00
  Crit W.S. (m)            84.25    Flow Area (m2)                       0.61
  E.G. Slope (m/m)      0.002999    Area (m2)                            0.61
  Q Total (m3/s)            0.87    Flow (m3/s)                          0.87
  Top Width (m)             2.98    Top Width (m)                        2.98
  Vel Total (m/s)           1.43    Avg. Vel. (m/s)                      1.43
  Max Chl Dpth (m)          0.24    Hydr. Depth (m)                      0.20
  Conv. Total (m3/s)        15.9    Conv. (m3/s)                         15.9
  Length Wtd. (m)         245.00    Wetted Per. (m)                      3.10
  Min Ch El (m)            84.00    Shear (N/m2)                         5.79
  Alpha                     1.00    Stream Power (N/m s)                 8.26
  Frctn Loss (m)                    Cum Volume (1000 m3)                 7.25
  C & E Loss (m)                    Cum SA (1000 m2)                     6.96


CROSS SECTION


RIVER: chann
REACH: two                RS: 5.1

INPUT
Description:
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    83.5       3      82       5      82       8    83.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       0    .013       8    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0       8                1       1       1             .1       .3

CROSS SECTION OUTPUT  Profile #100y

  E.G. Elev (m)            83.66    Element                  Left OB    Channel   Right OB
  Vel Head (m)              0.00    Wt. n-Val.                           0.013
  W.S. Elev (m)            83.66    Reach Len. (m)            1.00       1.00       1.00
  Crit W.S. (m)            82.25    Flow Area (m2)                       8.75
  E.G. Slope (m/m)      0.000002    Area (m2)                            8.75
  Q Total (m3/s)            0.87    Flow (m3/s)                          0.87
  Top Width (m)             8.00    Top Width (m)                        8.00
  Vel Total (m/s)           0.10    Avg. Vel. (m/s)                      0.10
  Max Chl Dpth (m)          1.66    Hydr. Depth (m)                      1.09
  Conv. Total (m3/s)       659.4    Conv. (m3/s)                        659.4
  Length Wtd. (m)           1.00    Wetted Per. (m)                      9.02
  Min Ch El (m)            82.00    Shear (N/m2)                         0.02
  Alpha                     1.00    Stream Power (N/m s)                 0.00
  Frctn Loss (m)            0.00    Cum Volume (1000 m3)                 6.10
  C & E Loss (m)            0.04    Cum SA (1000 m2)                     5.61


Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than
         0.7 or greater than 1.4.  This may indicate the need for additional cross sections.
Note:    Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION


RIVER: chann
REACH: two                RS: 5

INPUT
Description:
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    83.5       3      82       5      82       8    83.5

anning's n Values         num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       0    .013       8    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
            0       8              168     168     168             .1       .3

CROSS SECTION OUTPUT  Profile #100y
```

E.G. Elev (m)	83.62	Element	Left OB	Channel	Right OB
Vel Head (m)	0.39	Wt. n-Val.		0.013	
W.S. Elev (m)	83.22	Reach Len. (m)	168.00	168.00	168.00
Crit W.S. (m)	83.22	Flow Area (m2)		5.43	
E.G. Slope (m/m)	0.002000	Area (m2)		5.43	
Q Total (m3/s)	15.12	Flow (m3/s)		15.12	
Top Width (m)	6.89	Top Width (m)		6.89	
Vel Total (m/s)	2.78	Avg. Vel. (m/s)		2.78	
Max Chl Dpth (m)	1.22	Hydr. Depth (m)		0.79	
Conv. Total (m3/s)	338.1	Conv. (m3/s)		338.1	
Length Wtd. (m)	168.00	Wetted Per. (m)		7.47	
Min Ch El (m)	82.00	Shear (N/m2)		14.27	
Alpha	1.00	Stream Power (N/m s)		39.72	
Frctn Loss (m)	0.18	Cum Volume (1000 m3)		6.10	
C & E Loss (m)	0.07	Cum SA (1000 m2)		5.61	

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

CROSS SECTION

RIVER: chann
REACH: two RS: 4.1

INPUT
Description:
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	80.5	3	79	5	79	8	80.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	0	.013	8	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	8	1	1	1	.1	.3

CROSS SECTION OUTPUT Profile #100y

E.G. Elev (m)	82.52	Element	Left OB	Channel	Right OB
Vel Head (m)	2.90	Wt. n-Val.		0.013	
W.S. Elev (m)	79.62	Reach Len. (m)	1.00	1.00	1.00
Crit W.S. (m)	80.22	Flow Area (m2)		2.01	
E.G. Slope (m/m)	0.030509	Area (m2)		2.01	
Q Total (m3/s)	15.12	Flow (m3/s)		15.12	
Top Width (m)	4.48	Top Width (m)		4.48	
Vel Total (m/s)	7.54	Avg. Vel. (m/s)		7.54	
Max Chl Dpth (m)	0.62	Hydr. Depth (m)		0.45	
Conv. Total (m3/s)	86.6	Conv. (m3/s)		86.6	
Length Wtd. (m)	1.00	Wetted Per. (m)		4.77	
Min Ch El (m)	79.00	Shear (N/m2)		125.79	
Alpha	1.00	Stream Power (N/m s)		948.59	
Frctn Loss (m)	0.85	Cum Volume (1000 m3)		5.47	
C & E Loss (m)	0.25	Cum SA (1000 m2)		4.65	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided by downstream conveyance) is less than 0.7 or greater than 1.4. This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: chann
REACH: two RS: 4

NPUT
Description:
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	80.5	3	79	5	79	8	80.5

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	0	.013	8	.013

```
Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0       8              727     727     727             .1       .3

CROSS SECTION OUTPUT  Profile #100y

  E.G. Elev (m)            82.44    Element                  Left OB    Channel   Right OB
  Vel Head (m)              2.75    Wt. n-Val.                          0.013
  W.S. Elev (m)            79.70    Reach Len. (m)          727.00     727.00     727.00
  Crit W.S. (m)            80.31    Flow Area (m2)                       2.36
  E.G. Slope (m/m)      0.025503    Area (m2)                            2.36
  Q Total (m3/s)           17.36    Flow (m3/s)                         17.36
  Top Width (m)             4.79    Top Width (m)                        4.79
  Vel Total (m/s)           7.34    Avg. Vel. (m/s)                      7.34
  Max Chl Dpth (m)          0.70    Hydr. Depth (m)                      0.49
  Conv. Total (m3/s)       108.7    Conv. (m3/s)                        108.7
  Length Wtd. (m)         727.00    Wetted Per. (m)                      5.12
  Min Ch El (m)            79.00    Shear (N/m2)                       115.58
  Alpha                     1.00    Stream Power (N/m s)               848.74
  Frctn Loss (m)            0.03    Cum Volume (1000 m3)                 5.47
  C & E Loss (m)            0.04    Cum SA (1000 m2)                     4.65


CROSS SECTION


RIVER: chann
REACH: two                RS: 3.1

INPUT
Description:
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0    66.5       3      65       5      65       8    66.5

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       0    .013       8    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0       8                0       0       0             .1       .3

CROSS SECTION OUTPUT  Profile #100y

  E.G. Elev (m)            67.24    Element                  Left OB    Channel   Right OB
  Vel Head (m)              0.10    Wt. n-Val.                          0.013
  W.S. Elev (m)            67.15    Reach Len. (m)            0.00      0.00       0.00
  Crit W.S. (m)            66.31    Flow Area (m2)                      12.68
  E.G. Slope (m/m)      0.000231    Area (m2)                           12.68
  Q Total (m3/s)           17.36    Flow (m3/s)                         17.36
  Top Width (m)             8.00    Top Width (m)                        8.00
  Vel Total (m/s)           1.37    Avg. Vel. (m/s)                      1.37
  Max Chl Dpth (m)          2.15    Hydr. Depth (m)                      1.59
  Conv. Total (m3/s)      1142.6    Conv. (m3/s)                       1142.6
  Length Wtd. (m)           0.00    Wetted Per. (m)                     10.00
  Min Ch El (m)            65.00    Shear (N/m2)                         2.87
  Alpha                     1.00    Stream Power (N/m s)                 3.93
  Frctn Loss (m)            0.00    Cum Volume (1000 m3)
  C & E Loss (m)            0.04    Cum SA (1000 m2)


Warning: The cross-section end points had to be extended vertically for the computed water surface.
Warning: The velocity head has changed by more than 0.5 ft (0.15 m).  This may indicate the need for
         additional cross sections.
Note:    Hydraulic jump has occurred between this cross section and the previous upstream section.

CROSS SECTION


RIVER: chann
REACH: one                RS: 3

INPUT
Description:
Station Elevation Data    num=       4
     Sta    Elev     Sta    Elev     Sta    Elev     Sta    Elev
       0      67       4      65       6      65      10      67

Manning's n Values        num=       3
     Sta   n Val     Sta   n Val     Sta   n Val
       0    .013       0    .013      10    .013

Bank Sta: Left   Right    Lengths: Left Channel   Right     Coeff Contr.   Expan.
             0      10              186     186    1860             .1       .3

CROSS SECTION OUTPUT  Profile #100y

  E.G. Elev (m)            67.20    Element                  Left OB    Channel   Right OB
  Vel Head (m)              0.52    Wt. n-Val.                          0.013
```

W.S. Elev (m)	66.68	Reach Len. (m)	186.00	186.00	1860.00
Crit W.S. (m)	66.68	Flow Area (m2)		9.04	
E.G. Slope (m/m)	0.001843	Area (m2)		9.04	
Q Total (m3/s)	28.80	Flow (m3/s)		28.80	
Top Width (m)	8.73	Top Width (m)		8.73	
Vel Total (m/s)	3.19	Avg. Vel. (m/s)		3.19	
Max Chl Dpth (m)	1.68	Hydr. Depth (m)		1.03	
Conv. Total (m3/s)	670.8	Conv. (m3/s)		670.8	
Length Wtd. (m)	186.00	Wetted Per. (m)		9.53	
Min Ch El (m)	65.00	Shear (N/m2)		17.14	
Alpha	1.00	Stream Power (N/m s)		54.63	
Frctn Loss (m)	0.12	Cum Volume (1000 m3)		2.31	
C & E Loss (m)	0.11	Cum SA (1000 m2)		2.99	

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

CROSS SECTION

RIVER: chann
REACH: one RS: 2.1

INPUT
Description:
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	60	4	58	6	58	10	60

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	0	.013	10	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	10	1	1	1	.1	.3

CROSS SECTION OUTPUT Profile #100y

E.G. Elev (m)	63.09	Element	Left OB	Channel	Right OB
Vel Head (m)	4.23	Wt. n-Val.		0.013	
W.S. Elev (m)	58.85	Reach Len. (m)	1.00	1.00	1.00
Crit W.S. (m)	59.68	Flow Area (m2)		3.16	
E.G. Slope (m/m)	0.031678	Area (m2)		3.16	
Q Total (m3/s)	28.80	Flow (m3/s)		28.80	
Top Width (m)	5.41	Top Width (m)		5.41	
Vel Total (m/s)	9.12	Avg. Vel. (m/s)		9.12	
Max Chl Dpth (m)	0.85	Hydr. Depth (m)		0.58	
Conv. Total (m3/s)	161.8	Conv. (m3/s)		161.8	
Length Wtd. (m)	1.00	Wetted Per. (m)		5.81	
Min Ch El (m)	58.00	Shear (N/m2)		168.81	
Alpha	1.00	Stream Power (N/m s)		1539.08	
Frctn Loss (m)	4.43	Cum Volume (1000 m3)		1.18	
C & E Loss (m)	0.23	Cum SA (1000 m2)		1.68	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

CROSS SECTION

RIVER: chann
REACH: one RS: 2

INPUT
Description:
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	60	4	58	6	58	10	60

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	0	.013	10	.013

Bank Sta: Left	Right	Lengths: Left	Channel	Right	Coeff Contr.	Expan.
0	10	267	267	267	.1	.3

CROSS SECTION OUTPUT Profile #100y

E.G. Elev (m)	62.95	Element	Left OB	Channel	Right OB
Vel Head (m)	3.86	Wt. n-Val.		0.013	
W.S. Elev (m)	59.09	Reach Len. (m)	267.00	267.00	267.00
Crit W.S. (m)	59.96	Flow Area (m2)		4.54	
E.G. Slope (m/m)	0.022234	Area (m2)		4.54	
Q Total (m3/s)	39.53	Flow (m3/s)		39.53	
Top Width (m)	6.35	Top Width (m)		6.35	
Vel Total (m/s)	8.71	Avg. Vel. (m/s)		8.71	
Max Chl Dpth (m)	1.09	Hydr. Depth (m)		0.71	
Conv. Total (m3/s)	265.1	Conv. (m3/s)		265.1	
Length Wtd. (m)	267.00	Wetted Per. (m)		6.86	
Min Ch El (m)	58.00	Shear (N/m2)		144.22	
Alpha	1.00	Stream Power (N/m s)		1255.82	
Frctn Loss (m)	0.03	Cum Volume (1000 m3)		1.17	
C & E Loss (m)	0.11	Cum SA (1000 m2)		1.67	

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The conveyance ratio (upstream conveyance divided 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: chann
REACH: one RS: 1

INPUT
Description:
Station Elevation Data num= 4

Sta	Elev	Sta	Elev	Sta	Elev	Sta	Elev
0	53	4	51	6	51	10	53

Manning's n Values num= 3

Sta	n Val	Sta	n Val	Sta	n Val
0	.013	0	.013	10	.013

'ank Sta: Left Right Lengths: Left Channel Right Coeff Contr. Expan.

0	10	0	0	0	.1	.3

CROSS SECTION OUTPUT Profile #100y

E.G. Elev (m)	56.43	Element	Left OB	Channel	Right OB
Vel Head (m)	4.39	Wt. n-Val.		0.013	
W.S. Elev (m)	52.04	Reach Len. (m)			
Crit W.S. (m)	52.96	Flow Area (m2)		4.26	
E.G. Slope (m/m)	0.026467	Area (m2)		4.26	
Q Total (m3/s)	39.53	Flow (m3/s)		39.53	
Top Width (m)	6.17	Top Width (m)		6.17	
Vel Total (m/s)	9.29	Avg. Vel. (m/s)		9.29	
Max Chl Dpth (m)	1.04	Hydr. Depth (m)		0.69	
Conv. Total (m3/s)	243.0	Conv. (m3/s)		243.0	
Length Wtd. (m)		Wetted Per. (m)		6.66	
Min Ch El (m)	51.00	Shear (N/m2)		165.88	
Alpha	1.00	Stream Power (N/m s)		1540.30	
Frctn Loss (m)	6.46	Cum Volume (1000 m3)			
C & E Loss (m)	0.05	Cum SA (1000 m2)			

Warning: The velocity head has changed by more than 0.5 ft (0.15 m). This may indicate the need for additional cross sections.
Warning: The energy loss was greater than 1.0 ft (0.3 m). between the current and previous cross section. This may indicate the need for additional cross sections.

SUMMARY OF MANNING'S N VALUES

River:PIPE P2E

Reach	River Sta.	n1	n2	n3
ONE	31	.013	.013	.013
ONE	30.5	Culvert		
ONE	30	.013	.013	.013
ONE	29.5	Culvert		
ONE	29	.013	.013	.013
ONE	28.5	Culvert		
ONE	28	.013	.013	.013
ONE	27.5	Culvert		
ONE	27	.013	.013	.013
ONE	26.5	Culvert		
ONE	26	.013	.013	.013
ONE	25.5	Culvert		
ONE	25	.013	.013	.013
ONE	24.5	Culvert		

ONE	24	.013	.013	.013

River:chann

Reach	River Sta.	n1	n2	n3
two	6	.013	.013	.013
two	5.1	.013	.013	.013
two	5	.013	.013	.013
two	4.1	.013	.013	.013
two	4	.013	.013	.013
two	3.1	.013	.013	.013
one	3	.013	.013	.013
one	2.1	.013	.013	.013
one	2	.013	.013	.013
one	1	.013	.013	.013

SUMMARY OF REACH LENGTHS

River: PIPE P2E

Reach	River Sta.	Left	Channel	Right
ONE	31		189	189	189
ONE	30.5	Culvert		
ONE	30		122	122	122
ONE	29.5	Culvert		
ONE	29		18	18	18
ONE	28.5	Culvert		
ONE	28		90	90	90
ONE	27.5	Culvert		
ONE	27		80	80	80
ONE	26.5	Culvert		
ONE	26		316	316	316
ONE	25.5	Culvert		
ONE	25		16	16	16
ONE	24.5	Culvert		
ONE	24		0	0	0

River: chann

Reach	River Sta.	Left	Channel	Right
two	6		245	245	245
two	5.1		1	1	1
two	5		168	168	168
two	4.1		1	1	1
two	4		727	727	727
two	3.1		0	0	0
one	3		186	186	1860
one	2.1		1	1	1
one	2		267	267	267
one	1		0	0	0

SUMMARY OF CONTRACTION AND EXPANSION COEFFICIENTS
River: PIPE P2E

Reach	River Sta.	Contr.	Expan.
ONE	31	.1	.3
ONE	30.5	Culvert	
ONE	30	.1	.3
ONE	29.5	Culvert	
ONE	29	.1	.3
ONE	28.5	Culvert	
ONE	28	.1	.3
ONE	27.5	Culvert	
ONE	27	.1	.3
ONE	26.5	Culvert	
ONE	26	.1	.3
ONE	25.5	Culvert	
ONE	25	.1	.3
ONE	24.5	Culvert	
ONE	24	.1	.3

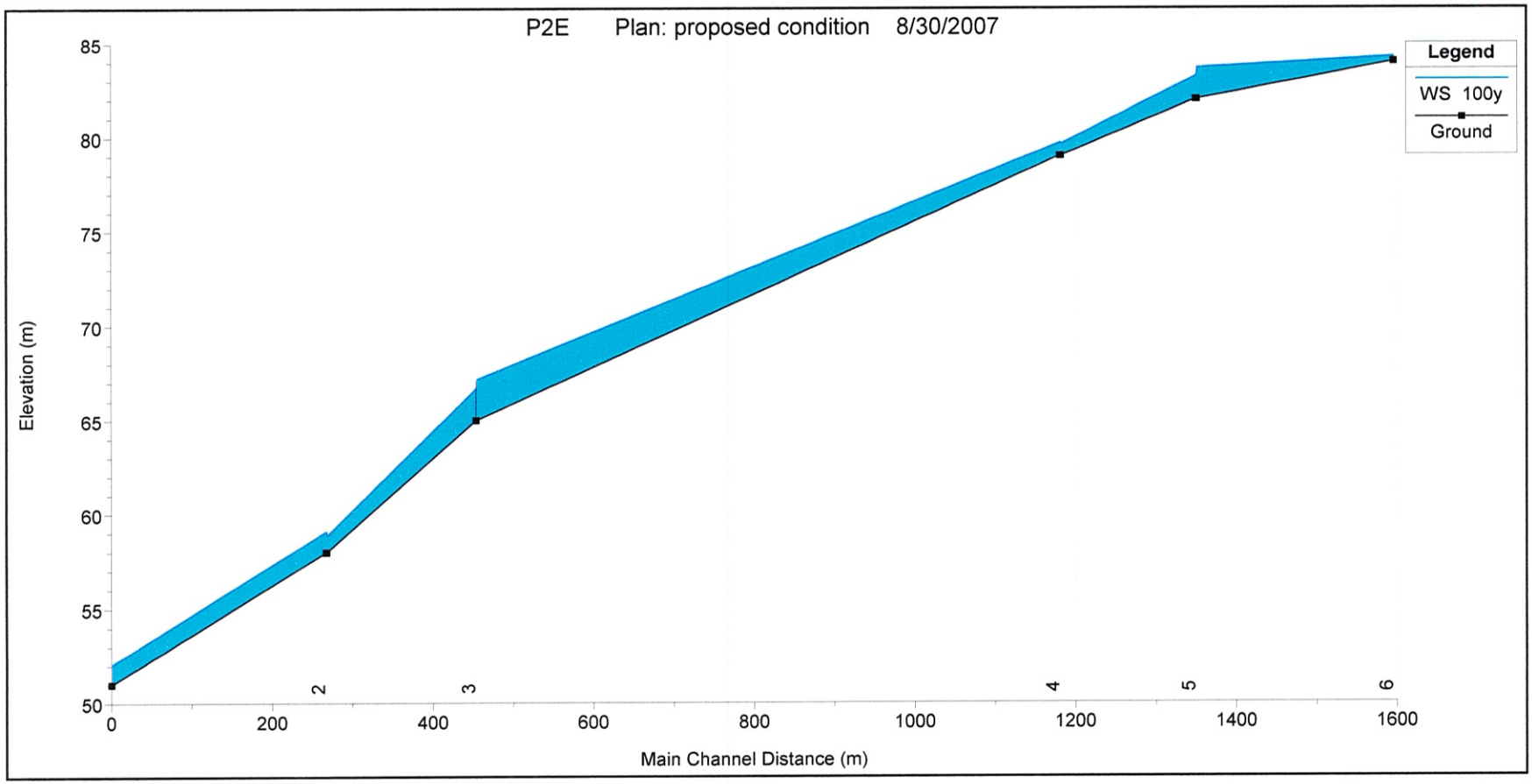
River: chann

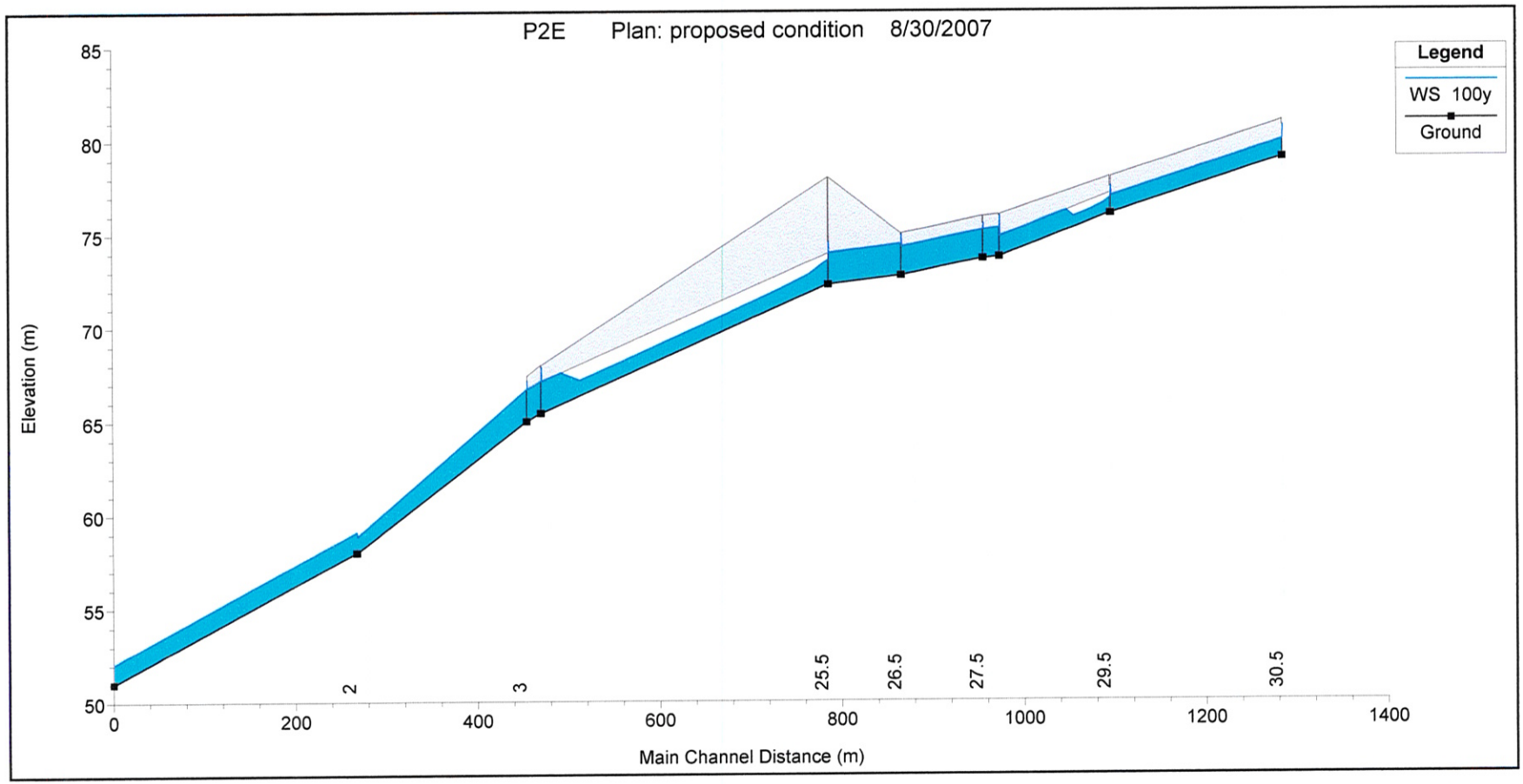
Reach	River Sta.	Contr.	Expan.

two	6	.1	.3
two	5.1	.1	.3
two	5	.1	.3
two	4.1	.1	.3
two	4	.1	.3
two	3.1	.1	.3
one	3	.1	.3
one	2.1	.1	.3
one	2	.1	.3
one	1	.1	.3

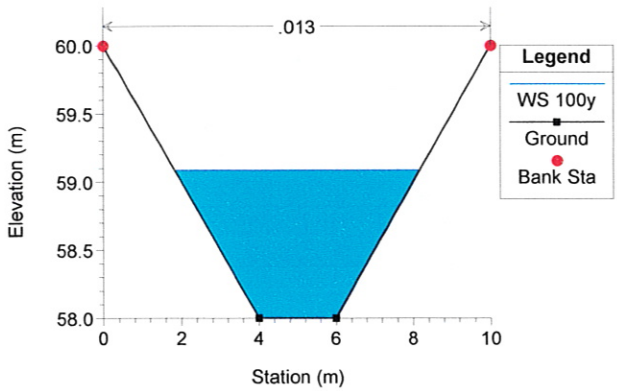
Profile Output Table - Standard Table 1

Reach	River Sta	Profile	Q Total (m3/s)	Min Ch El (m)	W.S. Elev (m)	Crit W.S. (m)	E.G. Elev (m)	E.G. Slope (m/m)	Vel Chnl (m/s)	Flow Area (m2)	Top Width (m)	Froude # Chl
two	6	100y	0.87	84.00	84.25	84.25	84.35	0.002999	1.43	0.61	2.98	1.01
two	5.1	100y	0.87	82.00	83.66	82.25	83.66	0.000002	0.10	8.75	8.00	0.03
two	5	100y	15.12	82.00	83.22	83.22	83.62	0.002000	2.78	5.43	6.89	1.00
two	4.1	100y	15.12	79.00	79.62	80.22	82.52	0.030509	7.54	2.01	4.48	3.60
two	4	100y	17.36	79.00	79.70	80.31	82.44	0.025503	7.34	2.36	4.79	3.34
two	3.1	100y	17.36	65.00	67.15	66.31	67.24	0.000231	1.37	12.68	8.00	0.35
one	3	100y	28.80	65.00	66.68	66.68	67.20	0.001843	3.19	9.04	8.73	1.00
one	2.1	100y	28.80	58.00	58.85	59.68	63.09	0.031678	9.12	3.16	5.41	3.81
one	2	100y	39.53	58.00	59.09	59.96	62.95	0.022234	8.71	4.54	6.35	3.29
one	1	100y	39.53	51.00	52.04	52.96	56.43	0.026467	9.29	4.26	6.17	3.57
ONE	31	100y	1.99	79.03	80.68	79.49	80.70	0.000115	0.60	3.31	2.00	0.15
ONE	30.5		Culvert									
ONE	30	100y	1.99	76.03	77.44	76.49	77.46	0.000173	0.71	2.81	2.00	0.19
ONE	29.5		Culvert									
ONE	29	100y	3.99	73.73	75.88	74.47	75.92	0.000242	0.93	4.30	2.00	0.20
ONE	28.5		Culvert									
ONE	28	100y	3.99	73.63	75.48	74.37	75.54	0.000350	1.08	3.70	2.00	0.25
ONE	27.5		Culvert									
ONE	27	100y	3.99	72.73	74.88	73.47	74.93	0.000242	0.93	4.30	2.00	0.20
ONE	26.5		Culvert									
ONE	26	100y	6.65	72.25	74.51	73.29	74.62	0.000594	1.47	4.53	2.00	0.31
ONE	25.5		Culvert									
ONE	25	100y	6.65	65.43	67.84	66.47	67.94	0.000510	1.38	4.82	2.00	0.28
NE	24.5		Culvert									
NE	24	100y	6.65	65.00	67.11		67.24	0.000701	1.57	4.23	2.00	0.35

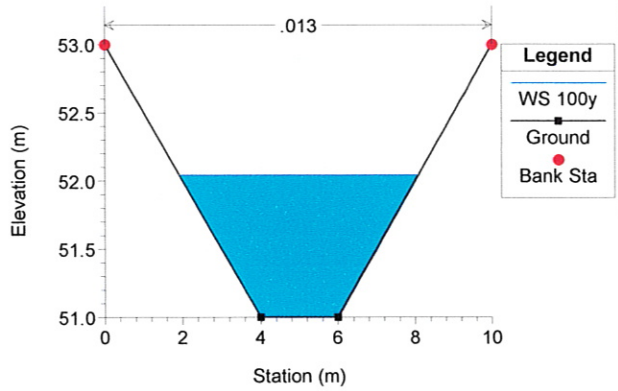

P2E Plan: proposed condition 8/30/2007
Legend
WS 100y
Ground
Elevation (m)
85
80
75
70
65
60
55
50
0
200
400
600
800
1000
1200
1400
1600
2
3
4
5
6
Main Channel Distance (m)


P2E Plan: proposed condition 8/30/2007
Legend
WS 100y
Ground
Elevation (m)
85
80
75
70
65
60
55
50
0
200
400
600
800
1000
1200
1400
Main Channel Distance (m)
2
3
25.5
26.5
27.5
29.5
30.5

P2E Plan: proposed condition 8/30/2007



P2E Plan: proposed condition 8/30/2007



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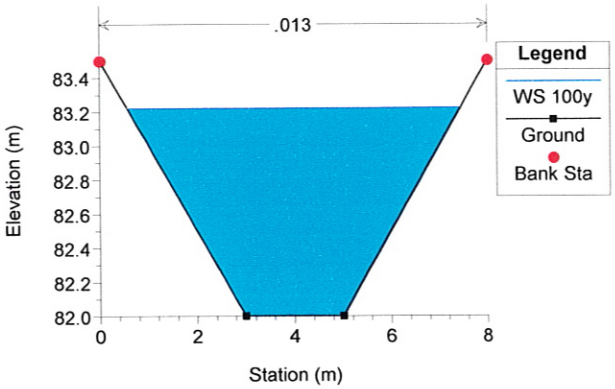
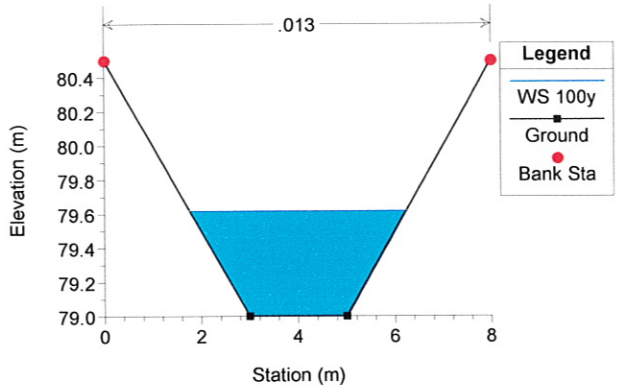
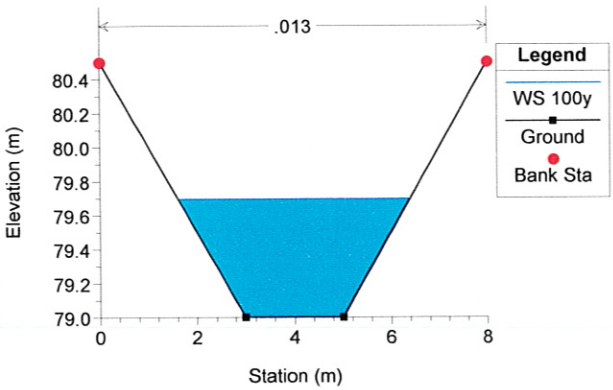


P2E Plan: proposed condition 8/30/2007



P2E Plan: proposed condition 8/30/2007



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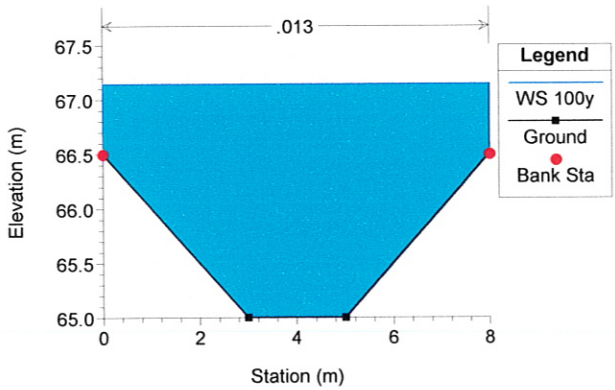
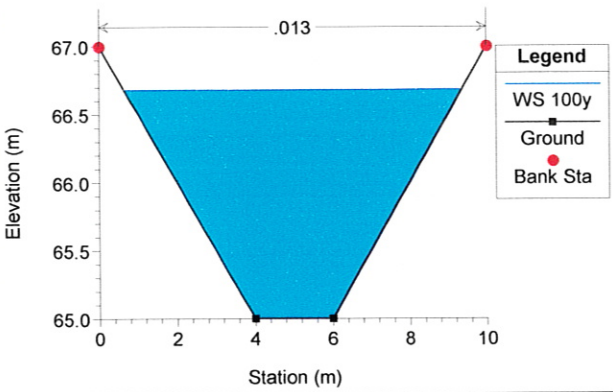
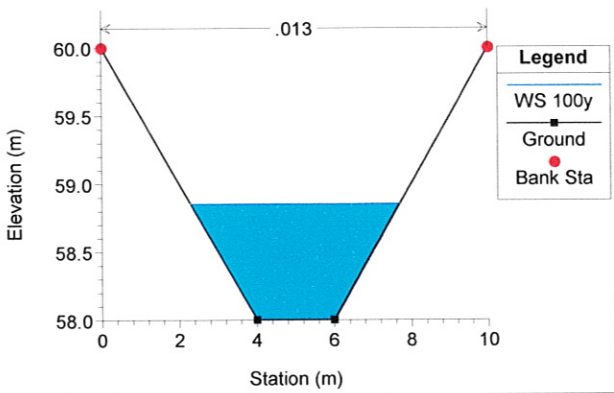


P2E Plan: proposed condition 8/30/2007



P2E Plan: proposed condition 8/30/2007